LINN SOC NEWS

THE LINNEAN SOCIETY OF NEW SOUTH WALES
ACCEDERE FONTES INTEGROS MDCCCLXXIV

JULY 1976

This is the first issue of a newsletter which will appear four times a year. The Council hopes that it will keep members informed of the Society's activities.

The death occurred in July of Dr. A.B. Walkom. His services to the Society were truly impressive - as Linnean Macleay Fellow, Council Member, Treasurer, Secretary, Editor and President. For more than 40 years he held positions on the Society's executive for much of this time combining the onerous tasks of Treasurer, Editor and joint Honorary Secretary. In recent years he has been an Emeritus Council Member and continued a keen interest in Society activities. Dr. Walkom's scientific contributions extend far beyond his work through this Society. He took a most active part in the Royal Society of N.S.W. and in A.N.Z.A.A.S. He also made distinguished contributions through his palaeontological research and as Director of the Australian Museum.

CHANGES IN COUNCIL:

Dr. Peter Valder of the University of Sydney has resigned from the Council. His resignation was accepted with regret and Council expressed its appreciation of his services to the Society. The Council voted to ask Mr. John Pickard, of the N.S.W. National Herbarium to fill the vacancy. Mr. Pickard has accepted and been welcomed to the Council.

NEW MEMBERS:

The Society welcomes the following new members who have joined this year:

Mr. M. Archer, of the Queensland Museum.
Mr. W.B. Kilkeary, of the University of N.S.W.
Mr. H.L. Wallace, Chairman of Directors of F.T. Wimble & Co. Ltd.
Mr. A.R. Smith-White, of Willoughby, N.S.W.
Mr. G.R. Dyne, of the University of Queensland.

PAPERS ACCEPTED FOR PUBLICATION:

This year, Council has accepted the following papers for publication in the Proceedings of the Society.

N.H. LUIG and I.A. WATSON: The role of barley, rye and grasses in the 1973-4 wheat stem rust epiphytotic in southern and eastern Australia.

G.R. ALLEN: *Scorpaendoes steenii*, a new species of scorpaenid fish from Western Australia.

E. SCHICHA: Immature stages of three mites from apple in Australia (Acarina: Phytoseiidae).

J.R.T. SHORT: A description and classification of some final-instar larvae of the Phytodietini and Eclytini (Hymenoptera, Ichneumonidae, Tryphoninae).

M. SUDZUKI and B.V. TIMMS: A new species of *Brachionus* (Rotifera) from Myall Lakes, New South Wales.

B.D. WEBBY: Upper Ordovician tabulate corals from central western New South Wales.

LINNEAN MACLEAY FELLOW:

In February 1976, Mrs. J.M. Anderson took up a Fellowship to work at the University of New South Wales studying beetles of the family Coccinellidae ("ladybirds"). She will investigate food sources, fecundity, life cycles and the behaviour of larvae and adults. She also plans some taxonomic work on this group and on aquatic beetles of the family Hydrophilidae.

LIBRARY:

Since cataloguing of the Society's library was completed, the librarian (Mrs. McKay) is employed there only part-time, on Tuesday and Friday mornings.

SCIENCE CENTRE:

Renovation of the Science Centre building, No. 35 Clarence Street, is nearing completion. It now appears probable that the Linnean and Royal Societies will be transferring all their activities, including the accommodation of their libraries, to the Centre.

PROGRAMME

WEDNESDAY, 28th JULY, 5.30 p.m. at the Australian Museum, Cafeteria Area (Use William Street entrance to New Wing, take lift to the top then walk up one flight.)

SPEAKER: Dr. Ralph Molnar, Department of Anatomy, University of New South Wales.

TOPIC: On Recent Discoveries in Dinosaurs and their Significance.

Dr. Molnar will commence at 6.00 p.m. Drinks will be served from 5.30 p.m. onwards (A small charge will be made for this).

FRIDAY, 13th AUGUST, 6.30 p.m., at the Science Centre.

MACLEAY MEMORIAL LECTURE: See separate notice.

WEDNESDAY, 27th OCTOBER, 5.30 p.m., at the Education Centre, Royal Botanic Gardens, (Enter from Mrs Macquaries Road).

SPEAKER: Dr. Jack Golson and Dr. Jocelyn Powell, of Australian National University and National Herbarium of N.S.W.

TOPIC: The Origins of Agriculture in New Guinea.

The speakers will commence at 6.00 p.m. Drinks will be served from 5.30 p.m. and a small charge will be made for this.

WEDNESDAY, 15th DECEMBER, 5.30 p.m., at Taronga Zoo.

SPEAKER: Dr. W.P. Crowcroft, Director, will outline future plans for the Zoo.

Refreshments will be served at 5.30 p.m. and Dr. Crowcroft's talk will be followed by an inspection of the Zoo.

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THE LINNEAN SOCIETY OF NEW SOUTH WALES

SEPTEMBER 1976

MOVE TO THE SCIENCE CENTRE

The office of the Society is moving to the Science Centre on 23rd September. After this date, the phone number will be 29-7747.

RESIGNATION OF MRS. McKAY

Mrs. McKay, our Librarian, is resigning as from the end of September. We are extremely grateful to Mrs. McKay who has catalogued the library and arranged it in its present orderly state, so that it is much more useful to members and to other libraries which seek inter-library loans.

CLOSURE OF LIBRARY

The library will be closed from the 1st October to the end of December, during the move to Science Centre.

SPECIAL MEETING, WEDNESDAY, 27TH OCTOBER, 1976

A special general meeting has been called to amend some of the rules relating to the procedure of election of Council members. As the rules stand now it is extremely difficult to have the ballot paper approved, printed and posted out to members in the time available. The suggested alterations should overcome this difficulty.

It is anticipated that the special meeting will not take long. Dr. Jack Golson and Dr. Jocelyn Powell will then speak on the origins of agriculture in New Guinea.

FUNCTIONS

The lecture by Dr. Ralph Molnar on the 20th of July was well attended and led to much lively discussion. The Macleay Memorial Lecture, given by Dr. Charles Fleming on the 13th of August, followed by dinner in the Trencherman Restaurant, was also a most successful function.

BACK ISSUES OF THE PROCEEDINGS

There are a number of back issues of the Proceedings in storage and the Council has decided to make them available to members on request at a charge of 50 cents per part. If you are interested please make your request before the end of November.

PAPERS ACCEPTED FOR PUBLICATION

R. DOMROW: New records and species of Laelaps and allied genera from Australasia (Acari: Dermanyssidae) Part 2.

E.F. RIEK: Four-winged Diptera from the Upper Permian of Australia.

SCIENCE CENTRE

The Chairman and Secretary of Science House Pty. Ltd., have had a meeting with the Premier, Mr. Neville Wran, who has expressed great interest in Science Centre. The Premier has asked to be shown over the new building.

The Fund-raising Committee for the Science Centre has received some donations and is actively seeking further support.

POSITION OF SECRETARY OF THE SOCIETY - APPLICATIONS INVITED

Mrs. R.J. Inall has indicated her intention of resigning from the secretaryship of the Society, although continuing as Secretary of Science House Pty. Ltd.

The Council invites applications from persons interested in the position of Honorary Secretary of the Society. In addition to seeking applications from members, Council encourages members to bring this matter to the notice of non-members who may have suitable interests and experience.

The duties of the Secretary include: becoming thoroughly familiar with the Society's rules, records and library organisation; arranging for the implementation of decisions of Council; preparing agendas; attending meetings of the Society, of Council and of committees; handling election procedures; dealing with correspondence; and taking responsibility for the publication of the *Proceedings* and liaising with the Assistant Editor and with the staff of Science House Pty. Ltd.; writing the Annual Report; generally arranging the Society's activities. A considerable range of administrative, clerical and editorial services is provided by the Secretariat of Science House Pty. Ltd, relieving the Secretary of much routine business. The Secretary will need to keep in close touch with the staff at the Society's Secretariat at the Science Centre but many of the duties could be carried out elsewhere. On average it is estimated that the secretarial work would occupy the equivalent of about one working day per week. It is expected that an honorarium of about $2,000 p.a. will be paid.

Those interested in applying should write to The Secretary, Linnean Society of N.S.W., The Science Centre, 35 Clarence Street, Sydney 2000, indicating their experience and qualifications. Applications resulting from this circularization of members will close 31.10.1976. The appointee would be expected to take up duty at least by early in 1977.

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JANUARY 1977

THE LINNEAN SOCIETY LIBRARY FUND

The Science Centre building has been purchased, renovated and occupied but this has been done only by obtaining substantial loans for the purpose. Meeting the interest charges on these will delay the time at which the Society begins to receive benefits from its asset. At present the Society's available funds are very limited and members will be aware of how this is adversely affecting its publication activities as publication costs rise. In particular the reduced size of the Proceedings is a matter of concern to members and to the Council.

Apart from its association with the Centre, as one of the two owner bodies, the Society is being directly and substantially assisted by the provision of rent-free space there for its Library.

Members are therefore urged to subscribe to the Linnean Society Library Fund which will be used for the housing and maintenance of the Society's Library. The services of the Library are constantly being called upon by a wide variety of scientific institutions, local, across Australia and overseas. Thus it is one of the principal activities of the Society in its support of scientific work. The important early holdings of journals, as well as recent ones, many of which were obtained by exchange for our own Proceedings, enable it to provide material not readily obtained elsewhere. At present, donations to the Fund will be used to assist with costs of its accommodation.

Donations to this Fund should be sent to the Secretary of the Society and made payable to the Linnean Society of New South Wales Library Fund. Donations are deductible for income tax purposes.

COMPLETION OF MOVE TO SCIENCE CENTRE

The Society has completed the move to the Science Centre, 35 Clarence Street, Sydney. The new phone number is 29-7747. Moving the library was the biggest job and we wish to thank Selby's Scientific Ltd., for a substantial donation towards the cost of the transfer. The libraries of the Universities of New South Wales and Sydney loaned us book boxes for the move and gave advice. This help is much appreciated.

RESIGNATION OF MRS RUTH INALL

Mrs. Inall has resigned as Secretary of the Society but will continue as Secretary of Science House Pty. Ltd. During the seven years of her Secretaryship there have been major improvements in the efficiency of management of the Society's affairs. The project to re-locate the Society and to develop the Science Centre as a financial asset has been initiated and successfully carried through. The Science Centre Secretariat has developed into an organisation servicing a variety of associations and professional bodies and this has come very largely from Mrs. Inall's initiative. Under her competent guidance, the activities of the Secretariat and efficient management of the building will, we feel sure, contribute most substantially both to this Society and to our partner in this venture, the Royal Society of New South Wales, as well as providing these worthwhile services. In thanking Mrs. Inall for all she has done, we look forward to a continued association in our close involvement in the Science Centre.

NEW SECRETARY

Mr. A.M. Ginges has been appointed as Secretary of the Society as from January 1977.

RESIGNATION OF MRS. JANET DONALD

Mrs. Donald, formerly Executive Editor of the Society's Proceedings, has resigned from this position. Council acknowledges with appreciation the high standard she has maintained in her work on our publications.

DEATH OF DR. IDA BROWNE

We note with regret the death of Dr. Browne, a past Linnean-Macleay Fellow and a President of the Society. She took a keen interest in the Society over many years and was a geologist of note, working first in petrology but later in palaeontology and stratigraphy.

PAPERS ACCEPTED FOR PUBLICATION

GREER, A.E.: On the adaptive significance of the loss of an oviduct in reptiles.

NEW MEMBERS

We welcome our new members:

Dr. D.A. Adamson, School of Biological Sciences, Macquarie University;

Mr. J.C. Turner, Geography Department, University of Newcastle;

Mr. H. Weng, Margate, Qld.;

Dr. J.J. Carter, School of Anatomy, University of N.S.W.;

Mr. R.W. Schön, West Ryde.

WEDNESDAY 23RD MARCH (evening) - OFFICIAL OPENING OF SCIENCE CENTRE

Please refer to previous notice of 16 December 1976. Those interested in attending should notify the Secretary without delay.

MONDAY 28TH MARCH - ANNUAL GENERAL MEETING, Science Centre 7.45 p.m.

Declaration of elections, report on the Society's activities for the past year. Presidential Address by Dr. Barbara G. Briggs: "Evolution in the Myrtaceae - evidence from inflorescence structure".

also MONDAY 28TH MARCH - SPECIAL GENERAL MEETING, Science Centre 7.30 p.m.

Meeting called to consider amendments of the Society Rules. These alterations, which concern the election of Council Members, were previously circulated and were approved at the Special General Meeting of 27 October 1976. However, they do not take effect unless confirmed at a further Special General Meeting.

WEDNESDAY 27TH APRIL, 1977 - Education Centre, Australian Museum, 6 p.m.

Mr. David Colby of the Australian Atomic Energy Commission will speak on the 'Uranium Debate'. Final details will be announced in the March Newsletter.

SATURDAY 11TH JUNE (or Saturday 18th June)

Visit to West Head to inspect the Aboriginal rock carvings. A park Ranger will accompany us and explain the carvings. Final details will be announced in the March Newsletter.

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No. 4 APRIL 1977

PRESIDENTIAL ADDRESS

The Annual General Meeting was held Monday, 28th March, 1977 and the President, Dr. Barbara Briggs, gave the address, "Evolution in the Myrtaceae - evidence from inflorescence structure".

The structure of the inflorescence in Myrtaceae has upset some established schemes of inflorescence classification. Several previously defined categories may be found together in the one inflorescence and the flexibility of some of them is quite remarkable. There has been much evolutionary reduction of the many branched structures and aggregation of smaller units.

Some of the most interesting modifications include the spike-like "bottlebrush" which appears to be an adaptation to bird pollination, for example, *Melaleuca*; the bell-like "flowers" of some species of *Darwinia* and the daisy-like *Actinodium*.

NEW PRESIDENT

Professor Barry Webby has been elected President for the coming year. We welcome our new President.

ELECTION OF COUNCIL MEMBERS

The six retiring members of Council were re-elected, unopposed. They are Dr. H.G. Cogger, Mr. D.M. Edwards, Dr. D.K. McAlpine, Dr. L.A. Moffat, Mr. J. Pickard, Professor T.G. Vallance.

OPENING OF SCIENCE CENTRE

On the 23rd March, Science Centre was officially opened by the Governor, Sir Roden Cutler. The Premier, Mr. Neville Wran opened the fund-raising campaign on behalf of Science House Pty. Ltd., and promised the support of his Government. The Band of the East Australian Area, Royal Australian Navy provided the Vice-Regal salute to the Governor and the musical background during the refreshments period after the ceremony.

Distinguished official guests included the Leader of the Opposition, Sir Eric Willis, the Deputy Lord Mayor, Alderman Barry Lewis, Mr. and Mrs. Homer, representing the Minister for Foreign Affairs, Mr. Andrew Peacock, Air-Vice-Marshall S.S. Robey and Mrs. Robey. The Linnean and Royal Societies were well represented by their respective Presidents, Councillors and Members.

PAPERS ACCEPTED FOR PUBLICATION

ANDERSON, J.M.E. & RICHARDS, A.M.: First record of reproductive diapause and aggregation in Australian coccinellidae (Coleoptera).

FUNNELL, G.R. & TCHAN, Y.T.: Nitrogenase activity during the life cycle of Azotobacter.

HOLMES, W.B.K.: A pinnate leaf with reticulate venation from the Permian of New South Wales.

ARCHER, M. and KIRSCH, J.A.W.: The case for the Thylacomyidae and Myrmecobiidae or why are marsupial families so extended?

FACER, R.A.: Geochemistry, heat generation and potash feldspar megacryst development in the Adamellite at Yetholme, New South Wales.

NEW MEMBERS

We welcome our new members:-

Mrs. R.J. Inall, North Sydney.
Dr. P. Gemmell, Department of Anatomy, University of New South Wales.
Mr. M.E. Scott, Paddington.

FELLOW OF THE ROYAL SOCIETY

We congratulate Professor Don Anderson of the School of Biological Sciences, University of Sydney on his election to Fellowship of the Royal Society of London. Professor Anderson, as most members will know, has been most active in the affairs of our Society, as President from 1965-66, member of Council from 1963-73 and as a frequent contributor to the Society's Proceedings.

SESQUICENTENARY OF THE AUSTRALIAN MUSEUM

The 150th anniversary of the establishment of the Australian Museum was celebrated on the 30th March with a formal dinner and opening of a special exhibition marking the history of the museum. The Governor, Sir Roden Cutler opened the exhibition and officiated at the function along with many other distinguished guests including the Premier, Mr. Neville Wran.

CENTENARY OF SCIENTIFIC PUBLICATIONS - ROYAL SOCIETY OF SOUTH AUSTRALIA

The Royal Society of South Australia celebrates the centenary of its Transactions. To mark the occasion, it has produced a special publication "The Natural History of the Adelaide Region". We congratulate the Royal Society of South Australia.

PROGRAMME

Wednesday, 27th April, 1977. Cafe, Australian Museum, 6.00 p.m.
(Enter from William Street, ask directions at desk).

Mr. David Colby of the Australian Atomic Energy Commission.

ATOMIC ENERGY : A WORLD PERSPECTIVE

The energy requirements of the world are examined in general terms for the period up to the year 2000, and a survey is made of the availability of reserves of conventional fuels in meeting these requirements. The role of atomic energy in this scheme in terms of its present status and future trends is then discussed, with a mention of the mechanisms of energy release in the fission process, reactor fuels, uranium supply and demand, the processing of uranium and radioactive waste management. The future options for atomic energy (the Fast Breeder Reactor and the Fission Reactor) are put in context as possibly supplying most of man's energy needs in the 21st Century.

Refreshments will be served from 5.30 p.m.

Saturday, 11th June, 1977. Visit to Aboriginal Rock Engravings, West Head Area.

Meet at Duck Hole Entrance to Ku-ring-gai Chase National Park (on West Head Road, just off McCarr's Creek Road) at 10.00 a.m. In the morning, we will visit three or four sites, driving between sites with short walks from the cars. Lunch at Garigal Picnic Area, West Head.

Ranger, Bob Conroy, who is the authority on Aboriginal relics in the area will be our guide. He will discuss the style of engravings, how they were done and the tools used. We will inspect some cave paintings or hand stencils also. Bob will point out the Aboriginal food and medicine plants and what part of the plants were used.

We need to know approximately how many people are coming. Please ring Helene Martin, 662-2954, if you intend to come, by Thursday, 9th June.

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ATLAS OF AUSTRALIAN BIRDS

The Royal Australasian Ornithologists Union is compiling an atlas of Australian Birds. There will be two parts to the Atlas. One covering field records of bird distributions for the five years from 1st January, 1977 to 31st December, 1981 and the other, the historical record of distributions and changes in distribution up to the end of 1976.

The present knowledge is sketchy and there are some areas where virtually nothing of the birdlife has been recorded. For success in this project, they need widespread support in the community.

If you can assist them, write for further information and an Instruction Sheet to:

Royal Australasian Ornithologists Union
119 Dryburgh Street,
North Melbourne, Victoria. 3051.

TRIBUTE TO DR. IAN MACKERRAS

The Queensland Institute of Medical Research plans to hang a portrait of Dr. MacKerras in their new building, in recognition of his outstanding contributions to medicine and science.

If you wish to be associated with this project, send donations to:

"The MacKerras Portrait Fund"
The Administration Officer,
Queensland Institute of Medical Research,
Bramston Terrace,
Herston, Queensland. 4006.

REPEAL OF REGULATION 13A

Council decided by majority vote to support the Australian Entomological Society in its efforts to gain repeal of regulation 13A of the Australian Customs Act, which severely restricts the export for scientific or other purposes of Australian insect material. A letter seeking repeal has been sent to the Minister for Science, who expressed an interest in reopening the matter, and a representative of the Linn. Soc. accompanied the Aust. Ent. Soc's. delegation to the Minister on June 24th. Other groups supporting the Aust. Ent. Soc's. stand include the Australian Academy of Science, Entomological Society of Queensland, Entomological Society of Australia (N.S.W.), Entomological Society of Victoria, Australian Society for Parasitology and Royal Zoological Society of N.S.W.

MANUSCRIPTS ACCEPTED FOR PUBLICATION

SHAW, D. and OLIVE, L.S.: A rare protostelid recorded in Australia.

SMITHERS, C.N. and THORNTON, I.W.B.: A new genus and some new species of Epipsocidae (Psocoptera) from the Melanesian Arc.

WOODRUFF, D.S.: Hybridization between two species of Pseudophryne (Anura: Leptodactylidae) in the Sydney Basin, Australia.

DANIELS, G.: Asiola, a new Australian genus of the Sub-family Asilinae (Diptera: Asilidae).

NEW MEMBERS

We welcome our new members:

Professor B.A. Engel, School of Geology, University of Newcastle.

Mr. A.J.P. MacLean, Department of Histology and Embryology, University of Sydney.
Mrs. S.G. McLean, School of Anatomy, University of New South Wales.

NEW COUNCIL MEMBER

The resignation of Mr. John Pickard was accepted with regret, and we thank him for his services on the Council. Dr. D.A. Adamson of the School of Biological Sciences, Macquarie University has accepted the election to the casual vacancy on Council.

SECRETARY

Mr. A.M. Ginges resigned as Secretary to the Society as from 30 June 1977. His resignation was accepted by Council with regret. Mrs. Barbara Stoddard has been appointed to the vacant post of Secretary as from 4 July 1977.

PROGRAMME

WEDNESDAY, 27th July, 6.00 p.m. Room L524, School of Zoology, University of New South Wales, Enter through Gate 9, High Street.

SPEAKER: Professor R.A. Gould, Department of Anthropology, University of Hawaii.

TITLE: Discovering the Australian Desert Culture

The Western Desert Aborigines live in an exceedingly marginal environment and they are restricted by their plant and animal resources and the harsh realities of the desert. The Aborigines have developed the means of coping in such a stressful environment and their culture must be considered in the framework of the total desert ecology.

Drinks will be available from 5.30 p.m.

SUNDAY, 28th August FIELD DAY

LEADER: Dr. Don Adamson, School of Biological Sciences, Macquarie University.

THEME: What's happening to the bush in our city?

A Sunday morning excursion by car, to look at changes in the islands of bushland in the Sydney urban areas. We shall visit several small areas of bush in the lower Northern Suburbs which illustrate the types of impact of the city on the native vegetation. We shall also inspect some programmes that have been carried out in an attempt to manage bushland. The impact of exotic species and the development works on the bush will be illustrated. As several sites will be visited, members will be able to depart at any time, at their own convenience.

PROGRAMME: Meet, 10 a.m., Corner of Ryde Road and Lady Game Drive, northern side of De Burgh's Bridge (there are traffic lights at this intersection). The first site is within walking distance of the meeting place. Latecomers could walk down Lady Game Drive. Sites will probably include: Mowbray Bushland, off Avian Crescent, West Chatswood; Lane Cove Bushland Park at Gore's Creek; River Road Lane Cove and Aquatic Park, near Longueville Wharf, off Mary Street, Longueville. The last one is a magnificent harbour side setting for a bushland park and is suitable for a picnic lunch or barbeque, but bring your own wood.

Members and non members welcomed.

LINNEAN SOCIETY OF N.S.W.

LINN S·O·C NEWS

Newsletter No. 6 September 1977

LINNEAN SOCIETY OFFICE

The Society now has its own office, in Science Centre, on the 6th floor. The new telephone number is 290-1612, and the office is open, 10 a.m. to 4 p.m., on Mondays, Tuesdays, and Wednesdays. At other times, a message may be left with the Secretariat of Science Centre.

LIBRARY HOURS

The library is now officially open, and our librarian, Mrs Johanne Buttigieg will be there, Mondays and Wednesdays, from 10 a.m. to 4 p.m. until end of October. After this, Mrs Buttigieg will be on duty in the mornings only, of Monday and Wednesday.

MANUSCRIPTS ACCEPTED FOR PUBLICATION

JENKINS, C., Llandovery and Wenlock stratigraphy of the Panuara area, central New South Wales.

WOODRUFF, D.S., Hybridization between two species of Pseudophryne (Anura: Leptodactylidae) in the Sydney Basin, Australia.

PROGRAMME

SATURDAY, 12th NOVEMBER

THE NATURAL HISTORY OF THE MYALL LAKES SAND-MASSES

The sand-masses of the New South Wales coast have frequently been the subject of land-use conflict. This symposium is not intended to examine or pursue this conflict but to examine the natural history of one of the most extensively studied of these sand-masses. For many years, geomorphologists and biologists have been working on the area which is one of the most important for assessing the depositional history along the coast.

This symposium provides an opportunity for workers in the different disciplines to discuss their results and for anyone who may be interested to ascertain the current status of these researches.

If you are interested, for further information, contact Dr Peter Myerscough, on 692-2910.

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<u>WEDNESDAY, 14th DECEMBER</u> 6 p.m. in Room E, Science Centre, 2nd Floor.

<u>SPEAKER</u>: Dr J.A. Dulhunty, Department of Geology, University of Sydney.

<u>TITLE</u>: <u>The Lake Eyre Story</u>

Lake Eyre and its huge internal drainage basin is possibly the most remarkable geographical feature in Australia. Its geological evolution commenced 250 million years ago, in Permian time, culminating in the present vast salina 50 feet below sea level.

Normally it is a dry salt-sheeted lake, surrounded by deserts, but on rare occasions of extreme climatic swing, it fills with water to become an ocean in the centre of the most arid region of the Australian continent. Then the change in environment from lifeless aridity to a living land of plenty, is a wonderful biological phenomenon.

Drinks will be available from 5.30 p.m.

LINNEAN SOCIETY OF N.S.W.

LINN S·O·C NEWS

Newsletter No. 7 December 1977

NEW MEMBER

The Society welcomes our new member, Mr R.J. Faulker, of Ryde.

MANUSCRIPT ACCEPTED FOR PUBLICATION

HALL, R.L., A Silurian (Upper Llandovery) coral fauna from the Woolomin Beds near Attunga, New South Wales.

MACLEAY MEMORIAL LECTURE

Professor Don Anderson will deliver the 11th Macleay Memorial Lecture on the 16th of March, 1978. The title of his address will be "Natural History Today". You will be advised of the arrangements.

ECHINODERM CONFERENCE

The International Conference on Echinoderm Biology will be held at the Australian Museum, March 12-17, 1978. If you are interested contact Dr Frank Rowe at the Australian Museum, Phone 339-8340.

PROCEEDINGS OF THE LINNEAN SOCIETY OF NEW SOUTH WALES - A MESSAGE FROM THE PRESIDENT

1. Members are reminded that the Proceedings depends very much on the submission of a steady flow of good quality contributions for publication. Currently there is no backlog of papers for consideration by the Publications & Exchange (P & E) Committee of Council. Members are encouraged to submit suitable papers to the Secretary. If recommended for publication by P & E, they can be expected to be published without delay.

2. A sub-committee of P & E is presently reviewing suggestions for alterations to the Proceedings. Any constructive suggestions for improvement from members would be welcomed. Please contact the Secretary with details.

A REMINDER OF MEETING: Wednesday 14 December at 6 p.m. in Room E, Science Centre, 2nd Floor.

Speaker: Dr J.A. Dulhunty, Department of Geology, University of Sydney.

THE LAKE EYRE STORY
(see Abstract in previous Linn Soc News No. 6 - for September 1977)

SCIENCE CENTRE

Fourth Annual General Meeting - Science House Pty Ltd. Report by Chairman.

The year ending 30th June, 1977, a momentous one in the life of the new Science Centre, was highlighted by the official opening on 23rd March, 1977, by His Excellency, the Governor of New South Wales. The year has been marked by the gradual occupancy of the Centre and use of its facilities by the two owner bodies, the Linnean and Royal Societies of New South Wales. The removal of the Libraries of these two Societies from the former Science House at 157 Gloucester Street, and their rehousing on the 6th Floor of the new Centre was a major task facilitated by careful planning, aided by an important benefaction, and executed by hard work on the part of a number of people. The Societies, now freed from the geographical uncertainties that stemmed from the resumption of the Gloucester Street site, again have a permanent home and are in the position to direct their attention more fully to their respective objectives as learned societies, with the fullest support that the Centre can provide.

Regarding the operations of the Science Centre itself, I would like firstly to thank the Honorary Directors constituting the Board of Science House Pty Ltd for the time and attention they have so generously given to the affairs of the Science Centre and for their willingness to accept responsibility on behalf of the Societies for a project which has been promoted during very difficult economic times. I am particularly grateful to Mr Maurice Puttock who has shared the Chairmanship of Meetings with me and who has regularly made time available for consultation and discussion.

I express our indebtedness to numerous benefactors, to Patrons and Honorary Advisors, and to the Fund-raising Committee under the Chairmanship of Mr John Studdy, which has successfully been pursuing a fund-raising campaign on our behalf.

I cannot speak too highly of the staff of Science House Pty Ltd. Mrs R.J. Inall, as General Manager, has been totally dedicated to the project. She has been ably supported by Mr M.E. Scott as Executive Officer since November, 1976. Mrs Inall has built up a staff which has worked as a team and has contributed far beyond what might be normally expected under the terms of employment, in meeting the various exigencies that have arisen, particularly during the settling-in period in the new building. The completion of the Centre and the formal opening provided the Company with an opportunity to thank the Architects, Builders and the Professional Advisers in legal and financial matters.

Our faith in the Science Centre concept has been entirely justified. Throughout the year there has been increasing demand for the use of Conference and Meeting-room facilities. There has been steady progress in the letting-up of the building, while in the area of secretarial services the escalation of requests has severely strained our resources.

A new dimension is steadily being added to our activities with the realisation that Science and Professionalism in general have not only interdisciplinary facets but also international responsibilities. Close links have already been established with the Professional Centres which have been built in various developing countries with the support of the Commonwealth Foundation. We expect these links to be strengthened and we anticipate becoming further involved in practical measures designed to foster communication and cooperation among professionals on an international basis. We have already entered a period of collaboration with the Commonwealth Foundation, which itself is financially supported by the Australian Government, and with the newly-established London Science Centre.

As indicated in the financial statements of the Company, the current economic climate has been very inclement to projects of the type in which we have been involved. The many challenges that have taxed our resources and the problems that have required all our available expertise to solve, are unlikely to be things only of the past as we continue into the next financial year. However, I am becoming increasingly impressed with the recognition that the Science Centre is receiving for its services to the scientific and professional community, and I am confident that we will receive such measure of encouragement and support as will assure us of a viable future.

N.G. Stephenson

In expressing our support and thanks to Professor Stephenson and the Board of Directors of Science House Pty. Ltd. for their efforts on behalf of our Society (one of the two owner bodies) I would like to draw members attention to the Fund-raising activities now aimed at reducing the indebtedness to the Commonwealth Savings Bank. The target of the Appeal is $1,000,000, and a Fund-raising Committee is actively pursuing this target with approaches to various commercial, industrial and banking organizations. Members of Council believe that some members may wish to make a personal donation in support of the Appeal through its own tax-deductible fund, the Society's Library Fund. I therefore invite you to support the Appeal and enclose an attached reply slip for return. All donations will be individually acknowledged.

B.D. Webby, President.

The President,
Linnean Society of New South Wales,
Science Centre,
35 Clarence Street,
SYDNEY, N.S.W. 2000

I enclose herewith my cheque/money order for $.......... made payable to the Linnean Society of New South Wales Library Fund.

Name: ....

Address: ....

....

Donations of $2.00 and upwards are allowable deductions for income tax purposes.

LINNEAN SOCIETY OF N.S.W.

LINN S·O·C NEWS

Newsletter No. 8 March 1978

NEW PRESIDENT

We welcome our President for the coming year, Mr John T. Waterhouse who was installed at the Annual General Meeting.

NEW COUNCILLORS

Three new Councillors have joined us; we welcome

Dr A.E. Greer
Mr A.N. Rodd
Dr C.N. Smithers

NEW MEMBERS

We welcome our new members:

Mrs Helen Lee, Dept of Botany, La Trobe University.
Mr Peter D. Kruse, Dept of Geology, University of Sydney.

LINNEAN MACLEAY FELLOWSHIP

Mrs J. Anderson continues as the Linnean Macleay Fellow for 1978. Her research topic is seasonal developmental cycles of some Australian ladybirds, particularly in relation to reproductive diapause.

ANNUAL GENERAL MEETING

The Annual General Meeting was held on the 29th March, in the Auditorium of the Science Centre. The Treasurer presented the balance sheet for the year and reported a deficit of $3,516 which she viewed with great concern. Although the Society has considerable assets, most of it is tied up in the Science Centre. Practically all of the office space has been let and the secretarial service has been doubled so that the income of the Science Centre exceeds running costs. However, the interest on the mortgage must be serviced still. This financial state is quite good, considering the present economic difficulties.

The Chairman reported changes in the publication of the Proceedings to start with Volume 103. An attractive new cover design was on display. There will be two issues each containing two parts for each volume. This will reduce the cost of publishing and the Proceedings should qualify for the Book Bounty.

The Presidential Address entitled "The Ordivician Stromatoporoids", was given by Professor B.D. Webby. These extinct organisms were probably most like the present day sponge or hydrozoan. They produced a calcareous skeleton and are found in the Ordivician bedded limestones and patch reefs. They are found in North America, Europe, U.S.S.R., China and Australia and their band-like distribution appears to follow the Ordivician equatorial region. The Stromatoporoids show a remarkable diversification in middle to late Ordivician time.

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Mangroves are found in the tidal mud flats of Botany Bay. A complex pattern of salt-marsh communities is found on the estuarine sand flats where small differences in elevation determine the frequency of flooding and the salt content of the soil.

PROGRAMME: Meet, 10 a.m., Connell's Hill. Take Captain Cook Drive, go about 1 mile or 1.6 km past the Cronulla High School on the turn-off to Cronulla (Elouera Road). The road turns to the right and there is a large flat area on the right, suitable for parking, opposite a locked gate across a private road (marked as Towra Point Road on older maps). We shall meet opposite the locked gate. Just before you reach our meeting place, on the right, there is a sealed road going up the hill, then an unsealed road (M.W.S. & D. roads).

We shall walk through the sand dunes to visit the middens and examine the vegetation en route. Later, the mud flats will be visited. This programme is flexible and will be adjusted according to the members' interests.

Bring lunch, suitable for carrying on the walk.
Leave to return home, about 4 p.m.
Enquiries to Dr Helene Martin, 662-2954.

SUNDAY, 15th OCTOBER FIELD DAY CASTLEREAGH STATE FOREST AND AGNES BANKS

LEADERS: Mr Doug Benson, National Herbarium, Sydney.
Ms Val Gobert, Geological survey of N.S.W.

At Agnes Banks, near Richmond, there is an isolated sand deposit which was originally formed by river action. The wind has formed low dunes since deposition. This is one of the few sources of sand for bricklaying near Sydney and much of the original vegetation has been destroyed by sand extraction. Nearby, the Castlereagh State Forest is located on Tertiary clay.

The sands at Agnes Banks have a unique flora which is related to that on the coastal sands. The native vegetation is woodland of *Eucalyptus sclerophylla* (Scribbly Gum) and *Angophora bakeri* (Narrow-leaved Apple) with a rich shrubby understorey of coastal sand dune species, including both *Banksia serrata* and *B. serratifolia*. There is a conflict of interest in the land use of this area. The company mining the sand is aware of this and has put up proposals for a nature reserve.

The Castlereagh State Forest is of particular botanical interest with open forest of *Eucalyptus fibrosa* (Broad-leaved Ironbark) and an understorey including several endemic species.

PROGRAMME: Meet, 10 a.m., at Castlereagh State Forest. From the Blacktown - Richmond Road, turn south into Llandilo Road at Berkshire Park. We shall meet on the western side of Llandilo Road, opposite Spence Street, 4 km south of the junction with Blacktown - Richmond Road.

Map references: Gregorys Map 119, H3.
Lands Department 1:25,000 "Riverstone" sheet, grid ref. 926 706.

We shall visit the Castlereagh State Forest, then return to the cars, so if you are late, wait at the meeting place. We shall also inspect the sand mining operations.

Bring lunch (food and drink). Leave to return home, about 4 p.m.
Enquiries to Mr Doug Benson, 27-4347.

NOVEMBER: TENTATIVE FIELD DAY, LAKE ILLAWARRA

Details and programme will be given in the next newsletter.

MEMBERS AND NON MEMBERS WELCOMED.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINNEAN MACLEAY FELLOWSHIP FOR 1979

Applications are now called for the Linnean Macleay Fellowship for 1979. The Fellowship is awarded for an initial period of twelve months, commencing 1st January 1979.

The following Regulations govern the Fellowship:

1. Every Candidate for a Linnean Macleay Fellowship must be a member of the Linnean Society of NSW, must reside in New South Wales, and must have taken a degree in Science or Agricultural Science in the University of Sydney.

2. A Candidate may offer himself/herself for a Fellowship in any one of the following branches of Science:

   (a) Animal and Plant Physiology and Pathology
   (b) Anthropology
   (c) Biochemistry
   (d) Botany
   (e) Comparative Anatomy and Embryology
   (f) General Biology
   (g) Geography
   (h) Geology
   (i) Palaeontology
   (j) Zoology

Applications close on 31st October 1978 and must reach the Secretary, at the address given below, by that date.

Applications are to be made in writing and must be appended by:

1. Satisfactory evidence of his/her qualifications for undertaking research in the branch of Science he/she offers; in general, such evidence should include some published work, or work in a form suitable for publication.

2. A satisfactory testimonial of character and conduct.

3. A certificate regarding his/her general health.

Further information may be obtained from the Society's Secretary:

Mrs B. Stoddard,
Linnean Society of New South Wales,
Science Centre,
35-43 Clarence Street,
Sydney, NSW, 2000

Tel. 290 1612

LINNEAN SOCIETY OF N.S.W.

LINN S·O·C NEWS

Newsletter No. 9 July 1978

NEW LIBRARIAN

Mrs Pauline Mills is our present librarian. The library is open, Mondays and Wednesdays, 9 a.m. - 1 p.m.

INTERNATIONAL SYMPOSIUM, in commemoration of Linnaeus, Thunberg and Fries, entitled "Parasites as plant taxonomists (host specificity as a tool in Angiosperm Taxonomy)" will be held in Uppsala, Sweden, August 25-27, 1978. If you are interested, address correspondence to The Symposium Secretariat, Institute of Systematic Botany, P.O. Box 541, S - 751, 21 Uppsala, Sweden.

RESIDENTIAL SCHOOL. THE STUDY OF BIRDS, to be held in Armidale and nearby National Parks, August 26 - September 3, 1978. The school is designed for amateur bird observers and especially for those with some experience. If you are interested, contact the Department of Continuing Education, University of New England, Armidale.

NEW MEMBERS. We welcome our new members:

Mr V.S. Till of Wahroonga.
Dr Sarum Peou, Department of Geology, University of Newcastle.
Mr G.J. Witten, Department of Anatomy, University of Sydney.

MANUSCRIPTS ACCEPTED FOR PUBLICATION:

B. BRIGGS and L.A.S. JOHNSON: Evolution in the Myrtaceae - evidence from inflorescence structure. (Incorporating the Presidential Address given by Dr Briggs).

D.T. ANDERSON. Natural History today. (Macleay Memorial Lecture).

B.A. ENGEL. Fenestrate bryozoans with large apertural form in the Carboniferous of Eastern Australia.

W. HOLMES and S. ASH. An early Triassic megafossil flora from the Lorne Basin, N.S.W.

PROGRAMME

SUNDAY, 3rd SEPTEMBER FIELD DAY KURNELL PENINSULA

LEADERS: Mr Frank Dickson, School of Earth Sciences, Macquarie University.
Mr John Waterhouse, School of Botany, University of N.S.W.

Kurnell Peninsula is good for the study of Aborigines who lived along the sea coast from the period when sea level stabilised, about 6,000 years ago, until white settlement. The food and the economy of the people is indicated by a study of the middens which occur on the Peninsula. Middens which have been exposed by coastal erosion and those amongst the sand dunes will be visited.

The exposed areas subjected to harsh winds from the sea support a low heath vegetation with many shrubby species. *Westringia rosmariniformis*, *Correa alba*, *Eriostemon buxifolius* and *Zieria pilosa* are found along the sea front. Other species found in the heath are *Epacris microphylla*, *Hakea teretifolia*, *Grevillea mucronata*, *Bossiaea heterophylla* and *Davesia mimosoides*. Woodland is found in the sheltered hind dunes and here *Angophora costata* (Smooth-barked Apple), *Eucalyptus racemosa* (Scribbly Gum), *E. gummifera* (Sydney Bloodwood) are common.

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MEMBERS AND NON MEMBERS WELCOMED.

LINNEAN SOCIETY OF N.S.W.

LINN S·O·C NEWS

Newsletter No. 10 September 1978

REPORT OF SPECIAL GENERAL MEETING, held in Science Centre, Wednesday, 13th September.

The meeting was attended by 38 members. This report includes only the points raised which are not included in "An Open Letter ..." by Dr Adamson *et al*. and "Response to an Open Letter ..." by Dr Vickery and Professor Stephenson. During the meeting, most of the arguments raised for and against the motions are in the two open letters and every member has a copy of each one, so there is no need to repeat them here.

The President pointed out that the $400,000 compensation money from the Science House (Gloucester Street) now invested in Science Centre (Clarence Street) is not the only asset of the Linnean Society, nor is Science Centre its only activity. Other investments which were outlined by Dr Joyce Vickery are (Approximate):

General Account	$99-100,000
Linnean Macleay Fellowship account	$ 130,000
Bacteriology account	$ 36,900
Scientific Research Account	$ 20,000

These assets are in no way involved in the activities of Science Centre.

Additional points raised by members

Most of the arguments about relocation of the library revolve around finance. Is this necessary? Is the cost to the Society major? Could this be overcome in some way, such as higher subscription rates to members? A discussion of the major costs, such as librarian's salary and the heavy expenditure for outgoing interlibrary loans followed. One of the major users of the interlibrary service has flatly refused a request to reimburse the Society. The new Treasurer of the Society summed it up: The library is a drain on the Society's resources. Last financial year, there was a deficit of $3,000. Without expenditure on the library, this deficit could be almost wiped out.

Near the end of the meeting another member commented that he would rather have had a conference than a formal meeting which he felt did not inform him sufficiently of the issues.

Results of Voting

Motions proposed in the "Notice of Special Meeting (25.7.78)"

1. "In view of the Linnean Society's inability fully to service its library and to pay a fair rental for the space occupied by the library in the Science Centre, the interests of natural science, the Society and Science Centre would best be served by re-location of the library collection, provided rent-free accommodation can be found for it in Sydney in an established working scientific library".

Yes, 23; No, 12. Motion carried.

2. "That this meeting re-affirms the dedication of the Linnean Society of New South Wales to the promotion of the interests of natural history and considers, since Science Centre has failed to fulfil expectations that it would serve the interests of natural sciences and scientific societies and is now of questionable financial viability, that the Society's energies should not be diverted into major fund raising activities on behalf of the Science Centre".

Yes, 19; No, 12. Motion carried.

Notice of Amendments to Motions Proposed.

1. "That this meeting of members of the Linnean Society of N.S.W. commends Science House Pty Ltd for having provided space for its library in the Science Centre at a nominal rental and considers that this provision represents, at this early stage in the Company's development, a valuable return upon its investment in the Science Centre. Further, it urges Council to secure a long-term option for renewal of its lease in order to ensure greater permanence and security of occupancy at its present location".

The President ruled that this motion was too different to the first motion to be allowed as an amendment, but it was an appropriate foreshadowed motion to be put if the first one was lost. As the first motion was carried, it lapsed.

2. "That this meeting affirms the dedication of the Linnean Society of N.S.W. to "The cultivation and study of the science of Natural History in all its branches" (as provided in its Act of Incorporation) and considers that the interests of this Society, as well as

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of other scientific, cultural and professional societies, are well served by close association with the Science Centre".

Yes, 12; No, 19. Amendment lost.

Notice of further motions

These three motions were put to the meeting in reverse order to that listed here.

1. "That this meeting requests Council to afford full moral support to the Board of Science House Pty Ltd in its efforts to overcome the financial problems compounded by recent economic conditions, and hopes that in at least some small measure within its limited means, the Linnean Society may find ways of providing financial support such as by maintenance of its tax-deductible Library Fund and encouragement of contributions to that Fund to assist Science House Pty Ltd to cover the capital costs incurred in providing the library floor in the Science Centre, so long as the library is housed in the Science Centre".

Yes, 12; No, 15. Motion lost.

2. "This meeting considers that the proper function of Council is to promote the scientific activities of the Linnean Society and that the proper function of the Board of Science House Pty Ltd is to work for the functional and financial success of the Science Centre, with such mutual support and encouragement as each can afford the other".

Passed with an overwhelming majority.

3. "This meeting acknowledges the obligations imposed upon the Society by the Science House (Grant) Act, 1928, to provide a Science Centre, re-enforced by the high rate of compensation it applied for and was granted upon resumption of Science House, Gloucester Street, on the grounds that it intended to re-establish a Science Centre, and pledges its loyalty and co-operation to its partner, the Royal Society of New South Wales, in the joint venture".

The President asked if anyone present had read the Act quoted, and whether we knew what was in it. This is a legal point. In view of this difficulty, it was put that this motion lie on the table.

Yes, 19; No, 7. The motion lies on the table.

ASSOCIATE MEMBERSHIP

This new category of membership will be introduced for next year. Associate members will receive the newsletter and other notices of interest, such as special lectures, and are invited to participate in all activities of the Society. They will not receive the Proceedings and will not have voting rights. The cost of associate membership will be $4.00 per year.

FEED-BACK REQUIRED

What do members think the Society should be doing? Have you suggestions for the programme or any other activity? Put pen to paper and write a letter for inclusion in the Newsletter, but please be brief, as space is limited. Any comments or criticisms will be welcomed, provided you don't transgress the laws of libel.

NEW MEMBERS

We welcome the following new members:

Mr G.J. Witten, Department of Anatomy, University of Sydney; Ms J.E. Watson, of Essendon, Victoria; Mr A.M. Blombery, of Eastwood; Mr C.G. Skilbeck, Department of Geology and Geophysics, University of Sydney; Ms R.C. Bohringer, Department of Anatomy, University of New South Wales.

PAPERS ACCEPTED FOR PUBLICATION

W.B.K. Holmes and S.R. Ash: An early Triassic Megafossil flora from the Lorne Basin, New South Wales.

J.R.T. Short: The final larval instar larva of Phaenocarpa (Asobara) persimilis Papp (Hymenoptera, Braconidae, Alysiinae from Australia).

P. Gemmel: Feeding habits and alimentary adaptations of the Australian Fresh Water Prawn - Paratya Australiensis (Kemp) (Malacostraca Family Atyidae).

T.G. Percival: Late Ordivician articulate brachiopods from Gunningbland, Central Western New South Wales.

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NEW BOOKS

Barnacles: A.J. Underwood: A.H. & A.W. Reed Pty Ltd, 1977.

This booklet on barnacles by A.J. Underwood, University of Sydney, allows the amateur naturalist, student, or working ecologist to identify with reasonable certainty the barnacles found along the New South Wales coastline. The key is easy to use, the drawings are clear and each species is illustrated by colour photographs. A paragraph on each species gives an idea of its size, abundance and habitat. The serious student using this book should be aware that since its publication many of the scientific names have changed. I recommend this field guide as a useful addition to the natural history library of those interested in the marine life of the shores of New South Wales.

J.K. Lowry,
Department of Crustacea,
The Australian Museum.

Science Field Guides - Insects, by Jan Grigg;

Reed Education, 1977; 47 pages, 57 colour photographs, 1 black and white photograph, 97 text figures; $2.95

This handbook is a good introduction for amateurs of all age groups to basic insect morphology, classification and biology. Its main attribute is that it provides a convenient and simply written, well illustrated key to the orders of insects. This key is adequate to key out most insects accurately but without certain prior knowledge a typical example of some orders (for example, Hemiptera) may provide difficulties. As a teaching tool it should prove quite valuable.

M.A. Schneider,
Department of Entomology,
The Australian Museum.

Botanists of the Eucalypts: Norman Hall: CSIRO, Australia, 1978.

This book contains biographical notes on people who have described species or who are accredited with having collected the type material or who have had species named after them. People associated with both validly published species names and names about which there is some doubt of their validity are included. Since botanists who have worked with the Australian flora are almost certain to have encountered and written about eucalypts, the book contains the biographies of most people involved in the Australian flora, even if they are better known for their work in other plant groups. The book represents a fine effort of compilation. There are a few errors and omissions, and in the Preface, an appeal is made to anyone who can help with historical information. This book will be an invaluable source of biographical information especially to the plant taxonomist and generally to anyone interested in the history of Australian botany.

Helene A. Martin,
School of Botany,
University of New South Wales.

PROPOSED FIELD CAMP

It is proposed to have a field camp over the October long week-end 29th September - 1st October, 1979, at the Smith's Lake Field Camp. Smith's Lake is situated at the northern end of the Myall Lakes system and there are excellent cooking, bunk house, hot shower, etc., facilities. We hope to have a number of leaders in different topics of natural history, e.g. birds, wild flowers, the aquatic environment, etc. Visits to the high dunes and Myall Lakes are possible.

The camp will be run on an informal basis and members would be free to choose their activities. We would all look after our own food and costs would be low, about $2.00 per night, per person. The camp would be suitable for families with children but there are no special facilities for children and they would be entirely the parents' responsibility.

We have a tentative booking, to be confirmed by the end of the year. The camp will hold 70 people but we do not have to fill it. A minimum number of about 20 people would be required to make it worthwhile.

If you are interested, please write or ring Dr Helene Martin, 399 5362 (evenings) or Dr Don Adamson, 427 0882 (evenings). Let us know if you have a particular interest.

SUNDAY 19TH NOVEMBER FIELD DAY ILLAWARRA LAKE

LEADERS: Mr Malcom Harris, Institute of Education, Wollongong.
Mr Graham Sansom, Illawarra Lake Management.

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Mr Norm Robinson, President, Illawarra Natural History Society.
Mr Brian Jones, Department of Geology, University of Wollongong.
Ms Denise Black, State Pollution Control Commission.

Illawarra lake is situated in a growing urban complex and is subjected to heavy use by different sections of the community. There is much concern about maintaining some sort of balanced ecology of the lake. Feasibility tests involving dredging and recolonisation of the sediments by replanting Zostera are being carried out. This field day will explore the problems involved in the management of the lake.

MEET: 10.30 a.m., in front of David Jones, in the Warrawong Shopping Centre. (Do not take Bulli Pass. Take Port Kembla exit from highway, drive along Five Islands Road, through Steelworks Complex. Proceed to Warrawong Shopping Centre).

Bring lunch, food and drinks. We will not be far from the cars during the day and there will not be a great deal of walking. Finish about 4.00 - 4.30 p.m.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

Newsletter No. 11 December 1978

OFFICE AND LIBRARY HOURS

The office hours of Mrs Stoddard, the Secretary, are 9.30 a.m. to 5.00 p.m., Tuesdays. The library is open Mondays and Wednesdays, 9.00 a.m.-1.00 p.m. When Monday is a public holiday Mrs Mills, the Librarian will work Wednesdays as usual and substitute Friday morning in place of the public holiday on Monday. Mrs Mills plans to go on holidays from 6 February to 16 February, during which time the library will be shut. The library will be open on Fridays, 2 and 23 February and 2 March instead of the three mornings missed.

CHANGE OF COUNCIL MEMBER

Mr D.W. Edwards has resigned from the council and Mr E.J. Selby has been elected to fill the vacancy. Under the rules, Mr Selby must retire from Council at the next Annual General Meeting.

PAPERS ACCEPTED FOR PUBLICATION

E. SCHICHA. Three new species of *Amblyseius Berlese* (Acarina: Phytoseiidae) from Australia.

J.E. WATSON. Biota of a temperate shallow water reef.

J. WEBB and G. BELL. A new species of *Limnadia* (Crustacia: Conchostraca) from the Granite Belt in southern Queensland and northern New South Wales.

NEW MEMBERS

We welcome our new members, Miss B.D. Porter, School of Zoology, University of New South Wales, Mrs P.M. Selkirk, Thornleigh and Mr L.W. Tropman, Mosman.

WANTED: BACK ISSUES OF THE PROCEEDINGS IN SHORT SUPPLY

Some issues of the Proceedings are out of print or in short supply. If you do not require them, we would appreciate it if you could return them to the Society. The issues required are as follows:

1953	Vol. 78	Part 1-2	Number 365-66
		3-4	367-68
		5-6	369-70
1957	82	1	383
		2	384
		3	385
1958	83	1	386
1961	86	2	396
		3	397
1962	87	3	400
1969	94	2	420
1971	96	2	426
1975	99	1	437
1977	101	3	447

EXHIBITION AT ELIZABETH BAY HOUSE OF SIR WILLIAM MACLEAY's EXPEDITION TO NEW GUINEA

In 1875, Sir William Macleay went on an expedition to New Guinea in the boat "Chevit" which he bought for the purpose. He collected hundreds of biological and anthropological specimens, most of which are housed at the Macleay Museum. This display illustrates what exciting things he collected at each port.

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Elizabeth Bay House was originally the home of Sir William Macleay. It was designed by John Verge, a prominent architect of his time. The house is well worth a visit itself.

The display will be on for about three months and Elizabeth Bay House is open 10.00 a.m.-4.00 p.m, Tuesday - Friday, 10.00 a.m.-5.00 p.m. Saturday, and Noon to 5.00 p.m. Sunday. The address is 7, Onslow Avenue, Elizabeth Bay. Admission is 50c.

INTERNATIONAL CONGRESS OF SYSTEMATIC AND EVOLUTIONARY BIOLOGY.

This congress, organised by the International Association for Plant Taxonomy and the Society of Systematic Zoology, will be held at the University of British Columbia, Vancouver, Canada, 17-24 July, 1980. The provisional list of symposia topics includes:

Arctic refugia and the evolution of the Arctic biota:
Origins and evolution of the North Pacific marine biota:
Evolution of reproductive strategies:
Evolutionary epigenetics:
Evolution of community structure:
Green algae and land plant origins:
Macromolecular mechanisms in evolution:
Allozymes and evolution:
Coevolution and foraging strategies:
Evolution of colonizing species:
Rare species and the maintenance of gene pools:
Paleobiology of the Pacific Rim.

There may be additional symposia as well as sessions for contributed papers.

If you are interested in receiving the circulars and for further information, write to:

Dr G.G.E. Scudder,
Department of Zoology,
University of British Columbia,
2075 Wesbrook Mall,
Vancouver B.C. V6T, 1W5,
CANADA.

STOP PRESS:

SIR JOSEPH BANKS - An Address by Dr H.B. Carter

The Society and the Australian Systematic Botany Society are arranging a lecture on Sir Joseph Banks by Dr H.B. Carter, on the evening of 14 March 1979 at the Education Centre, Royal Botanic Gardens, Sydney.

Dr Carter is a well-known skin and wool histologist, at one time of the Animal Breeding Research Organisation, Edinburgh, and recently of Leeds University, and is an authority on Sir Joseph Banks.

Further information from Mrs Stoddard 290 1612 or Dr H. Martin 662 2954.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W. 2033.

Newsletter No. 12 March 1979

ANNUAL GENERAL MEETING

The Annual General Meeting, held on 28th March, in the Science Centre was well attended. The President, Mr John Waterhouse, chaired the meeting.

There was an unexpected change of publisher of the Proceedings during the year. As was planned, the format of the Proceedings has been improved. Professor Tom Vallance has become the Honorary Editor. All these changes have resulted in less expense, but they have meant a delay in printing. This delay will soon be rectified. Manuscripts are coming in at a steady rate.

Dr Joyce Vickery resigned as Treasurer and a Finance Committee consisting of Dr Don Adamson, Dr Frank Rowe and Dr Alex Ritchie is guiding the financial affairs. The financial statement showed a credit balance, but this is the result of unusual circumstances. Because of the delay in printing the Proceedings, this item of expenditure was only $2,287 in 1978, compared with $10,573 in 1977. Printing will probably be in excess of $10,000 in 1979. The financial problems facing the Society in the coming year will require much careful decision.

Emeritus Professor I.A. Watson was elected a corresponding member of the Society for his distinguished contribution to Science and the Society. The Society now has 257 ordinary members, 26 life members and 6 corresponding members. Associate membership, a new category of membership more suited to students, has been introduced this year. Associate members participate in all activities of the Society except voting and receiving the Proceedings. The subscription is $4 per year.

Professor N.G. Stephenson presented a report on the Sydney Science Centre. He stated that the new Centre was, from an operational viewpoint, a functional and financial success but the problems of meeting the monthly payments of interest to the bank remain. Fund raising activities have not been very successful, for the present company structure is not the best means to attract tax deductions. The Board of Directors are investigating every avenue to alleviate this problem.

DEATH OF MR HAROLD JUDD

We note with regret the death last year of Mr Harold Judd who was, until recently, a ranger at Minnamurra Falls. Mr Judd had an intimate knowledge of the natural history of the area and is remembered for his generous assistance to those interested in the Minnamurra Falls Rain Forest Reserve.

PRESIDENTIAL ADDRESS

Mr John Waterhouse presented his address on the problems of the classification of some of the 'Liliales'. Floral morphology has long been the criterion of classification but Hutchinson has placed some of the larger members in an order mostly defined on size. A large plant results from certain growth patterns and the histology of one of these growth patterns was the nub of the address.

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Dracaena (D. draco is dragon's blood tree), Xanthorrhoea (Australian grass trees) and Aloe are examples of these large 'Liliales'. In Dracaena, the young stem has scattered vascular bundles which is usual for a monocot. A "cambium" develops as a ring in the outer part of the stem and it divides to produce parenchyma with radially arranged cells. Scattered vascular bundles develop in this parenchyma. These bundles look as if they were produced by further cell division, but a longitudinal section shows that their tracheids (water conducting cells) are 15 to 30 times longer than the original cambial derivative. In the process of growing from the original block-like cell to a long tapered shape, the ends of the tracheids must grow past each other and past surrounding cells, and in doing so, they run into cells and must grow around them, producing "bitter and twisted" shapes. A complex growth pattern such as this probably arose only once and it is therefore a character that indicated affinity. Its present geographic distribution suggests it is an ancient character. It is found amongst lilialian taxa that have septal glands in the ovary and the hypothesis was proposed that these two complex characters define one of the evolutionary lines in the "Liliales". Many of the smaller temperate species show vestiges of dracaena-type growth.

NEW PRESIDENT AND COUNCIL

The new President is Dr Alex Ritchie. As nominations for the council positions equalled the number of vacancies, all nominees were elected unopposed. The Council members are:

Dr D.A. Adamson	Mr E.J. Selby
Dr A.E. Greer	Dr C.N. Smithers
Dr L.A.S. Johnson	Dr P.J. Stanbury
Dr H.A. Martin	Prof. N.G. Stephenson
Dr L.A. Moffat	Prof. T.G. Vallance
Dr P.J. Myerscough	Dr J.W. Vickery
Dr A. Ritchie	Mr J.T. Waterhouse
Mr A.N. Rodd	Prof. B.D. Webby
Dr F.W.E. Rowe	Dr A.J.T. Wright

FUTURE OF THE LIBRARY

A sub committee of the Council has been enquiring into the possibility of relocation of the library and an initial response has been obtained from the main institutional libraries. All of the libraries canvassed would provide access and borrowing rights to all Members of the Society and would indicate ownership of the volumes. The libraries would also pay for relocation. Some of the libraries already take the journals that we have and most libraries do not want duplication. The degree of duplication is lowest in the "young" libraries. Most libraries wish to integrate the Society's volumes with their own.

Some of the main issues involved are as follows:

The Society cannot possibly provide the services available in large institutional libraries, some of which are open in the evenings and weekends.

There is little use of the library at present. Members hardly ever use it, for it opens only two mornings a week. The only major use is for outgoing interlibrary loans and these are an expense to the Society for it has no incoming interlibrary loans.

There would be "loss of identity" of the Society's library if it were integrated, but integration would probably be the most convenient for readers as all of the books on a particular topic would be in one place.

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Relocation is not disposal of the library. The Society would still own its volumes and maintain the present exchanges. The acquiring library would probably cancel its own subscription for duplicates. The books would be on permanent loan to the acquiring library, and in theory the Society could reinstate its library at some future date and remove its books from the acquiring library, but this would be very difficult in practice.

No decision has been made to date. The Council will negotiate the best deal possible. What are your views? The Council would appreciate the views of members about the library.

LINNEAN MACLEAY FELLOW

The New Linnean MacLeay Fellow is Miss Barbara Porter of the School of Zoology, University of N.S.W.

Miss Porter is studying the structure and function of macropodial salivary glands. This topic is of particular interest in relation to the evolutionary convergence of the digestive physiology of macropods and ruminants; the latter characteristically produce copious quantities of saliva whose composition differs from that of non-ruminant herbivores. Within the macropod marsupials, it is suggested that there are varying degrees of "ruminant-likeness", depending on habitat and diet. The three species under investigation, *Megaleia rufa* or Red Kangaroo, *Macropus eugenii* or Tammar Wallaby and *Thylogale thetis* or Red-necked Pademelon, include arid zone, intermediate and rainforest types respectively.

LINN SOC NEWS

To save money on postage we are endeavouring to arrange bulk deliveries of the Proceedings.

We should be pleased if members who work in universities or government departments in or near Sydney and who now have the Proceedings sent to their private address would be prepared to use the address of their place of employment.

Please notify us accordingly as soon as possible so we can amend our mailing records.

NEW MEMBERS

We welcome our new member Mr D.W. Garner of Coonamble.

MANUSCRIPTS RECEIVED FOR PUBLICATION

H.J. Larsen & D.F. Hoese: Species of the Indo-west Pacific genus *Calumia* (Pisces: Eleotridae).

A.E. Wood: A key to the Australian genera of the Agaricales.

S. Peou: Some Carboniferous articulate brachiopods from eastern New South Wales.

M. McD. Harris, R.J. King and J. Ellis: The seagrass *Zostera capricornia* Aschers in Illawarra Lake, New South Wales.

CORRESPONDENCE FROM MEMBERS

A 'bouquet' from MRS VALERIE JONES who attended the Lake Illawarra Field day and who found it both enjoyable and informative. Thank you, Mrs Jones.

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A letter from MRS THISTLE Y. STEAD concerning the future interests and activities of the Society made the following points:

The Society should be more actively involved in natural science and conservation of the environment. Governments are not moved by submission based on purely aesthetic or recreational grounds, but when backed by authoritative scientific data, the case appears more significant in the eyes of politicians.

The amateur field workers without academic training but with keen and discriminating powers of observation have much to offer natural history. These people could do much more with the support and encouragement of the scientifically trained workers. The society should do more along these lines.

Mrs Stead's letter was debated at length in a Council meeting and the reply made the following point:

Councillors feel that the Society's contribution to conservation is often inadequate. However, any submission must be adequately researched, or it could prejudice the Society's credibility. Councillors believe that we should offer our expertise to assist planners and others in conservation without becoming embroiled in political controversy.

Thank you for your letter, Mrs Stead. The Council will be pleased to receive any further comments and criticisms from members on what they think the Society should do.

<u>SUBMISSION RE GRADY'S CREEK FLORA RESERVE</u>

The Council was concerned about the possibility of the revocation of the Grady's Creek Flora Reserve so that it may be logged. A letter was sent to the Premier pointing out that an area set aside for its long-term biological value would be sacrificed for short-term economic considerations. Revocation would undermine confidence in the system of Flora Reserves unless it was made solely on the grounds that the criterion used in the original designation was invalid.

A reply from the Premier informed us that the decision to allow logging on the basis of a 50% reduction of the canopy had already been taken, but the start of logging depends upon consultation of the State Pollution Control Commission and the Forestry Commission. The S.P.C.C. has requested additional detailed information from the F.C. The Premier has brought our letter to the notice of the Minister for Planning and Environment.

<u>SUBMISSION TO CSIRO RE MAJOR NATIONAL LAND USE ISSUE</u>

The CSIRO, Division of Land Use Research requested the Society's views as to what are likely to emerge as national land use issues over the next 20 years or so. The Society listed 7 such issues:

1. Definition of wilderness, value to the community and management of lands so defined.

2. Evaluation of Australian wetlands in terms of their importance to migratory species of animals and in relation to flood mitigation.

3. Evaluation of rainforest lands in eastern Australia and Tasmania and their management and conservation.

4. Criteria for alienation of Crown Land.

5. Guidelines for the protection and public use of inland waterways.

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6. Coastal protection and planning guidelines for coastal sands and estuaries.

7. Land use and management of arid and semiarid shrublands and woodlands in relation to the regeneration of their long-lived native plant cover.

ANNUAL SYMPOSIUM OF THE MICROSCOPICAL SOCIETY OF AUSTRALIA

This event will be held on 27th - 28th August, 1979, at the University of Newcastle. The M.S.A. covers every interest in microscopy and the Symposium will include papers, display and discussion posters, technical sessions, a photomicrographic competition, equipment displays and laboratory visits.

If you are interested in participating in the Symposium, contact Mr J.E. McLennon, Department of Metallurgy, University of Newcastle, Shortland, N.S.W., 2308.

STUDY APPLICATIONS FOR MACQUARIE ISLAND

Applications for visits to Macquarie Island for the summer of 1979-80 close on 30th May, 1979.

If you are interested further information may be obtained from the Director, National Parks and Wildlife Service, P.O. Box 210, Sandy Bay, Tasmania, 7005.

AUSTRALIAN RESEARCH DIRECTORY

The Australian Research Directory lists research projects in the Natural Sciences and selected Social Sciences in progress in the higher education sector. There are about 13,000 research projects listed and it is fully indexed by key works and project leaders. The directory is recorded on microfiche and costs $12.50, postage paid. For further information contact Mr S. Millar, Canberra 83-2514. Copies of the directory are available from CSIRO Editorial and Publications Service, P.O. Box 89, East Melbourne, Vic., 3002.

BOOK REVIEWS

AUSTRALIAN HARMFUL ARACHNIDS AND THEIR ALLIES

by R.V. Southcott

Published by the Author 1978 36 pp. illustr. Price not known

This publication is a useful and concise contribution to the health problem, albeit a relatively minor one, created by arachnids in Australia. The coverage provided is broad with particular reference to the ticks, mites and spiders. However, it is rather surprising to find the very inoffensive orb web weaving spider, Araneus transmarinus, in such a publication, particularly as the author notes that its bite results in "no more than transient local pain", a comment which is applicable to very many other spiders also. For the more truly noxious species dealt with here the notes provided on the symptoms and treatment should be of particular interest to the medical practitioner whose training has not usually taken much account of such problems.

The major groups of animals considered here are generally well illustrated but it is a pity that the text and photographs are only of

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limited value for the definite identification of some of the more dangerous of the species discussed. Some errors of detail are apparent in the text such as the placement of the genus Atrax (the funnel web spiders) in the wrong subfamily. In the realm of common names the author's use of the name "Window Spider" for the common "Black House Spider" is unnecessarily confusing.

M.R. Gray
Australian Museum

AUSTRALIA'S ANIMALS, who discovered them?

(Contemporary accounts and illustrations selected by Peter Stanbury)

Macleay Museum, University of Sydney, 1978

It is difficult for Australian biologists to realise how strange their northern colleagues find the continent's fauna when they first come to the country. It must have been even more strange for the early explorers and biologists who had not even been partly prepared by days of sketching platypus skulls and pelvises. Peter Stanbury's collection of contemporary drawings and accounts reveal this bewilderment for all too often the draughtsman's pen obviously did not believe what his eyes were seeing.

This is a beautifully produced booklet which will delight both biologist and bibliophile. The animals range from cunjevoi (Banks' account) to kookaburras (Banks and White) and the illustrators from Bewick to the unknown Aboriginal. There is a sad picture of seven Aboriginals with nineteen Queensland lungfish, and a jolly picture of the escaped kangaroo at Regents Park. Dr Stanbury has cast his net wide and caught some delightful animals.

Arthur Woods
School of Zoology
University of N.S.W.

PROPOSED FIELD MEETING CUM CONVERSAZIONE

Saturday 13th October, at Warrah, The University of Sydney's Field Station, at Pearl Beach.

Organiser: Dr Peter Myerscough.

The theme of the meeting will be the Hawkesbury Sandstone and adaptations of its plants and animals.

Further details will be given in the next newsletter.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W. 2033.

Newsletter No. 13 June 1979

OBITUARY: Joyce W. Vickery, M.B.E., D.Sc., F.L.S.

We are very sorry to have to acknowledge the death of Dr Joyce Vickery on 29th May. Dr Vickery was elected to the Society in 1930 and became an Honorary Member in 1971. She served on Council from 1969 which included a long period from 1971 to 1978 as Honorary Treasurer, a position to which she brought a great deal of wisdom and expertise.

Her scientific contributions were primarily in taxonomy of the Gramineae carried out as a botanist at the National Herbarium of New South Wales; she continued with these interests in her retirement since 1973. With Dr Lilian Fraser, she also contributed three papers to the Proceedings (1937-1939) on the community ecology of the Upper Williams River area and one of these remains a basic study on rainforests in New South Wales.

At the last Council meeting it was resolved to rename the Scientific Research Fund the "Joyce W. Vickery Scientific Research Fund" as a memorial to her contribution and generosity to the Society.

NEW COUNCIL MEMBER

Mr E.J. Selby has resigned from the Council. Mr Selby's resignation was accepted with regret, for he has given invaluable assistance to the council on financial and business matters. Dr M. Archer of the School of Zoology, University of New South Wales, has been elected to fill the vacancy until the next elections.

NEW MEMBERS

We welcome our new members

Dr Paul Adam, School of Botany, Uni. of N.S.W.
Dr C.McA. Powell, School of Earth Sciences, Macquarie Uni..

Mrs R.J. Brown of Castlecove.

Mr G.S. Humphreys, School of Earth Sciences, Macquarie Uni.

Ms R.A. Buchanan of Thornleigh.

Mr C. Puttock of Vaucluse.

Dr H. Adamson of Northwood.

MANUSCRIPTS

No manuscripts have been finally accepted for publication during the last quarter, but there are a good number "going through the works" and being sent to referees or referred back to the authors.

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REPORT ON SYDNEY SCIENCE CENTRE

Report on the Sydney Science Centre to the Council and to the Annual General meeting by Professor Stephenson.

Members of the Linnean Society are aware of the grave financial position of their company, Science House Pty. Ltd. This report is made to inform them of the general outline of the moves proposed by the Board of Directors to ameliorate that financial position and to ensure the future of the two Societies.

First, however, we wish to report on the interview we had with the Premier on 6 March 1979 at which we sought assistance from the N.S.W. Government. We are pleased to report that we had a very sympathetic response and it was quite clear that the Premier was prepared to investigate how support could be given. He made it abundantly clear that any financial support from the Government of sufficient magnitude to meet our needs would be dependent on the creation of a mechanism which would be fully acceptable to the State and Federal Governments and to the Commonwealth Bank. Such a mechanism must attract tax concessions under Section 78A of the Income Tax Act (cf. Clunies Ross Foundation) if donations from government and private sectors are to be obtained in sufficient quantity. The Premier emphasised also that speed was essential and he requested an outline of our proposal within a few days. He also offered to make representations on our behalf to the Prime Minister regarding the tax concessions mentioned above (such a matter is considered non-political and the Premier's intervention would be very valuable).

In view of the above and of the advice and response previously received from the Federal Government and from senior officers of the Commonwealth Bank, which in both cases paralleled the Premier's, a working party met to try to outline a viable proposal. This working party consisted of the Chairman and Deputy Chairman of the Board, the senior officers of the Company and Mr Nettleton of Stephen, Jaques and Stephen whose clear thinking and sound advice (given in an honorary capacity) was of tremendous assistance.

The working party had the following salient features to take into consideration:

1. The existing debt to the bank is approximately $2.1 million. Therefore an injection of the order of $1 million is required and would appear to be a reasonable target.

2. Tax concessions under Section 78A of the Income Tax Act would be absolutely essential.

3. Any scheme must be acceptable to the two Societies, the Commonwealth Bank, the State and Federal Governments. This implies
   - maintaining the integrity and future of the Societies
   - being able to relieve the Company of its indebtedness by an amount significantly large to enable it subsequently to "trade" out of its residual debt.
   - satisfying the two governments that the funds acquired will be used in an unimpeachable manner (e.g. the governments cannot be seen to be putting funds directly into a Pty. Ltd. Company).
   - satisfying the governments and the bank that the proposal is viable.
   - convincing the two governments that the Science Centre is a worth while project - this point has in general been achieved.

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4. The present loans from the Societies to the Company (approx. $400,000 each) are irrecoverable. Liquidation of the Company and sale of the building would currently not fully meet the loan from the Commonwealth Bank (which would have first call on any funds) and there would be no funds left for the Societies.

5. The actual "trading" position of the Company is good and is steadily improving.

The result of the working party's deliberations is a proposal to establish a Foundation with similar objectives to those outlined on a previous occasion but with some very significant differences in the operational aspects and in relationship to the Societies. The essential features of the operational aspects are:-

(a) The Foundation would become a shareholder in the Company. This ensures that the Foundation has a compelling interest in the Company and its success.

(b) The Societies convert their loans to shares (400,000 each compared with proposed 900,000 for the Foundation). The significance of this action is:-

(i) loans have first call on funds in the event of a winding-up. No trustees of a Foundation (or of any other organization) would invest a large sum with secondary rights on winding-up; neither Government would contribute to a Foundation in those circumstances either.

(ii) The Societies thereby retain an equitable degree of control in the Company and an equitable share of any surplus funds from the Company in due course.

(c) Involvement of the governments is dependent on their funds going into a Foundation (this has been made amply clear to us) and with such involvement, coupled with the nature of the Foundation's objectives, the future of the two Societies will be assured.

There are many more details yet to be worked out and agreed upon but it is clear that a solution along these general lines is the only one likely to salvage the situation and to bring maximum advantage to the two Societies with a return in due course on their investment.

The proposal was unanimously accepted by the Board at its meeting on 13 March and, in accordance with the Premier's request, a general outline was immediately forwarded to him. Similar information has been conveyed to the Commonwealth Bank.

We are confident that with careful attention to detail this proposal will meet the hopes and aspirations of the Societies and that the Science Centre will become a lasting credit to them.

N.G. Stephenson Chairman

M.J. Puttock Deputy Chairman

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AUSTRALIAN BIOLOGICAL RESOURCES STUDY - PARTICIPATORY PROGRAM: REGISTRATION

A register of interested persons is being compiled. The Participatory Program will provide funds for selected studies of the Australian flora and fauna. Both professional and amateur naturalists are eligible to register. Further information is available from Australian Biological Resources Study, Department of Science and the Environment (contact officer Mrs J. Nott, phone 062. 83.2675), P.O. Box 449, Woden, A.C.T. 2606.

ROYAL SOCIETY OF VICTORIA'S MEDAL FOR SCIENTIFIC RESEARCH

The Society has a right to make a nomination for this award. The work shall have been done in Australia with preference for work done in (or on) Victoria. The award is made for work published from 1973 to 1978, in the Biological Sciences. Suggestions from members are invited.

THE MIKLOUHO-MACLEAY SOCIETY OF AUSTRALIA will hold a public meeting in the Hallstrom Theatre, Australian Museum on Thursday, 9th August at 7.45 p.m. Mr Charles Sentinella will talk of recent confirmation of Nicolai N. de Miklouho-Macleay's researches and Dr Peter McLaren of his experiences in the Madang district.

CORRESPONDENCE FROM MEMBERS

Professor F.H. Talbot has written concerning the future of the Society's library. In relocation of the library, he thinks that easy access to Members of the Society, informality of access including browsing in a library of the same scholarly type are important. Professor Talbot points out that other societies owning libraries are faced with the same problems. Thank you for your letter, Professor Talbot.

Professor S.W. Carey has written pointing out that the honours, degrees and titles of some of the members are not entirely correct, as listed in the Proceedings. We regret these errors, but are unable to make independent checks. Our lists are based on information supplied by members. We would appreciate it if members notified us of any errors or any changes in honours (etc.), and we will correct our lists. Thank you for your letter, Professor Carey.

PROCEEDINGS

We are pleased to announce that Parts 1 and 2 of Volume 103 will be ready for distribution by mid August.

PROGRAMME

Wednesday, 1st August, 7.00 p.m. at the Macleay Museum, University of Sydney.

ORGANISER: Dr Graeme Phipps, Ornithologist, Macleay Museum.

TOPIC: THE BIRD COLLECTION OF THE MACLEAY MUSEUM.

The Macleay Museum has some 9,000 specimens originally in Sir William Macleay's collection and donated to the University of Sydney in 1888. All biogeographic regions are represented and this collection is very important to Australian ornithology. About 97% of all Australian species are represented and there is some excellent material from the Pacific Islands and New Guinea. Exotics are also well represented.

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There will be on display all endemic Australasian families, some of the rarer pheasants, a selection of birds from the Chevert Expedition to New Guinea, the humming bird collection and some surprises - "treasures" of the Museum.

Supper will be served, compliments of the Macleay Museum.

Friday, 28th September, 7.00 p.m. in the Activities Room, Australian Museum. (Enter through the William Street entrance).

SPEAKERS: Dr Don Adamson, Biological Sciences, Macquarie University.

Dr Alex Ritchie, Australian Museum.

TOPIC: Two Naturalists in Antarctica

A slide and film evening, with specimens on display.

Both speakers have spent a summer season in Antarctica, Don Adamson visited the Australian area in the vicinity of Mawson and Davis bases and Alex Ritchie travelled with a New Zealand expedition from Scott Base through the Transantarctic Mountains to the Polar Plateau. The slides and film will show a glimpse of the landscape, wildlife and geology of Antarctica.

Refreshments will be served.

Saturday, 13th October, Field Day and Conversazione at Warrah, (University of Sydney Field Station).

ORGANISER: Dr Peter Myerscough.

The day will involve walking in the field and discussion on the various aspects of adaptations of the plants and animals to life on the Hawkesbury Sandstone. The wildflowers should be at their best then.

MEET at Warrah, 11.00 a.m. Leave to go home about 3.00 p.m.

HOW TO GET THERE: Turn off the Newcastle expressway at the Calga Exit and take the Pacific Highway toward Gosford. At Kariong before you reach Gosford, take the turn off to Woy Woy. At Woy Woy, take the turnoff to Patonga. Just after Umina, turn off to Pearl Beach. This turnoff is at the top of a hill with a water tower. In Pearl Beach, take the first turn to the right and continue over a little wooden bridge, to the end. Then turn right into Crystal Street and continue to the end of the road and Warrah. If you have trouble finding it, ask for directions to the University of Sydney Field Station. The drive will take about 2½ hours from Sydney.

IF YOU NEED TRANSPORT, ring Peter Myerscough on 692.2910 and it will be arranged.

BRING LUNCH. We will make a cup of tea.

NOVEMBER

BEHIND THE SCENES AT THE AUSTRALIAN MUSEUM

We will visit two of the departments at the Museum to discover what goes on there and to talk to the people concerned. Further details in the next newsletter.

AUSTRALIAN MUSEUM SEMINAR

On Tuesday 7th August 1979 at 3.00 p.m. Professor K.R. Surange from the Birbal Sahni Institute of Palaeobotany, Lucknow, India will speak on "The Permian *Glossopteris* Flora of Gondwanaland". The Seminar will be held in the Activities Room at The Australian Museum, 6-8 College Street, Sydney.

Tea will be served.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W. 2033.

Newsletter No. 14 October 1979

NEW MEMBERS:

We welcome our new members, Mr Paul F. Carr, of the Geology Department, University of Wollongong and Mr Seth Grant, a student in the Physiology Department, University of Sydney.

PAPERS ACCEPTED FOR PUBLICATION:

P. Hutchings and S. Rainer. A key to estuarine polychaetes in New South Wales.

R.A. Facer, A.C. Hutton and D.J. Frost. Heat generation and geochemistry of siliceous igneous rocks forming part of the basement in the North West, West and South margins of the Sydney Basin, New South Wales.

R.A. Buchanan and G.S. Humphreys. The vegetation of two podzols on the Hornsby Plateau.

PROPOSED FIELD GUIDES

The Society is planning a series of field guides. Any member who has special knowledge of any area and who would be interested in participating in this programme would be most welcome.

LINNEAN SOCIETY OF NEW SOUTH WALES, HISTORICAL NOTES OF ITS FIRST FIFTY YEARS

A booklet of this title, compiled by A.B. Walkom, is available on request. The text traces the history of the Society from 1874 to 1924 and there are a number of fascinating photos of individuals, groups of people and buildings and views of Sydney at the time.

ACKNOWLEDGMENT OF HISTORICAL MATERIAL IN SIR WILLIAM MACLEAY'S COLLECTION

"The Beagle Record", selections from the original pictorial records and written accounts of the voyage of HMS Beagle, edited by R.D. Keynes, has reproductions of two pictures by Syms Covington, cabin boy to Charles Darwin. Covington later settled in Sydney and his journal is now in the Sir William Macleay collection, located in the Mitchell Library. The Linnean Society has been duly acknowledged. The Mitchell Library has a number of valuable manuscripts on natural history of early Australia, and if any member is interested in working on them, the Society would be interested in publishing them.

LORD HOWE ISLAND SYMPOSIUM

The Australian Museum is sponsoring a symposium on the geology, biology and conservation of Lord Howe Island. The first part will be the presentation of scientific papers followed by a half day forum on the conservation of the island's natural environment. People with a genuine scientific interest are

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welcome at all of the meetings. The date for this symposium is 1st December. For further information contact Dr Harry Recher at the Australian Museum.

THE SEVENTH CONFERENCE OF THE ASIAN-PACIFIC WEED SCIENCE SOCIETY will hold a symposium on Weeds in the Urban Bushland at the Boulevard Hotel, Sydney, on Wednesday, 28th November, 1979. The whole of the conference goes from 26-30th November and if you are interested in this symposium or other parts of the conference, contact The Secretary, 7th Conference of the Asian-Pacific Weed Science Society, P.O. Box 287, Haymarket, NSW, 2001.

THE ASSOCIATION FOR ENVIRONMENTAL EDUCATION puts out a newsletter, the A.E.E. News, which features a round-up of activities organised by itself and a number of other organisations including the Newcastle Flora and Fauna Protection Society, N.S.W. Field Ornithologists Club, The Bicycle Institute of N.S.W., the National Parks Association of N.S.W., the Youth Hostels Association of N.S.W., and the Wildlife Preservation Society of Australia. The Association for Environmental Education is also looking for people with expertise in natural history as 'resource people'. If you are interested, contact the Association for Environmental Education at the N.S.W. Environmental Centre, 399 Pitt Street, Sydney, Phone 233-5388.

THE NATIONAL MUSEUM OF VICTORIA COUNCIL has established a Science and Humanities Scholarship which it hopes will encourage research that links science and the humanities. Applications for the scholarship close on the 31st October and if you are interested, further information can be obtained from the Director, National Museum of Victoria, 285-321 Russell Street, Melbourne.

PROCEEDINGS

Parts 1 and 2 of Volume 103 have been printed and are in process of being distributed.

NEWSLETTER

Following the death of Dr Vickery and the resignation of Professor Stephenson, there are two casual vacancies on Council. Councillors would welcome suggestions as to members who might fill these vacancies.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W. 2033

Newsletter No. 15 January 1980

RESIGNATION OF PROFESSOR N.G. STEPHENSON

Professor Stephenson has resigned from the Council and as the Society's representative on the Board of Directors of Science Centre. We thank Professor Stephenson for his major contribution to Science Centre and his support to the Society over the years, and we wish him well in his retirement.

NEW COUNCIL MEMBERS

Dr Peter Martin of the Higher Education Board and Mr L.W.C. Filewood of Eastwood have been elected to fill the casual vacancies on the Council.

NEW MEMBERS

Mr I.R. Mulholland, Geology Department, University of Sydney.

MANUSCRIPTS ACCEPTED FOR PUBLICATION.

B.V. Timms, The benthos of the Kosciusko glacial lakes.

P.E. Carr, B.G. Jones and A.J. Wright, Dating of rocks from the Bungonia Area, New South Wales.

R. Buchanan, The Lambert Peninsula, Ku-Ring-Gai Chase National Park, Physiography and the distribution of podzols, shrublands and swamps with details of the swamp vegetation and sediments.

'HISTORY IN THE SERVICE OF SYSTEMATICS' is a joint international conference organised by the Systematics Association and the Society for Bibliography of Natural History. This conference will be held on 13-16th April 1981 at the British Museum (Natural History). This meeting aims to illustrate the importance of bio-historical work in relation to early collections, collectors, biography, bibliography and the retrieval of biologically interesting data from often neglected historical sources. If you are interested further information may be obtained from the Conference Secretary, Mrs Judith A. Diment, Botany Librarian, British Museum (Natural History), Cromwell Road, London, S.W.7 5.B.D.

NATURAL HISTORY ORIENTATED TRAVEL

The Society receives brochures from travel agents who promote tours to wilderness areas, places of beauty and interesting cultures etc. of the world. Many of these are walking trips, graded from easy to hard, but there are canoeing and tours for the non-walkers. If you are interested in further information, contact Ausventure, 860 Military Road, Mosman, N.S.W. 2088, phone (02) 960.1677. Information about the American based Mountain Travel Inc. can be obtained also from Ausventure.

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PROGRAMME FOR 1980

The following events are planned for 1980. Final arrangements will be given in the Newsletter.

26th March	-	Annual General Meeting and Presidential address by Dr Alex Ritchie "A review of recent Australian Devonian Vertebrate Discoveries".
April	-	Symposium on the Sydney Basin.
June	-	Dr Jim Bowler, Department of Biogeography and Geomorphology, Australian National University, will speak on the late Pleistocene fossil lakes, in Western New South Wales.
July	-	Dr Patricia Selkirk, School of Biological Sciences, Macquarie University will speak of her experiences on Macquarie Island.
September	-	Tour of the Botanic Gardens.
October	-	Dr Don Adamson, School of Biological Sciences, Macquarie University, will speak on the Biology and Geology of a Blue Mountains Valley, the Grand Canyon, Blackheath.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W. 2033.

Newsletter No. 16

April 1980

MEMBERSHIP MATTERS

We welcome our new member, Mr Subhash Kharade of India.

Professor L. Pryor has been a member of the Society for 40 years so he becomes a Life Member. On being informed of this Professor Pryor forwarded a generous donation which, with his approval, will be placed in the J.W. Vickery Scientific Research Fund.

MACLEAY MEMORIAL LECTURE

Professor Whittington of Department of Geology, Sedgwicks Museum, University of Cambridge, U.K. will deliver the Macleay Memorial lecture on 10 September.

FIRST AWARD FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The first award has been made to Dr S.K. Roy, Reader in Botany, University of Varanasi (Banaras), India. Dr Roy, a cytotaxonomist has been working with Dr Mary Tindale of the National Herbarium on the Australian ferns. The project was commenced in 1976-77 when Dr Roy spent nine months in Australia. He returned in September 1979, with the aim of completing the project, and with a grant from the India/Australia Science and Technology Agreement which expires in April. Dr Roy wishes to stay a month longer and extend some of the studies, particularly on ferns from Northern Australia where the material is much easier to obtain after the wet season. He is on leave without pay, and not due to return to his teaching post until 9 July. His request to the Society for $300 for sustenance has been granted.

Thanks to generous donations to the Joyce W. Vickery Scientific Research Fund, we are now in a position to make grants. It is envisaged that the grants will be more of a supplemental nature, for the completion of a project or for work for which no other funding is available. Student projects will be considered. Grants will not be restricted to universities or professional research institutes. Each case will be judged on its merits. Guidelines for the application for grants will be drafted, and we will be interested in the views of members as to how they think the income from the research fund should be spent. We will have up to $4,000 per year for grants. We would appreciate member's views by 15 June.

Donations to the Joyce W. Vickery Research Fund are tax deductible.

ANNUAL GENERAL MEETING was held on 26 March in the Australian Museum, and attended by 16 members. The Hon. Treasurer reported that the finances have improved slightly. Costs have been reduced and income increased. The major saving has been effected by Professor T. Vallance, who has done a sterling job as Hon. Editor of the Proceedings. The backlog of papers is being whittled away and we have almost caught up with the publishing.

PRESIDENTIAL ADDRESS

The President, Dr Alex Ritchie, gave his address entitled "A review of recent Australian Devonian Vertebrate Discoveries".

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Since the 1950's several major and numerous minor discoveries of Devonian vertebrates in Australia have considerably increased our knowledge of local faunas and their intercontinental relationships. The most significant finds were reviewed including the Early Devonian marine limestones of S.E. Australia, the Middle Devonian Mulga Downs Group of Western N.S.W., the early Upper Devonian reef fauna from the Gogo Formation, Kimberleys, W.A., and numerous widespread Late Devonian assemblages containing forms found widely on other continents (Bothriolepis, Remigolepis, Groenlandaspis etc.).

NEW PRESIDENT

Dr Frank Rowe was installed as the President for 1980.

PAPERS ACCEPTED FOR PUBLICATION

K. McNAMARA & G. PHILIP. The schizasterid echinoids of Australia.

D. SHAW & E. CARTLEDGE. Sporobolomycetaceae from Indooroopilly (Australia) and from Port Moresby (Papua New Guinea).

C. SKILBECK. A preliminary report on the late Cainozoic geology and fossil fauna from Bow, N.S.W.

D. ANDERSON. Cirral activity and feeding in the lepadomorph barnacle *Lepas pectinata* Spengler (Cirripedia).

R. DOMROW. The genus *Raillietia* Trouessart in Australia (Acari: Dermanyssidae).

APPROVAL OF FORMER LINNEAN MACLEAY FELLOW'S THESIS

Our congratulations to Mrs Jenny Anderson who has had her thesis, "A study of the biology of two species of Australian ladybirds (Coleoptera: Coccinellidae) with special reference to their reproductive diapause" approved for the degree of Doctor of Philosophy. She will graduate early in May.

Mrs Anderson has expressed her gratitude to the Society for its three years of support, as she would not have been able to complete her project without it.

PRESENT LINNEAN MACLEAY FELLOW CONTINUES

Miss Barbara Porter, the Fellow for 1979 has been granted an extension for this year.

REQUEST FOR BIBLIOGRAPHIC HELP

The Museu E Laboraterio Zoologio E Anthropologico (Museu Bocage) of Lisbon, Portugal had a fire in 1978 and the library was burnt down. It has since been rebuilt and they have requested donations of any publications, reprints, books etc., on the themes of Zoology and General Biology and also in the fields of Systematics, Zoogeography, Ecology, Mammalogy, Ornithology, Histology and Embryology, Ichthyology, Marine Biology, Entomology, Herpetology and Anthropology. If you have anything you wish to donate, the address is: Direccao do Museu Bocage, Faculdade de Ciencias de Lisboa, Rua da Escola Politencnica 58, 1 200 Lisboa, Portugal.

AUSTRALIAN NATURAL HISTORY MEDALLION

This award is made annually by the Field Naturalists' Club of Victoria to any person who has "increased popular or scientific knowledge of Australian flora and/or fauna including Man, or has assisted notably in the protection or propagation of Australian flora and/or fauna or has discovered new species of importance or has devoted considerable time and care to the study of any phase of natural history by the publication of books or by photography or pictorial art or by any other means". The nominee is judged on his work during the preceeding ten years. Recipients of the award since 1970 were: Jean Galbraith (Vic.), A.C. Beauglehole (Vic.), Allen A. Strom (N.S.W.), Edmund D. Gill (Vic.), Vincent N.

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Serventy (W.A.), Alison M. Ashby (S.A.), Winifred M. Curtis (Tas.), John R. Wheeler (Vic.), Alan Sefton (N.S.W.) and Helen I. Aston, (Vic.).

If you have suggestions as to whom the Society may nominate, we would be interested.

FIELD SCHOOL IN AUSTRALIAN HISTORICAL ARCHAEOLOGY

The Department of Continuing Education, University of New England will be running the School on May 9-17, 1980. The purpose of the school is to introduce interested members of the public to the subject and its basic techniques.

If you are interested, write to the Department of Continuing Education, University of New England, Armidale, N.S.W. 2351.

PROGRAMME

The proposed Symposium on the Sydney Basin will be held later in the year. Arrangements will be given in a later Newsletter.

WEDNESDAY, 11 JUNE, 6 p.m. Room L403, School of Botany, University of N.S.W. (enter through Gate 9, High Street).

SPEAKER: Dr JIM BOWLER, Research School of Pacific Studies, Australian National University.

TOPIC: RECONSTRUCTING CLIMATES OF THE PAST 50,000 YEARS: EVIDENCE FROM SALT LAKES IN NORTHERN AND SOUTH AUSTRALIA:

The records of the last 50,000 years provide us with examples of how the Australian landscape has responded to the climate of the last glacial maximum. Two contrasting hydrologic events are identified; an early wet phase in which many lakes across Australia were much expanded, followed by a major dry interval during which desert environments extended in both northern and southern regions of the continent. The conditions during the last 10,000 years have varied slightly between these two extremes.

Drinks will be served from 5.30 p.m.

WEDNESDAY, 9 JULY, 6 p.m. Education Centre, Royal Botanical Gardens (park near Art Gallery, enter through Art Gallery Gate, just beyond the overpass over the expressway).

SPEAKER: Dr PATRICIA SELKIRK, School of Biological Sciences, Macquarie University.

TOPIC: SUMMER ON MACQUARIE ISLAND THROUGH A BIOLOGIST'S EYE:

Macquarie Island is a small subantarctic oceanic island - windy, moist, cool, with little annual variation in climate except in day length. It is a Nature Reserve administered by the Tasmanian National Parks and Wildlife Service. This talk will describe and illustrate the vegetation (grasslands, herbfields, bogs, feldmark) and animals (seals, penguins, albatross and petrels) which contribute to making this a most fascinating and beautiful island.

Drinks will be served from 5.30 p.m.

LINNEAN SOCIETY OF NEW SOUTH WALES

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
KENSINGTON, N.S.W. 2033

Newsletter No. 17 July, 1980

NEW MEMBERS:

We welcome our new members:

Ms Elizabeth Moodie of the State Fisheries Department
Dr B.G. Jones of the Geology Dept, University of Wollongong
Mr A.C. Hutton of the Geology Dept, University of Wollongong

PAPERS ACCEPTED FOR PUBLICATION:

C.McA. POWELL, C.L. FERGUSSON and A.J. WILLIAMS: Structural relationships across the Lambian Unconformity in the Hervey Range, Parkes area, NSW

R. DOMROW: A new species of the _ulysses_ group, genus _Haemolaelaps_ Berlese (Acari: Dermanyssidae).

A.J. WRIGHT and R.A. FLORY. A new Devonian tabulate coral from the Mount Frome Limestone from Mudgee, NSW.

P.F. CARR et al.: The geology of the Bungonia district, NSW.

K. DUGAN: Darwin and Diprotodon: the Wellington caves fossils and the law of succession.

S. SKINNER: New records of Zygnemaphyceae and Oedogoniophyceae (Chlorophyta) from Northern New South Wales.

ECOFEST SCHOOLS

The Department of Continuing Education, University of New England is running a programme of environmental studies, in a variety of locations in northern, coastal and inland NSW. The schools include Plant Identification (16-17 August), Rocky Shore Ecology (28-31 August), Lower Manning River (1-5 September), Warrumbungles/Pilliga (21-27 September), Nature photography (3-8 October), Insect Identification (4-6 October), Upper Namoi (31 October - 3 November) and Barrington Tops National Park and State Forest (21-24 November). For more information and brochure, write to the Department of Continuing Education, University of New England, Armidale, NSW, 2351 or contact Darryl Dymock (067) 72 2911, ext. 2123.

FOCUS ON FARM TREES - A NATIONAL CONFERENCE ON THE DECLINE OF TREES IN THE RURAL LANDSCAPE

This conference will be held 23-26 November at the University of Melbourne and the major sponsor is the Forests Commission of Victoria. In many parts of Australia trees are being lost from a number of causes. Generally, they are not being replaced by young trees so that the landscape is being steadily degraded. This follows soon after a technical conference for specialists on eucalypt dieback in forests and woodlands.

If you are interested, write for the brochure and application form from "Focus on Farm Trees" Conference, Council of Adult Education, 256 Flinders Street, Melbourne, 3001.

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ROYAL SOCIETY OF VICTORIA MEDAL

This year, the Royal Society of Victoria is awarding its medal for work in the Earth Sciences category. The work must have been carried out in (or on) Australia (including its territories), with preference for work done in (or on) Victoria. The candidates are judged on their published work between 1 January 1974 - 31 December 1979, and the sponsor must supply a written statement as to why he believes his candidate is worthy of the medal. Applications must be in by 1 September 1980, and we would be interested to hear if you have any suggestions as to who should be nominated.

MEETING OF SCIENTIFIC SOCIETIES

The Society was represented by our Vice-President, Dr Alex Ritchie, at a meeting of Australian Scientific Societies and National Committees held in Canberra on Wednesday 23 July and organised by the Australian Academy of Science.

The purpose of the meeting was to discuss common problems faced by scientific societies, such as the cost of maintaining libraries and the difficulty of meeting expenses associated with publication of journals.

Prof. T.G. Vallance, the Hon. Editor of the Proceedings recently wrote a letter to the Minister for Science and the Environment the Hon D.S. Thomson, pointing out that the regulations governing payment of the Book Bounty to publishers are in conflict with internationally accepted rules for the publication of scientific research.

The points made in Prof. Vallance's letter were raised at the meeting by Dr Ritchie and it is expected that further action will be taken as a result of discussions at this meeting.

MEMBERSHIP SUBSCRIPTIONS

The Council has reluctantly decided that the annual membership subscription for 1981 will be raised to $20. Members will appreciate that this is a modest increase in view of the present rate of inflation.

PROGRAMME

WEDNESDAY 10 SEPTEMBER, 6.30 p.m. MACLEAY MEMORIAL LECTURE

WEDNESDAY 24 SEPTEMBER, 6.p.m. In the Activities Room, Australian Museum (William Street entrance)

SPEAKER: Dr Patricia Selkirk (postponed from 9 July due to illness)

TOPIC: SUMMER ON MACQUARIE ISLAND THROUGH A BIOLOGIST'S EYE

Drinks will be served from 5.30 p.m.

SUNDAY 28 SEPTEMBER: Excursion to the Royal Botanic Gardens
Meet at the gate behind the Conservatorium at 11 a.m. or 1 p.m.

SATURDAY 25 OCTOBER: At the Australian Museum
THE SYDNEY BASIN - A REVIEW SYMPOSIUM

For details of these meetings see the enclosed yellow Programme sheet.

ADVERTISEMENT

NATIONAL BANK WILDLIFE SERIES

EAST AFRICAN SAFARI

Cost: $3447.00 (All inclusive)

27th August - 19th September
1980

Our East African Safari will take you to the heart of Kenya.
September is the cool dry season when the animal migration takes place across the plains of the Masai Mara and the Tanzanian Serengeti.
We visit Samburu, Amboseli, Tsavo West, Mombasa among other places.
This tour is led by the well known naturalist and author Mr Jack Hyett.
Join other wildlife enthusiasts on this exciting safari.
A detailed brochure is now available.
For inquiries ring:

National Bank Travel
Tours (Special Interest)
50 Elizabeth Street,
MELBOURNE. Phone: 630471

PROGRAMME

WEDNESDAY 10 SEPTEMBER, at 6.30 p.m. in the Auditorium on the first floor of the Science Centre.

THE MACLEAY MEMORIAL LECTURE will be presented by Professor H.B. Whittington from the Sedgwick Museum in Cambridge - Followed by dinner at Science Centre.

TOPIC: EVOLUTIONARY PROBLEMS PRESENTED BY THE APPEARANCE OF MULTI-CELLED ANIMALS IN THE CAMBRIAN.

WEDNESDAY 24 SEPTEMBER, at 6.p.m. in the Activities Room of the Australian Museum. Enter from William Street

SPEAKER: Dr PATRICIA SELKIRK, School of Biological Sciences, Macquarie University.

TOPIC: SUMMER ON MACQUARIE ISLAND THROUGH A BIOLOGIST'S EYE:

Macquarie Island is a small subantarctic oceanic island - windy, moist, cool, with little annual variation in climate except in day length. It is a Nature Reserve administered by the Tasmanian National Parks and Wildlife Service. This talk will describe and illustrate the vegetation (grasslands, herbfields, bogs, feldmark) and animals (seals, penguins, albatross and petrels) which contribute to making this a most fascinating and beautiful island.

Drinks will be served from 5.30 p.m.

SUNDAY 28 SEPTEMBER: EXCURSION TO THE ROYAL BOTANIC GARDENS.

LEADERS: Dr Laurie Johnson, Director.
Dr Tony Rodd, Horticulture Botanist.

An opportunity to visit Sydney's botanical garden (how long since you last spent a day there?) and learn something about its scientific and educational programme from the "horse's mouth". We will also see behind the scene activities such as herbarium, nursery, and glasshouses. For those interested, we will fill the gaps in your knowledge of the taxonomy, geography and ecology of plants in the gardens. Those who already know it all can admire the Azalea displays or feed the ducks.

MEET at the gate behind the Conservatorium. If coming over the bridge, turn hard left off the Cahill expressway. There should be parking behind the Conservatorium.

MEET at 11 a.m. if you are lunching in the Gardens (bring your lunch or buy it at the kiosk).

MEET at 1 p.m. (same gate) if not lunching in the Gardens.

SATURDAY 25 OCTOBER: at the Australian Museum.

THE SYDNEY BASIN - A REVIEW SYMPOSIUM.

D.S. BRANNAGAN: Geology Department, University of Sydney. The Sydney Basin What is it and how we have learnt about it.

C. HERBERT: Offshore Oil NL. The Evolution of the Sydney Basin. The tectonic and depositional history of the Sydney Basin from the Permian to the Triassic.

C. WARD: Institute of Technology. The Coal Resources of the Sydney Basin. Geological setting, coal quality and mine development in the Sydney Basin coalfields.

I. WALLACE: Geological Survey of NSW. The Industrial Mineral and Rock Resources of the Sydney Basin. The main industrial minerals and rocks commercially exploited in the Sydney Basin are the construction materials, e.g., sand, gravel, hard rock aggregate, clay, shale, dimension stone and loam.

C. HERBERT: Offshore Oil NL. Ancient Volcanoes of the Sydney Region. New theories on the origin of volcanic breccia necks and the appearance of the original volcanoes.

A. SHORT: Geography Department, University of Sydney. Beach dynamics of the Sydney Basin. The Holocene evolution of Sydney Basin beaches and their dynamic response to the Sydney wave climate.

B. DRUERY and A.F. NIELSEN: Coastal Engineering Branch, NSW department of Public Works. What is being done to improve the Waterways and Beaches of the Sydney Region. An outline will be given of the scope and objectives of the Department's coastal and estuarine works programme within the Sydney Region. Data collection, techniques and investigative methods will be discussed briefly. A few selected projects will be discussed in detail.

D. BENSON: National Herbarium. The Vegetation of the Sydney Basin. The natural vegetation of the Sydney Basin, its general relationships with geology and climate, and its effect on the pattern of development in the Sydney area.

It is planned to have three more papers on biological topics.

The final programme will be announced in the next newsletter.

LINNEAN SOCIETY OF NEW SOUTH WALES

Telephone: 290 1612

Science Centre,
35-43 Clarence Street,
SYDNEY, N.S.W. 2000

12TH MACLEAY MEMORIAL LECTURE

The biennial Macleay Memorial Lecture will be held in the Auditorium on the Conference (1st) floor at the Science Centre, 35 Clarence Street, Sydney, on Wednesday 10th September, 1980 at 6.30 p.m.

Professor H.B. WHITTINGTON of the Sedgwick Museum in Cambridge will speak on the general subject of evolutionary problems presented by the appearance of multi-celled animals in the Cambrian. The lecture will be illustrated with slides.

There is no chage for attending the lecture.

Following this address, a dinner has been arranged at Mr Fogg's licensed restaurant on the ground floor of the Science Centre at 8 p.m.

The cost of the dinner will be $11.50 for the following menu:

Entree:	1.	Prawn Cocktail
	or 2.	Smoked Salmon
	or 3.	Soup of the day
Main Course:	1.	John Dory Fillets
	or 2.	Steak and Salad
	or 3.	Roast Pork
Dessert:	1.	Pavlova - Chocolate
	or 2.	Cheesecake
	or 3.	Apple Strudel and ice cream
		Coffee included.

Please complete the form below if you wish to attend the dinner and return it to the Secretary of the Linnean Society at the above address with your cheque no later than Monday 1 September 1980.

Members are urged to give this function wide publicity among colleagues and students.

The Secretary,
Linnean Society of N.S.W.,
Science Centre,
35-43 Clarence Street,
SYDNEY, N.S.W. 2000

I wish to attend the dinner in Mr Fogg's restaurant on Wednesday 10th September at 8 p.m. following the Macleay Memorial Lecture.

(Name) ....
(Please print)

I enclose cheque for $ ....

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W. 2033.

Newsletter No. 18 October 1980

THE MACLEAY MEMORIAL LECTURE for 1980 was given by Professor H.B. Whittington on the 10th September and was attended by 75 members and friends. Professor Whittington's lecture, entitled 'Cambrian animals: their ancestry and descendants' described the amazing variety of animals of those times. A few molluscs, crustacea and shrimp-like animals are found amongst these fossils, but most of them are soft-bodied animals which cannot be placed in any of the present animal groups. Professor Whittington thinks that evolution was experimenting at that time and only the successful lineages have survived and shown a radiation of forms. The bizarre, soft-bodied animals all became extinct during the Cambrian.

NEW MEMBERS

We welcome our new members:

A.C. Hutton, School of Geography, Wollongong University.

Lt. Commander A.M. Young of Blacktown

RESIGNATION OF COUNCIL MEMBERS

The Council accepted, with regret, the resignations of Dr Peter Stanbury and Dr Alan Greer.

NEW COUNCIL MEMBER

We welcome Mr Grahame Phipps of the Macleay Museum as the new Council Member in place of Dr Stanbury and would welcome any nomination for a replacement for Dr Greer.

PAPERS ACCEPTED FOR PUBLICATION

D.P. THOMAS & R.E. GOULD. Tertiary non-marine diatoms from eastern Australia: palaeoecological interpretation and biostratigraphy.

W.F. PONDER. *Posticobia norfolkensis* (Sykes), an apparently extinct fresh water snail from Norfolk Island (Gastropoda, Hydrobiidae).

T. CLAY. A report on a collection of lice (Boopidae: Phthiraptera) on *Petrogule* (Rock Wallabies)

J.M.E. ANDERSON. Biology and distribution of *Scymnodea lividigaster* (Mulsant) and *Leptothea galbula* (Mulsant), the Australian ladybirds (Coleoptera: Coccinellidae).

F.W.E. ROWE. A new genus and species in the family Ophidiasteridae (Echinodermata: Asteroidea) from the vicinity of Lord Howe Island, Tasman Sea.

PROPOSED PUBLICATION OF PAPERS FROM THE SYMPOSIUM ON CAINOZOIC FOSSIL VERTEBRATES FROM THE SOUTH EAST QUADRAT OF AUSTRALIA.

The Society is considering the possibility of publishing papers from this symposium which will be held as a part of the conference on the Cainozoic Evolution

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of south east Australia, Canberra, from 26th-30th November. The symposium consists of review papers on both Tertiary and Pleistocene faunas. Mammals, birds, fish, amphibians, reptiles, cave faunas, a megafaunal and a Diprotodon site are included.

SOUTH WEST TASMANIA COMMITTEE - ANNUAL FILM NIGHT, 7.30 p.m., Friday 17th and Saturday 18th October, Law School Theatre, corner King and Elizabeth Streets. This year's annual film night is entitled "A South West Journey". It will present recent events regarding the South West of Tasmania as well as some of Australia's finest scenery.

NATIONAL BANK TRAVEL WILDLIFE SERIES

INDIA WILDLIFE SAFARI

Cost: $2,655.00 (all inclusive)

27 February - 20 March, 1981

Our safari will visit Corbett National Park, excursions into this wilderness on elephant back.

Nanital on the foothills of the grand Himalayan range, Agra and visit the Taj Mahal. Keoladeo Bird Sanctuary Sariska, its harbours, tiger, leopard, nigai samban and chital.

Bandhargarh National Park, it is famous as the only habitat of the rare white tiger!

SPRING BIRDWATCHING SCOTLAND

Land Cost: $3,180.00

25 April - 18 May, 1981

Includes all meals and air fare London/Edinburgh/London. Breakfast only is included in Edinburgh.

Because of its history and economic position Scotland is the most sparsely populated part of the British Isles and, therefore, the best area to see birds and mammals in the world. So we set off for three weeks, travelling by bus, by plane and by mail boat, through the Lowlands, the Highlands and the Orkney and Shetland Islands.

SRI LANKA TOUR

Cost: $2,404.00 (all inclusive)

13 June - 4 July, 1981

Our safari takes us to the major National Parks and covers a variety of habitats. Travel between places is a series of short journeys. Within relatively short distances one may visit ancient cities, temples, frescoes, fishing hamlets and rural villages. Our special wildlife tour takes you into the heart of this ancient island. You visit Yala and Kumana where some of the 400 species of birds and more than 100 species of mammals have their habitats.

You explore the jungles of Wilpattu and Gal Oya and stay at the Wirawilla Bird Sanctuary. May/June is the best time of the year for observing bird life in Sri Lanka, nesting is in progress. In the vast expanses of the wilderness you see hoopoes, minivets, bulbuls, woodpeckers, peafowl, waders. You will also be kept busy filming elephant, leopard, buffalo and various varieties of deer and monkey.

EAST AFRICAN SAFARI

Cost: $3,733.00 (all inclusive)

26 August - 18 September, 1981

Our East African Safari will take you to the heart of Kenya. September is the cool dry season when the animal migration takes place across the plains of the Masai Mara and the Tansanian Serengeti.

We visit Samburu, Amboseli, Tsavo West, Mombase among other places. This tour is led by the well known naturalist and author, Mr Jack Hyett. A detailed brochure is now available.

For enquiries please ring:

National Bank Travel,
Tours (Special Interest),
50 Elizabeth Street,
MELBOURNE, VIC. 3000.

Telephone: (03) 630 471

PROGRAMME

SATURDAY 25 October: At the Australian Museum in the Activities Room. Enter from the William Street Entrance.

THE SYDNEY BASIN - A REVIEW SYMPOSIUM

9.30 - 9.50	P.S. BRANAGAN: Geology Department, University of Sydney, The Sydney Basin. What is it and how we have learnt about it.	
9.50 - 10.20	C. HERBERT: Offshore Oil NL. The Evolution of the Sydney Basin. The Tectonic and depositional history of the Sydney Basin from the Permian to the Triassic.	
10.20 - 10.40	C. WARD: Institute of Technology. The Coal Resources of the Sydney Basin. Geological setting, coal quality and mine development in the Sydney Basin coalfields.	
10.40 - 11.00	I. WALLACE: N.S.W. Geological Survey. The Industrial Mineral and Rock Resources of the Sydney Basin. The main industrial minerals and rocks commercially exploited in the Sydney Basin are the construction materials, e.g., sand, gravel, hard rock aggregate, clay, shale, dimension stone and loam.	
11.00 - 11.20	MORNING TEA	
11.20 - 11.40	C. HERBERT: Offshore Oil NL. Ancient Volcanoes of the Sydney Region. New theories on the origin of volcanic breccia necks and the appearance of the original volcanoes.	
11.40 - 12.00	A. SHORT: Geography Department, University of Sydney. Beach dynamics of the Sydney Basin. The Holocene evolution of Sydney Basin beaches and their dynamic response to the Sydney wave climate.	
12.00 - 12.30	DISCUSSION	
12.30 - 2.00	LUNCH	
2.00 - 2.20	A. RITCHIE: The Australian Museum. The fossil vertebrate fauna of the Sydney Basin. These vertebrates are fish and amphibia and are mainly Triassic in age. They all lived in a non-marine environment. Relationships with contemporaneous faunas elsewhere in the world will be discussed.	
2.20 - 2.40	M.E. WHITE: The Australian Museum. Some Permian and Triassic plants of the Sydney Basin. Some of the more completely known plants will be discussed. Reconstructions of the plants and their methods of reproduction will be illustrated.	
2.40 - 3.00	D. BENSON: National Herbarium. The Vegetation of the Sydney Basin. The natural vegetation of the Sydney Basin, its general relationships with geology and climate, and its effect on the pattern of development in the Sydney area.	
3.00 - 3.30	G. PHIPPS: The Macleay Museum. Birds of the Sydney Region. The diversity of birds will be illustrated with a seven projector multiscreen audio-visual show. Historical references and how the birds have changed with man's activities will be discussed.	
3.30 - 3.50	AFTERNOON TEA	

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3.50 - 4.10 V. ATTENBROW: National Parks and Wildlife Authority. Aboriginal resources in the Sydney region. Resources of stone, bone and plants will be discussed in relation to settlement patterns and site location.

4.10 - 4.30 B. SIMMON: State Pollution Control Commission. Aquatic vegetation in the Hawkesbury - Nepean River System. Variations in species and biomass, particularly of algae are discussed in relation to nutrient enrichment of the waterway due to man's activities in the catchment.

4.30 - 5.00 DISCUSSION

WEDNESDAY 19 November, 6 p.m., in the Blue Room, Australian Museum. Enter from William Street and enquire at the desk.

SPEAKER: Dr Don Adamson, Biological Sciences, Macquarie University.

TOPIC: BIOLOGY AND GEOMORPHOLOGY OF A BLUE MOUNTAIN VALLEY, THE GRAND CANYON, BLACKHEATH.

A group at Macquarie University decided to look at the natural history of a representative area in the Blue Mountains as little has been published about this area. The valley of Greaves Creek (the Grand Canyon) near Blackheath was selected because it contains most of the topographic situations typical of the Blue Mountains, from plateaux to gentle upland valleys and deeply incised slots called canyons. Such an area provides a vast range of environmental sites for plants, e.g., in the deep canyons, light intensity is too low for the growth of most plants, whereas the plateaux are exposed to high light intensity. Processes associated with slope formation involve bushfires, lyrebirds and plants, and the interesting problem of asymmetric valleys is being looked at. Dr Pat Selkirk, Miss Alison Edgecomb and Mr Peter Glasby (of Biological Sciences) and Mr Peter Mitchell and Dr Russell Blong (of Earth Sciences) are associated with this project.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S·O·C NEWS

EDITOR: Dr Helene A. Martin,
University of N.S.W.,
P.O. Box 1,
KENSINGTON, N.S.W. 2033

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Library Hours: Monday & Wednesday Mornings from 9.00a.m. to 1.00p.m.

Phone No. 290 1612

Newsletter No.19 January 1981

NEW MEMBERS

Ms Janet Aitkin, of Randwick.

Mr Geoffrey Leon Frazer, of Carlingford.

Dr William Nalder Holland, Main Roads Department.

Ms Karen Vickery, of Leichhardt.

We welcome our new members.

MANUSCRIPTS ACCEPTED FOR PUBLICATION

G.R. DYNE: Three new species of the Earthworm genus *Plutellus* s. strict. (Megascolecidae : Oligochaeta) from NSW and Queensland.

T.G. VALLANCE: The start of government science in Australia: A.W. Humphrey, His Majesty's Mineralogist in New South Wales, 1803-1812.

ANNUAL GENERAL MEETING will be held on Wednesday 25 March 1981. The Presidential Address will be given by Dr Frank Rowe, of the Australian Museum, who will present "A Brief Review of Australian Echinoderms since H.L. Clark (1946)".

You will receive further notice of the AGM.

RELOCATION OF THE LIBRARY

The problems of the library were reported in Newsletter No.12, March 1979. The Society cannot provide full services and members hardly ever use the library as it is only open on two mornings a week. The main institutional libraries were canvassed as to the possibility of relocating the Society's library on permanent loan. The initial response was favourable, and since that time, the main libraries have assessed their position carefully and made more detailed submissions. Two main points have emerged:

All libraries are facing financial constraints and not one can possibly house the whole of the Society's library. However, some are interested in the sections which are most appropriate to their institution.

The Society's library is a very mixed collection. Some of it is pure Macleayana and would be best deposited in the Macleay Museum. Some is very specialised research material, some general, some archival etc.

The Executive reviewed the situation thoroughly and made the following recommendations:

1. That unless sufficient financial support can be obtained from outside sources the Society will reluctantly be compelled to relocate or dispose of the library.

   Council agreed to notify the N.S.W. Government, the Australian Academy of Science and other interested bodies of the situation and advise them that if assistance is not forthcoming within six months then relocation and dispersal is inevitable.

2. As public institutions, the Australian Museum and the National Herbarium should be given first refusal of parts of the library in which they are interested.

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3. Macleayana should be deposited in the Macleay Museum.

4. The remaining parts should be offered to the Universities of Sydney, New South Wales and Macquarie.

5. Anything remaining should be dispersed at the discretion of the Council.

In these times of escalating cost, the Society must have a clear view of its priorities. The Council considers that publishing and sponsoring research are more important than maintaining a library that is not being fully utilised. By the same token, the institutional libraries which are limited by financial constraints are likely to be even more limited in the assistance they can offer us in the future. The Council feels that this issue must be resolved now, and regrettably, it seems that relocation is the only solution.

The Council welcomes the views of members on this subject.

CHINA EXCHANGE AGREEMENT

The Australian Academy of Science invites applications from individual scientists or groups (up to a maximum of 6) who wish to visit China after June 1981, either for short term (3-4 weeks) fact-finding missions or longer term projects to carry out joint research work or field studies. Preference will be given to projects which come within the interests of the Australian Academies of Science and Technological Sciences and of Academia Sinica. Applications should be in areas of special significance to both countries.

If you are interested, write to the Australian Academy of Science, Box 783, Canberra City, A.C.T. 2601. A report of the first two years operation of the scientific exchange agreement is available from the Academy.

SCIENTIFIC EXCHANGES WITH JAPAN

Applications are invited from scientists wishing to visit Japan in 1981 under the terms of an exchange agreement between the Australian Academy of Science and the Japan Society for the Promotion of Science. The agreement provides for distinguished senior scientists from each country to give lectures and exchange ideas and information with scientists in the host country. The duration of a visit will normally be three weeks.

If you are interested, write to the Australian Academy of Science, P.O. Box 783, Canberra City, A.C.T. 2601.

FIFTH INTERNATIONAL CONGRESS OF PARASITOLOGY

This Congress is sponsored by the Canadian Society of Zoologists, the American Society of Parasitologists and the Canadian Society for Tropical Medicine and International Health. It will be held in Toronto, 7-14 August 1982. If you are interested, contact the Secretary, ICOPA V, Department of Zoology, University of Toronto, Toronto, Ontario M5S 1A1, Canada, for further information.

MEMBERSHIP DRIVE BY AUSTRALIAN CONSERVATION FOUNDATION

The ACF has written to the Society requesting assistance in their membership drive. The ACF has 8,000 members, but they believe that 16,000 members would make more than twice the impact. If you are interested in becoming a member, write to the ACF, 672B Glenferrie Road, Hawthorn, Victoria 3122. Ordinary membership is $15.00 (student/pensioners $7.00) and their journal, Habitat Australia, is $9.00 per year.

AUDIO-VISUAL MATERIAL OF GREAT BARRIER REEF

As part of the Great Barrier Reef Campaign, the ACF has a leaflet on the availability and source of information/audio-visuals/films about the Great Barrier Reef. The film, "The Reef" is an 80 minute feature documentary in colour by John Heyer, sponsored by the ACF, available for private showings only. If you are interested in obtaining this material, contact the ACF, 672B Glenferrie Road, Hawthorn, Victoria, 3122.

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BOOK REVIEW

KOSCIUSKO ALPINE FLORA
A.B. Costin, M. Gray, C.J. Totterdell and D.S. Wimbrush
1979, CSIRO/Collins Australia

Price: $A25.00

The first impressions of this book are the beautiful illustrations, most of them being colour photographs. There are maps and diagrams as well and all together, the illustrations would make up about half the thickness of the book. The text avoids specialist terminology so that it has both scientific and popular appeal. It will be indispensable to both the serious student/researcher and to the amateur who is interested in the flowers.

The first chapters present the general background of geologic, climatic and human history. The alpine environment is defined and compared with other such environments elsewhere in the world. There is a description of the plant communities followed by keys for the identification of the species. Each species is fully described and most of them are accompanied by coloured photographs. A glossary and references are included.

This book would be an excellent companion to anyone visiting the Snowy Mountains in the summer season.

Helene A. Martin.

NEW IDEAS ON UPLIFT OF THE EASTERN HIGHLANDS AND ITS IMPORTANCE TO BIOGEOGRAPHY

Helene A. Martin.

Recently, I attended a conference on the Cainozoic evolution of south eastern Australia, held in Canberra. As a botanist interested in biogeography, I had hoped to update some concepts, particularly on the uplift of the eastern highlands. In classic biogeography, mountains are important either as migratory routes for montane plants and animals, or as barriers to migration of the plains species, so it is important to know when they were formed and if there have been changes.

At the conference, it soon became apparent that there was disagreement about the timing, manner and cause of uplift of the eastern Australian highlands. It would appear that uplift had been going on for most of the Cainozoic, some 50-60 million years, and the accasional earthquake today indicates that movements are still going on. A point of disagreement revolved around whether uplift has been continuous or in a series of steps. Movements may have been going on at different times in different parts of the highlands. The basaltic eruptions are tied in with the uplift and isotopic dating of the basalts has been very important in the timing of uplift.

Uplift is not solely associated with sea floor spreading, for the continental margin is not near an active plate boundary. It appears to be more of a gentle warping of the continental margin. One explanation presented at the conference was that the Dividing Range was formed by doming of the earth's crust in the development of the rift between the Australian continent and the Lord Howe Rise. As the rift widened to eventually create the Tasman Sea, there was a progressive subsidence of the continental margin involving block faulting. Thus the Dividing Range has been pushed gradually and spasmodically westwards by the progressive collapse of the eastern blocks. In this explanation, the Dividing Range has existed from about the Jurassic, some 180 million years, although not in precisely the same place. Though this explanation sounds impressive, other participants at the conference had their reservations about it.

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Erosion has been very slight when comparisons are made with other parts of the world. The geomorphic models of cyclic erosion so commonly accepted in the northern hemisphere are not suited to Australia. In particular, rates of erosion are so low and the time scales so long that landscape evolution can be traced back to the Permian, some 250 million years ago.

What does all this mean to the biogeographer? It means that tectonics have been very slight and small. The eastern highlands have been there, in much the same state as they are today, all through the Tertiary, which was the major period when plants and animals were evolving to their present state. If the land forms were much the same as today, then a climatic gradient parallel to that of today may be implied for the Tertiary. (The plant fossil record also suggests this parallel gradient).

Of much greater importance to the biogeographer is the changing climate. This climatic change is due partly to continental drift, for Australia has moved through some 27° of latitude (from south to north) in the last 50 million years and it is the only continent to have done so in this period. The change is also due to the global change in climate. The great deserts of the world are a relatively recent development in geological time. Australia reached its present degree of aridity some 2½ million years ago, but it probably started a gradual drying-up much earlier. The alpine and sub-alpine climates are also a recent development, being probably no older than 2 million years, the time of the Pleistocene glaciations.

Inland Australia was once dotted with shallow seas and lakes, but these have all disappeared. Lake Eyre was probably the last to go, for it has been a dry salt lake for about 35,000 years. These inland waters were probably extremely important in providing a diversity of habitats. Vertebrate palaeontologists are well aware of their importance, for they are now the fossil sites for many extinct animals.

It is important to understand the changing environment. The evolution of an arid flora requires an arid climate. A number of primitive angiosperms are found in north-east Queensland today, not necessarily because that is where they evolved but because the climate there today is most like the climate in the late Mesozoic and early Tertiary when these angiosperms evolved. Other examples could be quoted. Plants and animals are always constrained by their environmental requirements. It is important that reconstructions of past environments are based on independent evidence (from geology, geomorphology, palaeoclimatology, etc) and not on present distributions in order to avoid criticisms of circular arguments. These reconstructions will give a much firmer base on which to discuss the evolution and past movements of the flora and fauna.

Reference:

The Cainozoic Evolution of Continental South-east Australia. Abstracts of papers presented at a symposium, Canberra, November 1980. Bureau of Mineral Resources, Geology and Geophysics Record 1980/67.

TENTATIVE PROGRAMME FOR 1981

The following events are planned for the programme:

Mr W. Filewood of the School of Botany, University of New South Wales, will talk on New Guinea Birds.

Professor Frank Talbot of the Centre for Environmental Studies, Macquarie University, will talk about his scientific cruise in the Indian Ocean.

A bird banding excursion.

A special dinner in August with members of the Linnean Societies of London and Sweden, who will be in Sydney for the International Botanical Congress, as guests. Dr Jonsell of the Swedish Linnean Society will give the address.

The final arrangements with times and places will be announced in the next Newsletter.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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Phone No. 290.1612

Newsletter No. 20

April 1981

NEW MEMBERS are cordially welcomed:

Dr D.R. Murray, Department of Biology, Wollongong University.

ANNUAL GENERAL MEETING, on 25th March was attended by 15 members with apologies from 8 others.

The Treasurer's Report ended on a happy note with a surplus of about $2,677 for the year. The Chairman reported the year's activities. The highlight was the discovery of a large quantity of back issues of the Proceedings in The Museum of Applied Arts and Sciences who want the storage space cleaned out. The early issues are leather bound, and we will be able to offer almost complete sets for sale. The Science Centre report foreshadowed the registration of the foundation and the start of fund raising activities.

The Presidential Address, entitled "A Brief Review of Australian Echinoderms since H.L. Clark (1946)" was given by Dr Frank Rowe. Echinoderms in Australia are probably the best known of all the marine invertebrates, thanks to the efforts of H.L. Clark. Only 48 new species and some 100 new records have been added to the list of 790 given by Clark. Up to seven geographic regions or provinces around Australia have been described, but if distribution of echinoderms is compared with other areas in the Indo-Pacific, that number of provinces is difficult to sustain. Comparisons of the northern Australian distributions with those in the Indian Ocean, Indonesian - Malaysian and Pacific areas suggest only one tropical region where endemism is relatively low. Some 70% of species are shared with Indonesia. North West Australia (15% endemism) shows affinity with Indian Ocean and North East Australia (14% endemism) with South West Pacific. In contrast, endemism is very high along the southern, particularly the south eastern coasts (nearly 80%) suggesting a discrete region. Interestingly, some remarkable brooding and viviparous echinoderms have recently been discovered on the south east coast of Tasmania, Victoria and South Australia.

FORMATION OF REGIONAL COMMITTEE OF THE I.U.C.N. COMMISSION ON EDUCATION

This regional committee will help give cohesion to the environmental education movement in Australia and provide a linkage with the I.U.C.N. for the large numbers of organisations concerned with environmental education. The I.U.C.N. would benefit directly through the existence of a national organisation which would directly assist I.U.C.N. in achieving its goals. I.U.C.N. - the International Union for Conservation of Nature and Natural Resources is an independent international organisation based in Switzerland and closely affiliated with the World Wildlife Fund. I.U.C.N. works in co-operation with other international agencies such as United Nations Educational, Scientific and Cultural organisation (UNESCO) and the Food and Agricultural Organisation (FAO). I.U.C.N. comprises some 420 voting members, including sovereign states, government agencies and national and International non-governmental organisations.

If you are interested in further information, write to Dr Jones at the University of Tasmania, Hobart, Tasmania, 7000. Enquiries may also be directed to the Secretary, Rod Williams, Assistant Executive Officer, Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland. 4810

PROGRAMME

Wednesday 27th May at 6 p.m.

The Activities Room, Australian Museum

Enter from William Street and enquire at the desk

SPEAKER: Mr Win Filewood
School of Zoology
University of N.S.W.

TOPIC: The Birds of New Guinea

The talk will include both the spectacular birds of paradise and the familiar backyard birds. It will be well illustrated with colour slides and the relationship to the Australian avifauna will be discussed.

Drinks will be served from 5.30 p.m.

Sunday 21st June - North Ryde

Bird Banding Excursion

Meet at the end of Plassey Road, North Ryde. Go along Delhi Road and turn off into Plassey Road, opposite Channel 10, and proceed to the end.

Meeting time: 6.30 a.m. for keen bird banders and those who wish to see the nets set up.

8.00 a.m. for late risers.

The North Ryde bird banding station has been operating for 20 years and some 10,000 birds have been banded there. It is the most important bird banding site in N.S.W. The end of June, at the change of the seasons should be good for birds. All the keen birdwatchers are out before dawn, and late risers will note that the 21st June is also the shortest day of the year. We will finish about lunch time, or when the birds stop coming.

Wednesday 22nd July at 6 p.m.

The Activities Room, Australian Museum

SPEAKER: Professor Frank Talbot
School of Environmental Studies
Macquarie University

TOPIC: Islands of the Indian Ocean: A personal view of their Environment and some thoughts on South Africa.

In July 1979 Professor Talbot, his wife Sue, also a marine biologist and young son Nicky left aboard "Rainbird of Sydney" for a research trip around the eastern seaboard of Australia and across the Indian Ocean to South Africa. Some of the islands they called at included Christmas Island and Cocos-Keeling. They returned to Australia after a few months in South Africa, via the Southern Ocean. In total almost 18,000 miles passed under the keel of "Rainbird of Sydney", a 41 foot steel yacht outfitted as a research vessel.

Drinks will be served from 5.30 p.m.

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DISTINGUISHED CHINESE PALAEONTOLOGISTS VISIT AUSTRALIA

Professor Wu Ru-Kang, Deputy Director of the Institute for Vertebrate Palaeontology and Palaeoanthropology, Peking, will be visiting Sydney and it is hoped that he will give a lecture on 13th or 14th May. His topic would be on recent excavations for and discoveries of Peking Man.

Dr Minchen Chow, one of China's leading palaeontologists and Director of the Institute for Vertebrate Palaeontology and Palaeoanthropology and Deputy Director of the Peking Natural History Museum is visiting Australia. He will give a lecture on "Recent Advances in Vertebrate Palaeontology in China". Dr Chow speaks excellent English, having studied in the U.S.

The recent advances in China include Devonian vertebrates, Permo-Triassic mammal-like reptiles (relevant to Gondwana forms), Mesozoic reptiles (especially dinosaurs and pterosaurs), Mesozoic mammals, Tertiary and Quaternary mammal faunas. His illustrated talk would cover most of the field.

The lecture will probably be Thursday 28th or Friday 29th May.

For further information about both lectures ring the Seminar Committee at the Australian Museum on 339-8111.

LINNEAN SOCIETY OF NEW SOUTH WALES

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Newsletter No. 21

June 1981

NEW MEMBERS

We welcome our new members

Philip Malumo Simbotwe, Research Herpetologist, Livingstone Museum, Zambia.

Dr A.W.D. Larkum, School of Biological Sciences University of Sydney.

Mr H.J. Rueckert, Lord Howe Island.

ELECTION OF OFFICE BEARERS AND STANDING COMMITTEES

The following Council Members were elected

Honorary Treasurer: Dr A. Ritchie

Finance Committee: Dr F.W.E. Rowe, Dr C.N. Smithers

Vice-Presidents: Dr L.A. Moffat, Dr A. Ritchie, Dr F.W.E. Rowe, Mr J.T. Waterhouse

Honorary Editorial Secretary: Professor T.G. Vallance

Assistant Honorary Editorial Secretary: Professor B.D. Webby

P. & E. Committee: Dr M. Archer, Dr L.A.S. Johnson, Mr A.N. Rodd, Dr F.W.E. Rowe, Dr C.N. Smithers, Dr A.J.T. Wright

Programmes & Publicity Committee: Mr L.W.C. Filewood, Dr A. Ritchie, Mr G.R. Phipps

Research Committee: Dr P.M. Martin, Dr C.N. Smithers, Professor B.D. Webby

Newsletter Editor: Mr J.T. Waterhouse

PAPERS ACCEPTED FOR PUBLICATION

P. Mather (Kott): The Ascidians of the reef flats of Fiji

A.J. Mory: A review of early Carboniferous stratigraphy and correlations in the northern Tamworth Belt, N.S.W.

R.W. McLeod: Morphology, distribution and host range of the lucerne race of Ditylenchus dipsaci in New South Wales

E.B. Britton & P.J. Stanbury: Type specimens in the Macleay Museum, University of Sydney. VIII Insects: Beetles (Insecta; Coleoptera)

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RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.00.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30th June* in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary at:

Science Centre, 35-43 Clarence Street, Sydney.

*DEADLINE FOR APPLICATIONS HAS BEEN EXTENDED TO 31ST JULY FOR 1981

HELP REQUIRED

The Society plans to reorganise the secretarial services. At present, these are provided by Science Centre but it cost the Society over $8,000.00 for the year. This money could be used for better purposes, e.g. publishing field guides. In order to effect a saving, we will have to do more work ourselves. There will be some money available for payment, especially for typing. If any member (or member's spouse) could help us, we would be pleased to hear from you. Phone The Secretary on 290-1612, Tuesdays, 10.00 a.m. to 5.00 p.m.

CALL FOR APPLICATIONS TO PETER RANKIN TRUST FUND FOR HERPETOLOGY

Applications are being called for grants-in-aid in the range of $50.00 - $500.00

Applicants must be under 30 years of age and must not already hold a position as a professional biologist. Applications close 15th July 1981. Further information may be obtained from Dr H. Cogger or Dr A. Greer, The Australian Museum, P.O. Box A285, Sydney South, NSW 2000, Phone (02) 339-8249

BICENTENNIAL HISTORY OF AUSTRALIAN SCIENCE

The Australian Academy of Science is proposing to celebrate the bicentenary of Australia in 1988 by publishing one or more volumes on the history of science and applied science in Australia since 1788. The Academy invites the Society or any of its members who may have an interest in these matters to proffer manuscripts for publication or to signify an interest in attending a proposed conference on this subject in August 1982.

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Specifically, the Academy wishes to encourage study in the following areas:

- the influence of Australian natural history on European scientific thought;
- the formation of scientific societies, the professionalisation of science, and the relationship between the scientific community and other parts of society;
- the education, recruitment, and mobility of scientists;
- the changing pattern of support for science, including the relationships between the State departments of agriculture, the universities, CSIRO and scientific societies;
- aspects of the growth of pure research since World War II;
- economic aspects of research, including differences in science for agricultural and manufacturing industries;
- special intellectual currents such as social Darwinism and public health, plant breeding and cytogenetics, biological control and population dynamics, radio transmission and cosmology;
- Australia and Antarctica, the Great Barrier Reef, etc.
- studies of particular scientists and their intellectual environments;
- Australian contributions to international science.

Professor T. Vallance has made a submission on behalf of the Society, and representatives of the Society will be attending the conference in August 1982. If you are interested, contact either Professor Vallance or write direct to Mr P. Vallee, Secretary of the Bicentennial History of Science Committee, Australian Academy of Science, P.O. Box 783, Canberra City, ACT 2601.

P R O G R A M M E

Wednesday 22nd July at 6.00 p.m.

The Activities Room, Australian Museum.

SPEAKER: Professor Frank Talbot,
School of Environmental Studies,
Macquarie University.

TOPIC: Islands of the Indian Ocean: A personal view of their Environment and some thoughts on South Africa.

In July 1979 Professor Talbot, his wife Sue, also a marine biologist and young son Nicky left aboard "Rainbird of Sydney" for a research trip around the eastern seaboard of Australia and across the Indian Ocean to South Africa. Some of the islands they called at included Christmas Island and Cocos-Keeling. They returned to Australia after a few months in South Africa, via the Southern Ocean. In total almost 18,000 miles passed under the keel of "Rainbird of Sydney", a 41 foot steel yacht outfitted as a research vessel.

Drinks will be served from 5.30 p.m.

A JOINT MEETING OF THE LINNEAN SOCIETIES OF LONDON, SWEDEN AND NEW SOUTH WALES

will be held during the International Botanical Congress on Wednesday 26th August 1981.

Dinner will be served in the Macleay Museum at 6.30 p.m., followed by a lecture to be delivered by Dr Bengt Jonsell in the Macleay Lecture Theatre at 8.00 p.m.

TOPIC: Linnaeus and his two circumnavigating apostles.

Dr Jonsell is a former secretary of the Linnean Society of Sweden and a lecturer in botany at the University of Stockholm. The apostles he refers to are Solander and Sparrman; the lecture will be illustrated by slides.

The charge for dinner will be $7.00 per person. Please fill in the coupon below and send it to the Secretary of the Society by 13th July with your money so that catering can be finalised.

LINNEAN SOCIETY OF NEW SOUTH WALES

I wish to attend the dinner at the Macleay Museum on Wednesday 26th August at 6.30 p.m. I enclose cheque/money order for $

NAME: . . . .

ADDRESS: . . . .

No. of GUESTS: . . . . PHONE No. . . . .

TO BE SENT TO: Mrs B.J. Stoddard,
Honorary Secretary,
Linnean Society of New South Wales,
Science Centre,
35-43 Clarence Street,
SYDNEY, N.S.W. 2000

Thursday 8th October at 6.00 p.m.

The Macleay Lecture Theatre, Macleay Building,
Science Road, The University of Sydney.

SPEAKERS: Dr Peter Stanbury, Director of the Macleay Museum and
Mr Graeme Phipps, Ornithologist.

TOPIC: Australia's Animals Discovered.

This is a multiscreen audio-visual about the discovery of our fauna. What were European attitudes towards the strange new animals which were being sent from Australia? What were the first species encountered by Europeans? All of this and more at the lecture.

Drinks will be served from 5.30 p.m.

Everyone welcome.

LINNEAN SOCIETY OF NEW SOUTH WALES

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Newsletter No. 22

October 1981

NEW MEMBERS

We welcome our new members

Mr. M.R. Gray of the Australian Museum, Sydney.

Dr. B.E. Chenhall, Senior tutor in Geology, University of Wollongong.

Mr. W.R. Low Choy, Lecturer in Biology, Darwin Community College, Darwin.

PAPERS ACCEPTED FOR PUBLICATION

J.R.T. Short: The final-instar larvae of two Anomaloninae (Hymenoptera, Ichneumonidae) from Australia.

A.C. Hutton: Pre-Permian geology of the Bullio area, New South Wales.

D.K. McAlpine & D.S. Kent:

Systematics of Tapeigaster (Diptera, Heleomyzidae) with notes on biology and larval morphology.

B.A. Foster: Two new intertidal balanoid barnacles from eastern Australia.

M.A. Schneider: A comparative morphological study of the reproductive systems of some species of Tapeigaster Macquart (Diptera: Heleomyzidae).

D. Shaw, B.K. Cantrell & K.J. Houston:

Neurochaeta inversa McAlpine (Diptera: Neurochaetidae) and seed set in Alocasia macrorrhiza (L.) G. Don (Araceae) in southeast Queensland.

P.A. Hutchings and H.F. Recher:

The fauna of Australian mangroves.

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CONGRATULATIONS TO DR BARBARA PORTER,

Our Linnean MacLeay Fellow who graduated recently. The title of her thesis is "The Structure and Function of Macropodid Salivary Glands".

APPLICATIONS CALLED FOR LINNEAN MACLEAY FELLOWSHIP 1982

Closing date for applications, 30th December and the results will be available by the end of February. Applicants must be a member of the Society. Further information is available from the Secretary, 290-1612 on Tuesdays.

DO WE HAVE YOUR CORRECT ADDRESS?

We would appreciate it if we could use your institutional address, especially if it is on the courier system. Besides savings in postage, we could circumvent the delays due to postal strikes. Please notify the Secretary, 290-1612 on Tuesday or 35 Clarence Street, Sydney if we do not have your correct address.

JOYCE W. VICKERY RESEARCH FUND AWARDS

Mr Anthony Smith, Honours student, School of Zoology, University of New South Wales. The application was made in March for a field trip in May as a matter of urgency. A recent change in departmental policy ruled out all University funding for interstate travel and May was the only time the trip could be made. Amount requested and granted: $464.

His project entails the taxonomic assesment of populations of three small dasyurid marsupials using enzyme electrophoresis. The field trip was to collect specimens from populations in Victoria. Expenditure was less than anticipated and Mr Smith returned $125, which is much appreciated.

REPORT

Nine specimens of *Antechinus minimus*, 2 of *Sminthopsis leucopsis* and 2 of *A. swainii* were collected. The result is especially pleasing as many people consider that A. minimus is scarce and difficult to obtain. Preliminary results of the electrophoresis indicate that even the most recent and not yet published phylogenetic relationships within the *S. leucopsis*/*S. murina* species complex are in need of revision. There is probably at least one unrecognised species of *Sminthopsis* in the group. Mr Smith expects to publish the results.

Mr David Reid, Department of Zoology, James Cook University. Amount requested and granted: $454 to join an interdisciplinary working party in the western Torres Strait Islands.

The Project. The interdisciplinary team is working on a survey and drilling programme of mangrove and reef flats. Mr Reid will pay particular attention to the molluscs of the sedimentary facies. This is of value for an interpretation of Holocene deposits and in relation to archaeological sites which consist of edible molluscs. The second purpose of the visit is to continue Mr Reid's own study of the ecology of molluscs in mangrove swamps and in particular of the mangrove snail *Littorina scabra*.

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REPORT

The molluscan species in shell fragments of fossil and contemporary beach rock are closely similar to each other and to those of shells being washed up on the beach. Collections were made in nearby habitats of reef flat (40 species) seagrass lagoon (31 spp) rocky shore (15 pp) and mangrove swamp (15 spp). Three middens yielded some 28 species. The most abundant species would have been obtained from lagoons, shallow reefs, mangrove swamps and sandy beaches. As part of Mr Reid's special interests, five mangrove areas were visited. The low number of species collected is a reflection of the impoverished flora that provided the habitat

Mr Keith Holmes, Farmer and Grazier of Wellington and Honorary Research Fellow, Geology Department, University of New England. Amount requested and granted: $335 for travel to Brisbane to examine material and type specimens.

The Project. The fossil plants from the Basin Creek Formation at Nymboida, N.S.W. need taxonomic descriptions. This is the richest and most diverse fossil flora of Midde Triassic age from Australia and many forms are undescribed. Fossil plants of similar age are found in various places in Queensland and type specimens are housed in Brisbane. The Queensland specimens must be compared with those from Nymboida

SUBMISSION ON THE PRESERVATION OF SOUTH-WEST TASMANIA

The Society received a request from the Tasmanian Wilderness Society to sign and return prepared form letters on this topic. However, the Council decided that the preservation of Southwest Tasmania is such an important matter that the Council should make its own submission. The following is a copy of the declaration submitted.

DECLARATION ON SOUTH-WEST TASMANIA

The Linnean Society of N.S.W. strongly supports the preservation of the South-West Tasmanian wilderness because of its world-wide scientific interest, and the Society therefore opposes any further encroachment for purposes such as hydro-electric schemes, forestry and mineral exploitation.

The Society agrees with the International Union for the Conservation of Nature and Natural Resources that South-West Tasmania is of international importance as a Southern Hemisphere temperate widerness which should be preserved as such.

The Society considers that the Tasmanian temperate vegetation is of world-wide significance because it contains:

* abundant endemic species of plants and animals. Many of the plants have affinities with the vegetation of Gondwanaland, the ancient former Southern Hemisphere supercontinent.

* temperate rainforests which are extremely rare in the Southern Hemisphere. The Tasmanian examples can only be compared with those in New Zealand and Southern South America, but the species composition is unique in each of these three areas.

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* living plants which preserve in their wood a record of some 2000 years of environmental history, particularly of past climate and fire. Wood of dead trees extends this record even further into the past.

South-West Tasmania is the region in which these diverse and unique attributes still exist undisturbed in an area large enough to safeguard their survival.

The Society strongly urges that a full, open, independent and expert Federal-State inquiry into the future of South-West Tasmania be initiated as a matter of urgency.

Terms of reference of the inquiry should include:

* environmental and scientific values of South-West Tasmania to Australia and the world.

* future energy needs of Tasmania and energy options available to Tasmania outside the South-West.

* federal response to assist Tasmania to preserve its wilderness areas of national and international importance.

In summary, the Society consider that South-West Tasmania, in its entirety, as listed on the Register of the National Estate, should be declared a national park to be held inviolate for all time.

WINNERS OF SCIENCE CENTRE SWEEPSTAKE

The Qantas prize was won by Dr John Yeo, Director of the Spinal Injuries Unit at the Royal North Shore Hospital. Dr Yeo, in collaboration with Mr Robert Bosshard, an engineer, has devised a low cost, do-it-yourself wheelchair for third world countries. The wheelchair is made out of bicycle wheels, plastic tubing and other readily obtainable materials. Dr. Yeo will use the prize for a trip to New Caledonia for himself and Mr Bosshard, who is fluent in french, to demonstrate the wheelchair and teach the people how to make the wheelchair. Congratulations to Dr Yeo.

The TAA prize was won by Dr G.R. Meyer of Macquarie University and a member of the Linnean Society. Congratulations to Dr Meyer.

PROGRAMME

Sunday 22nd November

EXCURSION TO BLACKHEATH

LEADER: Dr Don Adamson,
School of Biological Sciences,
Macquarie University.

IF TRAVELLING BY TRAIN: Catch the 8.10am train from Country Platforms. You will arrive at Blackheath about 10.30 and transport will be waiting. Return transport to the station is guaranteed, either for the 4.28 or 6.11pm train from Blackheath, but you may get a ride back with someone.

IF TRAVELLING BY CAR: Leave cars in Evans Lookout parking area and meet at Evans Lookout itself at 11am for a 11.15am departure.

Children are welcome but toddlers will need to be watched closely in one or two areas where there are cliffs.

This excursion covers the area that Dr Don Adamson discussed in his talk "Biology and Geomorphology of a Blue Mountain Valley, the Grand Canyon, Blackheath" in the Linnean Society programme, November of last year.

The Walk is circular, from Evan's Lookout along the Grand Canyon, through Neat's Glen and return. It is a comfortable day's walk but involves climbing steps to get back out of the canyon. Detailed notes and diagrams will be available to cover the walk which passes through spectacular scenery and very diverse vegetation, including ferneries and rainforest.

Bring lunch - food and drink. The creek water should not be drunk.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

EDITOR: Mr J.T. Waterhouse
University of New South Wales,
P.O. Box 1,
KENSINGTON, NSW 2033.

Office Hours: Tuesdays from 9.30 a.m. - 5.00 p.m.

Library Hours: Monday & Wednesday mornings from 9.00 a.m. - 1.00 p.m.

Telephone: 290 1612

Newsletter No: 23 December 1981

PAPERS ACCEPTED FOR PUBLICATION

D.T. Anderson: Origins and relationships among the animal phyla.

R. Ford: A short note on T.G. Vallance's paper on A.W.H. Humphrey.

C.J. Jenkins: Late Pridolean graptolites from the Elmside formation near Yass, New South Wales.

C.J. Jenkins: Darriwilian (mid-Ordovician) graptolites from the Monaro Trough sequence, east of Braidwood, New South Wales.

C.McA. Powell *et al.*: Timing of deformation indicated by late Cambrian (Idamean) fossils in the Cupala Creek formation, north western New South Wales.

JOYCE W. VICKERY RESEARCH FUND GRANT REPORT

Dr S.K. Roy, Reader in Botany, University of Varanasi (Banaras) India was the first recipient of a grant. Dr Roy spent nine months in 1976-77 working on the cytotaxonomy of ferns with Dr Mary Tindale. He returned in September 1979, with a grant from the India/Australia Science and Technology Agreement to complete the project. The grant expired in April 1980, but Dr Roy required another month to complete the project. The Society granted his request for $300 sustenance.

REPORT:

A cytotaxonomic survey of the Australian Pteridophyta consisting of 468 chromosome counts of 247 species was completed in June 1980. Many species were examined cytologically for the first time. Diploids represented 51% of the counts and polyploids 49%.

New base numbers were found in 13 genera. Special attention was given to the Adiantaceae, Cyatheaceae, Hymenophyllaceae, Lindsaeaceae and

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Marsilaceae. A number of new species complexes were found and further chromosome counts added to intercontinental species complexes. Several forms of reproductive apomixes were discovered and endemism and hybridity amongst them was investigated.

A paper on this work was presented by Dr Tindale at the International Botanical Congress and it will be published in "Telopia".

52nd ANZAAS CONGRESS, MAY 1982, MACQUARIE UNIVERSITY, SYDNEY.

Some of the symposia and themes are:

Marine mammals,
Antarctic marine biology,
Fecundity and dispersal, their ecological consequences,
Reptile ecology,
Forest ecology,
Management of urban bushland,
Coastal zone management,
Maintaning a natural ecosystem in the Australian industrialised future,
Revegetating mined lands,
Plant and animal extinctions,
Disentangling human and climatic influences,
Influence of fire on modern and prehistoric biota,

For the second circular, write to:

The Hon. Organising Secretary,
52nd ANZAAS Congress,
Macquarie University,
NORTH RYDE 2113.

EDITING IN A CHANGING ENVIRONMENT:

A workshop for editors of scientific, technical and medical journals, 11-15 July 1982, at Clyde Cameron College, Wondonga. For further information write to:

Department of Continuing Education,
University of New England,
ARMIDALE 2351.

MEMBERSHIP LIST

Titles and degrees of members are those supplied to the Society. If there are any errors, please let us know.

LINNEAN SOCIETY DINNER

7.30 p.m. Wednesday 17 February 1982, at Mr Fogg's Restaurant,
35 Clarence Street, Sydney. Cost $16.

The Council would be pleased to meet members, their spouses and friends, at an informal dinner. Please make bookings by February 5.

The Secretary,
Linnean Society of New South Wales,
35 Clarence Street,
Sydney, 2000. Telephone 290 1612 (Tuesday)

I require .... tickets at $16 each for the dinner, February 17.

Cheque for .... enclosed.

Name ....

Address ....

LINNEAN SOCIETY OF NEW SOUTH WALES

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Telephone: 290 1612

Newsletter No :24 April 1982

NEW MEMBER : We welcome Dr B.C. Russell, Curator of Fishes, Northern Territory Museum.

PAPERS ACCEPTED FOR PUBLICATION

M.R. Gray: The taxonomy of the semi-communal spiders commonly referred to the species Ixeuticus candidus (L. Koch) with notes on the genera Phryganoporus, Ixeuticus and Badumna (Araneae, Amaurobioidea).

C.J. Jenkins: Darriwilian (mid-Ordovician) graptolites from the Monaro Trough sequence, east of Braidwood, N.S.W.

A.W.D. Larkum & R.J. West: Stability, depletion and restoration of seagrass beds.

P.A. Hutchings: The fauna of Australian seagrass beds.

R.J. West & A.W.D. Larkum: Seagrass primary production - a review.

THE ANNUAL GENERAL MEETING was held in the Activities Room, the Australian Museum at 7.30p.m. on Wednesday 31 March 1982. A full report of the AGM will be published in the Proceedings but members might like to note the following:

The President, Dr Martin, was in the Chair and 28 members and friends attended. Apologies were received from 8 members.

The Hon. Treasurer's report showed that the Society's finances are satisfactory. A saving in running costs is especially due to the editorial activities of Prof. Vallance. Members should note that as a result of the bequest of the late Dr Joyce Vickery, the Joyce Vickery Research Fund Account now has assets of some $53,000.

The President delivered a presidential address entitled "A natural history of the Lachlan River Valley". The President attempted to reconstruct the geological and botanical history of the Lachlan River Valley from Cowra to West of Hillston, as shown by palynological data provided by numerous bores sunk by the Water Resources Commission of New South Wales. These bores give a stratigraphic range from late Eocene in the deepest part of the valley west of Hillston to Pliocene and Pleistocene near Cowra. The former strata contain abundant Nothofagus pollen (Southern beeches). These were replaced by floras with abundant Myrtaceae (the eucalypt family) and in the Pleistocene abundant Compositae (daisies) and Gramineae (grasses). These changes are consistent with the hypothesis of a progressively drier climate. The narrow

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valleyed tributaries to the upstream part of the Lachlan River may have been refuges for some rainforest elements in the Pliocene.

Two new Council Members filling casual vacancies were welcomed: Mr Allen Andrews, Chief Engineer, MWS & DB and Dr Richard Facer, University of Wollongong.

Members declared elected to Council at the AGM, as recommended by Council, are:

Dr A.J.T. Wright, President
Dr D.A. Adamson
Dr C.N. Smithers
Dr H.A. Martin
Dr A. Ritchie

A vote thanks to the retiring President was proposed by Dr Ritchie.

ENVIRONMENTAL MATTERS

1. South West Tasmania

Our Secretary is receiving replies to the Society's declaration concerning the wilderness area of South West Tasmania (see Linn Soc News No. 22). The replies so far are:

a) Indicating support: International Union for Conservation of Nature and Natural Resources, Gland, Switzerland. This Union has already sent a detailed note of opposition to damming of the south west rivers to both the Tasmanian Premier and the Australian Prime Minister.

Deputy Leader of the Australian Democrats (Senator C.V.J. Mason) Parliament of Australia.

Shadow Minister for Environment and Conservation (Mr Stewart West), Parliament of Australia. A background paper prepared by Mr West was enclosed.

b) Awaiting reports or considerations of recommendations thereof of Parliamentary Committees Minister for Home Affairs and Environment (Mr Ian Wilson), Parliament of Australia. "The Commonwealth Government... believes that decisions on the development of South West Tasmania are primarily the responsibility of the Tasmanian Government. [However] the Commonwealth has consistently maintained that it is prepared to assist the Tasmanian Government to establish a national part of world significance in the South West; [and the Commonwealth] has listed the South West in the Register of Nationals Estate".

c) Receiving and noting our declaration

The Royal Society of Tasmania, Hobart.

Minister for Science and Technology (Mr David Thomson), Parliament of Australia. "... this matter is no longer my Ministerial responsibility..."

d) Receiving and noting our declaration but still supporting dams.

Leader of the Opposition (Mr Robin Gray), Parliament House, Hobart. "... the Liberal Party is convinced... that the Gordon below Franklin scheme should be developed."

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2. Rainforests

The Council submitted a declaration of its views to the state cabinet committee which is currently deciding questions of rainforest conservation in New South Wales. The declaration was also sent to all other relevant parties.

DECLARATION ON AUSTRALIAN FAINFORESTS AND RELATED VEGETATION

The Linnean Society of New South Wales for biological reasons strongly supports the preservation of the full range of Australian rainforests and of dry seasonal rainforests and related woodlands. The Society therefore opposes those activities and land-use practices that endanger the continued existence of any vegetation type within the full range of Australian rainforests and dry seasonal vegetation related to them.

The Society agrees with the resolution of the XIIIth International Botanical Congress held in Sydney in August, 1981, concerning the benefits to man of rainforests as a valuable reservoir of useful plants and as a living part of the world's heritage, drawing attention to the current rate of disappearance of rainforest and the high rate of extinction of species should this continue, and urging governments throughout the world to make rainforest conservation a matter of priority (Resolution 12 of XIII IBC). Furthermore, the Society shares the concern about dry seasonal rainforests expressed in the letter of 8th September, 1981, from Professor Sir Rutherford Robertson, A.C., C.M.G., F.A.A., FRS., President of the XIIIth International Botanical Congress, forwarding the Congress' resolution on rainforests to the Right Honourable Malcolm Fraser, Prime Minister of Australia. The Prime Minister's attention was drawn to the urgent need for a strategy for the immediate survey and conservation of remaining areas of dry seasonal rainforests which contain species of great antiquity, are of high biological value and whose continued existence is understood to be threatened by current systems of land management. The Society endorses this, and holds that the same urgent need for a strategy of survey and conservation applies for similar reasons to the full range of Australian rainforests and related forms of vegetation.

The Society considers that the range of Australian rainforests and related forms of vegetation includes:

- temperate rainforests of various types occurring in parts of Tasmania, Victoria and New South Wales. Some of these rainforesta are the only habitats of plants such as the antarctic beeches and a number of cool temperate conifers which appear to have changed relatively little since they were part of the vegetation of Gondwanaland, the ancient former supercontinent in the Southern Hemisphere.

- various types of tropical rainforests occurring in parts of eastern Queensland and of subtropical rainforests occurring parts of south-eastern Queensland and eastern New South Wales. Most of these rainforests have far larger numbers of species in their canopies than do forests of any other type in Australia. Some of them are the only habitats of a number of endemic flowering plants including some primitive species with no known close relatives elsewhere in the world. Some of them contain significant stands of araucarian conifers. The tropical and subtropical rainforests of Australia's eastern coast contain a remarkable mixture of species derived from the tropics, from Gondwanaland, and from plants that have apparently evolved rapidly in Australia since it separated from Antarctica. Extensive areas of these tropical and subtropical rainforests have been cleared or have had their population structure altered by logging and other human activities since European settlement.

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- various types of dry seasonal vegetation related to rainforest, occurring in patches from Queensland across coastal regions of northern Australia to the Kimberleys. They range in form from closed vine thickets to scattered trees and also range greatly in their species composition. Several of the species occurring in them have strong affinities with closely related species in other parts of the world that with Australia also made up the ancient southern supercontinent of Gondwanaland, for instance the baobabs of central Africa and those of the southern Kimberleys. Many of these types of vegetation contain important food plants for Aborigines. The range of these types of dry seasonal vegetation related to rainforest includes those known variously as 'monsoon forest', 'softwood scrub'. 'Araucarian vine thicket', 'semi-evergreen vine thicket', 'semi-deciduous vine thicket'.

- the native forests of islands in the Tasman Sea. Both Lord Howe Island and Norfolk have forests which contain numbers of endemic species of plants and animals. Those of Norfolk Island have particularly suffered from clearance and the invasion of weedy exotic plants. The remaining endemic flora and fauna of both islands are a scientific resource of great significance, and deserve most stringent measures in their conservation. In the case of Norfolk Island the need is desperately urgent.

  the remaining native forests of Christmas Island which are Malaysian in type but contain some endemic species of plants and animals including land-crabs. These forests are under threat from phosphate-mining and other developments.

The Society emphasizes that the continued existence of the full range of Australian rainforests and related forms of vegetation together with their fauna is threatened in a wide variety of ways which include:

- logging. Compared with many commercially exploited eucalypt and cypress pine forests, rainforests regenerate much more slowly. Indeed, some of them may not recover at all from certain forms of logging. Further, logging in any form destroys the population structure and disturbs the species composition of the forest, and hence destroys information about natural forest regeneration from episodic natural damage such as storms and landslips. Preservation of these forest types in the long term depends on a good knowledge of their population dynamics, information that can only be obtained in the absence of all forms of logging. Rainforests and related forms of vegetation are also damaged by logging around their periphery, as a result of tree-fall, canopy disturbance, road construction, and bulldozer access.

- clearance for agricultural purposes or other types of development.

- inappropriate fire regimes.

- grazing, browsing, rooting and/or trampling of domestic stock and feral grazing animals, e.g., cattle, pigs, buffalo.

- invasion of exotic weeds.

- domestic and feral predators.

The Society strongly urges all governments and citizens in Australia to pursue a strategy for the immediate survey and conservation of the full range of remaining Australian rainforests and related dry seasonal types of vegetation.

3. Great Barrier Reef

The Council has received a request for uses of the Great Barrier Reef Marine Park to report sightings of Crown of Thorns starfish to the Great Barrier Reef Marine Park Authority.

MEETING OF SCIENTIFIC SOCIETIES

The Australian Academy of Science held its second meeting for representatives of scientific societies on 25th February. Our President Dr Helene Martin attended the meeting. The meeting discussed inter-relationships between the societies, their problems and ways in which they and the Academy can complement and support one another more effectively. Some eighty societies were represented and a lively and useful discussion resulted.

DANIEL SOLANDER

This year is the 200th anniversay of the death of Daniel Solander the Swedish naturalist who accompanied Captian Cook on his voyage of discovery in the "Endeavour". The Linnean Society of Sweden had brought to our attention during the International Botanical Congress XIII at Sydney in August, 1981 that this anniversary would be coinciding with the visit to Australia of His Majesty King Carl XVI Gustav of Sweden, and that His Majesty was interested in cultural activities as well as the Swedish Trade Exhibition. As a result of this happy coincidence, the Royal Botanic Gardens and Domain Trust decided to construct a memorial garden to Daniel Solander, and the Macleay Museum of the University of Sydney organised a special exhibition entitled "My Dear Friend Daniel Solander".

The memorial garden at the Royal Botanic Gardens was dedicated on Wednesday 31st March by His Majesty King Carl Gustav at a gathering to which the Gardens Trust invited members of Council to attend. Our President, Dr Helene Martin was invited to make a short speech. In pleasant surroundings and sunny weather the King unveiled a bust of the Swedith naturalist which was supported by granite boulders set in a garden planted with Australian species collected by Solander on Cook's voyage. The memorial garden is in the south east corner of the Gardens just west of the National Herbarium.

The Exhibition at the Macleay Museum was opened by the Princess Christina of Sweden on Thursday 1st April at a late afternoon gathering to which many members of the Linnean Society were invited.

PUBLICATIONS OF THE LINNEAN SOCIETY (OF LONDON) FOR SALE

Mrs E. Rayner wishes to sell the journals which belonged to her late husband, who was a Fellow of the Linnean Society of London. The collection dates from 1947 to the present although some are missing so it is not a complete set. If you wish to purchase any of these publications, contact Mrs Rayner on 523.7011.

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 5 MAY — 5.30 P.M. for 6 P.M.

In the Edgeworth David Theatre, Department of Geology & Geophysics, University of Sydney.

Parking is available along Codrington and Alma Streets (enter from City Road) then walk across the footbridge.

SPEAKER : Professor A.C. LENZ,
Department of Geology,
University of Western Ontario.

TOPIC : LOWER PALEOZOIC GEOLOGY AND SCENERY OF NORTHERN CANADA.

OR

SUMMER DOES COME TO NORTHERN CANADA.

Drinks will be served from 5.30 and the lecture will start at 6 p.m.
An informal dinner will be arranged for afterwards.

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.00.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary at:
SCIENCE CENTRE, 35-43 CLARENCE STREET, SYDNEY. 290.1612 (Tues. only)

LINNEAN SOCIETY OF NEW SOUTH WALES

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Newsletter No. 25 : July 1982

RESIGNATION OF LIBRARIAN: We regret that Mrs Pauline Mills, our Librarian has resigned. The Council wishes to express its appreciation of Mrs Mills' service. The Library will now be closed, but any enquiries may be directed to Mrs Stoddard, the Secretary, on Tuesdays.

NEW MEMBERS: We welcome
Dr D.S. Horning Jr., Macleay Museum.
Dr Deedee Woodside, School of Zoology, University of New South Wales.
Miss H.M. Holmes of Wellington.

THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES is conducting a weekend workshop for amateur entomologists and collectors on the weekend of 25-26 September 1982 at the Sydney University. There will be lectures and demonstrations on a number of topics. Collections, literature and equipment will be demonstrated. A fee of about $5 to $10 will be charged to cover expenses. Participants need not be members of the Society. For further information and a registration form, contact:

Harley Rose,
Dept. of Plant Path. and Agric. Entomology,
Agriculture Faculty,
University of Sydney,
NSW 2006

Telephone: (business hours)
692 2528 or 692 2531

FIFTIETH ANNIVERSARY OF THE NORTH QUEENSLAND NATURALISTS CLUB. Celebrations are planned for the 21 August, with a dinner and an address by a guest speaker. If you are interested, write to the North Queensland Naturalists' Club, P.O. Box 991, Cairns 4870.

EGYPT'S NATIONAL CONFERENCE OF ENTOMOLOGY, organised by the Entomological Society of Egypt will be held in Cairo, December 6-9, 1982. For further information, write to The Secretariat, Egypt's National Conference of Entomology, Entomological Society of Egypt, 14 Ramses Street, P.O. Box 430, Cairo, Egypt.

ORIGINS AND RELATIONSHIPS OF LOWER INVERTEBRATES: A meeting organised by the Systematics Association will be held on the 7-9 September 1983. For further information, write to Dr S. Conway, Department Earth Sciences, The Open University, Milton Keynes, MK7 6AA England.

BOOK REVIEW

Rogers, R. 1981 The Genera of Australian Lichens. University of Queensland Press pp 124.

The variety and beauty of lichens, those mysterious of all plants, each a "tightly integrated biological community" (Rogers 1981) fascinate many. The soft and delicate structures when moist contrast markedly with their rigidity when dry. My approach to reviewing this book is that of a botanist but an amateur as regards identification of lichens. This lack of my knowledge reflects in part the poor state of understanding of the taxonomy of this group when I was an undergraduate and indeed until fairly recently.

Rogers has contributed already, as joint author Lichens of South Australia, to the first comprehensive account for any state. The present book is the first to describe all known genera in Australia. The book contains artificial keys (to sterile material where possible), a glossary of terms, chemical index and comprehensive reference lists (including regional floras and reports on genera). The introduction states briefly the nature of lichens, important sources of information, notes on the use of the keys as well as an outline of lichen classification. Seven separate keys are provided, each for a major lichen group, Fruticose, Foliose etc. As the book is aimed primarily at the professional botanist some basic knowledge of the differences between these groups is assumed. A simple statement of the characteristics of each (as in Lichens of South Australia p 10) or a key to the seven groups might have extended the usefulness of the book to beginners as well.

Individual descriptions of genera are well organised and give details of morphology, chemistry, identity of the phycobiont and distribution. The inclusion of chemical characteristics is essential for correct diagnosis of many genera. Hidden in the descriptions is much useful information which shows the depth of research undertaken in preparing them. The analysis of distribution includes ecological preferences, and estimated species numbers both intra- and extra-Australian. Of the 184 genera listed, 58 have a single species and only 48 have more than 10 species in Australia. The commonest genera are *Lecanora* (70 spp.) and *Lecidea* (87 spp.). Illustrations are limited to some basic diagrams, mainly of reproductive structures which are referred to in the glossary of terms.

The book is an important resource for studies of lichens and is hopefully the forerunner to a comprehensive account of sub-tropical species or indeed an Australia-wide lichen flora.

H.P. Ramsay.

MACLEAY MEMORIAL LECTURE

WEDNESDAY SEPTEMBER 8: 6.30 p.m. in the Hallstrom Theatre, Australian Museum. Enter from William Street and enquire at the desk

SPEAKER: Dr L.J. WEBB, School of Environmental Studies, Griffith University.

TOPIC: ECOLOGICAL VALUES OF THE TROPICAL RAINFOREST RESOURCE

The definition of Ecology is enlarged to include not only the traditional values of production and protection but also various forms of recreational or cultural values. Many of these have not been closely identified and are not quantifiable but are assuming great importance both nationally and internationally in world tropics and sub-tropics.

DRINKS will be served from 6 p.m. in the Education Foyer, adjacent to the Hallstrom Theatre.

THE LECTURE will start at 6.30 p.m.

A DINNER will start at 8.00 p.m. in the Museum Cafeteria. Please book for the dinner by Tuesday 24 August.

EVERYONE WELCOME

The Secretary,
Linnean Society of New South Wales,
Science Centre,
35-43 Clarence Street,
SYDNEY 2000.

Telephone: 290 1612
(Tuesdays only)

I wish to make .... bookings for the Macleay Memorial dinner. Cost $8 per person. Please find enclosed a cheque for $ ....

Name ....
Address ....

PLEASE MAKE BOOKINGS FOR THE DINNER BY 24 AUGUST

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

EDITOR: Mr J.T. Waterhouse, University of New South Wales, P.O. Box 1, KENSINGTON. NSW 2033

Office Hours: Tuesdays from 9.30am - 500pm

Telephone: 290 1612

Newsletter No. 26 : October 1982

PAPERS ACCEPTED FOR PUBLICATION

P.F. Carr: A reappraisal of the stratigraphy of the Upper Shoalhaven Group and Lower Illawarra Coal Measures, Southern Sydney Basin, N.S.W.

W.B.K. Holmes, F.M. Holmes and H.A. Martin: Fossil *Eucalyptus* remains from the Middle Miocene Chalk Mountain Formation, Warrumbungle Mountains, N.S.W.

I.A. Watson and C.N.A. de Sousa: Long distance transport of spores of *Puccinia graminis tritici* in the southern hemisphere.

JOYCE W. VICKERY RESEARCH FUND: Twenty applications were received, most of a high calibre. Unfortunately, the money available was quite insufficient to fund all of the worthy applicants.

The applications raised some points not foreseen. Private vehicles used for field trips were budgeted at the institutional rate. The Council decided that the fund could not support this, so only out-of-pocket expenses for the use of private behicles will be paid. Sometimes the hire of vehicles or special vehicles are needed, and the Council will consider such requests on their merits if a good case is made out as to why such vehicles are necessary.

When a detailed budget is requested, it means just that. Some applications did not contain details. Some projects were so large and general that they could not possibly be accomplished for $500, the maximum normally considered. In such cases, a small project within a larger project should be defined.

Because donations to the fund are tax deductible, we are bound by the ruling of the Taxation Commissioner. The fund must be used for research. This rules out anything, such as conference expenses, which is not strictly research. The Society is keeping complete records of the fund, for it may be called to account for its activities by the Taxation Commissioner. Successful applicants are reminded that a report on the completion of their project is required, including details of all expenditure.

We congratulate the following applicants:

C.J. JENKINS, Lecturer, Geology, James Cook University, $225.
Project: Stratigraphically orientated mapping of the Wagonga Beds.
Following the discovery of graptolite faunas and fossiliferous limestone in the largely unfossiliferous Wagonga Beds, re-mapping in the light of this important new evidence is required.

K.M. MOORE, a retired entomologist, Yeppoon, Queensland, $265.
Project: Investigation of *Glyaspis* spp. on *Eucalyptus raveretiana* and *E. howittiana*.

These two eucalypt species have a very restricted distribution between Nebo and MacKay and west of Ingham, Queensland, respectively. They may be threatened in the future. *Glycaspis* spp. have previously indicated the affinities of various eucalypt species. Lerps and female *Glycaspis* spp. have been found on these species but males are necessary for species determination.

M.S. MOULDS, Part-time school-teacher, Waitara, $336.60
Project: The revision of some genera of cicadas.

Important collections of cicadas, including type specimens are housed in Melbourne and Adelaide. They must be examined for revision of the genera.

D.R. MURRAY, Lecturer, Biology, University of Wollongong, $227
Project: Comparative studies of seed proteins in *Acacia* spp.

The applicant formerly held grants but is now left with no support to finish the project. The request is for materials and some part time assistance, for the proteins must be extracted and run on the electrophoresis gels immediately and it is not possible for one person to do this.

J.R. OVENDEN, MSc. student, Zoology, University of New South Wales, $547
Project: Origins and specific status of rosellas.

There are taxonomic problems, e.g. the supposed hybrid origin of the Adeliade rosellas and the uncertain relationship of the Tasmanian green rosella which have not been previously investigated. The grant will be used for a collecting trip to the Northern Territory to complete the collection of rosellas. Frozen tissue samples will be used for isozyme electrophoresis and mitochondrial DNA required to establish the relationship of all the different forms of rosellas.

J.A. WEBSTER, Honours Student, Prehistory, Sydney University, $434.
Project: Analysis and interpretation of faunal material in two central Australian archaeological sites.

The collection of faunal material from one site is housed in Perth. This material must be examined. The applicant holds a Grant-in-aid: Anthropology from the Australian Museum.

K.P. APLIN, PhD student, Zoology, University of New South Wales, $324
Project: Inter-relationships of kangaroos, possums, bandicoots etc.

T.F. FLANNERY, PhD student, Zoology, University of New South Wales, $324
Project: Relationships and evolution of living and extinct kangaroos.

S. VAN DYCK, Museum Technician, Queensland Museum, $648
Project: Mammals: *Antechinus* and other primitive genera.

Aplin and Flannery made a collecting trip to New Guinea to obtain tissues for cytogenetic analysis which is necessary for phylogenetic studies. The tissues had to be maintained under liquid nitrogen refrigeration, and this was the first time it was done successfully under logistically difficult field conditions such as New Guinea. They also established contacts and obtained support from New Guinea institutions and people. The request is for a further collecting trip.

New Guinea is undoubtedly important to many problems in the study of the Australian flora and fauna. These applicants seek clarification of systematic and biogeographical uncertainties associated with Australian marsupials in the New Guinea fauna. They will be collecting material for colleagues not accompanying them on this field trip.

INTERNATIONAL POLYCHAETE CONFERENCE: The Australian Museum, Sydney, 4-9 July, 1983. If you are interested in further information, contact Dr Pat Hutchings, The Australian Museum, 6-8 College Street, Sydney for information and a provisional programme.

ANNOUNCEMENT OF COMPETITION: The Institute of Agricultural Entomology, Faculty of Agriculture, University of Naples, Portico established the Filippo Silvestri Foundation to honour the memory of Prof. Silvestri. The Foundation announces a competition for three prizes to scientific work or set of works concerning agricultural entomology, with particular consideration for papers on biological control, published from July 1st, 1980 to June 30th, 1982. The papers will be evaluated by an international commission of experts. The winners will be awarded:

1) a first prize of 1,000,000 It. Lire, a gold medal and a diploma of merit.
2) a second prize of a gold medal and a diploma of merit.
3) a third prize of a diploma of merit.

Applications should be addressed to "Presidenza della Fondazione Filippo Silvestri presso l'Istituto di Entomotogia Agraria, via Universita 100-80055 PORTICI (Na)" from 1st July to 31st December, 1982. Each application must include six copies of the paper or set of papers to be considered for the competition.

BOOK REVIEW: A Field Guide to the Common Shelled Molluscs of New South Wales Estuaries by K. Robinson & P. Gibbs. Published by the Coast and Wetlands Society, Sydney, 1982.

This booklet is a welcome addition to the range of identification handbooks already available. It covers the majority of the larger estuarine shelled molluscs found in New South Wales and includes several of the commoner, small species. The taxonomy employed is up-to-date and identification should be relatively easy given the excellent photographs used to illustrate many of the species. The accurate identification of juveniles is still likely to be a problem however, and naming small and minute species will continue to be difficult. The drawings used are, unfortunately, not of good quality and will hamper the determination of the identity of the species so illustrated.

No other book had adequately covered the fauna dealt with by this handbook and it should be considered an essential addition to the library of any institution or person with an interest in the animals of coastal wetlands.

W.F. PONDER

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

EDITOR: Mr J.T. Waterhouse, University of New South Wales, P.O. Box 1, KENSINGTON. NSW 2033

Office Hours: Tuesdays from 9.30am - 500pm

Telephone: 260.1612

NEWSLETTER No. 27 DECEMBER – 1982

NEW MEMBERS. We welcome

Miss R.M. Stafford, Kuring-gai College of Advanced Education
Dr R.J. King, School of Botany, University of New South Wales
Mr Chan Yoon Fong, Director of the Professional Centre, Singapore
Mr D.E. Warden, Speleologist of Baulkham Hills
Dr V.R. Bejsak, University of Sydney
Mr R.A.L. Osborne, Department Geology, University of Sydney.

MANUSCRIPTS ACCEPTED FOR PUBLICATION

M.R. Gray: A new genus of spiders of the subfamily Metaltellinae (Araneae, Amaurobioidea) from south eastern Australia.
D.E. Shaw & B.K. Cantrell: A study of the pollination of Alocasia macrorrhiza (Araceae) in Southeast Queensland.
J. Kuo: The Biology of seagrasses.
D.R. Selkirk, P.M. Selkirk and K. Griffin: Palynological evidence for Holocene environmental change and uplift on Wireless Hill, Macquarie Island.
P.M. Selkirk, A.B. Costin, R.D. Seppelt and J.J. Scott: Rabbits, vegetation and erosion on Macquarie Island.
L.J. Webb: Ecological values of the tropical rainforest resource (MacLeay Memorial Lecture)

CONGRATULATIONS TO OUR SECRETARY,

Mrs Barbara Stoddard who has been elected President of the New South Wales branch of the Australian Federation of University Women.

AUTHORS PLEASE NOTE

It is important to consult a recent issue of the Proceedings and submit your manuscript in the same format. This applies especially to the references. If your manuscript is in some other format, the Honorary Editor must change it and this means a lot of extra and unnecessary work for him. Manuscripts not presented in the correct format may be returned to the author for alteration. Your cooperation in this matter would be appreciated.

LINNEAN SOCIETY PAINTINGS AS POSTCARDS

The Mitchell Library has recently issued six postcards. Two of them are from paintings in the Linnean Society collection held in the Mitchell Library One is the head of a very distinguished-looking koala bear and the other, two shovel-nosed crayfish, both from watercolours by James Stuart, ca. 1840.

BOOK REVIEW

Pollination and Evolution, edited by J.A. Armstrong, J.M. Powell and A.J. Richards, Royal Botanic Gardens Trust 1982 $12.

The great diversity of pollination mechanisms has long excited the interest of biologists. However, while certain particular cases have frequently been quoted as examples of co-evolution of plants and animals in textbooks the observations to support the argument were often made many years ago. As is often the way when particular theories become so accepted as to enter the basic folklore of the subject the textbooks tend to concentrate on sweeping generalisations, far wider in scope than could be supported by the original research.

We owe much of our knowledge on floral structure in relation to pollination to careful observation, often under difficult conditions, made in the late 19th and early 20th centuries. Since then the subject has enjoyed brief limited returns to popularity. However in recent years there has been a world wide upsurge in interest in pollination and the relationship between plants and pollinators. In part this is but one facet in the renewed interest and debate of mechanisms of evolution but it also reflects the development of plant population dynamics as a new, a thriving, subdiscipline in plant ecology. Much of the research required in the field requires meticulous, painstaking observations; some years ago this might have been dismissed as pure natural history but fortunately that phase has passed and field science is now (almost) respectable.

This volume records the proceedings of the well attended and lively Symposium on Pollination Biology held as part of the 13th International Botanical Congress in Sydney in August 1981. The papers presented will be of interest to all concerned with pollination biology and with the co-evolution of plants and animals. However the volume should also provide much information to anyone with a serious interest in the natural history of Australia. While the symposium was international in its scope there was a clear, and quite proper, Australian bias. The papers on birds and mammals as pollinators of Australian plants provide clear summaries of our present knowledge and will be of considerable interest to wide audience.

The Trustees of the Royal Botanic Gardens are to be congratualted on their support for the publication of this symposium volume which should serve to foster further research into this fascinating field of study.

Paul Adam

LINNEAN SOCIETY DINNER

Wednesday 9 February, 1983, at Mr Fogg's Restaurant, 35 Clarence Street, Sydney.

Cost : $17.50

Meet at 7pm for 7.30pm

The dinner is informal and members are invited to bring their spouses and friends. Please make bookings by 1 February.

The Secretary,
Linnean Society of New South Wales,
35 Clarence Street,
SYDNEY. 2000 Telephone : 290.1612 (Tuesdays)

I require .... tickets at $17.50 each for the dinner, 1 February.

Cheque for .... enclosed

Name ....

Address ....

RENEWAL OF MEMBERSHIP FOR 1983

Prompt renewal will be much appreciated.

The Secretary,
Linnean Society of New South Wales,
35 Clarence Street,
SYDNEY. 2000

Full Membership $20

Associate Membership $4

Please circle the appropriate membership.

Cheque for .... enclosed

Name ....

Address ....

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

EDITOR: Dr Helene A. Martin
University of New South Wales,
P.O. Box 1,
KENSINGTON. NSW 2033

Office Hours: Tuesdays from 9.30 am - 5.00 pm
Telephone: 290 1612

NEWSLETTER No: 28

April 1983

Vale John T. Waterhouse

Members were greatly saddened by the sudden death of Mr John T. Waterhouse at his home on the night of April 1 1983, aged 58 years.

John obtained a Bachelor of Science with Honours in Botany from the University of Sydney in 1946, and joined the Linnean Society of New South Wales the following year. Apart from two short periods on the staff of the Botany Department, University of Sydney, he spent the next decade and a half on the land in the north west of the state. Throughout this period he maintained and developed his knowledge of the native flora, and on leaving the land in 1962 he joined the staff of the Botany School at the University of New South Wales shortly before it moved to the Kensington Campus. In 1967 he was awarded a Master of Science by the University of New South Wales for studies on the Xanthorrhoeaceae, and in 1972 he was awarded a Master of Science in Pure and Applied Taxonomy by the University of Reading. The following year he was elected a Fellow of the Linnean Society, London.

Over the years since he joined the University of New South Wales he has had a great impact on the teaching of botany undergraduate and postgraduate levels. He was responsible for raising taxonomy in the undergraduate syllabus above the level of plant identification, having developed at first a part unit and later a full unit in the third year on the principles and methods of taxonomy. The combination of his quiet manner and critical mind has sharpened the wits of a large number of students, and has stimulated many to take a deeper interest in botany.

John was elected to the Council of the Linnean Society of New South Wales in August 1975, and remained an active and valued member until his death. He was President in 1978-1979, at a time of considerable controversy over the accumulating debt on Science House, and chaired several torrid meetings with great skill. He also devoted a great deal of time to researching the complexities of the issues, and went out of his way to inform members. He continued to make a large contribution to the problems faced by the Society in subsequent years, and his knowledge and energy will be greatly missed.

John made many other contributions of a professional nature to the Sydney community, ranging from tendering expert witness to serving for many years as the University representative on the Ludovic Blackwood Memorial Sanctuary Committee. He was a foundation member of both the Australian Systematic Botany Society and the recently formed Friends of the Royal Botanic Gardens. He will also be remembered for his contributions to monocotyledonous anatomy, the taxonomy of the Myrtaceae and his work on a vegetative key to the rainforest species of New South Wales. Only the week before he died he saw '*Waterhousea*', the genus named in his honour, in print in the new Royal Botanic Gardens' pamplet entitled 'A Rainforest Walk'. It is typical of him that he should protest with a grin that the name had not been published, a shortcoming soon to be remedied (Hyland, in press).

In 1980, John embarked upon an intensive floristic survey of the Magela Creek Catchment, Northern Territory, in relation to the projected establishment of the Jabiluka uranium mine by Pan Continental Mining Ltd. He studied the area throughout the full monsoonal cycle, amassing a large collection and a wide range of field observations. It is to be hoped that the working-up of this collection, already well advanced, can be completed so that the full value of his important contribution to our knowledge of the northern Australian flora can be realised.

Not only the Society but the Australian botanical community at large will be much the poorer for his passing.

NEW MEMBERS

We welcome:

Dr P.A. Jell, National Museum of Victoria.
Mr L.H. Smith of Epping.

SPECIAL MEMBERSHIP FOR RETIRED MEMBERS

A new category of Senior Member, for members having attained the age of 60 years and having retired is now available. Annual subscription is half that of the normal membership rate. Membership of the Society for 40 years is required to qualify for life membership.

MANUSCRIPTS ACCEPTED

S.M. Backhouse and K.G. McKenzie: The re-establishment of the Ostracod fauna of Llangothlin Lagoon after a drought.

M.A. Rimmer and J.R. Merrick: A review of reproduction and development in fork-tailed catfishes (Ariidae).

M.R. Gray: The male of *Progradungula carraiensis* Forster and Gray (Araneae, Gradungulidae) with observations on the web and prey capture.

K.I.M. Robinsen, P.J. Gibbs, J.B. Barclay and J.L. May: Estuarine flora and fauna of Smith Lake, New South Wales.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship. Under the terms of Sir William MacLeay's will, the fellowship can only be awarded to graduates of Sydney University. For further information, ring the Secretary.

ROADSIDE FLORA AND FAUNA SURVEY/AUDIO VISUAL PROJECT

The Bird Observers Club and the Roadside Conservation Committee are preparing an Audio-Visual Cassette Programme for borrowing by community groups to raise public awareness of the importance throughout Australia of roadside vegetation and of the animals and birds which use it. In conjunction with the cassette, a Roadside Flora and Fauna Survey is being conducted.

Theyseek a) information on birds using roadsides and b) donations of 35 mm colour slides showing roadside vegetation, birds, animals, etc.

If you are interested in assisting this project, write to the Bird Observers' Club, P.O. Box 185, Nunawading, Victoria 3131, for further information. Forms are available for recording the relevant information at each roadside location.

CATCHMENT UNITS FOR SCIENTIFIC REFERENCE

The New South Wales National Parks and Wildlife Service is administering an investigation into catchment areas suitable for scientific reference purposes in eastern Australia. The investigation is being funded through the National Estate Programme.

For the purposes of the study, a reference catchment is defined as a catchment unit which has been left largely unmodified by the impacts of settlement, is potentially available for scientific reference purposes, and is capable of permanent protection from modification by direct human impact.

A sample of researchers has already been contacted to establish needs, nature and level of potential research use and possible conflicts between users of reference areas. Anyone not contacted, who has pertinent ideas and comments on this topic, is invited to participate in this investigation.

For more information, contact Dr Tim Latchen, Sydney (02) 82.5556 or Terry Lustig, Sydney (02) 663.2996, or forward any comments T.J. Fatchen and Associates, 106 Fourcart Street, Rozelle, NSW 2039.

DISCUSSION PAPER ON THE MANAGEMENT OF YURAYGIR NATIONAL PARK.

The discussion paper, due to be published in May 1983, aims to stimulate discussion of the future management of the Park. It will outline options for future management of vehicle access and recreation in the Park and will seek submissions from interested people about which options should be included in a draft plan of management for the Park. Service officers will be available to meet with clubs and organisations to expand on the issued raised in the discussion paper. For further information, contact G.W. Vincent, Senior Ranger, Grafton District, National Parks and Wildlife Service, P.O Box 97, Grafton, NSW 2460.

SAVE THE MARINE TURTLES COMPAIGN

All of the seven species of turtles and many of the tortoises are registered in the Washington Agreement Appendix 1 as severely endangered species which should be permanently protected. Trade in turtle and tortoise products is banned in the USA but is very active in Germany. The authorities in Germany claim that the source of the turtles is the Grand Cayman Turtle farm but others claim that this farm has never raised a single turtle. The trade involves thousands of turtles and the source appears to be the Indonesian waters. An organisation to save the marine turtles is active in Germany. They request our support. If you are interested, send money to "Rettet die Seechildkröte" Bank Hamburger Sparkasse Account-NR: 1261/133332 (Blz 20050550) through Jean-Claude Frisch, 26 Route D'Esch, 1470-Luxembourg. If you wish to protest about the trade and call for it to be outlawed, write to Dr Edmonds, or Mr Ertle, P.O.B. 140 270, 53 Bonn 1, Federal Republic of Germany.

LINNEAN SOCIETY OF NEW SOUTH WALES. WEDNESDAY, 1 June, 6 p.m.

HALLSTROM THEATRE, Australian Museum – enter from William Street and enquire at the desk.

SPEAKER : Mr Alan Andrews – Metropolitan Water Sewerage and Drainage Board.

TOPIC : GEORGE CALEY'S JOURNEY TO MOUNT BANKS 1804: An illustrated talk.

Yorkshireman George Caley, collector for Sir Joseph Banks and the Kew Gardens, botanist, explorer, and commentator, was the first man to stand at the hub of the Blue Mountains – Mount Banks, named after his employer. Alan Andrews intends to trace the trail of George Caley and his three staunch assistants, using maps and slides and Caley's own descriptions. Mr Andrews is editor of a new book now being published, entitled *The Devil's Wilderness*, containing Caley's full report of the journey to Mount Banks – "the most laborious man ever went to" – and all about it.

Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES. WEDNESDAY, 13 July, 6 p.m.

BLUE ROOM, Australian Museum – enter from William Street and enquire at the desk.

SPEAKER : Dr Don Adamson – School of Biological Sciences Macquarie University.

TOPIC : NORTH EAST AFRICA – THE RIFTING OF A CONTINENT.

Rifting of north east Africa produced Arabia and Madagascar. The rifting which produced the Red Sea and Gulf of Aden is still active along the Ethiopian Rift Valley and extends into the heart of Africa.

Afro-Arabian rifting produced the vast Ethiopian highlands which, in turn, gave birth to the Blue Nile. The White Nile was created by rifting processes in Kenya, Uganda and Southern Sudan. The Nile River System and the vast sedimentary basins along its course (some of which are oil bearing) are by-products of rifting. Major ancient and recent changes in the Nile drainage basin will also be described.

The talk will be illustrated with slides of Sudanese and Ethiopian scenery, maps and diagrams.

Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.00.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary at:
SCIENCE CENTRE, 35-43 CLARENCE STREET, SYDNEY. 290.1612 (Tues. only)

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

EDITOR: Dr Helene A. Martin
University of New South Wales,
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KENSINGTON. NSW 2033

Office Hours: Tuesdays from 9.30am - 5.00pm
Telephone: 290 1612

NEWSLETTER No: 29

July 1983

PAPERS ACCEPTED FOR PUBLICATION

L. Dawson: The taxonomic status of small fossil wombats (Vombatidae: Marsupialia) from Quaternary deposits and of related wombats.

K.M. Moore: Two new species of *Glycaspis* (Psylloidea) from tropical Queensland.

R.V. Southcott: A new Australian species of *Charletonia* (Acarina: Erythraeidae).

R.A.L. Osborne: Cainozoic stratigraphy at Wellington Caves, New South Wales.

A. Ritchie: A new Placoderm *Placolepis* gen. nov. (Phyllolepidae) from the late Devonian of N.S.W., Australia.

FILM: A VOICE FROM THE WILDERNESS

"The film that says it all about the rainforests" Joseph Glascott, Sydney Morning Herald. The film traces the changes in attitudes towards the land; from aboriginal occupation, through the struggles of the early white settlers to the golden days of the timber getters. It then traces the gathering strength of the conservation movement. The film tells the story by focusing on the Hastings River district and the untouched forests of its upper reaches.

This film will be screened at Anzac House Auditorium, 26 College Street, Sydney on Fridays and Saturdays, 29 and 30 July, 5 and 6 August, 12 and 13 August and 19 and 20 August, 6pm and 8pm each time. Each weekend will be hosted by a different conservation body who will receive the royalties from the screening.

DISPOSAL OF THE LIBRARY

Among various proposals confirmed by a majority of the members present at the Special General Meeting of September 1978 was one acknowledging the possibility that the Society's library might have to be placed elsewhere. The library even then was seen as a weak link in the Society's chain of service. Open for only a few hours a week and rarely visited by members, it had become practically a provider of outgoing inter-library loans. The Society lacked the means to improve library facilities and in 1979 Council resolved to relocate the collection where it could be made generally accessible. Enquiries, however, revealed that no one institution in Sydney could accommodate the whole. Believing that researchers should not be deprived of access to sources, some not otherwise available locally, some not otherwise in Australia, Council then resolved to offer the library for selection. First choices were given to the Australian Museum and National Herbarium, they being regarded as secure repositories which by these additions could make their extensive holding in Natural History more comprehensive; what remained would be offered to the unviersity libraries in the state. In each case the offer of a current title taken on exchange carried the proviso that the recipient library would maintain the arrangement whereby many copies of our Proceedings are distributed.

The Museum and Herbarium had removed their selections before the Society was given notice this year to vacate its premises, consequent on the financial collapse of Science House Pty Ltd (Members will be informed in the Newsletter about the fate of the company and of Science Centre as soon as this has been resolved.) Since then Macquarie University and the University of New England have taken the portions allotted to them. At the time of writing the Universities of Newcastle and Wollongong are removing their selections and the University of Sydney will shortly take a few titles. The librarian of the University of New South Wales finally declined our gift offer. Negotiations are still in progress for disposal of what titles remain. It is probable they will go to the N.S.W. Department of Agriculture which would house and service them at Wagga Wagga, whence they could be distributed as required. The library resources system at Wagga Wagga supplies Colleges of Advanced Education.

The extensive collection of pamphlets that also formed part of the Society's library was never adequately catalogued and thus remained almost unknown. It has been removed for temporary safe-keeping at the University of Sydney while Prof. Vallance completes the work of cataloguing, after which the pamphlets will be distributed as appropriate to need. The collection includes some rare historical items; those with particular Macleay connections will go to the Macleay Museum.

It is hoped in due course to publish in the Proceedings a list of the contents of our former library together with records of present location. Council takes no pleasure in seeing the Society's library dispersed but feels confident that in their new homes the journals and pamphlets will be more usefully available to members and to the whole scientific community in Australia.

LINNEAN MACLEAY FELLOWSHIP

Closing date for applications is 31 October. For further information, contact the Secretary.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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University of New South Wales,
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Telephone: 290.1612

NEWSLETTER NO. 30

October 1983

RELOCATION OF SOCIETY'S OFFICE

From November 1st, the Society's office will be at 6/24 Cliff Street, Milsons Point.

NEW MEMBERS

We welcome
Mr T. Flannery, School of Zoology, University of New South Wales
Mr R.W. Johnstone, School of Biological Sciences, University of Sydney

PAPERS ACCEPTED FOR PUBLICATION

L.N. Lester: Two new chiggers from Australian marsupials (Acari : Trombiculidae)
M.J.M. Rajput and R.C. Carolin: Phyllotaxis and stem vascularisation of *Dampiera* R.Br. (Goodeniaceae)
P.J. Moran: Variability in the opercular structures of the serpulid polychaete *Hydroides elegans* (Haswell)

JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND AWARDS

This year, there were applications for far more money than was available from the fund. Council decided that the Fund could not pay for travel on a per km basis so successful applicants had their travel item revised to an estimate of the fuel required. By adopting this procedure, most worthy applicants received an award although less than was requested.

Some applicants did not provide sufficient justification of their budgets. Items were included without any indication of how they were costed, and their relevance to the project was a matter of conjecture. Proper justification of all items on the budget is required.

SUCCESSFUL APPLICANTS:

Dr Robert M. Herd, School of Zoology, University of New South Wales.

Two species of fruit bats occupy a "camp" in the Sydney suburb of Gordon. It is proposed to use small radio-transmitters attached to the bats to follow the foraging movements of individual bats in the spring of 1983.
Awarded $140.

Dr Patricia A. Holdway, Visiting Research worker, Department of Zoology, University of Sydney.

Neuston (sea surface fauna) samples were collected by Dr Holdway on scientific cruises and expeditions. The samples must be sorted and the pontellid copepods, possibly the major predators of this zone, identified. Their presence in this 'nursery zone' is important, especially on larval fish.
Awarded $500.

Dr Mary M. Hindmarsh, Honorary Research Fellow, School of Botany, University of New South Wales.

The preparation of a key to some rainforest species in New South Wales, based on vegetative characteristics is already in draft form but some 16 species have not been seen in the field. This key is designed for field use and some useful characters change or are lost during drying, hence the necessity for observing them in the field. A collecting trip to Coffs Harbour where 15 of the species are found, is planned. Dr Peter Wilson who is familiar with some of the species will assist in the field.
Awarded $330.

Mr Michael Leu, Tutor and M.Sc. student, School of Earth Sciences, Macquarie University.

Rich assemblages of Late Permian fish fauna at Blackwater, Central Queensland have recently been uncovered at a site being continually quarried for road metal. A collecting trip is proposed.
Awarded $230.

Dr Elizabeth Nesta Marks, Honorary Research Fellow, Queensland Institute of Medical Research.

Drawings of mosquito genitalia made by an entomological illustrator are required to accompany a review of some of the species.
Awarded $300.

Dr John R. Merrick, Lecturer, Centre for Environmental and Urban Studies, Macquarie University.

A field trip to central-eastern Queensland is required to collect eggs and larvae for a study of the reproduction of two spotted barramundi species.
Awarded $120.

Mr Christopher F. Puttock, Technical Officer and Ph.D. student, School of Botany, University of New South Wales.

A collecting trip to Cape York is required to obtain material of Gardenieae (Rubiaceae). There are about 20 poorly described species and 15 undescribed species, some of which will probably require new genera. This collecting trip will be made in the next flowering period, November-December.
Awarded $500.

Mr Douglas Rugg, Technical Officer and M.Sc. student, Department of Plant Pathology and Agricultural Entomology, University of Sydney.

The biology of some Australian cockroaches in the subfamily Panesthiinae (Blattodea: Blabendae) is little known. These are wood living and burrowing species. Laboratory studies indicate that they take two years (minimum) to develop. Field trips at two monthly intervals will sample and observe the natural populations (the nearest are at Mudgee).
Awarded $200.

Dr Nicolette Thorpe, Tutor/Research Scientist, Biological Sciences, University of Sydney.

The mechanism of oxygen supply and overall gas exchange to the mangrove, Avecinnia marina is not well understood yet it is of great importance to the adaptation of this species to its specialised environment. It is thought that under conditions of high CO_2 accumulation at high tide, CO_2 may be sequestered in an unknown compound and may be exported in the transpiration stream. There is some photosynthesis in the green outer layer of the pneumatophore although the oxygen contribution from this source is probably low. It is proposed to investigate the overall gas exchange using radioactive $^{14}CO_2$ and assessing translocation, if any, of the metabolic products.
Awarded $490.

Dr Peter G. Wilson, Botanist (not permanently employed), Kensington.
In the National Herbarium, there is a single specimen collected near Yetman unlike any of the other 9 species of *Indigofera* found in N.S.W. It resembles *I. haplophylla* in northern Queensland and Northern Territory. The specimen has no flowers or fruits so the question cannot be resolved without further collection. A vist was made to this locality last September but the species was not found because it probably dies back to the root stock in times of drought. There has been good rains recently, so a spring collecting trip this year should prove more fruitful.

The Council assessed this project worthy of a grant, but since applying, Dr Wilson was offered alternative funding, so no award was made.

Dr Deedee P. Woodside, Honorary Visiting Fellow, School of Zoology, University Of New South Wales.
An accurate analysis of bat sonar signals reveals many ecological constraints of the animals' preception which are therefore constraints on the exploitation of resources. High speed magnetic instrumentation tapes are required to record the sonar signals.
Awarded $210.

LIQUIDATION OF SCIENCE HOUSE PTY LTD AND THE SALE OF THE SCIENCE CENTRE BUILDING

Science House Pty Ltd is in the hands of a Liquidator. The Board of Directors took this action on the advice of their solicitors when they reviewed the Company's financial situation after the first attempt to auction the building failed. The Liquidator advised the Societies that the secretarial services have no goodwill value so it is not possible to sell the business.

The building was put up for auction again on the 12 October. Much argument has revolved around the value of the building. Claims as high as $5 million have been made, but a sworn valuation from Messrs Jones Lang and Wootten, provided to the Liquidator, was $3.7 million. An approach to the bank for permission to delay the sale of the building until property values improved, failed. The bank insisted that if the sale was not proceeded with by the Liquidator, then they would sell as mortgagors in possession.

The building was sold for $3.775 million. Indebtedness to the bank is $3.9 million. The bank will take all funds after fees and commissions are deducted. Therefore nil will remain for the Societies which loose the $400,000 compensation from the Rocks Redevelopment Authority originally invested in Science House Pty Ltd. The new owner intends continuing and upgrading the conference facilities.

The winding up of Science House Pty Ltd will have very little effect on the activities of the Society. Being a limited company, the creditors cannot call on the Shareholders' funds. The Society had one share of $1, which it will loose. The Society has never had the compensation money and has been operating without it for years. The Society will continue publishing, arranging meetings and symposia and awarding fellowships and research grants, just as it has been doing in the past years.

MORPETH WEEKEND SCHOOLS

The University of Newcastle and the W.E.A. (Hunter Region) sponsor weekend residential, schools for the development of skills or for interest and to increase opportunities available to adults. The 1984 programme will be finalised in December and the organisers are seeking sponsors and teachers. If any member wishes to be involved, contact the University of Newcastle, Department of Community Programmes.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

NEWSLETTER EDITOR:
Dr Helene A. Martin,
School of Botany,
University of New South Wales,
Box 1, P.O.,
KENSINGTON,
NSW 2033.

SOCIETY OFFICE:
6/24 Cliff Street,
MILSONS POINT 2061.

POSTAL ADDRESS:
P.O. Box 457,
MILSONS POINT 2061.

TELEPHONE: 929 0253
OFFICE HOURS:
Tuesday 9.30 a.m. - 5 p.m.

NEWSLETTER No: 31 January 1984.

HOLIDAY PERIOD: The Society's office will be closed from 21 December to 16 January, inclusive.

PLEASE CHECK ADDRESSES. We have computerised our membership lists and addresses. Please inform us of any errors.

RENEWAL OF MEMBERSHIP SUBSCRIPTIONS: Memberships are due for renewal. Subscriptions for Ordinary Members are now $28 and Associate Members $5. The Council has kept subscriptions constant for as long as possible but rising costs make the increase necessary. Associate Members receive the same privileges correspondence, etc. as the Ordinary Members except for a copy of the Proceedings.

NOMINATIONS FOR COUNCIL: See separate sheet. Ordinary Members may nominate Council Members independently.

PAPERS ACCEPTED FOR PUBLICATION:

D.M. Lambert and H.E. Paterson: On "Bridging the gap between race and species": the isolation concept and a testable alternative.

T. Miura and T. Kajihara: An ecological study of the life histories of two serpulid worms, *Hydroides ezoensis* and *Pomatoleios kraussii*.

NEW MEMBERS: We welcome — Mr Vincent Chi-Kiu Lau, School of Dentistry, University of Sydney.

COURSE: INSECT COLLECTING AND PRESERVATION/INSECT IDENTIFICATION: at the Sydney Technical College, Ultimo. This course is designed for anyone interested in the subject. Enrolment is Monday 6 February, between 1 p.m. and 7 p.m. at the School of Biological Sciences, Building E, Level 3, Corner Harris and Thomas Streets, Ultimo. The course starts Friday 17 February, 6 p.m. to 9 p.m. and continues every Friday until 15 June. Fees, nil. Weekend excursions are included. For information and placing your name on the list, ring the Office, 217 3852 or 217 3541. After 31 January, ring G. Bedford, 217 3520 or N. Young, 217 3352.

PROPOSED FIRST WORLD CONGRESS OF HERPETOLOGY: The Planning Committee has not yet selected the time or place for this event and would be interested to hear the views of the herpetological community. It would also be interested to hear from potential hosts and any views about setting up a larger and broadly representative International Herpetological Committee to provide a self-perpetuating mechanisms for future conferences. Address comments or questions to the Australian member of the Planning Committee, Dr Harold G. Cogger, of the Australian Museum, P.O. Box A285, Sydney South, 2000 or the Secretary-General, Professor Kraig Adler, Cornell University, Section of Neurobiology and Behaviour, Seeley G. Mudd Hall, Ithaca, New York 14853, USA.

LINNEAN SOCIETY LUNCHEON

Wednesday 15 February, 12.30 p.m. in the Trust Room, National Herbarium, Royal Botanic Gardens. Enter from Mrs Macquarie's Road and enquire at the desk.

Cost: $10 per head.

The luncheon is informal and members are invited to bring their spouses and friends.

Please make bookings by February 6.

The Secretary,
Linnean Society of New South Wales,
6/24 Cliff Street,
MILSONS POINT 2061.
or
P.O. Box 457,
MILSONS POINT 2061.

Telephone: 929 0253.
(Tuesdays only)

I require .... tickets at $10 each for the luncheon, 15 February.

Cheque for $..... enclosed.

Name ....

Address ....

RENEWAL OF MEMBERSHIP FOR 1984: Prompt renewal will be appreciated.

The Secretary,
Linnean Society of New South Wales,
6/24 Cliff Street,
MILSONS POINT 2061.
or
P.O. Box 457,
MILSONS POINT 2061.

Full Membership $28, Associate Membership $5. Please circle the appropriate membership.

Cheque for $.... enclosed

Name ....

Address ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES.

Council Nominations for President, Council and Auditor for 1984/85.

Election at Annual General Meeting, Wednesday, 28th March, 1984.

** The names of Members who retire (in terms of rules 15(a) and 15(b)) are marked with an asterisk.*

President:- * C.N. Smithers, Ph. D.

Council:-

D.A. Adamson, B.Sc. Agr., Ph.D.
A.E.J. Andrews, A.S.T.C. (Civ.Eng.) M.I.E. Aust.
M. Archer, B.A., Ph.D.
R.A. Facer, B.Sc., Ph.D.
L.W.C. Filewood, B.Sc.
* M.D. Fox, B.Sc., Ph.D.
* L.A.S. Johnson, D.Sc., F.L.S.
* H.A. Martin, Ph.D.
P.M. Martin, M.Sc.Agr., Dip.Ed., Ph.D.
P.J. Myerscough, M.A., Ph.D.
G.R. Phipps, B.Sc.
* A. Ritchie, B.Sc., Ph.D.
T.G. Vallance, B.Sc., Ph.D.
B.D. Webby, M.Sc., Ph.D.
* K.L. Wilson, B.Sc. (Agr.).
A.J.T. Wright, B.Sc., Ph.D.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- G.R. Phipps, B.Sc.

Council (seven vacancies):- Council nominates the following and invites further nominations in accordance with rule 15(e) to complete the list.

M.D. Fox, B.Sc., Ph.D.
K.L. Wilson, B.Sc. (Agr.).
L.A.S. Johnson, D.Sc., F.L.S.
C.N. Smithers, Ph.D.
H.A. Martin, Ph.D.
A. Ritchie, B.Sc., Ph.D.

Auditors:-

This notice is given under the provision of Rule 15(e). *It is not a voting paper.*

RULE 15(e):- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

NOTE:- The Society's office will be closed from Wednesday, 21st December, 1983, until Monday, 16th January, 1984, inclusive.

The library has been permanently closed.

For the Council

Barbara J. Stoddard,
SECRETARY,

20th December, 1983.

P.O. Box 457,
Milsons Point,
SYDNEY, N.S.W. 2061.

Telephone - 929.0253 - Tuesdays only.

PLEASE NOTE OUR NEW ADDRESS.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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NEWSLETTER No.: 32

April 1984

AWARD OF LINNEAN MACLEAY FELLOWSHIP

The Fellowship has been awarded to Mr R.W. Johnson of the University of Sydney who will work on Marine Microbiology of coral reefs. Our congratulations to Mr Johnson.

NEW MEMBERS

We welcome Ms Rhonda M. Beasley, Biologist of Merimbula.

PAPERS ACCEPTED FOR PUBLICATION

P. KOTT. Related species of Trididemnum in symbiosis with Cyanophyta.

M. O'DONNELL. Aspects of the ecology of the serpulid Galeolaria caespitosa.

H.A. MARTIN. On the philosophy and methods used to reconstruct the Tertiary vegetation.

C. STOP-BOWITZ. A short note on the problems with systematics of some pelagic polychaetes.

L. WARREN. How intertidal polychaetes survive at low tide.

THE PROCEEDINGS VOLUME 107 (PARTS 1 & 2)

Printing and distribution of this issue has been dogged with problems and Council believes members are owed both apology and explanation. Prior to going on leave last August the Honorary Editor, Professor Tom Vallance, handed over to the Acting Honorary Editor instructions and such corrected galleys as had then been returned by authors. The Acting Editor assembled the rest of the material, took it to the printers and handed it over to the man who has been doing the Proceedings for some years now. Under normal circumstances, Volume 107 (Parts 1 & 2) would have been published by early November. When the deadline passed with no word from the printers the Acting Editor contacted them only to find that they knew nothing about it. The employee who was dealing with it had left without informing his employers. Certain files and records at the printers could not be found. The Acting Editor went to extraordinary lengths to impress upon the printers the necessity to have this material published on time. Thanks to his efforts, the first copies were published just before Christmas and he delivered copies personally to libraries to ensure that the 1983 date of publications was valid.

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Distribution presented more problems. Previous issues had been distributed by Science House Pty Ltd, now in liquidation, and no such service was available this time. Council members and friends tackled the task, using the new computer mailing lists. Even then our troubles were not at an end. One bundle of the Proceedings, destined for a local address, appears to have gone astray in the mailing system. Any member who has not received his or her copy should report the matter to the Honorary Secretary.

We regret the recent breakdown in our publishing routine which, sadly, will continue to be delayed a while longer. Professor Vallance is now back and about to resume work as Honorary Editor but as yet we do not have sufficient papers to complete the next double issue. Copy will go to the printer when the stock is replenished – soon, we hope. Council wishes to assure members that it regards regular publication of good-quality Proceedings as its first duty, and will continue to strive towards that end.

AUSTRALIAN TRUST FOR CONSERVATION VOLUNTEERS (ATCV), PROVISIONAL NSW DIVISION

The ATCV has been operating in Victoria since 1981. It aims to organise volunteers to assist landholders in labour intensive conservation tasks such as tree planting, weeding and mulching, erosion control, maintenance of walking tracks and Heritage Listed Buildings, etc. etc. The volunteers pay most of their transport costs and contribute to costs of food. The landholder (both private and governmental) arranges accommodation, usually in woolsheds, local halls or camping grounds. So far, most of the volunteers have been senior high school students or members of youth groups, but it is an opportunity for adults in sedentary occupations to do physical work whch benefits the environment. The ACTV will not become involved in controversy.

Thw NSW Division will be established at a public meeting in the Hallstrom Theatre, Australian Museum on Tuesday, 10 April at 8pm. For further information, contact the ACTV, Provisional NSW Division, 399 Pitt Street, Sydney or Mr Alex Tucker on 451.4028, after hours.

THE INSTITUTE OF BIOLOGY IN AUSTRALIA (IBA)

The IBA has been formed to foster the professional status of biologists and to accredit those engaged in biological work. It aims in addition to act as a national advocate in matters affecting employment of biologists and to provide a forum for publicising the views of biologists on biological topics of national or regional interest. The activities of the IBA will not compete with the scientific functions of existing specialist biological societies.

At present, the IBA is a branch of the Institute of Biology which is incorporated in the United Kingdom. It is intended that the branch will become autonomous as soon as membership has been built up to a viable level. At present, there are 186 members. For further information contact Dr Neville J. Williams, Membership Officer, Institute of Biology in Australia, Science Centre, 35-43 Clarence Street, Sydney 2000

BOOK REVIEW

Pickard, J. Vegetation of Lord Howe Island
Rodd, A.N. & J. Pickard Census of vascular flora of Lord Howe Island.
CUNNINGHAMIA Volume 1(2) 1983

The mention of Lord Howe Island conjures up a picture of warm sub-tropical climate, peace and tranquility away from civilisation and great beauty in the sandy beaches,

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coral reef, lagoon and misty mountain peaks. Since its first sighting in 1788, it has held a unique place in studies of island floras, for, having been uninhabited until 1833, although sometimes visited, it remained free of disturbance by man until 150 years ago. It, therefore, is a laboratory for the study of evolution of vegetation isolated from mainland Australia to which it has probably never been directly connected, as it lies on the edge of the continental shelf some 600 km east of the Australian coast. The island is now estimated to have emerged from the sea only about 7 Ma ago at the close of the Miocene (Rodd 1981). Its vegetation must have arrived by long distance dispersal. The effects of disturbance by man in the last 150 years can be studied in detail in this microcosm.

Pickard and Rodd & Pickard in their papers on Vegetation of Lord Howe Island and Census present a detailed and thorough analysis of the floristics of the Island. The vegetation survey (Pickard) discusses the flora in relation to geological and climatic factors together with detailed data and maps. The great variation in vegetation types (some 26 Associations) is the result of geological past history and climatic factors. The soils include volcanics, and sediments from coral sands. The altitudinal range from sea level to the twin mountain peaks rising from the sea to 875 m (Mt Gower), and 777 m (Mt Lidgbird) offers microclimates and edaphic variation to suit a wide range of vegetation types. The total vascular flora contains 379 species: 219 native, 74 endemic and 160 naturalised. These have been classified into Formation, Sub-formations, Alliances and Associations. Keys are provided for each Formation and in Table 4 an expanded outline is given (p.164-225) in a standard format which sets out the Sub-formation and Alliance, a map of its distribution, representative photograph, structural features, floristics, notes on disturbance and other factors.

The large contoured and coloured vegetation map at the back is a good example of the detailed information provided. An analysis of the influence of substrate on vegetation gave significant results for substrate and growth form for total and native species, substrate and origin, origin and growth-form in these preliminary studies but the need for more specific sampling is stressed. The influence of other factors such as wind and sea birds, introduced mammals and man on the vegetation, is discussed.

Some of the most interesting aspects of the vegetation are the presence of 4 palm species, 3 of which are endemic, the gnarled mossy forests on the mountain peaks and the complete absence of Eucalyptus and Proteaceae prominent on mainland Australia. While the Census (Rodd and Pickard) lists the species present within the families represented and the Vegetation Survey defines the vegetation types, the phytogeographic relationships are barely mentioned:

> "Much of the vegetation on Lord Howe does not occur in Australia, although similar types are found on other Pacific Islands. Therefore, in the Australian context, Lord Howe can be regarded as unique". (p.261).
>
> "Much of the flora of 400 species has affinities with New Zealand. (p.134).

Island floras are of great fascination to phytogeographers and one would have expected some detailed comments on the relationships of Lord Howe Island biota to other floras in the main paper by Pickard, or as an adjunct to the Census (Rodd and Pickard). While the topic is discussed in other publications (e.g. Rodd 1981, Van Balgooy 1971 etc.), the reader is not made aware of this and some of the significance of the vegetation analysis on a broader basis is lost.

Nevertheless, the work provides a detailed survey of the vegetation of Lord Howe. Obtaining the data has involved intense physical exertion, as the mountains are precipitous, while identification of specimens has required detailed taxonomic work. The methodology of vegetation analysis is based on modern ecological principles applying Fosberg's methods rather than those of Specht. It is the only attempt to use this method in this region. An error occurs in some calculations and all basal area values need to be multiplied by 0.053 to correct them. An analysis of the consequences of introduction of exotic animals and man's activities on the vegetation emphasise the fragility of some ecosystems but points out that less than 20% of the Island has been disturbed and 10% cleared.

The aim of the survey was "to describe the ecosystems of Lord Howe Island and to provide biological information for the assessment of future management options". This has been achieved. Pickard advocates a continuance of the commercial use of palms both for seed and direct export of plants and a balance between conservation (establishment of a National Park) and the welfare of residents. Since acceptance of and publication of the article, a National Park has been recognised as Lord Howe Island has been placed on the World Heritage List.

H.P. RAMSAY

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.00.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

SPECIAL BOOK OFFER

Macmillans are promoting their new book <u>Extinct and Endangered Plants of Australia</u>. The enclosed leaflet describes it. The company has offered the Society a 25% discount for bulk orders. This discount applies also to the other books promoted on the leaflet.

To obtain the discount, you must order through the Society. Use the order form on the next page. Do not use the order form on the promotional leaflet.

To : The Secretary,
Linnean Society of NSW,
P.O. Box 457,
Milsons Point,
Sydney 2061
N.S.W.

I wish to order the following books at a 25% discount.

Copy/ies	EXTINCT AND ENDANGERED PLANTS OF AUSTRALIA	at $38 each	$............
Copy/ies	MAMMALS OF AUSTRALIA	at $68 each	$............
Copy/ies	THE HERITAGE OF AUSTRALIA	at $64 each	$............
Copy/ies	THE HERITAGE OF VICTORIA	at $19 each	$............
	Cheque enclosed for a total of		$............

IMPORTANT Please order by 29 May.

The Secretary,
Linnean Society of N.S.W.,
P.O. Box 457,
MILSONS POINT 2061

Telephone 929.0253 (Tuesdays only)

I wish to make .... bookings for the Macleay Memorial Dinner (see programme for deails). Cost $9 per person. Please find enclosed a cheque for $............

Name......................

Address ....

PLEASE MAKE BOOKINGS FOR THE DINNER BY 3 JULY.

PROGRAMME

EXCURSION – SALTMARSHES, MANGROVES AND COASTAL VEGETATION OF BOTANY BAY.

SUNDAY 3 JUNE – Meet 11a.m. at Connell's Hill.
Directions: Take Captain Cook Drive, go about 1 mile or 1.6km past the Cronulla High School on the turn-off to Cronulla (Elouera Road). The road turns to the right and there is a large flat area on the right, suitable for parking, opposite a locked gate across a private road (marked as Towra Point Road on older maps). We shall meet opposite the locked gate. Just before you reach our meeting place, on the right, there is a sealed road going up the hill, then an unsealed road (M.W.S.&D. roads).

LEADERS:

Dr Paul Adam, Dr Robert King (School of Botany, University of New South Wales) and Dr Tony Larkum (Biological Sciences, University of Sydney).

This excursion is designed to show some of the characteristic coastal communities of the Sydney region (sea grass, mangroves and their associated algal flora, salt marsh and coastal woodland). The intertidal wetlands of the southern Botany Bay are the largest remaining stands of communities formerly widespread around the coastal inlets of the Sydney region.

Bring lunch, suitable for carrying on the walk. Wear old clothes and sensible shoes and be prepared to get dirty.

WEDNESDAY 20 JUNE at 6p.m. in the Hallstrom Theatre, Australian Museum. Enter from William Street and enquire at the desk.

SPEAKER:

Mr Alan Andrews, Metropolitan Water Sewerage and Drainage Board.

TOPIC:

Kosciusko and the Nineteenth Century Scientists. Their Contribution to its Nomenclature.

Council member Alan Andrews will give an illustrated talk on the Mount Kosciusko area, with special reference to the nineteenth century scientists and their relationship to the names that adorn the topographic features of the High Country.

Members and their friends are invited, and any who may have a slight aversion to history and geography need not be deterred by the subject title, for Alan's talk and his remarkable photographs are aimed at showing off this magnificent area. Nor should naturalists, who think they know the scenery well, stay away for that reason; most of the illustration will be rare photographs of the country under snow. Alan has been skiing, and walking, at Kosciusko for forty-three years – nearly ninety per cent of that time in the High Country; and for all of that time he has been studying its history and reading of its visitors.

Drinks will be served in the Education Foyer from 5.30p.m.

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MACLEAY MEMORIAL LECTURE

WEDNESDAY 18 JULY: 6.30p.m. in the Hallstrom Theatre, Australian Museum. Enter from William Street and enquire at the desk.

SPEAKER:

Professor R.V.S. Wright, Department of Anthropology, University of Sydney.

TOPIC:

New Light on the Extinctions of the Australian Megafauna.

Much of our knowledge of the Australian megafauna has been derived from scattered sites in the arid zone. Recent excavations in spring swamps on the Liverpool Plains show that in at least one well watered part of Australia, the fauna survives to the Holocene. The palaeoecological and archaeological implications of this late date for extinctions are explored in the lecture together with an account of the excavations themselves.

DRINKS will be served from 6p.m. in the Education Foyer, adjacent to the Hallstrom Theatre.

THE LECTURE will start at 6.30p.m.

A DINNER will start at 8.00p.m. in the Museum Cafeteria. Please book for the dinner by Tuesday, 3 July. Use booking slip on page 5.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER EDITOR:
Dr Helene A. Martin,
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TELEPHONE: 929 0253
OFFICE HOURS:
Tuesday 9.30 a.m. - 5 p.m.

NEWSLETTER No.: 33

July 1984

NEW MEMBERS. We welcome

Mr A.W. Archer, Department of Health Research
Dr E.J. Willis, Biology Department, Melbourne C.A.E.
Mr J.M. Sanders of Newtown
Mr D.K. Yeates, University of Queensland

PAPERS ACCEPTED FOR PUBLICATION:

P. Hutchings – A preliminary report on the spatial and temporal patterns of Polychaete recruitment on the Great Barrier Reef.

D. Reisch and T. Gerlinger – The effect of cadmium lead and zinc on survival and reproduction in the polychaetous annelid *Neanthes arenaceodentata*.

D. George – The behaviour and life history of a mangrove dwelling capitellid.

C.J. Glasby – A review of *Dorvillea* and *Schistomeringos* from southern and eastern Australia.

J.P. Hartley – Cosmopolitan polychaete species: The status of *Aericidea belgicae* (Fauvel, 1936) and notes on the identity of *A. succica*.

J.A. Blake – Polychaete Oweniidae from Antarctic Seas collected by the U.S. Antarctic Research Program.

K. Fauchauld – Polychaete distribution patterns or can animals with palaeazoic cousins show large scale geographic patterns.

M.N. Ben-Eliahu, P.A. Hutchings and C.J. Glasby – *Ceratonereis lizardensis*; n.sp. (Polychaeta: Nereididae) and *Malacoccias indicus*.

P. & E. Knight Jones – Systematics, ecology and distribution of southern hemisphere spirorbids.

N. Maciolek – New records and species of *Marenzelleria* Nesnil and *Scolecolepides* Ehler from N.E. N. America.

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ADDRESS UNKNOWN FOR BOOK OFFER: EXTINCT AND ENDANGERED PLANTS OF AUSTRALIA

R.A. Hanson ordered this book but forgot to give us his/her address. The book is waiting at the Society Office, so could R.A. Hanson contact the Secretary.

OPEN DAY, WIRRIMBIRRA SANCTUARY, SUNDAY 16th SEPTEMBER, 9.45a.m. - 4p.m.

The programme features walks and talks to explain and demonstrate the facilities and services provided by this National Trust property for education, conservation and the enjoyment of the environment. Speakers and walk leaders will represent the National Trust, the David G. Stead Memorial Foundation, Department of Education, and Teaching and Management Staff of the Sanctuary. For further information and the programme, contact the Manager, Wirrimbirra Sanctuary, Hume Highway, Bargo 2574, Phone No. (046) 84.1112.

AN ILLUSTRATED GUIDE TO THE ESTUARINE POLYCHAETE WORMS OF N.S.W.,

by Pat Hutchings published by the Coast and Wetlands Society. The common polychaetes of NSW estuarine habitats are described and illustrated and a key to the polychaete families is given. Also provided are data on the ecology of species, an extensive glossary of terms and details on methods of collecting and preserving specimens. Price $6 plus postage. Orders can be placed with the Coast and Wetlands Society, P.O. Box A225, South Sydney, NSW 2000.

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PROGRAMME

EXCURSION – MT TOMAH BOTANIC GARDEN

SUNDAY 23rd SEPTEMBER – Meet 11 a.m. in the parking lot of the Garden.

HOW TO GET THERE. Take Bells Line Road, West of Bilpin. The Garden is on the left hand side, soon after the National Park boundary and approximately 20-22 km from Bilpin. There will be a "Linn Soc" sign. Drive in the gate to the parking lot.

Mt Tomah is a cool climate annex to the Royal Botanic Gardens. It is about 30 hectares with approximately two thirds on a basaltic cap. The other one third is on a steep sandstone gully supporting cool temperate rainforest which is being kept in its natural state.

The Garden was given to New South Wales about 1968 by the previous owner who ran it as a flower farm. The Royal Botanic Gardens has been developing it since 1970. In 1983, it was listed as a joint Commonwealth-State Bicentenary Project.

Apart from growing plants from cold climates from all parts of the world, the Garden features plants from the southern hemisphere.

A guide will show us around the Garden and discuss its development.

WEAR good walking shoes as some of the slopes are steep and muddy.

BRING lunch, food and drink.

WEDNESDAY 24 OCTOBER at 6 p.m. in the Hallstrom Theatre, Australian Museum, enter from William Street and enquire at the desk.

SPEAKER: Dr MARILYN FOX, National Herbarium of New South Wales.

TITLE: "EVERYTHING's COMING UP ROSES, DAISIES, CHENOPODS, GRASSES....."

OR

"YEAR TO YEAR VARIATION IN THE VEGETATION OF WESTERN NEW SOUTH WALES"

At the height of the recent drought a number of sites was established in western New South Wales. At many of these the only living plants were the perennial shrubs and trees. Drought-breaking rains in the winter of 1983 led to a spectacular spring display of wildflowers, some not seen in recent years. This spring flora was dominated by composites and annual chenopods. Much of the area then experienced above-average summer rain and what remained of the spring growth was added to by another suite of annuals, principally grasses.

The talk will discuss the vegetation of western New South Wales, and variation within each vegetation type both spatially and temporaly.

Drinks will be served from 5.30 p.m.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER EDITOR

Mr. Graeme R. Phipps,
The Macleay Museum,
The University of Sydney 2006

SOCIETY OFFICE

6/24 Cliff Street.
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P.O. Box 457,
MILSONS POINT 2061

TELEPHONE: 929 0253
OFFICE HOURS:
Tuesday 9.30a.m.-5 p.m.

NEWSLETTER No.: 34

September, 1984

PAPERS ACCEPTED FOR PUBLICATION:

F.W.E.Rowe - A review of the ophiocomin genus Clarkcoma Devaney, 1970. (Ophiuroidea: Ophiocomidae).

J.D. Stevens & J.R. Paxton - A new record of the Goblin Shark, Mitsukurina owstoni (Family Mitsukurinidae) from eastern Australia.

JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND GRANTS FOR 1984.

We congratulate the following applicants and hope that their planned projects are successful:

R.J. King , Senior Lecturer . Botany, University of New South Wales .PROJECT : Preliminary floristic survey of the macroalgae associated with the mangrove vegetation in northern Australia.

D. Morrison, Research assistant, Botany, University of Sydney PROJECT: Collection in Western Australia of material for a taxonomic revision of the genus Lechenaultia.

D.R. Murray, Senior Lecturer, Biology, University of Wollongong PROJECT: To determine the fate of the amino acid albizziine following translocation from the cotyledons to the radicle and hypocotyl of young Acacia seedlings.

L. Selwood, Senior Lecturer, Zoology, La Trobe University. PROJECT: Duration of spermatozoan storage in the oviduct of female Antechinus stuartii without loss of fertilizing capacity.

* * * * * * *

APOLOGY FROM NEW NEWSLETTER EDITOR FOR LATENESS OF THIS NUMBER.

- The first one is always the most difficult to organise.

* * * * * * *

OCEANIC RESEARCH FOUNDATION LTD, NEWS RELEASE

In the summer of 1981/82, the Oceanic Research Foundation mounted an expedition to Commonwealth Bay, Antarctica. Their Research Vessel, the Dick Smith Explorer, moored in Mawson's Boat Harbour and the group carried out exploratory and scientific work in the area and around Mawson's hut. Later they visited the Mertz glacier and Dumont d'Urville.

Commencing November 1982 and finishing March 1984, the O.R.F. mounted an expedition (their third to Antarctica) to the Prydz Bay area, where the Dick Smith Explorer was frozen-into a chosen location for the winter of 1983.

Both expeditions were led by Dr David Lewis.

The Foundation has now published their Occasional Publication No. 1 (ISSN 0914-0529). This contains over 100 pages and is a well prepared and bound volume. It contains Karen William's and Dr Harry Keys' ice-berg study in full and a summary of the 1981/82 expedition results. It also contains initial reports by scientists on the 1982/84 Frozen Sea expedition. These deal with sea-ice observations, lichen and moss collections, sea-bird counts and observations, fishing programme, seal tagging, small group study, Emperor penguin studies, summary logs of both expeditions and a Clearing House concept for independent expeditions. Altogether, there are over 20 contributions.

Further information and copies are available from the Ocean Research Foundation at $5.50 each, plus $1.00 postage.

Their address is Box 247, P.O. Windsor, 2756 Australia, phone (045) 799254. All orders and enquiries will be welcome.

PROGRAMME

PUBLIC LECTURE - "A NIGHT IN THE DAINTREE"

THURSDAY 1st NOVEMBER - 8.00 PM SYDNEY TOWN HALL

DETAILS. The Wilderness Society and the Australian Conservation Foundation are organising a public meeting as part of the campaign to try and save the Daintree and wet tropics of northern Queensland.

Dr. DAVID BELLAMY will deliver a lecture "A Night in the Daintree."

Celtic harpist and singer CATHY O'SULLIVAN will entertain.

NEVILLE WRAN and JILL WRAN will address the meeting.

ENTRANCE FEE/DONATION $6.00 Pensioners or students $4.00

* * * * * * * * * * *

EXCURSION - C.S.I.R.O. DIVISION OF ENTOMOLOGY.
RESEARCH STATION at
55 Hastings Road, WARRAWEE 2074

WEDNESDAY 21st NOVEMBER, 1984. 7.15 for 7.30 start.

DETAILS. The Institute of Biology in Australia and the Linnean Society of N.S.W. are jointly organising a visit to the Division of Entomology research station. At 7.30 a series of four short talks will be given on the general subject of

" BIOLOGICAL CONTROL OF PEST ARTHROPODS"

Mr. G. LUKINS will talk on"Biological control of White Wax Scale."

Dr. W. MILNE on "The Introduction and Establishment of *Aphidius ervi* as a biological control agent of blue-green lucerne aphid."

Dr. P. WELLINGS on "Assessing the effectiveness of *Aphidius ervi*" as a biological control agent.

AND

Dr. B. FLETCHER on "Ecology of the Queensland Fruit Fly. "

There will be a quick lap around the building to look at facilities including rearing and propagation facilities, and TEA, COFFEE and BISCUITS will be served. Concluding at 9.30 to 9.45.

Ample car parking available within the research station grounds.

Only about 2 minutes walk from Warrawee Railway Station.

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LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

NEWSLETTER EDITOR

Mr. Graeme R. Phipps,
The Macleay Museum,
The University of Sydney 2006

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Tuesday 9.30 a.m. - 5.00p.m.

NEWSLETTER No.: 35

December, 1984

We welcome our new member, SUZANNE HAND from the University of New South Wales , and also congratulate her on a successful application to the JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND for a grant to enable her to take reference casts of bat skeletal material during a forthcoming tour of overseas museums.

Two other"emergency " grants from the JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND have also been given. One is to our Linnean Macleay Fellow, RON JOHNSTONE to make an oxygen electrode to measure oxygen potential within the sediment column . This work is being carried out on One TREE Island on the Barrier Reef. The other was to FRANK ROWE in partial support of a collecting trip to Lord Howe Island and Norfolk Island. The project is an investigation into the taxonomy, composition and zoogeographic relationships of the Echinoderm fauna of New South Wales. Our best wishes go to the three successful applicants.

PAPERS ACCEPTED FOR PUBLICATION:

B.V. Timms - The Cladocerans (Crustacea) of New Caledonia.

NEWS ITEMS

AUSTRALIAN ACADEMY OF SCIENCE/ACADEMIA SINICA EXCHANGE AGREEMENT 1985/86. Applications from individuals or groups of scientists in the field of natural history are invited. Visits may be short or long term. Applications need to reach the Academy by 1 February 1985, and for further enquiries please telephone (062) 473966.

Applications by the same date and to the same telephone contact number are also invited by the AUSTRALIAN ACADEMY OF SCIENCE / JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE EXCHANGE AGREEMENT 1985/86. The purpose of the visits is to exchange lectures, ideas and information between scientists in the two countries. Visits not normally to exceed four weeks.

NEWS ITEMS

Our member GEOFF BEDFORD wishes to publicise a course on INSECT COLLECTING AND PRESERVATION, and INSECT IDENTIFICATION to be located at Petersham Technical College , Course is to commence Friday, 15th February 1985 every Friday between 6-9 p.m. for 16 sessions until Friday 13th June. The fees are nil. Contact course information officer on (02) 568.0200.

DAVID MURRAY of the University of Wollongong wishes to publicise a two volume work on SEED PHYSIOLOGY which he edited. The publishers are Academic Press, and prices are $55 per volume or $99 if purchased together. Volume 1 provides a comprehensive account of seed development, while Volume 2 is concerned with Germination and Reserve Mobilization. It looks like a very impressive work and there would be many chapters of interst to members. Congratulations to David Murray.

Following the recent successful excursion to the C.S.I.R.O. Division of Entomology at Warrawee, held in conjunction with the INSTITUTE OF BIOLOGY IN AUSTRALIA , we have received details about the Institute , including membership information. The IBA has some 280 members in Australia, and some 17,000 worldwide. The objectives of the IBA are to foster the professional status of biologists and to accredit those engaged in biological work. It also aims to act as a national advocate in matters affecting the employment of biologists and to provide a national forum for publicising the views of biologists on biological topics of national or regional interest.

Some information leaflets were sent to the Society, but people wanting to know more about IBA should contact the membership officer Dr. Neville J. Williams c/- NSW Institute of Technology, P.O. Box 123, Broadway 2007 or telephone (02) 436.6235.

G A R D E N   L U N C H E O N

Earlier this year we had a very successful luncheon in the Royal Botanical Gardens, so we have decided to have another one on 20th February 1985. Please see booking slip in the back of this newsletter for reservations and details.

VOLUME 107 of PROCEEDINGS PUBLISHED

Volume 107, nos 3 and 4 has just been published. a bumper issue of some 400 pages. It contains an interesting series of papers relating to the symposium on the evolution and biogeography of early vertebrates, in addition to more general offerings. Our editor TOM VALLANCE is to be congratulated on his fine efforts. This year has seen some major publishing efforts being made by the Society. Our first special publication which is on POLYCHAETES will be available soon, and we are grateful to PAT HUTCHINGS of the Australian Museum who acted as editor of thisspecial publication.

* * * * *

LINNEAN SOCIETY LUNCHEON

Wednesday 20 February, 12.30 p.m. in the Trust Room, National Herbarium, Royal Botanic Gardens. Enter from Mrs Macquarie's Road and enquire at the desk.

Cost $10 per head.

The luncheon is informal and members are invited to bring their spouses and friends.

Please make bookings by February 6.

The Secretary,
Linnean Society of New South Wales,
6/24 Cliff Street,
MILSONS POINT 2061.

or

P.O. Box 457,
MILSONS POINT 2061.

Telephone: 929 0253
(Tuesdays only)

I require .... tickets at $10 each for the luncheon, 15 February.

Cheque for $ ...... enclosed.

Name ....

Address ....

RENEWAL OF MEMBERSHIP FOR 1985: Prompt renewal will be appreciated.

The Secretary,
Linnean Society of New South Wales,
6/24 Cliff Street,
MILSONS POINT 2061.

or

P.O. Box 457,
MILSONS POINT 2061.

<u>Full Membership $28</u>, <u>Associate Membership $5</u>.

Please circle the appropriate membership.

Cheque for $ ...... enclosed.

Name ....

Address ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES.

Council Nominations for President, Council and Auditor for 1985/86.

Election at Annual General Meeting, Wednesday, 27th March, 1985.

* The names of Members who retire (in terms of rules 15(a) and 15(b)) are marked with an asterisk.

President:- G.R. Phipps, B.Sc.

Council:-
* D.A. Adamson. B.Sc. Agr., Ph.D.
A.E.J. Andrews, A.S.T.C. (Civ. Eng.) M.I.E. Aust.
* M. Archer, B.A., Ph.D.
R.A. Facer, B.Sc., Ph.D.
* L.W.C. Filewood, B.Sc.
M.D. Fox, B.Sc., Ph.D.
* P.A. Hutchings, B.Sc., Ph.D.
L.A.S. Johnson, D.Sc., F.L.S.
H.A. Martin, Ph. D.
* P.M. Martin, M.Sc. Agr., Dip.Ed., Ph.D.
P.J. Myerscough, M.A., Ph. D.
A. Ritchie, B.Sc., Ph.D.
C.N. Smithers, Ph.D.
T.G. Vallance, B.Sc., Ph.D.
* B.D. Webby, M.Sc., Ph.D.
K.L. Wilson, B.Sc. (Agr.)
A.J.T. Wright, B.Sc., Ph.D.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:-

Council:- (six vacancies):- Council nominates the following and invites further nominations in accordance with rule 15(e) to complete the list.

M. Archer, B.A., Ph.D.
L.W.C. Filewood, B.Sc.
P.M. Martin, M.Sc. Agr., Dip. Ed., Ph.D.
I. Percival, Ph.D.

Auditors:- W. Sinclair & Co.

This notice is given under the provision of Rule 15(e).
It is not a voting paper.

RULE 15(e):- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices provided that each nomination paper is signed by not less than two ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

For the Council

Barbara J. Stoddard,
Honorary Secretary.

P.O. Box 457,
Milsons Point,
SYDNEY, N.S.W. 2061.

Telephone - 929.0253 - Tuesdays only.

18th December, 1984.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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NEWSLETTER NO.: 36

APRIL 1985

CLARKE MEDAL AWARDED TO PROF MICHAEL ARCHER.

The Clark Medal for 1985 for distinguished work in the natural sciences has been awarded to Prof Michael Archer by the Royal Society of New South Wales. Our congratulations Prof Archer on this prestigeous award.

MR GRAEME PHIPPS - CURATOR OF BIRDS AT TARONGA PARK ZOO.

Our congratulations to Mr Graeme Phipps who has recently taken up the position of curator of Birds at the Taronga Park Zoo.

NEW MEMBER

We welcome Mr Harold E. Barnaby, of the School of Zoology, University of New South Wales to the Society.

PAPERS ACCEPTED FOR PUBLICATION

T.G. VALLANCE: Sydney Earth and after: Minerology in Colonial Australia.

K.M. MOORE: Four new species of Glycaspis Taylor (Homoptera: Spondyliaspidae) from some endangered eucalypts.

K.M. MOORE: A new gall-forming species of glycaspis (Homoptera: Spondyliaspididae) from Eucalyptus obliqua.

R.J. FAULDER: Some species of Aganippe (Araneae: Ctenizidae) from eastern Australia.

JOYCE VICKERY RESEARCH FUND GRANT

An emergency grant of $500 has been awarded to Emeritus Professor F.V. Mercer and Dr Mary M. Hindmarsh to complete the check list of plants collected by the late Mr John T. Waterhouse from the Alligator Rivers Region of the Northern Territory. The Waterhouse collection comprises some 2,500 specimens representing

../2

about 750 species and is the most comprehensive made for the Alligator Rivers Region. Work is in progress on the check list but a considerable amount of curatorial work is required on about half the specimens. The grant has been awarded to employ assistance for the curatorial work.

SYMPOSIUM - IN DEFENSE OF SCIENCE: A RESPONSE TO CREATIONISM (Held 9th March 1985)

Over the last few years there has been much controversy involved in the teaching of science. The opposition to science comes from creationists who question the conclusions on evolution. Such criticisms can be useful if based on scientific approaches.

In response to this controversy, the Society combined with the Institute of Biology in Australia, the Royal Zoological Society of New South Wales and TAMS to conduct a symposium to highlight the implications for scientific thought and methods.

The symposium was held in the Joseph Post Auditorium, the Conservatorium of Music, to a capacity audience. Dr Ron Strahan of the National Photographic Index of Australian Wildlife opened with his paper "In defense of science", tracing the development of the controversy and some of the recent highlights. Prof Ron Brown, Chemistry, Monash University followed with "The Universe unfolds". The millions upon millions of years required for the development of the universe, the solar system and the earth, before life could evolve, was stressed. The paper by Dr Alex Richie of the Australian Museum, "The testimony of the rocks" again stressed the millions of years involved and how geological evidence simply does not fit the model of catastrophic flooding proposed by the creationists. Dr Michael Archer, Zoology, University of New South Wales, in his paper, "The fossils say yes!" presented specific examples from the fossil record which clearly contradict the interpretations of the creationists. Dr Dave Briscoe, Biological Sciences, Macquarie University, with his paper "Species are still evolving" showed how the theory of evolution is applied to biological sciences and is the basis of practical and successful programmes such as drug testing and evaluation and plant and animal breeding. The symposium ended with a lively discussion.

This symposium will be published by the University of New South Wales Press in a book of about 100 pages. This book will include an additional paper by Dr Ian Falconer, University of New England, who is also a lay preacher, on why Christians can accept evolution.

"THE CHEVERT EXPEDITION REVISITED", Presidential Address, 27th March 1985.

Mr Graeme Phipps presented the results of his archival research on the Chevert Expedition in his Presidential Address delivered at the Annual General Meeting.

In 1875, William Macleay organised a scientific expedition to Cape York and southern New Guinea. For the purpose he purchased a sailing ship the "Chevert".

Macleay intended the expedition for scientific study and the collection of specimens. There was great public interest and expectations of the discovery of new trade opportunities which would boost the economy of the colony. To some extent, Macleay was carried along with the public fervour.

A dinner was given in his honour and the expedition was farewelled in great style.

The expedition fulfilled its scientic expectations, though not without trials and tribulations. It did not, however, fulfil the great expectations of the public and Macleay returned to criticism and public disenchantment.

The collections of the Chevert Expedition form the most important segment of the Macleay Museum holdings. Mr Phipps is currently revising its ornothology and has discovered many surprises.

BOOK REVIEW

Alan, E.J. ANDREWS: The Devil's Wilderness. George Caley's Journey to Mount Banks 1804. Hobart: Blubber Head Press, 1984.

'The roughness of the country I found beyond description. I cannot give you a more expressive idea than travelling over the tops of the houses in a town.' Thus in a letter to his employer Sir Joseph Banks George Caley, briefly and dramatically, referred to the country he had visited during November 1804. For three weeks of that month Caley, with three men and a dog, had been out in the untracked Blue Mountains, penetrating as far as a prominent feature he named Mount Banks. Caley kept a diary record of the journey and in 1805 entrusted to Robert Brown, then returning to England, a copy of it for Banks. That copy now in the Botany Library of the British Museum (Natural History) provides the text now printed. For all his stricture about Caley's loquacity, Brown should have been content with this matter-of-fact record. Picturesque allusions is largely confined to names like Dismal Dingle and The Devil's Wilderness bestowed along the way; there is not even a digression to identify the fellow travellers. Caley is brief and to the point, recording observations of nature - chiefly plants and topography, and noting the course taken each day.

Alan Andrews has now combined his own considerable knowledge of the terrain and modern maps with Caley's data to establish a convincing plot of the 1804 journey, a course very different from that assumed by J.H. Maiden in 1909. The editor's elegant charts and illustrations, in fact, add vastly to the impressiveness of this volume. So, too, do the intelligent notes supplied at the foot of each page of transcript and the learned introduction where, incidentally, the business of 'Caley's Repulse', at a place he never was, is set straight. Historically-minded botanists in particular will also appreciate the Appendix containing transcripts of Caley's descriptions of plants found on the journey to Mount Banks, again from documents in the BM(NH).

Alan Andrews has done Caley proud, and has been ably supported by the publisher. This is a handsome book that will be of interest and service to Australian historians, both natural and civil - as Robert Brown succinctly put it in another context. One's only regret is that this printing is limited to 400 copies.

T.G. Vallance

APPLICATIONS FOR RESEARCH GRANTS, JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the society.

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Individual grants will not normally exceed $500.00.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

THURSDAY, 16TH MAY - 6 PM,
ACTIVITIES ROOM, AUSTRALIAN MUSEUM,
ENTER FROM WILLIAM STREET AND ENQUIRE AT THE DESK.

SPEAKER : PROFESSOR R.G. WEST, DEPARTMENT OF BOTANY,
UNIVERSITY OF CAMBRIDGE.

TITLE : ICE AGES, - PAST AND FUTURE

A VIEW FROM EUROPE

Past severe climatic changes can be increasingly well identified by geologists, with evidence from fossils and sediments. Improvements in dating add a time framework. How does present climate relate to these changes? What is the significance of the study of these climatic changes for an understanding of our present environment and its future?

EVERYONE WELCOMED

DRINKS WILL BE SERVED FROM 5.30 PM.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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NEWSLETTER NO. 37

JUNE 1985

NEW MEMBERS
Mr. Con Xydis, Geology Dept. University of Sydney.
Mr. Terry Barr, School of Geology, University of NSW.
Mrs. Judith Eastman, Sydney Technical College.
Mr. Douglas E. Throst, School of Applied Geology, University of NSW.
Mr. Ron Haering, School of Zoology, University of NSW.
Mrs. Jane Chalson, School of Botany, University of NSW.
Dr. Robert Whelan, Wollongong University.
Ms. Susan M. Carthew, Wollongong University.
Dr. David J. Syre, University of Wollongong.
Ms Roslyn M. Musten of Mt. Ousley.

We welcome our new members.

NEW COUNCIL MEMBERS
Three new members have filled recent casual vacancies.

Mrs. Judith Eastman is a teacher in the School of General Studies, Sydney Technical College, and teaches biology and junior science. She is also a member of the Education Committee of the Institute of Biology in Australia and Chairman of the Board of Senior School Studies.

Dr. John Merrick, Lecturer, School of Biological Sciences, MacQuarie University is a fish biologist working on the taxonomy and reproductive biology of fresh water fishes. Dr. Merrick is also interested in relating fishing techniques to technological change in aboriginal communities.

Dr. Ian Percival, Geologist, Exploration Department, Esso Australia Ltd. is a palaeontologist who has worked on Ordivician brachiopods. He was awarded the Rotary Foundation Graduate Fellowship to study at the University of Kansas. Dr. Percival has also worked for the Geological Society of Australia documenting the significant geological heritage sites.

PAPERS ACCEPTED FOR PUBLICATION
G.M. SHEA and N. PETERSON. The Blue Mountains Water Skink *Sphenomorphus leuraensis* (Lacertilia scincindae): a redescription, with notes on its natural history.

G.A. BOXSHALL. A new species of *Mugilicola tripathi* (Copepoda: Poecilostomatoida) and a review of the family Thermodamasidae.

T.J. KING and M.D. WHEELER. Composition and geographic distribution of mangrove macro-algal communities in New South Wales.

E.C. LEITCH and D. ASTHANA. The geological development of the Thora district northern margin of the Nambucca Slate Belt.

D.R. MURRAY nad C.M. McGEE. Seed protein content of Australian species of Acacia.

A.W. ARCHER. The chemistry and distribution of Cladonia capitella in Australia.

A. NATEAWATHANA and J. HYLLEBERG. Nephtyid polychaetes in the Andaman Sea, Thailand, with description of five new species.

PROCEEDINGS OF THE FIRST INTERNATIONAL POLYCHAETE CONFERENCE, Sydney, July 1983, published by the Society, continues to sell well. It has had a good review in the Australian Marine Sciences Bulletin.

JOYCE VICKERY RESEARCH GRANT AWARD.
A grant of $500 was awarded to Dr. Tim Flannery, mammologist of the Australian Museum as a matter of urgency. Dr. Flannery has an opportunity to go on the 'Dick Smith Explorer' in July, on a cruise to the Admiralty, St Matthais and Bismark Island Groups as well as several smaller, isolated groups in northern New Guinea. Many of these islands have not been visited by a mammologist. It would be difficult to work in this region without the aid of the 'Dick Smith Explorer'.

WILDERNESS SOCIETY RALLY TO SUPPORT THE DAINTREE RAINFOREST, 12th Oct. 1985.
A march from Town Hall to Hyde Park will start at 12.30 pm, finishing with guest speakers in the Park. The aim of the march is to gather public support for listing the Daintree Region as 'World Heritage" in 1986. The Wilderness Society will supply a speaker with an audiovisual presentation to interested meetings. For further information, ring Cindy Nunn at the Wilderness Society office, (02) 267-7929.

SATURDAY 14th SEPT.

TOUR OF THE HISTORIC QUARANTINE STATION
See Sydney as it was in the Nineteenth Century. Our guided tour will take in the buildings, European rock engravings. Hear about quarantine proceedures and social customs of the time.

The tour leaves from Manly Wharf by bus at 10.40 a.m. There is no parking at the Station and parking is difficult around Manly Wharf. Lunch may be arranged if members wish. There is a bus every half hour to North Head.

There is no cost for the tour but the bus trip is $1.75 adults and $1.10 students and pensioners.

BOOKINGS ARE ESSENTIAL

TO: LINNEAN SOCIETY OF NSW
P.O. Box 457
Milsons Point. 2061

Phone 929-0253
Tues, 9.30 a.m. - 5 p.m.

Please make .... bookings for the tour of the historic Quarantine Station, Sat. 14th Sept.

NAME..............................

ADDRESS ....

Please make bookings by Tues. Sept. 3rd.

WEDNESDAY, 6th NOV. 6 p.m.

THE AUDITORIUM, FORUM Centre, 35 Clarence St. Sydney.

SPEAKER DR. DON ADAMSON School of Biological Sciences, MacQuarie University.

TITLE GREAT RIVER BASINS, THEIR PRESENT BEHAVIOUR AND RECENT PAST

The great river basins of Africa, Australia and South America show common features, during transition from the last glacial period to the present. The sediments laid down on their great, gently sloping alluvial fans preserve records of river history. Common river features present across such a wide range imply global synchoneity.

Drinks will be served from 5.30. You are invited to a dinner in 'La Normandie' restaurent afterwards. Bookings are not required.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

WEDNESDAY 17th July, 6 p.m.
HALLSTROM THEATRE, Australian Museum. Enter from William St. and enquire at the desk.

SPEAKER, Dr. BEN WALLACE, Horticulural Botanist, Royal Botanic Gardens.

TITLE: PLANT GEOGRAPHY OF CHILE

Dr. Wallace recently went to Chile to collect live specimens for the Gardens, particularly for Mt. Tomah Garden in the Blue Mountains. The emphasis in his lecture will be on the wetter, cooler areas of south and south central Chile, plus some comment on the semi-arid north/central areas, including coastal mist-supported lomas forests.

EVERYONE WELCOMED
DRINKS WILL BE SERVED FROM 5.30 p.m.

SATURDAY 27th JULY. 6.30 a.m. (YES, in the morning)

EARLYBIRD BIRDWATCH AND CHAMPAGNE BREAKFAST AT THE ZOO.

Meet at the side entrance of the Zoo, 100 m from the top entrance, down Bradleys Head road towards the ferry. Mr. Graham Phipps, Curator of Birds will escort us to the Australian Section and we will experience the sights and sounds of the Zoo birds starting the day anew. The sounds of the Gibbons (mammals) and other creatures in the Zoo are a wonderful experience also.

The champagne breakfast, about 8.00 to 8.30 will be in the Safari Room. Cost $10 per head.

BOOKINGS ARE ESSENTIAL

TO: Linnean Society of N.S.W.
P.O. Box 457,
Milsons Point. 2061

Phone 929-0253
Tues. 9.30 a.m. - 5 p.m.

Please make .... bookings for the Earlybird Birdwalk and Champagne Breakfast, Sat. 27th July, at $10 per head.

Cheque for $ included.

NAME...............................

ADDRESS............................

Please make bookings by Tues. 23rd July.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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TELEPHONE: 929-0253
OFFICE HOURS:
Tuesday 9.30 a.m. - 5 p.m.

NEWSLETTER NO. 38 OCTOBER 1985

NEW MEMBERS

We welcome
Mr. Darryl L. Houston, Biological Sciences, University of Sydney.
Mr. David P. Maitland, Zoology, University of New South Wales.

PAPERS ACCEPTED FOR PUBLICATION

GRAY, M.R. and ROBINSON, M.L. Behavioural and taxonomic observations on the Australian tailess whipscorpion (*Charinus pescotti* Down 1949, Amblypygi: Charontidae)

CORRECTION

In the June Newsletter it was reported that our new Council member, Ms Judith Eastman is the Chairman of the Board of Senior School Studies when she is in fact Chairman of the Board of Senior School Studies Biology Syllabus Committee. Our apologies to Mrs. Eastman.

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

In 1952, the Department of Taxation approved the society as a scientific research institute for the purposes of Section 73A of the Income Tax and Social Services Contribution Assessment Act 1936/1952. This means that all donations to the Society for scientific research are tax free.

The first donations of £10 was made in 1952 by a Mr. Armstrong of Nyngan who saw an article in the journal of the Graziers Association that donations to the Society were tax free. The research fund remained at $20 until 1971 when $1,000 was donated anonomously. Each year until 1978, another $1,000 was added, and it became a well-known secret that Joyce Vickery was the donor. Besides the tax advantage, Joyce Vickery had a long-term view: to revitalise a fund which at some future time could achieve some worth-while objective for the Society.

The fund was named the Joyce W. Vickery Scientific Research Fund to honour her foresight and generosity. On her death in May 1979, her estate paid almost $34,000 to the Society.

There have been other donors to the fund and the Society gratefully acknowledges their contribution.

The grants from the fund are paid out of interest earned on the capital. Although meagre, the grants assist research workers to achieve some worthwhile objective.

The long-term future of the fund is somewhat clouded. Inflation will inevitably erode the value of the fund. Our canny Treasurer insists on capitalising some of the interest. Another solution to this problem is to increase capital through tax free donations.

All contributions to the Joyce W. Vickery Scientific Research Fund are tax deductable, and most welcomed.

ADVICE TO APPLICANTS

Applications should contain sufficient information about the project and its importance to the relevant field of research to convince the Society that it is worth funding. The application can only be assessed on the information provided and if this is inadequate, the applicant does his project an injustice. You are not limited to the space provided on the application form.

GRANTS AWARDED

M/s D.M. BERGSTROM Student, Biological Sciences, MacQuarie University.
Project: Field trip to the Bavarian Alps with the British Bryological Society to collect northern hemisphere alpine species of the moss genus *Andreaea* found on MacQuarie Island. Awarded $230.

Miss S.M. CARTHEW, Student, Biology, University of Wollongong.
Project: The outcrossing rate of two species of *Banksia* and their breeding systems. The generic relatedness of adult plants and their experimental progeny is determined by electrophoresis of six variable enzymes. Awarded $360.

Mr. R. HAERING, Student, Zoology, University of New South Wales.
Project: Habitat requirements in small mammal, lizard, anuran and arthropod communities in Myall Lakes National Park. Awarded $500.

Dr. M.H. HINDMARSH and Emeritus Professor F.V. MERCER, Botany, University of N.S.W.
Project: Completion of the check list of plants collected by the late Mr. John T. Waterhouse from the Alligator Rivers region of the Northern Territory. Awarded $150. This project had been supported by a previous grant.

Mr. D.L. HOUSTON, Student, Biological Sciences, University of Sydney.
Project: Growth, energetics and reproduction of the aquatic file snake. Despite heavy predation by aborigines and the fact that the female reproduces once every 8 or 10 years and may feed only once every three or four months, the file snake is very successful. Awarded $500.

Mr. C.D. JAMES, Student, Zoology, University of Sydney.
Project: Species diversity and coexistance in sympatric arid-zone lizards, genus *Ctenotus*. The high degree of sympatry within arid-zone *Ctenotus* is exceptional and provides an opportunity to test "competitive coexistence" theories. Awarded $500.

Mr. R. JOHNSTONE, Biological Sciences, University of Sydney.
Project: Analytical methods for quantifying bacterial biomass and bacterial productivity of marine sediments. These analytical methods are poorly developed in Australia and Mr. Johnstone will work with Dr. Henry Blackburn, an authority on marine sediment microbiology, in Denmark. Mr. Johnstone is also the Linnean MacLeay Fellow. Awarded $500.

Mr. D.P. MAITLAND, Student, Zoology, University of New South Wales.
Project: To collect scolpimerine crabs found on beaches north of Brisbane, for further study of gas exchange membranous discs on the legs. These membranous discs were thought to be hearing organs but Maitland has shown that they are respiratory structures. Awarded $500.

Dr. R. SHINE, Senior Lecturer, Biology, University of Sydney.
Project: Ecological differences between males and females in the aquatic file snake, *Acrochordus arafurae* There is an extraordinary degree of sexual dimorphism - females grow much larger, live in deeper water habitats and eat larger prey. Awarded $500.

Mr. G.A. SKILLETER, Student Biological Sciences, University of Sydney.
Project: Population dynamics, distribution and abundance of three congeneric species of the tropical marine snail *Rhinoclavis* Species of this genus are common and contribute significantly to the biomass of coral reef systems. Awarded $500.

OCEANIC RESEARCH FOUNDATION LTD.

The Foundation was formed in 1977 as a registered research organisation with the aims of promoting and encouraging study and research into maritime resources and the environment. Its research vessel, the "Dick Smith Explorer" makes regular cruises. Recently, the Society awarded a Joyce Vickery Research Grant to Tim Flannery who had an opportunity to go on the "Dick Smith Explorer" in a cruise to islands in northern New Guinea. His study of mammals on these islands would have been impossible without the aid of the "Dick Smith Explorer".

The Oceanic Research Foundation relies entirely on annual subscriptions for its funding. Membership is $15 per year. For further information, write to P.O. Box 247, Windsor N.S.W. 2756 or phone (045) 79-9254.

NEW MAGAZINE: AUSTRALIAN GEOGRAPHIC

The "Australian Geographic" is Dick Smith's Journal of Australian Discovery and Adventure. Judging from the colourful brochure sent to the Society, it is more or less what one would expect from such a title. However, the aims of "Australian Geographic" caught your Newsletter Editor's eye. Two in particular may interest members who wish to do research in remote areas:

- Offering encouragement and financial support to Australian adventurers
- Offering encouragement and financial support toward research into Australia's flora, fauna and the environment.

There is no information as to how such encouragement and financial support is given, but if you are interested, write to 'Australian Geographic', P.O. Box 321, Terry Hills, N.S.W. 2084, or phone (02) 450-2344.

OVERSEAS EXCHANGE AGREEMENTS

The Australian Academy of Science announces two new overseas exchange agreements:

- with the Royal Society of London, to foster cooperation in the natural and technological sciences between Australia and the United Kingdom.
- Post-doctoral scientific exchanges in the fields of biological and physical sciences with Japan.

The deadline for applying for grants for 1986 was 30th Sept. and the Society did not receive the information in time to be included in the previous newsletter. However, these exchanges will be awarded annually. There may be others as well. For further information, contact International Relations, The Australian Academy of Science, G.P.O. Box 783, Canberra ACT 2601 or phone (062) 47-3966.

"CUNNINGHAMIA" Vol 1(3), 1985 NOW AVAILABLE

Articles on the following topics are included:

- Natural vegetation and settlement at MacQuarie Pass.
- A floristic survey of Kur-ring-gai Chase National Park.
- Maturation periods for five sensitive shrub species in Hawkesbury Sandstone vegetation.
- Vegetation of the Merriwa area.
- Ecology of the rare *Eucalyptus benthamii*
- Algal floras near two sewerage outlets.

Contact the National Herbarium, Royal Botanic Gardens, Mrs Macquarie's Road, Sydney N.S.W. 2000 or phone (02) 231-8111.

SPECIAL OFFER ON NEW ZEALAND DSIR JOURNALS

The DSIR is offering subscriptions to its journals to members of scientific societies at reduced rates. The special rate would be NZ $30-00 plus $6.00 postage and packing against the current full rate of NZ $50-00 plus $6.00 postage for the 1986 subscription year. The journals are

N.Z. Journal of Agricultural Research
N.Z. Journal of Experimental Agriculture
N.Z. Journal of Botany
N.Z. Journal of Geology and Geophysics
N.Z. Journal of Marine and Freshwater Research
N.Z. Journal of Technology
N.Z. Journal of Zoology

Please note the *N.Z. Journal of Technology* replaced *N.Z. Journal of Science* as from the start of 1985.

If you wish to take advantage of this offer, write or phone the Secretary, on or before Oct. 29th.

Report "Quarantine Station" Saturday 14th September 1985.

The weather looked very uncertain on the morning of our visit to the Quarantine Station but no rain fell until the inspection was completed. Twenty members and friends enjoyed this outing.

With the speed of modern travel, and medical advances in the control of infectious diseases, the quarantine of people is something most of us have never thought about. Obviously, in the past, control of disease presented a major problem - hence the Quarantine Station.

This area contains many examples of "Budget" buildings, and while the layout seems spacious now, no doubt it was a hive of activity many times in the past. Following the accommodation patterns of the ships which provided the majority of users of the Quarantine Station, separate quarters were provided for 1st, 2nd and 3rd class passengers and crew. This arrangement seems a little quaint in retrospect but was sensible at the time as ship owners had to pay the cost of their passengers enforced stay. The Quarantine Station was last used to house Darwin refugees from Cyclone Tracey.

Perhaps the most interesting part of the visit for most of us was the walk through the Wildflowers to North Head. The vegetation was in excellent untouched condition, and National Parks by restricting access to guided groups may be able to keep it that way.

Wendy Filewood.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

WEDNESDAY 23rd Nov. 6 p.m.

J.H. MAIDEN THEATRE IN THE ANDERSON BUILDING, BOTANIC GARDENS. Enter the Gardens from the main gates on Mrs MaQuarie's Road, follow signs to Information Centre. The J.H. Maiden Theatre is next to the Information Centre, opposite the Cactus Garden.

SPEAKER: DR. DALLAS MILDENHALL, Head of the Palynology Section, New Zealand Geological Survey.

TITLE: CHANGES IN THE NEW ZEALAND MIOCENE - PLIOCENE VEGETATION

In the Early Miocene (some 25 million years ago) the climate of New Zealand was relatively warm and the vegetation subtropical, with a rich variety of taxa. Forests predominated in the Early Miocene. In the Late Miocene, however, the climate became colder and herbaceous and temperate taxa became prominent in some areas. The Pliocene was a time of marked fluctuations of vegetation and climate. A mosaic of different forest types existed in space and time. Glaciations reduced the forest to scrubland/grassland in some areas.

Throughout this time, New Zealand remained at approximately the same latitude so the changes in the vegetation largely reflect the climate.

Drinks will be served from 5.30 p.m.

WEDNESDAY, 6th Nov. 6 p.m.

THE AUDITORIUM, FORUM Centre, 35 Clarence St. Sydney.

SPEAKER: DR. DON ADAMSON School of Biological Sciences, MacQuarie University.

TITLE: GREAT RIVER BASINS, THEIR PRESENT BEHAVIOUR AND RECENT PAST

The great river basins of Africa, Australia and South America show common features, during transition from the last glacial period to the present. The sediments laid down on their great, gently sloping alluvial fans preserve records of river history. Common river features present across such a wide range imply global synchoneity.

Drinks will be served from 5.30. You are invited to a dinner in 'La Normandie; restaurant afterwards. Bookings are not required.

THURSDAY, 28th Nov. 6 p.m.

Continued, page 2

THURSDAY, 28th Nov. 6 p.m.

THE SEMINAR ROOM, NATIONAL HERBARIUM. Enter through the main entrance on Mrs. MaQuarie's Road.

SPEAKER: MR. ALISTAIR HAY, School of Botany, University of New South Wales

TITLE: PALMS AND THE VEGETATION ON NEW GUINEA

The Palms are a striking and strikingly tropical family. In New Guinea some 33 genera and 300 species occur in all forest vegetation types. With their distinctive appearance many of the genera form useful 'markers' for differing forest conditions and stages in forest successional cycles.

The physical scenario for the vegetation of New Guinea, which ranges from mangrove to alpine, is one of relatively frequent catastrophic disturbance - volcanic eruptions, earthquakes, fires, frosts, cyclones and so on, and now also clearing by industrial man. The tallest and most 'virgin' forests are seen in this perspective, and many groups of plants, including the palms, normally associated with 'undisturbed' or 'climax' conditions are opportunistic here.

The intimate association that man can have with rainforest is epitomised by the palms, which may be said to be the most useful group of plants in that they are put to more uses by more people than any other plant family.

Drinks will be served from 5.30 p.m.

EVERYONE WELCOME

SEMINAR

CHANGES IN THE NEW ZEALAND MIOCENE-PLIOCENE VEGETATION

BY

DR. DALLAS C. MILDENHALL

HEAD OF THE PALYNOLOGY SECTION,
NEW ZEALAND GEOLOGICAL SURVEY

WEDNESDAY 23rd OCTOBER at 6pm

In the J.H. MAIDEN THEATRE, Anderson Building, Royal Botanic Gardens. Enter the Gardens from the main gates on Mrs MaQuarie's Road, follow signs to Information centre. The J.H. Maiden Theatre is next to the Information Centre, opposite the Cactus Garden.

In the Early Miocene (some 25 million years ago) the climate of New Zealand was relatively warm and the vegetation subtropical, with a rich variety of taxa. Forests predominated in the Early Miocene. In the Late Miocene, however, the climate became colder and herbaceous and temperate taxa became prominent in some areas. The Pliocene was a time of marked fluctuations of vegetation and climate. A mosaic of different forest types existed in space and time. Glaciations reduced the forest to scrubland/grassland in some areas.

Throughout this time, New Zealand remained at approximately the same latitude so the changes in the vegetation largely reflect the climate.

Please note: This is the same seminar as the one incorrectly advertised for Wednesday 23rd November in the Linnean Society of N.S.W. Newsletter.

DRINKS WILL BE SERVED FROM 5.30 p.m.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTN WALES

LINN S'O'C NEWS

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NEWSLETTER NO. 39 JANUARY 1985

NEW MEMBER: We welcome Mr. G.A. Skilleter of the School of Biological Sciences, University of Sydney.

DONATION TO JOYCE W. VICKERY RESEARCH FUND

Our thanks go to Dr. Mary Tindale for her generous donation.

MANUSCRIPTS ACCEPTED FOR PUBLICATION

F.W. Rowe & A.K. Hoggett. The cidarid echinoids of New South Wales.

K.G. McQueen, G. Taylor & M.C. Brown. The Cambalong Complex: a new metamorphic complex in south-eastern New South Wales.

M.M. Stevens & M. Carver. Type specimens of Hemiptera (Insects) transferred from the Macleay Museum, University of Sydney, to the Australian National Insect Collection, Canberra.

R.J. King. Aquatic Angiosperms in Coastal Saline Lagoons of New South Wales. 1. The Vegetation of Lake Macquarie.

R.J. King & V.M. Holland. Aquatic Angiosperms in Coastal Saline Lagoons of New South Wales. 2. The Vegetation of Tuggerah Lakes with specific comments on the growth of *Zostera capricorni* Ascherson.

R.J. King & J.B. Barclay. Aquatic Angiosperms in Coastal Saline Lagoons of New South Wales. 3. Quantitative assessment of *Zostera capricorni* Ascherson

R.J. King & B. Hodgson. Aquatic angiosperms in Coastal Saline Lagoons of New South Wales. 4. Long Term Changes.

COURSE ON INSECT COLLECTING, PRESERVATION AND IDENTIFICATION

The course will be held at the Petersham Technical College, commencing Friday 14th Feb. with a session every Friday, 6 - 9 pm/ until 13th June. No fee is charged. Enrolment is Tues 4th Feb. between 3 pm. and 7 pm. at the Petersham Technical College, Cnr. Crystal St. and Margaret St. Petersham. For further information, ring 568-0221 or 568-0256. After 28th January, contact the above numbers or G. Bedford on 568-0276.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C NEWS

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NEWSLETTER NO. 40 APRIL 1986

HONOURS TO MEMBERS

Our congratulations to members who have been awarded honours recently.

Professor D.T. Anderson was awarded the A.O. (Officer in the General Division of the Order of Australia) in the Australia Day Honours list, for service to education, especially biology.

Dr. Germaine Joplin was awarded the A.M. (Member in the General Division of the Order of Australia) in the Australia Day Honours list, for services to science, particularly in the field of geology. Dr. Joplin has also been awarded the W.R. Browne Medal of the Geological Society of Australia.

Mr. M.S. (Max) Moulds has been awarded the L.C. "Zoo" Le Souef Memorial Award for 1985. This award is given in recognition of outstanding service rendered to Australian Entomology by amateur entomologists.

Although available annually the award is made only for those years in which outstanding candidates are nominated to the Victorian Society. Max Moulds' interests are mainly in the cicadas and hawk moths, on which he is a recognised authority, but his interests are wide and many important revisionary papers refer to material collected by Max and his wife, Barbara, on their extensive collecting expeditions to remote areas of Australia.

NEW MEMBERS: We welcome our new members :

Mr. Philip Congdon of Helensbergh
Ms. Dana Strain of the Cumberland College of Health Services
Ms. Susan J. Hall, Dept. of Zoology, University of Sydney
Mr. Mark Stevens, Dept. Agricultural Entomology, University of Sydney.

PAPERS ACCEPTED FOR PUBLICATION

D. Bergstrom. An atlas of seeds and fruits from Macquarie Island.

B.G. Jones et al. Geology of an area between Bungonia and Windellama, NSW.

MEMBERSHIP FEES (1986)

A membership renewal slip is sent out with the January Newsletter to save the cost of postage of billing each member separately. The Society now has a number of categories of membership. These are :

Full member	$28
Retired member (over 60 years of age)	$14
Student member	$14
Associate member	$5
Life member	NIL
Over 40 years membership	NIL

GRANTS FOR WORK ON J.T. WATERHOUSE COLLECTION FROM EAST ALLIGATOR RIVER

A grant of $60,000 from the CES job training scheme has been allotted for work to continue on the J.T. Waterhouse plant collection from the East Alligator River region of Arnhemland, thanks to the efforts of the Supervising Scientist at Jabiru. This grant will employ an Experimental Officer for twelve months and two Technical Officers for forty weeks each. Mr. Nick Gartrell, a graduate in plant taxonomy has been appointed Experimental Officer and the first Technical Officer has been appointed also. The Supervising Scientist also provided another $10,000 for expert supervision of the project, on a two day per week basis. Mr. Bruce Wannan, who has just completed a PhD. thesis in plant taxonomy has been appointed to this position.

Work on the project will complete a check list of the collection and start on compilation of data for a field key.

The Society awarded $650 in two separate grants from the Joyce Vickery Research Fund to Dr. Mary Hindmarsh and Emeritus Prof. Frank Mercer for curatorial work and a check list of identified species of the J.T. Waterhouse collection. This project was completed, but with a total of some 2,500 specimens, many of them still require identification. This present project follows on from that of Dr. Hindmarsh and Em. Prof. Mercer.

NON-DOMESTIC ANIMAL PATHOLOGY REGISTRY ESTABLISHED AT TARONGA ZOO

Taronga Zoo is establishing a national reference collection of normal and pathological material from zoo and native animals. It will consist of colour transparencies of gross and microscopic pathology and normal tissue, parafin blocks and microscope slides of processed tissue and a pathology reference library. From October 1985, Dr. Bill Hartley has been employed on a full-time basis to work on this reference collection. He examines tissues and writes a protocol for each so that the information is presented in an easily retrievable form. Taronga Zoo is the only Australian Zoo to have twenty years of detailed medical records for its past and present animal population. When these records are organised into an easily accessible form, they will be of immense value, not only to zoos but to other interested organisations. The opportunity exists to expand the registry with material from other sources, such as universities, state wildlife authorities and vetinarian practices. This material is otherwise in danger of being lost to science.

Dr.William Hartley is a Master of Vetinary Science, a Doctor of Science and a Fellow of the Royal College of Pathology. Most recently, he has established a registry of domestic animal pathology for the Ministry of Agriculture in New Zealand. He is a comparative pathologist of world renown, especially with regards to the disease processes of the nervous system.

INTERNATIONAL SYMPOSIUM ON WETLANDS

The symposium will cover themes of conservation and management, research, public education, recreation and tourism. There will be sections of the programme which cater more for the general public.

The symposium will be held 5th to 8th June, 1986, at the University of Newcastle and the Shortland Wetlands Centre, Newcastle, N.S.W. Australia. For further information, contact The Convenor (Kevin McDonald), Wetlands Symposium, Science Dept., Newcastle CAE, P.O. Box 84, Waratah 2298, NSW Australia.

AUSTRALIAN FOLK HIGH SCHOOLS ASSOCIATION LTD.

The organisation is a non-profit incorporated Association of people interested in widening the range of educational facilities and activities to adults. It plans to develop the Bandon Grove School, 14 km along the Chichester Dam Road out of Gulgong, as a residential adult education college which will be available for use by any group or organisation. Fees are reasonable, $6 per person per night.

For further information, contact The Secretary, Australian Folk High Schools Association Ltd., 4 Market St.,Hinton , NSW 2321

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.00.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30 June in any year; however in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

PROGRAMME

JOINT MEETING WITH THE ROYAL SOCIETY OF N.S.W.

WEDNESDAY 4TH JUNE, 6.15P.M

BOWLERS' CLUB, 95 YORK ST. SYDNEY

SPEAKER: Dr. P.B. GOODWIN, Dept. of Agronomy and Horticulture, University of Sydney

TITLE: MAKING ORNAMENTALS FROM AUSTRALIA'S FLORA

In the fourteen years since the creation of the Chair of Horticulture, the Department has been involved in the development of ornamental plants from the nature Australian flora. This is by no means the first work on the flora. Australian native plants were status symbols amongst the British glass house owning class by the end of the eighteenth century. I will discuss the development of indoor-outdoor flowering pot plants to supplement the market now supplied by African violets and potted chrysanthemums. The talk will emphasis work on *Anigozanthos*, the kangaroo paw.

FROM THE PROGRAMME OF THE ROYAL SOCIETY OF N.S.W.
WEDNESDAY 2nd JULY AT 6.15P.M.

BOWLERS' CLUB, 95 YORK ST. SYDNEY

SPEAKER: PROF. K.L. WILLIAMS, School of Biological Sciences, Macquarie University

TITLE: WHAT CAN SLIME MOULDS TEACH US ABOUT OURSELVES?
SOME SURPRISES FROM FUNDAMENTAL AND APPLIED RESEARCH ON *D. DISCOIDEUM*

Cellular slime moulds are often considered odd organisms as they do not fit neatly in the classical description of plants or animals. When they are feeding they are typical animal cells. They are phagocytic amoebae which live in the soil and eat bacteria. When food is exhausted the amoebae signal each other and aggregate to form a small tissue, which is not unlike a small slug. This organism is still animal-like, but the final stage of development leads to the construction of a plant-like fruiting body involving 3 classes of cells: basal disc cells which anchor the fruiting structure and stalk cells which raise the third class of spores above the substratum. At this stage of the life cycle the organism is much more plant or fungal-like, since all three cell types are surrounded by a cell wall.

I have been interested in these organisms for a number of years because they offer one of the simplest model systems for studying multicellular development, in particular formation of patterns involving different classes of cells. Surprisingly, the basic biochemistry of these cells is remarkably similar to our own cells and work in recent years shows many parallels at the physiological and even the molecular level. Basic features of the multicellular slug stage will be discussed and some parallels with animal development will be made. The possibility of using this organism as a system for producing high-value genetically engineered products will also be considered.

LINNEAN SOCIETY OF NEW SOUTH WALES

SEMINAR

PALMS AND THE VEGETATION OF NEW GUINEA

BY

MR. ALISTAIR HAY

SCHOOL OF BOTANY

UNIVERSITY OF NEW SOUTH WALES

THURSDAY 28th NOVEMBER at 6 pm

IN THE SEMINAR ROOM, NATIONAL HERBARIUM. Enter through the main entrance on Mrs. Macquarie's Road.

The Palms are a striking and strikingly tropical family. In New Guinea some 33 genera and 300 species occur in all forest vegetation types. With their distinctive appearance many of the genera form useful 'markers' for differing forest conditions and stages in forest successional cycles.

The physical scenario for the vegetation of New Guinea, which ranges from mangrove to alpine, is one of relatively frequent catastrophic disturbance - volcanic eruptions, earthquakes, fires, frosts, cyclones and so on, and now also clearing by industrial man. The tallest and most 'virgin' forests are seen in this perspective, and many groups of plants, including the palms, normally associated with 'undisturbed' or 'climax' conditions are opportunistic here.

The intimate association that man can have with rainforest is epitomised by the palms, which may be said to be the most useful group of plants in that they are put to more uses by more people than any other plant family.

Drinks will be served from 5.30 pm

EVERYONE WELCOME.

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C NEWS

NEWSLETTER EDITOR
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Tues. 9.30 a.m. - 5 p.m.

NEWSLETTER NO. 41 JULY 1986

DONATION TO THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Society has received an anonymous donation of $5,000 for the Joyce W. Vickery Scientific Research Fund. We are extremely grateful to our donor, who will assist us in one of our most worthwhile activities.

The first grant was awarded in 1980 to a visiting scientist from overseas who ran out of funds and required emergency support for four weeks to finish his project. The second grant was awarded to a student to make a collecting trip to Victoria to complete his studies. Previously, the University had provided the running costs of its vehicles, but this support was withdrawn. Grants have been awarded on a regular basis since 1981. A total of 56 grants have been awarded - 21 to professionals, 29 to students, 4 to retired persons and 2 to amateurs, i.e., people who earn their living in some other way. There have been 17 unsuccessful applications. The main reason for lack of success has been an inadequate explanation of the project and budget. Some of the unsuccessful applicants subsequently re-applied and were successful.

The situation of postgraduate research students deserves special comment. They take on ambitious projects and sometimes must pay their expenses from savings and borrowings (postgraduate scholarships are currently worth $8,126, fully taxable!) Support facilities which may have been provided by the University when the student started his/her project may be withdrawn and the student must find extra funds from an already tight budget. Much of Australia's meagre effort at research is carried out by postgraduate students, and at bargain prices to the Government!

The grants given from the J. W. Vickery Scientific Research Fund, although not large, nevertheless fill a very real need. Given the present economic climate and government attitude to research, these needs will probably become more pressing.

Once again, we thank our most generous donor for timely support to the J. W. Vickery Research Fund. All donations are tax deductible.

WELCOME TO NEW MEMBERS

Mr. Phillip Kodela, School of Geography, University of New South Wales.
Mr. (Walter) Alan Ives, Archivist, Riverina-Murray Institute of Higher Education
Ms. Dana Bergstrom, Biological Sciences, Macquarie University.
Ms. Jennifer A. Chaplin, Biology Department, University of Wollongong.
Ms. Linda J. Heaphy, School of Zoology, University of New South Wales.
Ms. Caroline A. Farrelly, School of Zoology, University of New South Wales.
Ms. Nicola Marlow, School of Zoology, University of New South Wales.

Dr. Hugh Spencer, Department of Biology, University of Wollongong.
Mr. Patrick M. Tap, Department of Biology, University of Wollongong.

PAPERS ACCEPTED FOR PUBLICATION

Carr, P. F. and Jones, B. G. Non-contemporaneity in the Marulan Batholith.

BACK ISSUES OF THE PROCEEDINGS stored for many years in the Museum of Applied Arts and Science have been collected and a list of available volumes is being compiled. Issues dating from the first volume were discovered in the Museum of Applied Arts and Science a few years ago. It was thought previously that stocks of all the early volumes had been destroyed in a fire.

SYMPOSIUM TO HONOUR EMERITUS PROFESSOR J. M. VINCENT

Professor Vincent, formerly Head of the School of Microbiology, University of New South Wales, and latterly Honorary Associate at the University of Sydney, will have his 75th birthday on 14 August, 1986. A two-day weekend symposium is being organised.

The first day will be devoted to biological nitrogen fixation, and the second to soil, food and general microbiology. For further information, contact the Department of Microbiology, University of Sydney, NSW, 2006, telephone 692-2536.

"SHALLOW TETHYS 2", an international conference will be held at the Riverina-Murray Institute of Higher Education, Wagga Wagga, in September 1986. It will follow the 12th International Sedimentological Congress in Canberra, late August 1986. For further information, write to "Shallow Tethys 2", School of Applied Science, Riverina-Murray Institute of Higher Education, PO Box 588, Wagga Wagga, NSW, 2650.

SCIENTIFIC AND TECHNOLOGICAL EXCHANGE PROGRAMME

The Australian Academy of Science, the Australian Academy of Technological Sciences and the Royal Society aim to foster co-operation in the natural and technological sciences between Australia and the United Kingdom. To meet this objective, the two Australian Acadamies operate an exchange programme fostered by the Australian Department of Science.

Visits may be long term (6 months or more) or short term (not less than two weeks). The deadline for applications is 1 September. For further information, contact the International Exchanges Officer, Australian Academy of Science, GPO Box 783, Canberra, ACT, 2601, telephone (062) 47-3966.

FIRST WORLD CONGRESS OF HERPETOLOGY, 11-19 September, 1989, University of Kent, Canterbury (UK). The congress will enable all persons interested in herpetology to meet and exchange information to promote the advance of knowledge and the conservation of the world's amphibians and reptiles. For further information and mail listing, write to: Dr. Ian R. Swingland, World Congress of Herpetology, Rutherford College, University of Kent, Canterbury, Kent, CT2 7NX, United Kingdom.

LECTURE BY DR P.B. GOODWIN — 'MAKING ORNAMENTALS FROM AUSTRALIAN NATIVES

Did you know that light levels in an office are often about 1/200th of natural sunlight? Or that hundreds of Australian plant species were cultivated in European glasshouses by the end of last century? These were points made by

PROGRAMME

WEDNESDAY 3 SEPTEMBER, 6 pm

ANDERSON BUILDING, ROYAL BOTANIC GARDENS. Enter from the vehicular entrance, Mrs Macquarie's Road.

SPEAKER: PROFESSOR MIKE ARCHER, School of Zoology, University of New South Wales.

TOPIC: THE ORIGIN OF AUSTRALIA'S DRY COUNTRY MAMMALS

While some mammal lineages from Australia's closed forest communities have a reasonable fossil record, the origin of Australia's dry country mammals such as the Koala, the Platypus and the Brushtail Possum have been poorly understood. Very few of them are clearly descendants of the middle Miocene mammals from central Australia which, until recently, were the best known of the middle Tertiary Australian assemblages. Recent discoveries of highly diverse middle and late Tertiary faunas from northwestern Queensland have revealed the oldest and in many cases first-known representatives of many of the modern types of Australian mammals and in some cases tied these to otherwise enigmatic Miocene forms from central Australia. The bottom line appears to be that many of Australia's dry country forms had their origin in northern Australian rainforest communities.

WINE AND CHEESE WILL BE SERVED FROM 5.30 pm

EVERYONE WELCOME

THE ECOLOGY OF LAKE ILLAWARRA

SATURDAY 18 OCTOBER: Meet 10 am at the Eastern Gate of the University of Wollongong on Northfield Avenue. The exit from the Expressway is sign-posted, University of Wollongong.

LEADERS: Dr Iradj Yassini and Dr Tony Wright, University of Wollongong.

We will examine the flora and fauna of Lake Illawarra and observe the influence of urbanisation on the circulation of the Lake.

There is a possibility that we may be able to collect Permian invertebrate fossils at Albion Park.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

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Tuesday 9.30 a.m.-5 p.m.

NEWSLETTER No. 42 October 1986

PAPERS ACCEPTED FOR PUBLICTION:

A.T. Howden. Notes on the biology of adult and immature Amycterinae (Coleoptera, Curculionidae).

JOYCE W. VICKERY RESEARCH FUND AWARDS:

The requests for money from the Joyce W. Vickery Research Fund far exceeded the amount available for disbursement in 1986. All of the applications were of a good standard and the Council decided that all of the projects were worth funding. As a consequence, all of the applicants received a grant but for less than was requested. The following awards were made:

ANDERSON, Trevor, Ph.D. student, Biological Sciences, University of Sydney. *Project*: Qualitative and quantitative aspects of the digestive system of luderick (black fish). Previous studies indicate that the capacity of luderick to absorb 14C from labelled food varies according to the feeding regimes. Other workers studying the utilisation of algae by herbivorous fish have paid little regard to the effect of different feeding regimes on the digestive physiology. Food and faecal remains require analysis for carbon and nitrogen in a Heraeus CHN analyser. Awarded $190.

CARTHEW, Susan M., Ph.D. student, Biology, University of Wollongong. *Project*: Analysis of the genetic structure of a population of *Banksia spinulosa*. Leaf material will be assayed using electrophoretic procedures and staining for at least four polymorphic loci. Pollinators and their effect on seed set is studied as well. The 1985 grant from the Joyce W. Vickery Research Fund was used to determine the extent of outcrossing in *Banksia spinulosa* and *Banksia paludosa*. This work is nearing completion. Awarded $225 for electrophoretic requisites.

CHALSON, Jane, Ph.D. student, Botany, University of New South Wales. *Project*: Palynology and history of the vegetation of the Blue Mountains. Seven swamps between Penrith and Lithgow have been chosen to give an altitudinal transect. It is hoped that a record of changes in the vegetation from the last glacial period (17,000 years BP) to the present will eventuate. Funds are requested for carbon dates. Awarded $375.

..2..

CHAPLIN, Jennifer A., Ph.D. student and Teaching Fellow, Biology, University of Wollongong.
Project: Mode of reproduction of fresh water ostracods. Available information suggests that the mode of reproduction depends on the degree of environmental stability — asexual in relatively unstable, e.g. ephemeral ponds and sexual in stable environments, e.g. reservoirs and lakes. This contradicts theoretical models which predict the reverse. Funds were requested for travel and electrophoresis. Awarded $265.

CHURCH, A.G. student, Zoology, University of New South Wales.
Project: Reproduction of sweetlip emperor in Norfolk Island waters. It has been suggested that this species and seven others of its family from northern Australian waters undergo natural sex reversal and are protogynous hermaphrodites changing sex from females to males over a wide range of sizes. The main evidence for this change is the occurrence of ovarian material in the form of atretic bodies or degenerating oocytes embedded in the testicular tissue. So far, examination of 53 male gonads failed to reveal evidence to support this claim. More material of both sexes is required before firm conclusions can be drawn. This will require two collecting trips, July 1986 and January 1987. Awarded $375.

CHRYSTAL, Jane M., Ph.D. student, Biological Sciences, University of Sydney.
Project: A study of the thylakoid membranes, pigments and pigment protein complexes of the Eustigmatophyta group of unicellular algae. This group is very unusual since it possesses only chlorophyl a and it lacks both chlorophyl b and c which are present in all other photosynthetic eucaryotes. The method involves immunological studies which so far indicate no chlorophyll a/b or a/c binding protein. These studies should indicate whether the accessory chlorophyls have been lost or the group never possessed them. Awarded $150 towards costs while working in an American laboratory with expertise in this field.

FARRELLY, Caroline A., Ph.D. student, Zoology, University of New South Wales.
Project: "The relative importance of gills and lungs in the aerial gas exchange of crabs". Aquatic crabs have gills. Air breathing crabs have 3 main strategies with varying degrees of reliance on lungs and/or gills. The assumption in the literature is that respiratory functions relies mainly on gills in all of these strategies. The study includes 11 species across the range of strategies. There is only one terrestrial species, the ghost crab in sandhills, known from the Australian mainland. However, Christmas Island has a variety of terrestrial species which are large and this is an advantage for micropuncture blood sampling. Awarded $375 for a collecting trip.

HEALY, John, Post-doctoral Research Fellow, Biological Sciences, University of Sydney.
Project: Comparative morphology of the ultrastructure of spermatozoa of barnacles and the major molluscan classes. The sperm structure (often very complex) is used as a new indicator of taxonomic position and phylogenetic relationship in problematic groups. Awarded $300 for photographic and laboratory materials.

HEAPHY, Linda, Ph.D. student, Zoology, University of New South Wales.
Project: Population dynamics, reproduction, diet and ecological physiology of the pig-nosed turtle. This turtle was thought to be endemic to Papua New Guinea, but it is present in some localities of the Northern Territory. It is classified as a species at risk but not much is known about it. Main study site is on the Daly River. Animals will be captured, tagged, released and recaptured. Environmental variables will be measured. Awarded $375 for a field trip.

..3..

<u>HOUSTON</u>, Darryl, L., Ph.D. student, Biological Sciences, University of Sydney. *Project*: Growth rates, reproductive frequencies, fecundity, diet, habitat selection and prey selectivity of the file snake. The study is being done in Magela Creek of the East Alligator River. Snakes are caught, branded, released and recaptured. Results so far indicate an astonishingly high population density, extreme sexual size dimorphism, significant movement after flooding at the onset of the monsoon season, with a tendency to return to favoured positions. Of 20 live snakes brought to Sydney, four were gravid females which have recently given birth to 46 live young. Sexual size dimorphism is already apparent in the neonates. Awarded $165 for trapping nets.

<u>JACKLYN</u>, Peter, Ph.D. student, Zoology, University of Sydney. *Project*: Three species of Northern Australian termites build elongated mounds with a N-S orientation. Under certain environmental conditions, two of the species may build conical mounds with apices oriented in a northerly direction. The cue to orientation is thought to be magnetoperception. Magnetite has been found in various animals capable of magnetoperception, including one species of termite, although in a different genus to the species involved here. The study aims to establish the extent and mechanism of mound orientation, the function of mound orientation. Magnetometers, thermocouples and humidity meters will be set up in and around the mounds for automatic monitoring.

Australia appears to have the only termite species, *Amitermes meridionalis*, which constructs ridge-like nests with a N-S orientation. Many of the large fields of uniformly aligned nests that apparently only occur south of Darwin have been destroyed. Termites have an important role in the ecology of tropical areas. Awarded $300 for field work.

<u>LEMCKERT</u>, Francis L., M.Sc. student, Zoology, University of Sydney. *Project*: Reproductive isolating mechanisms of frog species in the *Litoria aurea* complex. Female frogs will be tested to see if they can distinguish between the calls of males of their own and other species, or whether there are spatial and temporal differences to prevent interbreeding. The possibility of hybridisation will be tested using artifical techniques. These frogs occur in a zone of sympatry south of Canberra. Awarded $150 for field work.

<u>MARLOW</u>, Nicola, Ph.D. student, Zoology, University of New South Wales. *Project*: Arid zone fox ecology, especially predatory behaviour. This information is valuable in determining whether the beneficial predatory impact that foxes have on rabbits outweighs the detrimental predatory impact that they have on lambs. Methods of study include capture, fitting of collars and release, the study of stomach contents, scat contents and observations of predatory behaviour. Awarded $300 for field work.

<u>STOCKER</u>, Laura T., Ph.D. student, Biology, University of Sydney. *Project*: Demography of a colonial ascidian, *Didemnum* sp., important in epibenthic marine assemblages. The effects of fission and fusion of colonies are subject to contradictory and untested predictions. Evolutionary theory suggests that the presence of a competitor should induce change in the rate of fission in clonal organisms. Observations show that where *Didemnum* borders patches of sponges, the colonies tend to be large and undivided. An experiment is planned:

1) remove sponges;
2) leave sponges around borders of colonies; and
3) control, colonies which naturally lack sponges around the borders. Changes will be monitored over 60 quadrats.

Awarded $375 for photographic materials (photography is the only practical means of recording changes in the colonies).

<u>TAP</u>, Patrick, M., Ph.D. student/Teaching Fellow, Biology, University of Wollongong.
Project: Arthropods and the role of refuges in post-fire succession in a south east Australian heathland. At present, there is no satisfactory method of processing and sorting the large number of samples (several thousand individuals) required for anlaysis. I have developed a method which employs a 35 mm camera adapted for macrophotography to create static and magnified images which can be readily counted and sorted. This reduces processing time to less than 20 min per sample, a saving of more than 40 min per sample when processed using a stere-microscope. Awarded $295 for photographic materials.

<u>VAN DYCK</u>, S.M., Curatorial Officer, Queensland Museum.
Project: Clarification of the taxonomy of antichinus and related species of New Guinea. Antichinus and other primitive marsupials are of great interest but there is a century of conflicting synonomies. Type specimens held in various institutions around the world must be examined. Awarded $375 towards travel.

EVOLUTION AND CREATIONISM IN THE TEACHING OF SCIENCE

The Society put its views to Mr Cavalier, the Minister of Education, that creationism, as an alternative to the theory of evolution, has no part in the science curriculum in schools. The Minister replied and expressed his views:

> "The New South Wales science curriculum includes the study of evolution because it is a major, contemporary, scientific theory. The curriculum treats evolution as theory and not as fact. Teachers are required to teach the curriculum, not personal enthusiasms or beliefs. I find it extraordinary that anyone should defend any teacher who chooses to use school time and school lessons as an opportunity for personal theorising, in open defiance of the curriculum and their professional obligations.
>
> Science teachers may discuss creationism as a belief held by some people about the origins and development of life. In such discussions teachers have a responsibility to maintain objectivity and to respect the rights of students and parents to dissent in matters of belief. My understanding is that most religious denominations do not see evolutionary theory as being, of necessity, in conflict with religious belief".

The Minister has also issued a memorandum to school principles (reproduced below). We commend Mr Cavalier for his actions in this matter which ensure that our children receive an education fitting them for the future with its reliance on science and technology. The Minister emphasises that the memorandum applies only to Science and not to Special Religious Instruction.

MEMORANDUM TO PRINCIPALS

Some recent media publicity regarding the teaching of "creationism" in schools appeared to imply that teaching about the theory of evolution could be omitted from Science courses in schools or could be replaced by the teaching of "creationism".

..5..

To assist principals and teachers, the following statement summarises the current views on evolution underlying the Science syllabuses for primary and secondary schools. It is Department of Education policy that the teaching of Science in N.S.W. Government schools must be consistent with the current Science syllabuses.

The concept of evolution is fundamental to most contemporary scientific explanations of change and diversity in the universe. Evolution is embedded in the theories of every branch of the natural sciences (physics, chemistry, geology, biology and astronomy). Theories of evolutionary change are, therefore, relevant wherever natural change over time is considered in the Science syllabuses for both primary and secondary schools.

In studying Science, students should develop an understanding of evolutionary theories, the evidence on which they are based and the mechanisms by which the processes of evolution may occur. They should also recognize that scientific knowledge, including evolutionary theory, is changing and expanding.

Scientific theories are based on the evidence available at the time they are proposed. They remain liable to review and subsequent revision. For a theory to maintain its place within the scientific community, the evidence on which it is based and the predictions which arise from it must be subjected to and withstand scientific scrutiny. Scientists do debate the details of the processes and mechanisms of evolution. This is because differences of opinion are a part of the investigative nature of science. Even so the evidence for evolution and the broad mechanism of natural selection by which evolution occurs are generally accepted by the scientific community.

Though most religious denominations do not see evolutionary theory as being of necessity, in conflict with religious belief, some groups claim that literal "creationism" is a scientific theory which can be substituted for evolutionary theory. The great majority of the scientific community does not accept "creationism" as a credible theory in the scientific sense. Scientists generally do not accept that the scientific evidence cited for "creationism" is reliable, or that predictions based on it agree with observations.

"Creationism" should therefore not be taught as a scientific theory in N.S.W. Government schools either as a replacement for evolutionary theory or as an alternative scientific theory.

Science teachers may, if appropriate, refer to literal "creationism" as one of the views held by some people about the origins and development of life. They may also consider the differences between "creationism" and evolution from the point of view of what constitutes a scientific method and the differences between religious beliefs and scientific theories. Such a consideration could help to clarify students' understandings of scientific methods.

The distinction between religious belief and scientific theory is important in handling the treatment of evolution in the classroom. It is not the teacher's role to prescribe students' beliefs. In our society individuals are free to hold their own religious beliefs. Teachers have a responsibility to be as objective as possible, to avoid distortion of discussion and to respect the rights of students and parents to hold particular religious beliefs. Equally, it is the responsibility of teachers of Science to make students aware of the content of current scientific knowledge and of the nature of scientific inquiry.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

WEDNESDAY 12 NOVEMBER, 6PM

SEMINAR ROOM, ROYAL BOTANIC GARDENS. ENTER FROM THE MAIN ENTRANCE, MRS MACQUARIES ROAD.

SPEAKER: DR HELENE A. MARTIN, SCHOOL OF BOTANY, UNIVERSITY OF NEW SOUTH WALES.

TOPIC: THE TERTIARY VEGETATION AND CLIMATIC CHANGE IN SOUTHEASTERN AUSTRALIA.

The palaeo-vegetation of the Murray Basin and rivers of the western slopes in New South Wales is reconstructed from palynology. There is an almost continuous record from the late Eocene to the end of the Tertiary and into the early Pleistocene. The palaeoclimate is deduced from climatic parameters of generally comparable modern vegetation.

In the late Eocene to early Oligocene, *Nothofagus* was abundant and the climate was probably the wettest of the Tertiary. Then followed a series of changes, most of them towards a drier climate, until open woodlands and/or grasslands were dominant in the late Tertiary-early Pleistocene. A fire history, reconstructed from charcoal counts, indicates that fires had become a regular feature of the environment by the late Miocene.

The major changes in vegetation and climate coincide with major changes in sea level and stages in the development of the ice cap on Antarctica. The hypothesis of climatic change presented here is used to test some models on the development of aridity in Australia.

Wine and cheese will be served from 5.30pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C NEWS

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NEWSLETTER No. 43

January 1987

NEW MEMBERS

We welcome:

Miss Julia Hush, School of Botany, University of Sydney

Mr Phillip R. Ellis, School of Biological Sciences, Macquarie University.

Mr S.A. Wajon, School of Zoology, University of New South Wales.

Ms Karen Kool, School of Zoology, University of New South Wales.

PAPERS ACCEPTED FOR PUBLICATION

D. Anderson. The circumtropical barnacle *Tetraclitela divisa* (Nilsson - Cantrell) (Balanomorpha, Tetracitidae): cirral activity and laval development.

J.J. Carter. Metagenesis as a possible key to animal form.

D.T. Brewer and K. Warburton. A dietary study of *Sillago analis* and its variation in three Australain locations.

A.S. Steffe and B.C. Pease. Dirunal survey of Ichthyoplankton abundance, distribution and seasonality in Botany Bay, N.S.W.

A. McMinn. Late Pleistocene dinoflagellate cysts from Bulladelah, northern N.S.W.

LINNEAN MACLEAY FELLOWSHIP FOR 1987

Under the terms of Sir William Macleay's Will, only graduates of the University of Sydney are eligible. Applications close 13 February. For further information, contact the Secretary.

PROCEEDINGS DELAYED

The Editor regrets the delay to Vol. 109, Nos 1 and 2 of the Proceedings, due to a fire at the printer's. Despite the printer's losses, practically all of the Society's material has survived. All of the original illustrations have been recovered.

BACK ISSUES OF THE PROCEEDINGS

The Society will shortly offer back issues of the Proceedings for sale. Some issues, however, are in short supply so that complete or nearly complete sets are limited. If members have any back issues they no longer require, we would appreciate their return. Issues from 1945 onwards are required.

SOCIETY MEMBER APPOINTED TO A BICENTENNIAL COMMITTEE

Professor Alan Burgess, formerly Professor of Botany, University of Sydney and currently Vice-Chancellor at the University of Ulster, has been appointed to a Bicentennial Committee in Northern Ireland to organise celebrations of the Australian Bicentennary.

PROJECT KIMBERLEY, AUSTRALIA

The Linnean Society of London and the Royal Geographic Society are planning a multidisciplinary field project to the Kimberley Region of North Western Australia from March-September of 1988. This project commemorates the bicentennary of both Australia and the Linnean Society of London.

Anyone wishing to participate should contact Dr Andrew Burbidge of the Western Australian National Parks and Wildlife Service who is co-ordinating Australian participation. You should provide a project title/subject, a brief outline of proposed work, *curriculum vitae* etc.

LAKE ILLAWARRA FIELD TRIP

On a windy and overcast morning, in last October, we gathered at the gates of the University of Wollongong for a tour of Lake Illawarra. Our guide, Dr Iraj Yassini of the University of Wollongong is thoroughly versed in all aspects of the ecology of the Lake, including the effects of urbanisation.

The Lake is a shallow coastal lagoon separated from the ocean by a sand barrier. From the beach, we viewed the entrance. Movements of sand, change the place of the entrance and may, at times, close it. Tidal flow is restricted by shoaling in the entrance so that the exchange of water from the Lake to the ocean is very limited, and pollutants accumulate.

The Lake suffers siltation which is slowly filling it in. Although about 6,000 years old, the Lake holds only one tenth of the water that it did once. Siltation has increased dramatically with urban development and activities, such as road building, have resulted in the sedimentation rate jumping to six times the normal rate. Runoff from a tank trap built during the war, to prevent Wollongong from being invaded, caused the formation of a small delta in the Lake!

Increased nutrient input is also a problem. Agriculture in the catchment area contributes some of the nutrients but urban storm water drains contribute by far the greatest proportion. These nutrients stimulate excessive growth of algae which has a considerable impact on the ecology. The algae decay, and produce a putrid smell, which is well known to the lake-side residents. We experienced a whiff of decay, but our tour was 'out of season' for the fully blown putrid smell.

Heavy metal pollution is building up in the Lake. Slag from the smelters is used for fill and road making. A power station on the shores of the Lake contributes pollution from ash. Although heavy metal contamination of shellfish and other seafood has not been reported to date, this seems inevitable in the future.

The Lake Illawarra Management Committee has been assessing these problems and what to do about them. The problems are, of course, very complex and there is no simple solution. Any attempt to rectify these problems is certain to be costly. There are a number of State and Local Government bodies involved, each with its own interests, so that overall agreement and planning requires considerable co-ordination.

LINNEAN SOCIETY OF NSW LUNCHEON

WEDNESDAY 18 FEBRUARY at 12.30 p.m. in the Education Room, National Herbarium, Royal Botanic Gardens.
ENTER FROM MRS MACQUARIES ROAD
COST $12 PER HEAD
The Luncheon is informal and members are invited to bring spouses and friends.

PLEASE MAKE BOOKINGS BY TUESDAY 10 FEBRUARY

The Secretary
Linnean Society of New South Wales
6/24 Cliff Street
MILSONS POINT 2061

Telephone: 929 0253
(Tuesdays only)

OR PO Box 45, MILSONS POINT 2061

I require ...... tickets at $12 each for the luncheon, 18 February.

Cheque for $.... enclosed.

Name ....

Address ....

RENEWAL OF MEMBERSHIP FOR 1987: Prompt renewal will be appreciated.

The Secretary
Linnean Society of New South Wales
6/24 Cliff Street
MILSONS POINT 2061

OR PO Box 457
MILSONS POINT 2061

Full member	$35.00	
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Life member	Nil	...having been a full member of the Society for over 40 years

Please circle the appropriate membership.
If you have already paid or payment is not required, please disregard this notice.

Cheque for $ .... enclosed.

Name ....

Address ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES.

Council nominations for President, Council and Auditor for 1987/88.

Election at Annual General Meeting, Wednesday, 25th March, 1987.

*The names of Members who retire (in terms of rules 15(a) and 15(b) are marked with an asterisk.

President:- P.M. Martin, M.Sc. Agr., Ph.D.

Council:- A.E.J.Andrews, A.S.T.C. (Civ.Eng.) M.I.E. Aust.
M. Archer, B.A., Ph. D.
J.H.K. Eastman, B.Sc., Dip.Ed., M.I.Biol.
R.A. Facer, B.Sc., Ph.D.
L.W.C. Filewood, B.Sc.
*M.D. Fox, B.Sc., Ph.D.
*L.A.S. Johnson, D.Sc., F.L.S.
H.A. Martin, Ph.D.
J.R. Merrick, M.Sc.,
P.J. Myerscough, M.A., Ph.D.
I.G. Percival, Ph.D.
*G.R. Phipps, B.Sc.
A. Ritchie, B.Sc., Ph.D.
*C.N. Smithers, Ph.D.
*T.G. Vallance, B.Sc., Ph.D.
*K.L. Wilson, B.Sc. (Agr.).
A.J.T. Wright, B.Sc., Ph.D.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- To be announced.

Council:- (six vacancies):- Council nominates the following and invites further nominations in accordance with rule 15(e) to complete the list.

G.R. Phipps, B.Sc.
T.G. Vallance, B.Sc., Ph.D.
M.D. Fox, B.Sc., Ph.D.
L.A.S. Johnson, D.Sc., F.L.S.
C.N. Smithers, Ph.D.
K.L. Wilson, B.Sc. (Agr.)

Auditors:- W. Sinclair & Co.

This notice is given under the provision of Rule 15(e).
It is not a voting paper.

RULE 15(e):- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices provided that each nomination paper is signed by not less than two ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

P.O. Box 457,
Milsons Point,
SYDNEY, N.S.W. 2061

Telephone - 929.0253 - Tuesdays only.

For the Council.

Barbara J. Stoddard,
Honorary Secretary.

23rd December, 1986

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C NEWS

NEWSLETTER EDITOR:
Dr Helene A. Martin,
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University of New South Wales,
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POSTAL ADDRESS:
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MILSONS POINT 2061.

TELEPHONE: 929 0253

OFFICE HOURS:
Tuesday 9.30 a.m. - 5 p.m.

NEWSLETTER No: 44

April 1987

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DR LAWRIE JOHNSON AWARDED A.M.

Our congratulations to Dr Johnson on being appointed a member of the Order of Australia, announced in the Australia Day Honours.

NEW LINNEAN - MACLEAY FELLOW:

Our congratulations to Ms Julia Hush, School of Biological Sciences, University of Sydney on her appointment as Linnean Macleay Fellow. Her research is in the area of developmental biology where an important problem is the mechanism that establishes and maintains polarity in cells, eggs, spores and whole tissues. Evidence indicates that self-generating steady ionic currents may play a role in the establishment of polarity. The project aims to extend our understanding of steady ionic currents in the establishment of polarity in plants.

PAPERS ACCEPTED FOR PUBLICATION

C.J. Quinn, Obituary for J.T. Waterhouse.

H.A. Martin. Cainozoic history of the vegetation and climate of the Lachlin River Region, New South Wales.

H.E. Parnaby. Distribution and taxonomy of the long-eared bat species *Nyctophilus befax* Thomas 1915 and *Nyctoplulis gouldi* Tomes 1858, in eastern Australia.

F.W.E. Rowe & E.L. Albertson. The echinoderm genus *Henricia* Gray, 1840, (Asteroidea: Echinasateridae) in South eastern Australian waters, with the description of a new species.

F.W.E. Rowe & E.L. Albertson. A new species in the echinasterid genus *Echinaster* from south eastern Australia and Norfolk Island.
~~~~~~

K.M. Moore. Associations of some *Glycaspis* species (Homoptera: Spondyliaspididae) with their *Eucalyptus* species hosts.

K.M. Moore. A new species of *Glycaspis* (Homoptera: Spondyliaspididae and some new host records.

K.G. Campbell & K.M. Moore. Two new species of *Glycaspis* (Homoptera: Spondyliaspididae from potentially endangered *Eucalyptus* species and one from *E. stricta*.

T.D. Auld. Post-fire demography in the resprouting shrub *Angophora hispida* (SM.) Blaxell: seed production, dispersal, seedling establishment and survival.

BACK ISSUES OF THE PROCEEDINGS ON SALE

Some time ago, back issues of the Proceedings were discovered in cupboards at the Museum of Applied Arts and Sciences. They have now been collected and sorted and are ready for sale. Our thanks go to the members who volunteered for this job, and particularly to Allen Andrews. For details of availability and price, see enclosed sheets.

"SEED DISPERSAL", EDITED BY DR DAVID MURRAY, NOW AVAILABLE.

The book, "Seed Dispersal", is edited by a Society Member, Dr David Murray of the Biology Department, University of Wollongong and published by Academic Press. The chapters are as follows:

The aerial motion of seeds, fruits, spores and pollen, by F.M. Burrows

Seed dispersal by water, by D.R. Murray

Seed dispersal syndromes in Australian *Acacia*, by D.J. O'Dowd and A.M. Gill

Seed dispersal by fruit-eating birds and mammals, by H.F. Howe

Rodents as seed consumers and dispersers, by M.V. Price and H. Jenkins

Seed dispersal in relation to fire, by R.J. Whelan

Evolution of seed dispersal syndromes according to the fossil record, by B.H. Tiffney.

THE BICENTENNIAL BHP AWARDS FOR THE PURSUIT OF EXCELLENCE

BHP seeks to honour people whose efforts may have gone unrecognised outside of their special field of endeavour. You may nominate yourself or nominate someone, or if you think the Society should nominate a certain member, let us know. Each of six winners will receive a grant of $40,000 and a trophy. Categories relevant to the Society are the environment, science and technology and possibly rural development. Entries close October 2, 1987. For further information, contact The Secretariat, BHP Pursuit of Excellence, GPO Box 8003V Melbourne, 3001.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Applications forms can be obtained from the Secretary.

PROGRAMME

LINNEAN SOCIETY OF N.S.W.

JOINT MEETING WITH THE ANTARCTIC SOCIETY

Thursday, 4 June 1987 at 7.30 pm.

J.H. MAIDEN THEATRE, ROYAL BOTANIC GARDENS. Enter from Mrs Macquaries Road.

SPEAKERS: Dr. Patricia Selkirk, School of Biological Sciences, Macquarie University, on behalf of the Linnean Society.

Dr. D.S. (Woody) Horning Sn., Macleay Museum, on behalf of the Antarctic Society.

TOPIC: MACQUARIE ISLAND, PAST, PRESENT AND FUTURE.

Our meeting follows the Symposium on Macquarie Island, sponsored by the Antarctic Division, Department of Science in Hobart in May, and both speakers will attend.

Wednesday, 1 July 1987 at 6.00 pm.

J.H. MAIDEN THEATRE, ROYAL BOTANIC GARDENS. Enter from Mrs Macquaries Road.

SPEAKER: Dr. Pat Quilty, Antarctic Division, Department of Science.

TOPIC: PLIOCENE ANTARCTIC VERTEBRATE AND WOOD REMAINS AND THEIR SIGNIFICANCE FOR THE DEVELOPMENT OF ANTARCTIC GLACIATION.

Dr. Quilty will talk about some amazing new discoveries in Antarctica.

Drinks will be served from 5.30 pm.

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C NEWS

NEWSLETTER EDITOR:
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Tuesday 9.30 am - 5.00 pm

NEWSLETTER No. 45

JULY 1987

HONOUR TO DR. LEN WEBB

Our congratulations to Dr. Len Webb who was appointed an Officer in the Order of Australia, in the Queen's Birthday Honours. Dr. Webb is well known for his work on the ecology of rainforests. He has also given a Macleay Memorial Lecture to the Society.

AWARD TO PROFESSOR MIKE ARCHER

Our congratulations to Professor Mike Archer who was awarded the First Queensland Museum Medal for contributions to research in Queensland in fields relevant to the Queensland Museum. This is not the first award Professor Archer has received from Queensland. The Creation Science Foundation has awarded him the title of Arch Anti-Creationist of Australia!

DEATH OF DR. I.V. NEWMAN

Friends and colleagues were saddened to learn of the death of Ivor Vickery Newman, M.Sc. (Sydney), Ph.D. (London), F.L.S., F.R.M.S., who died on 5 May 1987 at the age of 84.

Dr. Newman was a Member of the Society for over 61 years, having joined in 1925. He had a long and varied career as a botanist, with particular interests in morphological research and botanical teaching. His appointments included periods as head of the Botany Department, Victoria University College, Wellington, New Zealand, Professor of Botany in the University of Ceylon, Senior Research Officer, Division of Forest Products, C.S.I.R.O. and Senior Lecturer in Botany, University of Sydney.

He is widely remembered by both undergraduate and postgraduate students for the care he took in the preparation of his lectures and the detailed blackboard diagrams with which he illustrated points of structure. His greatest pleasure in teaching came from his laboratory classes, particularly the advanced morphology classes, in which, to use his own words "the opportunity to be rewarded by mastering intricate structure, the opportunity to be satisfied in observing the fitness of harmonious activities" were best exemplified.

His research work spanned several fields, but he is best known for his studies of the Australian Acacias (commenced while a Linnean Macleay Fellow in Botany) and his fundamental researches into the morphology and behaviour of the apical meristem (growing point) of gymnosperms, in which field he was an internationally recognised authority.

Dr. Newman was a strong supporter of the Society, being a Councillor for many years, President in 1960/61 and a regular attender at Society meetings until the last few years when increasing difficulties with arthritis made it impossible for him to participate.

A man of wide interests, he rendered significant services to the peace movement, the Methodist Church (later the Uniting Church) and the nature conservation movement. He maintained his interest in all these activities, as well as his botanical work, to the last.

At the Council meeting held on 20th May 1987, Dr. Newman's memory was honoured by the observance of two minute's silence and on behalf of the Society a message of deepest sympathy has been conveyed to Mrs. Newman and family. A full obituary and list of publications is being prepared for inclusion in the Society's Memorial Services.

Peter M. Martin

PAPERS ACCEPTED FOR PUBLICATION

J.E. Watson: Records of *Eudendrium* (Hydrozoa : Hydroida) from New Zealand.

W. Ivantsoff: Descriptions of a new species of freshwater hardy head *Craterocephalus kailolae* (Piscess : Atherinidae) from Safia, northeastern Papua New Guinea.

A.J. Wright: First report of Late Devonian trilobites from Eastern Australia.

C.J. Quinn, Ed.: Presidential Address of J.T. Waterhouse 1979, edited from the author's notes.

D.A. Morrison: A review of the biology of *Acacia suaveolens* (Smith) Willd. (Mimosaceae).

C.L. Fergusson: Multiple folding of the Ordincian sequence Tambo River, eastern Victoria.

B. Shea: Two new species of *Delma* (Lacertilia : Pygopodidae) from northeastern Queensland.

B.V. Timms: Physiography and physiochemical features of the lateral lakes of the lower Hunter Valley, New South Wales.

BARGAIN SALE CONTINUES

The clearance of back-issues of the first hundred volumes of the Proceedings is gathering momentum. Those who managed to decode the very detailed circular and order form sent out with the last Newsletter would realise that what is being offered is one of the best antiquarian book bargains in Australia today.

Reasonable stocks of most volumes and parts remain, but stocks of some are perilously low. If you want fairly complete runs or particular volumes or parts please hurry with your order because the whole world is about to be let in on the secret. The Council has placed advertisements in the July and September issues of Australian Geographic (Circulation about 30,000 per issue) and has also decided to notify kindred societies such as the Royal Zoological Society of N.S.W. Orders received after this general advertising commences will be handled strictly in order of receipt - orders from Members will no longer receive priority.

A revised order form is included. Please note that Society members get a 10% discount on all unbound publications listed in the order form, including the polychaete volume - P.M.M.

If you are interested, get your order to the Secretary without delay.

LUDWIG LEICHARDT AND OTHER GERMAN SCIENTISTS AND EXPLORERS

A Conference on this topic is being convened by Dr. Jurgen Tampke, School of History, University of New South Wales, 24 - 26 March 1988, as part of the Bicentenary activities. For further information, contact Dr Tampke

THE GREEN HOUSE PROJECT: PLANNING FOR CLIMATIC CHANGE

A conference on the impacts of climate and sea level change resulting from the changing composition of the global atmosphere will be held, 30 November - 4 December 1987, at Monash University. For further information, contact Ms V. Jemmeson, "Greenhouse 87", CSIRO Division of Atmospheric Research, Private Bag No 1, Mordialloc, Vic, 3195.

AUSTRALIA'S EVER CHANGING FORESTS

The first national conference on Australian forest history will be held at the Australian National University, Canberra, 9- 11 May 1988. For further information, contact Dr. J. Dargavel, Centre for Resource and Environmental Studies, The Australian National University, G.P.O. Box 4, Canberra, ACT, 2601.

"VENTURE OUT" TOUR OF THE NORTHERN GREAT BARRIER REEF BIRD ISLANDS

"Venture Out" has been formed by Paul A. Nagle, Ornithologist and associate Lyle Davis, Entomologist. The tour aims to examine the status of the bird populations of these islands and to make a count of the numbers of species that are breeding. Strict controls will be enforced to keep disturbance to a minimum. The tour will also give people interested in sea birds an opportunity to visit the islands. Cost is $700 ex Cairns. For further information, contact Paul A. Nagle, P.O. Box 82, Katoomba, NSW, 2780.

'EARTHWORM' - RADIO PROGRAMME FOR AIRING ENVIRONMENTAL ISSUES

The weekly programme 'Earthworm' on ABC Radio, National Network, Wednesdays at 5.30p.m. is presented by Dr. Peter Hunt. It covers issues such as the global environment, regional issues, the built environment, the people and researchers. Peter is seeking to have a very 'local' imput into the programme, with all sorts of Australians sharing their observations, successes and failures from their part of the environment. For further information, contact Peter Hunt (02)339-2264 or c/- the ABC, Box 9994, GPO, Sydney NSW 2001.

MACQUARIE ISLAND - JOINT MEETING WITH THE ANTARCTIC SOCIETY, held on 4 June 1987.

Dr. Patricia Selkirk spoke for the Linnean Society and Dr. Woody Horning for the Antarctic Society. Both speakers had recently attended a symposium, Macquarie Island, Past, Present and Future. Fifty four papers were presented, covering a wide range of topics. Our speakers summarised the symposium, Dr Selkirk speaking on the physical topics and Dr. Horning on the biological topics. Both of our speakers have worked extensively on the island, so an enjoyable evening was spent being brought up to date on scientific matters and the ambience of living on the island.

Macquarie Island is halfway between Australia, Antarctica and New Zealand. It is situated on the boundary of the Pacific and Antarctic plates, a very active area as attested by the numerous earthquakes. Visitors to the island have usually experienced earth tremors. The island is rising rapidly and eroding rapidly also. Numerous faults control the features of the landscape. The weather is wet, windy and foggy most of the time. We were agreeably surprised with excellent scenic slides. Discussion with Dr Horning afterwards revealed his secret of photography under such poor conditions. On the rare occasions when a fine day does turn up, all work is suspended and the day is spent taking photos.

We were entertained with an ingeneous method of measuring wind speeds when a large set of anemometers is not available. The flag tatter method measures the area of an unhemmed cotton flag worn away by the wind, per day! This method produced the obligatory graph and lacks only calibrations with conventional methods.

There are no trees on the island and all of the vegetation is low fell field, tussock grassland etc. The terraced hill slopes are impressive. These slopes usually feature a vegetated rise and gravel step, but these features are active and precise, form depends on hillslope and other factors.

Faulting and land slips may provide natural sections of lake sediments. These sections reveal fragments of cushion plants, mosses and *Myriophyllum*. Further study of these sediments will reveal past history.

The animal life suffered immensely at the hands of the sealing and oiling industries, to the point of total elimination of some species. The seals provided skins and blubber. Penguins were boiled down for oil and the albatross was eaten! Since these industries ceased, most species have made a reasonable return and recovery. There are now vast penguins rookeries of thousands of birds. There are four species of penguins on the island and Dr. Horning must have an identification chart etched on his leg. He described each species by the place where it bit him on his leg! It seems penguins don't just bite, they hold on then twist to inflict maximum pain!

Introduced animals have wrecked havoc on the ecosystem and now that their populations are being controlled, there is continual readjustment. *Myxomatosis* has brought the rabbit population down and tussock grassland is expanding. Cats caused serious depredations of the sea bird nesting sites. With the reduction of the rabbit population, the cat population has crashed. Without the cats, the rats have increaed to plague proportions. Rats like the tussock grasslands, so do the nesting sea birds. The rats devastate the eggs and young nestlings. There seems to be no way of controlling the rat population. Mice do not seem to harm the environment. The weka, (a large brown bird, introduced by sealers for eating) raids sea bird eggs, and their numbers are being controlled also.

There is no clear direction for future research. Dr Horning stresses that research to date has been on numerous individual topics and there is a need for overall assessment of the whole ecosystem, not only of Macquarie Island but the sub antarctic islands as a whole.

Helene A. Martin

RECENT DISCOVERIES IN ANTARCTICA

Dr. Pat Quilty of the Antarctic Division, Department of Science, addressed the Society, 1 July 1987 about some exciting new discoveries which challenge accepted views on the glaciation of Antarctica.

Up to 25 years ago, it was thought that the ice cap was simple, a thick cap with exposed rock in some places around the edge. Echo sounding techniques have shown that the average thickness of the ice is 2.8 km, equal to a rise in sea level of 65 m, should it all melt. When the ice cap in the northern hemisphere, only half as big, melted some 20,000 years ago, and caused a rise in sea level of 120 m, it had a profound impact on Man.

Antarctica has had a long history, most of it unglaciated. The major part of the land mass moved from the tropics to the pole about 300 million years ago. Then followed the Permian glaciation (about 240 million years ago). There is a good Triassic (230 - 180 million years) on Antarctica, but no evidence of glaciation. The record of the early Jurassic to the present is not so good, but there is much evidence from the surrounding sea floor, obtained from the deep sea drilling programmes. There seems to be no evidence of glaciation until the end of the Eocene, 37 million years ago, when small areas of ice developed. Antarctica was probably well vegetated up to this time. In the last six months, the New Zealand drilling team have recovered a mid Oligocene leaf, 30 million years old, almost identical to *Nothofagus gunnii* of Tasmania, only larger.

In the early Miocene, 21 million years ago, the northward drift of Australia opened up a deep sea circulation around Antarctica, and glaciation developed in earnest on this land mass. Oxygen isotope temperatures show a marked decline at the end of the Eocene, the beginning of glaciation, then little change and another massive decline to much colder temperatures in the Miocene. The late Miocene - Pliocene temperature record is not very good. Based on this evidence, it is thought that the ice cap built up in the early - mid Miocene and has remained stable ever since.

In 1980, John Pickard found shells in the Vestfold Hills. Most of them were carbon dated to 5,000 - 8,000 years old but one gave a date of 31,000. This age is at the limit of carbon dating so it could have been much older, especially as it is identical to an early Pliocene species. Late Miocene - Pliocene diatoms have been found also. In 1985, Pat Quilty found bone fragments in a diatomite beneath glacial debris and the fragments have been pieced together to form a dolphin skull of an extinct species, some 4.5 to 5 million years old (Pliocene). Shells associated with the bone fragments indicate an oxygen isotope temperature 5.8° warmer than that of today. There are more bone fragments, shells and microfossils yet to be fully studied, and the possibilities are exciting.

In the Transantarctic Mountains, fossils of different ages are found, including two types of wood. One type has been identified as a pine similar to a species growing in the high Andes. It was found at an altitude of 1,800 m, and if it grew at this altitude, would indicate a temperature 25° higher - unbelievably high. One explanation offered is that the pine grew near sea level and the mountains have been uplifted. If the wood is Pliocene in age, the uplift would have been extremely rapid and would have been accompanied by massive earthquakes, and there is no evidence of this. A more likely explanation is that the pine grew in the Wilkes Basin to the east. Glaciation developed first in East Antarctica, over rode the Wilkes Basin and then the Transantarctic Mountains, and in doing so, picked up material, including the wood and fossils of assorted ages and transported them into the mountains.

The detailed studies of these recent discoveries are just beginning.

We were pleased to learn that the Australian Antarctic programme is now taking an interest in these younger sediments, for the prospects are most exciting.

Helene A. Martin

The

PROCEEDINGS

of the

LINNEAN SOCIETY OF NEW SOUTH WALES

BICENTENNIAL OFFER - during1987 and 1988.

The Linnean Society of New South Wales is offering for sale, during the whole of this period, its volumes of the Society's PROCEEDINGS FROM VOLUME 1 to VOLUME 10 one hundred years of priceless scientific information and a historic treasury from 1875 to 1975

AT BARGAIN PRICES

The offer is on a FIRST COME * FIRST SERVED basis, in view of LIMITED SUPPLY.

The Society intends to dispose completely of its holdings of all but the most recent Proceedings and these journals, once dispersed, will no longer be available from the Society.

Volumes 5 and 6 (1880 and 1881) are missing from the Society's stock. Some volumes and parts are in very short supply and further gaps must occur as these are sold. However, apart from volume 5 and 6 and asmall number of later parts, complete sets from volume 1to volume 100 are available to early purchasers.

Also available for early purchasers are

LEATHER BOUND VOLUMES

between volume 1 and volume 18.

EXTRA REDUCTION IN PRICE IS OFFERED in a great many cases where stock is held in good supply. In these cases purchasers of complete volumes may obtain a total price reduction.on those volumes of more than 75%. LESS THAN QUARTER PRICE

These price reductions do not reflect upon the contents. As in all scientific journals, the scientific and historical value of the different parts varies considerably. No attempt is made here to indicate value in that regard. Even so, all parts are being sold at far less than their antiquarian value.

Among the contents of these volumes will be found papers by such eminent scientists and historical identities as

Von Lendenfeld, Miklouho Maclay, Tenison-Woods, Von Mueller, Woolls, Macleay, Edgeworth David, Helms, Etheridge, Ramsay, Sloane, Cambage, Carter, Baker, Grieg Smith, Tillyard, Maiden, Jensen, Brazier ANDMANY OTHERS.

AVAILABILITY AND PRICES OF PROCEEDINGS.

(a) Bound Volumes.

There are leather-bound volumes available between volume 1 and volume 18. These are in short supply, their quantities varying between only 5 to 15 of each volume (nil of volumes 5 and 6). The quantities ofpaper-covered parts making up these early volumes also are low - the availability of volumes in paper-covered parts varying from a minimum of nil to a maximum of 20. Purchasers will be provided with whatever is available on a "first come - first served" basis; hence, they should state their preference for either "bound" or "paper". Should a purchaser state "bound only" or "paper only" and that requirement cannot be met then the order will NOT be filled. Otherwise the order will be filled according to preference; if the first preference is unavailable, the second preference will prevail.

Volume 1 - volume 18 - Price $20.

(b) Volumes in Separate Paper-covered Parts.

Volume 1 to volume 46. Prices - $10.per volume.
(4 partsper volume; a few volumes have supplements)
but SEE SPECIAL OFFER for volumes 21 to 46.
$2.50 per part or supplement.

Volume 47 to volume 52. Prices - $10 per volume.
(5 parts per volume.)
but SEE SPECIAL OFFER for volumes 47, 48, 50, 51, 52.
$2.50 per part.

Volume 53 to volume 56. Prices $10 per volume.
(6 parts per volume).
but SEE SPECIAL OFFER for volume 53.
$2.50 per part.
Volume 57 to volume 94 - Price $9 per volume.
(6 parts, but in3 portions per volume)
$3 per portion.

Volume 95 to volume 100. Prices $12 per volume.
(4 partsper volume)
$3 per part.

(From volume 90 the part
(generally are thin and
(some parts are in
(extremely short supply

SPECIAL OFFER: Due to higher stocks in particular volumes, the Society is offering a further reduction to $7.50 per whole volume in the following cases:-

Volume 21 (1896) to Volume 53 (1928)
except Volumes 38 (1913)
42 (1917)
45 (1920)
49 (1924)

Members will receive a further 10% discount on all purchases, except for bound volumes 1 - 18.

NOTE: Good quality photocopies of Volumes 5 and 6 can be supplied in an unbound condition. Prices and delivery details on application to the Secretary.

(c) Volumes 101 - 108.

Volume 101 and 102. Prices - $40 per volume, $10 per part.

Volume 103–104 Prices, $40 per volume. $20 per issue (each containing 2 part

(From Volume 103, each volume was published in 2 double issues)

Members ordering back issues of these volumes or parts will receive 10% discount.

THE PROCEEDINGS.

The condition of these Proceedings is, in general, very good. Allowances may need to be made, though, for the years of storage (Series I - volumes 1 to 10 - is more than a hundred years old!). In some cases, due to the fragility of these rare Proceedings and the unavoidable handling of them over the years, slight damage may have occurred. All separate parts prior to 1944 have thin paper covers - covers intended to be dispensable when binding into volumes. These covers, being brittle with age, are most likely to be torn or even missing; less likely to be so when bundled as a volume in their original packaging. (Such bundles may well be dusty, but, where practicable, parts may be consigned in these packages to minimize damage from overhandling.)

Purchasers should note that for volumes 1 to 67, prior to 1943, in separate parts, the pages are uncut. Careful separation of pages is advised unless the pages are intended to be machine cut during a binding operation.

For bound volumes and all later parts this condition is not a factor. The parts of the Proceedings from 1944 will be found to be sturdier and much less likely to damage........(but thinner).

Every effort will be made to allocate to purchasers the best copies available at time of receipt of order.

OTHER SOCIETY PUBLICATIONS. (10% discount to members)

1. Macleay Memorial Volume, 1893.

A large quarto volume containing 308 pages, 42 plates and an actual photograph (not aprinter's reproduction) of Sir William Macleay. A fascinating piece of Victoriana for only...$60

2. Index to Volumes 1 - 50.

An indispensable aid in using the first fifty volumes - contains author and subject indexes as well as a full indexto the exhibits at the monthly meetings. Only a few left...$2.50 each

3. ~~XXXXXXXXXXXXXXXXX~~ Index to the first Series (1 - 10) 1887.
Only a few left ....$3.00 each

4. Catalogue of the Library of the Linnean Society of New South Wales. Issued in 1886. A fascinating record of the way in which the library was rebuilt following the destruction of the original library in the Garden Palace fire of 1882. Only a few in stock.................................$3.00 each

5. Historical Notes of the First Fifty Years of the Linnean Society of New South Wales. Generously illustrated on art paper. Moderate stocks..$5.00 each.

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Bound Volume 2 ....$20.00 (no discount on
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7. Memorial Series. Obituaries of distinguished members.................50c each.

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17. D. Mawson.
18. A. Musgrave.
19. T.C. Roughley.
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8. The Society's Heritage from theMacleays, Part 2 (1979).
Part I of this series dealt with Alexander Macleay and William Sharpe Macleay. Part 2 is devoted entirely to an account of the life and work of our founder, Sir William Macleay, and is complete in itself........................ $3.50.

9. Proceedings of the First International Polychaete Conference. July 1983, 483 pages..
Containing over 30 refereed papers, extensively illustrated. Information leaflet and order form available on request..........................$45.00

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The Society is relying on the goodwill of its members to undertake the onerous task of disinterring, arranging,packaging and preparing for despatch the Proceedings required.. For orders of more than 2 volumes or 10 parts or equivalent miscellaneous publications, a handling fee of $5 will be charged. It will assist the Society and will be to the purchaser's own advantage to collect their order where this is practicable - where any significant number of volumes or parts is entailed. Otherwise, material will be sent by post, road or rail to the destination nominated at the purchaser's expense.

Purchasers who wish to collect their own orders will need to make arrangements with the Society's Secretary. Phone (Tuesdays only) 929.0253 or write initially

ORDERING.

General.

Please note that it is not possible to act upon any tentative orders that might have been indicated prior to April, 1987.

Orders should be made on the basis of theprices quoted here and sent to:-

The Linnean Society of New South Wales,
P.O. Box 457,
MILSONS POINT (Sydney),
N.S.W. 2061.

For orders of more than 2 volumes or 10 parts, a deposit is required (except for Government Departments, Institutions and Authorities, who should quote an official order number). The deposit for orders of between 11 and 50 parts (or between 3 and 10 volumes) is $10. For more than 50 parts (or 10 volumes) the deposit is $50. The deposit - to indicate good faith and to allow collation of the parts required - will become part of the final payment.

NO PAYMENT, other than the deposit, shall accompany the order. The purchaser will receive an invoice, indicated upon which will be notification of any portion of the order that cannot be supplied; also the balance due for material being supplied. This price will include shipping cost, if any, in addition to the purchase price.
On receipt of payment of the balance the goods will be forwarded, or if prior arrangements have been made, will be available for collection.

For orders under $500, should no payment be received within 30 days of the invoice date, thepriority of the order shall lapse, a new priority to operate from the date payment is received. For invoices in excess of $500, individuals, but not departments, institutions or authorities, may negotiate terms for payment over a longer period.

Subject to the provisions of the preceding paragraph, all parts or volumes in stock at the time of receipt of order will be provided. Those items, if any, that are no longer in stock shall be deleted from the order and the invoice (with the goods in the case of Government Depoartments, Institutions and Authorities) shall be forwarded to the purchaser without further correspondence.

Orderswill not be accepted unless they are on the official order form and accompanied by the appropriate deposit.

NO PHONE ORDERS!.

ORDER FORM • INVOICE

Proceedings of The Linnean Society of New South Wales

INSTRUCTIONS

To order Proceedings:

- use Groups A to F where complete volumes are required. (See centre)
- use Group G when ordering individual parts only. (See below)

A combination of groups needs to be used when ordering both complete volumes and individual parts.

Where one complete "set" of any group of volumes is required TICK the "set" box. Otherwise, tick the required volume or volumes.

Note:- If a complete SET of all available volumes from 1 to 100 is required then each group "set" needs to be ticked, viz. A &/or B, C, D, E, and F. (5 ticks, minimum).

Guide to the Years: Vol. 1(1875); 10(1885); 20(1895); 30(1905); 40(1915); 50(1925); 60(1935); 70(1945); 80(1955); 90(1965); 100(1975).

••••••••••••••••••••

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Add other parts here, e.g. "47/3" for Part 3 of vol.47. (Use separate sheet as necessary)

*Supplements are:- 20/S, 21/S, 27/S, 30/S1, 30/S4.

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3 portions (1/2), (3/4), (5/6) per volume.

Order as: 1 2 3 "parts" @ $3.00 per "part".

(e.g. Parts 3/4 of vol.58: Order as "58/2".)

For parts in volumes 95 to 100

4 parts per volume @ $3.00 per part.

For parts in volumes 100 to 102

4 parts per volume (normal prices) @ $10.00 per part.

For parts in volumes 103 to 108

2 portions (1/2), (3/4) per volume (normal prices)

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Linnean Society of New South Wales

SALE OF PUBLICATIONS For details of offer see information sheets.

Intending buyers should order on this form or a copy of it.
The order form is for ordering one of any item. Should multiple copies of any of any publication, part or volume, be required please indicate as a separate matter. The Society reserves the right to limit the allocation of multiple copies where considered appropriate.
To order any item tick in the box provided.

PUBLICATIONS

			Office use only	
1. Proceedings of the Linnean Society of N.S.W. Vols 1(1875) to 100(1975) at bargain prices; also current Proceedings at normal prices	For ordering instructions see back page.		$	c
2. Macleay Memorial Volume, 1893. (few only)	☐	$60		
3. Index to Volumes 1 to 50. (few only)	☐	$2.50		
4. Index of First Series Vols 1-10 (few only)	☐	$3		
5. Linn. Soc. Library Catalogue, 1886. (few only)	☐	$3		
6. Linn. Soc. Historical Notes. (moderate stocks)	☐	$5		
7. Transactions of the Entomological Soc. N.S.W. Vol. 1 Parts 1. 2. 3. 4. 5.		each $4		
Vol. 2 Parts 1. 2. 3. 4. 5.		each $4		
Vol. 2 Leatherbound (few only)	☐	$20		
8. Memorial Series: 9. Carter ☐ 10. Hamilton ☐ 11. Tillyard ☐ 12. Sussmilch ☐ 13. Andrews ☐ 14. Waterhouse ☐ 15. Osborne ☐ 17. Mawson ☐ 18. Musgrave ☐ 19. Roughley ☐ 20. Colefax ☐		each $0.50		
9. The Society's Heritage from the Macleays (II)	☐	$3.50		
10. Proceedings of the First International Polychaete Conference. 1983. (normal price)	☐	$45		

ORDERING

Payment shall be made upon receipt of priced INVOICE
A DEPOSIT is required with your order in the following cases:

(a) for between 3 and 10 volumes (11 - 50 parts)	$10		
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VOLUMES only - Groups A to F.

Office use only

Group A: Complete volumes - Leatherbound
Volumes 1 to 18 (except 5 & 6)

$320

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I require only individual volumes of Group A (@ $20 per volume)

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11.	12.	13.	14.	15.	16.	17.	18.

I will accept volumes in separate paper covered parts (at Group B prices) wherever leatherbound volumes are unavailable. (Cross out if this does not apply).

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11.	12.	13.	14.	15.	16.	17.	18.

(4 parts per volume)

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Group C: Complete volumes - in separate paper covered parts $90
Volumes as shown below

I require one set of Group C (@ $10 per volume)

I require only individual volumes of Group C (@ $10 per volume)

19.	20.	38.	42.	45.

(4 parts per volume);

49.

(5 parts per volume);

54.	55.	56.

(6 pts per vol.)

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Volumes 21 to 53 (except 38,42,45,49. See Group C) $217.50
@ $7.50 per volume (Special Offer)

I require one set of Group D (@ $7.50 per volume

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33.	34.	35.	36.	37.	39.	40.	41.	43.	44.	46.	(4 pts);
47.	48.	50.	51.	52.	(5 parts);					53.	(6 pts).

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57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.
68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.
79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.
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95.	96.	97.	98.	99.	100.

(4 parts per volume)

PROGRAMME

LINNEAN SOCIETY OF N.S.W.

FIFTEENTH SIR WILLIAM MACLEAY MEMORIAL LECTURE

WEDNESDAY, 30 SEPTEMBER 1987, AT 7.30 P.M.

HALLSTROM THEATRE, AUSTRALIAM MUSEUM
COLLEGE STREET, SYDNEY.

SPEAKERS: DR D.J. CARR and DR S.G.M. CARR

TOPIC: "The Layered Rubber Cuticle and other Studies of the *Corymbosae* (*Eucalyptus*)"

OR

"The Elastic-sided Gum Leaf"

The cuticle of the *Corymbosae* (bloodwoods) is shown by infra-red spectroscopy and chemical properties to consist largely of rubber (caoutchouc). It is layered and the number of layers corresponds with an estimate of the duration of leaf growth, *i.e.* a layer is produced each day. Comparisons are drawn with layered insect cuticles, layering of cell walls in cotton fibres etc.

The layered rubber cuticle imposes special problems in stomatal breakthrough. A cone of cuticle over the developing stomatal complex is apparently digested away, leading to the formation of a canal to the surface and an opening on that surface. A variety of methods of stomatal breakthrough in different organs is described. Breakdown and exfoliation of some of the outer-layers of rubber is shown to be the cause of "scurfiness", *e.g.* of flower buds of some species.

Quantitative and Qualatative aspects of the cuticular patterns of species of the *Corymbosae* are shown to be of great taxonomic value, especially at the species level.

WEDNESDAY, 21 OCTOBER, 1987 AT 6 P.M.

Education Room, Royal Botanic Gardens. Enter from Mrs Macquaries Road.

SPEAKER: PROFESSOR WILF SCHOFIELD, Department of Botany, University of British Columbia.

TOPIC: "The Biogeography of Bryophytes"

Professor Schofield is a world renowned expert on bryophytes with particular interest in the phytogeography of mosses, especially in relation to species with disjunct distributions in the northern and southern hemispheres. He has worked in Australia and New Zealand previously and has written a number of books, including a text book *Introduction to Bryology* which has won wide recognition and several prizes in the United States and Canada.

Drinks will be served from 5.30 p.m
Everyone welcomed

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LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C'

NEWSLETTER EDITOR:
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MILSONS POINT NSW 2061

TELEPHONE: 929 0253

OFFICE HOURS:
Tuesday 9.30 am - 5.00 pm

NEWSLETTER No. 46

OCTOBER 1987

NEW MEMBER

We welcome Dr. Alistair Hay, School of Botany, University of Sydney.

DONATION TO LIBRARY FUND

We thank an anonymous donor for a generous donation of $300 to the Library Fund. Although the Society does not have its library any more, it has retained a nucleus of special books and a full set of the Proceedings. These are housed at the office in Milsons Point.

All donations to the Library Fund are fully tax deductable.

PAPERS ACCEPTED FOR PUBLICATION

I. Yassini and A.J. Wright: Distribution and ecology of Recent ostracodes from Port Hacking, N.S.W.

F.W.E. Rowe and E.L. Albertson: A new genus and four new species in the family Echinasteridae (Echinodermata: Asteroidea).

D. McAlpine: Studies in upside-down flies (Diptera: Neurochaetidae). Part I, Systematics and Phylogeny.

D. McAlpine: Studies in upside-down flies (Diptera: Neurochaetidae). Part II, Biology, adaptations and specific mating mechanisms.

A.T. Hotchkiss and K. Imahari: A new species of *Nitella* (Characeae) belonging to the Pluricellulate species group in Australia.

A.T. Hotchkiss and K. Imahari: Additional observations on *Nitella verticellata* (Characeae) from a locality in New South Wales.

R.V. Southcott: A new Australian larval calidostomatine mite (Acarina: Erythraeidae) parasitic on flies, with notes on sub family and tribe classification.

P. Glasby, P.M. Selkirk *et al*: Blue Mountains Ash (*Eucalyptus oreades* R.T. Baker) in the western Blue Mountains.

JOYCE W. VICKERY RESEARCH FUND AWARDS

There were nineteen applications, mainly from post graduate students, although awards are not restricted to students or professional researchers. Some of the applicants received awards last year and were successful again this year.

Funds for disbursement this year were sufficient to award most applicants the amount requested, up to the normal maximum of $500. For this healthy state of the funds we owe thanks to some very generous donations in recent years.

The following awards were made:

CHALSON, Jane, Ph D Student, Botany, University of New South Wales.
Project: The history of the vegetation and regional climate of the Blue Mountains. A series of swamps were chosen to give an altitudinal transect and the pollen is being studied.
Awarded $500 for Carbon-14 dates.

HEAPHY, Linda, Ph D Student, Zoology, University of New South Wales.
Project: The ecological physiology of the pig-nosed turtle of Northern Australia. Originally described from freshwater, this turtle has been found in estuaries and on occasions, in salt water, indicating much broader tolerances than other fresh water species.
Awarded $500 for field equipment.

HOUSTON, Darryl, Ph D Student, Biological Sciences, University of Sydney.
Project: Ecology and dynamics of the Arafura filesnakes in the Alligator Rivers region. A detailed data base has been compiled for snakes in one billabong, and comparative data is required from several other billabongs.
Awarded $500 for a field trip.

HUSH, Julia, Ph D Student, Botany, University of Sydney.
Project: The role of steady ionic currents in the establishment and maintenance of polarity in plant cells and whole tissues. The focus initially will be on the importance of these electrical currents on the cytoskeleton in the wound healing of pea roots.
Awarded $500 for vibrating probes and film.

JACKLYN, Peter, Ph D Student, Zoology, University of Sydney.
Project: In the Northern Territory, there are two species of termites which build tombstone-like nests orientated a few degrees east of north. It is thought that the orientation has a thermal advantage because of the pattern of interception of sunlight. There are fields of orientated nests at Lakefield, 280km northwest of Cairns. These fields should be examined and compared with those in the Northern Territory.
Awarded $500 for travel.

KEMP, Dr., Anne R., Queensland Museum, South Brisbane.
Project: The collection of fossil material of lungfish at Riversleigh, northwestern Queensland. Several tooth plates of an undescribed species has been found and in one locality lungfish fossils are plentiful.
Awarded $500 for travel.

MAITLAND, David P., Ph. D Student, Zoology, University of N.S.W.
Project: Air breathing crabs have conspicuous membrane discs on their legs. These were thought to be hearing organs but they are respiratory structures, called gas-windows and are used for aerial gas exchange.
Awarded $300 for electron microscopic investigation of the gas windows in soldier crabs.

MARLOW, Nicola, Ph D Student, Zoology, University of N.S.W.
Project: Fox ecology in the arid zone and their predatory impact on rabbits, domestic stock and native fauna.
Awarded $500 for a radio-collar for tracking a fox.

THANN NAING, Ph D Student, Earth Sciences, Macquarie University.
Project. The study of trace fossils (burrows, tracks etc) in the Sydney Basin, especially the Triassic Narrabeen Group. Some 21 genera have been found so far and trace fossils may characterise the stratigraphic succession.
Awarded $392 for travel.

OTWAY, Nicholas M., Ph D Student, Biological Sciences, University of Sydney.
Project: The effects of grazing chitons on the macroalgae on the lower part of the intertidal zone. Special fences are required to exclude the chitons.
Awarded $498.24 for fence materials.

PARNABY, Harold, Ph D Student, Zoology, University of New South Wales.
Project: To clarify the species level systematics of Australian and New Guinea populations of long-eared bats (*Nyctophilus*). Very little material has been collected from New Guinea.
Awarded $470 for accommodation and travel in New Guinea.

ROUSE, Greg and SKILLETER, Greg, Ph D Students, Zoology, University of Sydney.
Project: The applicants work on separate projects, polychaetes and marine snails (respectively) of the Great Barrier Reef. An invertebrate larval culturing unit is required to study reproduction and larval development. The unit would be available to other workers.
Awarded $500 to set up the unit at the One Tree Island Research Station, Great Barrier Reef.

SCHWARZKOPF, Lin, Ph D Student, Zoology, University of Sydney.
Project: The ecological consequences of vivipary in the water skink. Up to 30-40% of the total body weight of pregnant females is offspring. This increase in weight probably affects behaviour, metabolic rate and survival rate. These ideas require testing.
Awarded $500 for equipment.

VAUGHTON, Glenda, Ph D Student, Zoology, University of New England.
Project: The pollination ecology of *Banksia spinulosa*. The levels of selfing/outcrossing in the population will be determined using protein electrophoresis of parents and offspring.
Awarded $500 for electrophoresis materials.

YASSINI, Dr. Iradj, Geology, University of Wollongong.
Project: The distribution of the family Lagenidae (Foraminifera) in the estuaries of NSW. These forams may be abundant and are thought to be important in detailed ecological studies.
Awarded $500 for scanning electron microscope studies.

1988 SUMMER SCHOOL ON THE ENVIRONMENT

All courses are residential and will be held:

24 - 28 January	Kosciusko in summer - in Kosciusko National Park.
3 - 6 February	Rainforests of southern N.S.W. - at Kioloa, South Coast N.S.W.
8 - 12 February	Native plant identification - at Jervis Bay, South Coast N.S.W.
12 - 14 February	Nature and Landscape photography - in Kosciusko National Park.

For further information, contact the Centre for Continuing Education, Australian National University, G.P.O. Box 4, Canberra, A.C.T. 2601 or phone (062) 49 3016 or 49 4754.

PROGRAMME

LINNEAN SOCIETY OF NSW

WEDNESDAY, 11 NOVEMBER 1987 at 6 pm

J.H. Maiden Theatre, Royal Botanic Gardens
Enter from Mrs Macquaries Road.

SPEAKER: Dr Yip CHO, Department of Microbiology, University of Sydney.

TOPIC: THE BIOTECHNOLOGY OF MUSHROOM CULTIVATION

Yip Cho

Mushroom cultivation embodies the principle of solid state fermentation. Today, the cultivation of edible mushrooms evolved into an area of industrialised horticulture and a working model of biotechnology. The talk will summarize the recent advances in the biotechnology of mushroom cultivation. The basic science of the sequential stages of mushroom culture is discussed briefly. The cultivation of other mushrooms other than *Agaricus bisporus* will also be mentioned.

The lecture will be followed by a mushroom tasting and informal buffet dinner.

THERE IS NO CHARGE FOR THE LECTURE

Dinner will cost $8.00 per head. Please make bookings by Tuesday 3 November on the slip below.

EVERYONE WELCOME

The Secretary
Linnean Society of New South Wales
6/24 Cliff Street
MILSONS POINT 2061 OR P.O. Box 45, MILSONS POINT 2061
Telephone: 929 0253
(Tuesdays only)

I require..........tickets at $8.00 each for the dinner, 11 November.

Cheque for $.........enclosed

Name...

Address..

Please make bookings by 3 November.

WEDNESDAY, 21 OCTOBER, 1987 AT 6 P.M.

Education Room, Royal Botanic Gardens. Enter from Mrs Macquaries Road.

SPEAKER: PROFESSOR WILF SCHOFIELD, Department of Botany, University of British Columbia.

TOPIC: "The Biogeography of Bryophytes"

Professor Schofield is a world renowned expert on bryophytes with particular interest in the phytogeography of mosses, especially in relation to species with disjunct distributions in the northern and southern hemispheres. He has worked in Australia and New Zealand previously and has written a number of books, including a text book *Introduction to Bryology* which has won wide recognition and several prizes in the United States and Canada.

Drinks will be served from 5.30 p.m
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Office hours:
Tuesday 9.30 am - 5.00 pm

NEWSLETTER NO. 47

December 1987

DEATH OF DR LILIAN FRAZER:

It is with regret that we learned of the death of Dr Frazer on 5 October. Dr Frazer was a former President of the Society and is well known for her pioneering work on the plant ecology of the Barrington Tops.

NEW MEMBERS:

We welcome our new members:
Mr John W. Pemberton, Geology Department, University of Wollongong.

Dr Michael Augee, School of Zoology, University of New South Wales.

Dr J.N. Yates, Medical Practitioner, Caloundra, Queensland.

PAPER ACCEPTED FOR PUBLICATION:

A.W. Archer: The Lichen genus *Cladonia* section *Cocciferae* in Australia.

SPECIAL LECTURE:

Dr Robert Hill, the well known Palaeobotanist will be in Sydney for two weeks and we have taken the opportunity to hear his lecture on the evolution of the Tasmanian Vegetation on 28 Jan. 1988 (see Programme for further information).

DONATION TO LIBRARY FUND:

We thank Dr David McAlpine for a generous donation to the Library Fund. Although the Society does not have its library anymore, two full sets of the Proceedings are kept in the Office for its own use. The fund is used for binding of the Proceedings. Some of the earlier volumes bound in leather require rebinding. All donations to the Library Fund are tax deductable.

DAVID BELLAMY:

"TWO HUNDRED YEARS GONE, TWELVE YEARS TO GROW - A BOTANIST LOOKS AT THE 21ST CENTURY".

This lecture is offered by the University of New South Wales through its Continuing Education Programme. David Bellamy will be introduced by Dr Robin Williams of the ABC Science Show. The lecture will be held on Monday 1 February 1988 in the Sir John Clancy Auditorium, University of New South Wales at 8 p.m. and admission is $10. For bookings, contact Continuing Education, University of New South Wales, P.O. Box 1, Kensington 2033. Telephone (02) 697 3175.

INVENTORY OF WETLANDS IN THE SYDNEY REGION

In 1988 the Nature Conservation Council hopes to compile an inventory of wetlands in the Sydney Region (broadly from the northern Illawarra to Broken Bay and west to include the Hawkesbury/Nepean floodplain). Such an inventory would include all sites - however small and disturbed - which might still possess wetland values.

Some wetlands are fairly easily defined eg. mangroves, saltmarsh, reedswamp etc. but others may be more difficult to identify (intermittently wet meadows etc). At this stage the net needs to be cast very broadly, the inclusion of particular sites can be considered at a later date.

Many highly modified, or even artificial sites have high wildlife value and should be included. Obvious example in this category would be the wetlands in Centennial Park and the Botany Bay Foreshores Park. We suspect that a number of interesting wetlands are to be found on golf courses.

Linear wetlands - for example a fringe of mangroves only one tree wide are of value as even are heavily weed infested sites (dominated by sharp rush or pampas grass. However, at present wet heath is excluded from consideration.

Records of possible sites to be included should be sent to the NCC's office. Each site should be identified either on a map, or by a map reference (CMA or Gregory's/UBD) and some idea of the size and wetland type should be given.

It is felt that the inventory will be a valuable resource for both conservationists and planners. If you can assist, send information to the NCC, 176 Cumberland St, Sydney 2000, or phone (02) 27-2228.

PROGRAMME

LINNEAN SOCIETY OF NSW

THURSDAY, 28 JANUARY, 1988

at 6 pm

J.H. Maiden Theatre, Royal Botanic Gardens - Enter from Mrs Macquaries Road.

SPEAKER: DR ROBERT HILL - School of Botany, University of Tasmania

TOPIC: **EVOLUTION OF THE TASMANIAN VEGTATION - 40 MILLION YEARS OF EVIDENCE**

Macrofossils (especially leaves and reproductive structures) from Tasmanian deposits covering approximately the last 40 million years demonstrate the succession of vegetation in a relatively small land mass which occupies a unique position in relation to Gondwanaland. Tasmania lay at the boundary between Antarctica and Australia, and was the entrance point for many of the plants which migrated from South America, across Antarctica to Australia during the Early Tertiary. However, following the separation of Australia from Antarctica there were major climatic changes which had profound effects on the Tasmanian vegetation, and these are reflected in the fossil remains. Until the arrival of Aborigines in Tasmania, climate was the major factor controlling the vegetation. More recently, fire has assumed equal, if not greater importance.

WINE AND CHEESE WILL BE SERVED FROM 5.30 P.M.

EVERYONE WELCOME

LINNEAN SOCIETY OF N.S.W. LUNCHEON.

WEDNESDAY, 17th FEBRUARY, 1988, at 12.30 p.m. in the J.H. Maiden Theatre, National Herbarium, Royal Botanic Gardens.

ENTER FROM MRS. MACQUARIE'S ROAD.

COST $12 PER HEAD.

The luncheon is informal and members are invited to bring spouses and friends.

PLEASE MAKE BOOKINGS BY TUESDAY, 9th FEBRUARY.

The Secretary,
Linnean Society of N.S.W.,
P.O. Box 457
MILSON'S POINT, N.S.W. 2061.

Telephone: 929.0253.
(TUESDAYS ONLY)

I wish to make bookings for ...... people at $12 per person for the luncheon on 17th February.

Cheque for $..... is enclosed.

Name ....

Address ....

RENEWAL OF MEMBERSHIP FOR 1988: Prompt renewal will be appreciated.

The Secretary,
Linnean Society of N.S.W.,
P.O. Box 457,
MILSON'S POINT, N.S.W. 2061.

Full member	- $35.
Retired member	- $20 - retired having reached the age of 60 years.
Student member	- $20 - full time student. Please include proof of student status.
Associate member	- $7.50 - receiving Newsletter, but not Proceedings. No voting rights.
Life member	- NIL - having been a full member of the Society for over 40 years.

Please circle the appropriate membership.

If you have already paid or payment is not required, please disregard this notice.

Cheque for $..... is enclosed.

Name ....

Address ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES.

Council nominations for President, Council and Auditor for 1988/89.

Election at Annual General Meeting, Wednesday, 30th March, 1988.

*The names of Members who retire (in terms of rules 15(a) and 15(b)) are marked with an asterisk.

President:- P.M. Martin,M.Sc. Agr., Ph.D.

Council:-
A.E.J. Andrews, A.S.T.C. (Civ.Eng.) M.I.E. Aust.
*M. Archer, B.A., Ph.D.
J.H.K. Eastman, B.Sc., Dip.Ed., M.I. Biol.
*R.A. Facer, B.Sc., Ph.D.
*L.W.C. Filewood, B.Sc.,
M.D. Fox, B.Sc., Ph.D.
L.A.S. Johnson, D.Sc., F.L.S.
*H.A. Martin, Ph.D.
J.R. Merrick, M.Sc.
P.J. Myerscough, M.A., Ph.D.
I.G. Percival, Ph. D.
G.R. Phipps, B.Sc.
*A. Ritchie, B.Sc., Ph.D.
C.N. Smithers, Ph. D.
T.G. Vallance, B.Sc., Ph.D.
K.L. Wilson, B.Sc. (Agr.)
*A.J.T. Wright, B.Sc., Ph.D.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- T.G. Vallance, B.Sc., Ph.D.

Council:- (six vacancies):- Council nominates the following and invites further nominations in accordance with rule 15(e) to complete the list.

H.A. Martin, Ph.D.

A. Ritchie, B.Sc., Ph.D.

Auditors:- W. Sinclair & Co.

This notice is given under the provision of Rule 15(e).
It is not a voting paper.

RULE 15(e):- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such offi

For the Council

P.O. Box 457,
Milson's Point,
SYDNEY, N.S.W. 2061.

Telephone - 929.0253 - Tuesdays only.

Barbara J. Stoddard,
Secretary.

22nd December, 1987.

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C'

NEWSLETTER EDITOR:
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University of New South Wales,
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KENSINGTON, NSW 2033.

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POSTAL ADDRESS:
P.O. Box 457,
MILSONS POINT, NSW 2061

Telephone: 929 0253

Office hours:
Tuesday 9.30 am-5.00 pm

NEWSLETTER NO. 48

APRIL 1988

GENEROUS DONATION FROM PROFESSOR NOEL BEADLE

The Society is grateful to Professor Beadle, a life member of the Society, for a donation of $1,000. The donation has been put in the Joyce Vickery Scientific Research Fund. Proceeds of this fund benefit mainly research students and Professor Beadle has had a long association with students. All donations to the Joyce Vickery Research Fund are tax deductible.

Once again, we thank Professor Beadle for his most generous donation.

PAPERS ACCEPTED FOR PUBLICATION

B.V. Timms - A study of crustacean zooplankton of six floodplain waterbodies of the Lower Hunter Valley.

Syeda Saleha Tahir and R.C. Carolin - Seed type and seed surface patterns in *Calandrinia sensu lato* (Portulacaceae).

SCIENTIFIC RESEARCH POLICY OF THE COMMONWEALTH GOVERNMENT

The recent emphasis on applied research and industrial development has lead to concern that increased effort and expenditure in these fields will be at the expense of basic research. The Society wrote to the Prime Minister and a number of Federal Government Ministers about its concern that if basic research is neglected today, tomorrow's technolgy will suffer. A good reply was received from Mr Barry Jones, Minister for Science and Small Business. He pointed out that there has been some misunderstanding that "achieving national objectives" equates to conducting only applied research. He recognises that a strong and innovative capacity in pure and strategic research, by itself, is an important national objective. Ultimately, Australia's scientific and technological advancement depends on wide recognition of science and technology by the broader community and the Minister believes that the most significant problem facing Australia's development is the lack of such support and interest.

We thank Mr Jones for his courteous and illuminating reply. It also puts the ball back into the scientific community's court: how to raise interest and support for science in the community at large.

"VENTURE OUT" ENVIRONMENTAL COURSES

"Venture Out" run most of their environmental courses from Wentworth Falls so that the environment may be enjoyed as well as studied. All of the courses are held on the week-end.

The cost of the courses include meals, teaching notes and chalet style accommodation. Cost $140 per person.

PROGRAMME

6-8 May: Aboriginals of the Blue Mountains.
Leader: Eugene Stockton. The course traces aboriginal history in the Blue Mountains and sites in Glenbrook, Kings Tableland and Blackheath areas will be visited.

3-5 June: *Banksias* and honeyeaters
Leaders: Paul Nagle, Jill Dark, Graham Alcorn. The *Banksias* provide a food source for resident and migratory honeyeaters. Both *Banksias* and birds will be studied.

29-31 July: Geology of the Sydney Basin
Leader: Margaret Baker. A field course for beginners of the major geological divisions of the Sydney Basin which includes the Blue Mountains.

26-28 August: Mountain ecosystems
Leader: Paul Nagle. A course designed for the amateur ecologist.

16-18 September: Mammals by day and night
Leaders: Mick Dark, Win Jones, Paul Nagle. Most of the course will involve spotlighting for the shy native marsupials at night.

21-23 October: What Plant is that?
Leaders: Jill Dark, Margaret Bake. This is a good time for wild flowers and learning to identify them.

11-13 November: Insects for Insectivors
Leader: Geoff Holloway. Learn how to catch and identify insects.

For further information, contact Mr P.A. Nagle, P.O. Box 82, Katoomba, NSW 2790, or telephone (047) 82 5022 (BH) or (047) 57 3181 (AH).

SYMPOSIUM: AQUATICA TOXICOLOGY IN AUSTRALIA

Sponsored by the Australian Insitute of Biology Inc., Thursday 19 May 1988, at the University of Sydney (in conjunction with ANZAAS).

In recent years it has become increasingly obvious that the environment cannot accept chemicals which are released into it without the appearance of a number of undesirable impacts. The prediction and evaluation of these impacts in aquatic environments is particularly important for Australia, which has scarce resources of water. The symposium will focus on three representative types of aquatic environment, each paired with one of three main types of environmental impact. The convenor is Dr Frank Cattell of Macquarie University, telephone (02) 805 7993.

For the programme and registration form, contact Dr F.C.R. Cattell, Centre for Environmental and Urban Studies, Macquarie University, NSW 2109.

LECTURE BY DR YIP CHO, LINNEAN MACLEAY LECTURER IN MICROBIOLOGY

On Wednesday 11 November 1987, Dr Yip Cho of the Department of Microbiology, University of Sydney, presented a lecture entitled "The biotechnology of mushroom cultivation". It is fitting that Dr Cho, who is the Linnean Macleay Lecturer in Microbiology should address the Society.

In 1890, Sir William Macleay left an endowment of 12,000 to the University of Sydney to employ a competent bacteriologist to conduct oiginal research. He was convinced of the extreme importance of the then fledgling science of bacteriology, but doubted that others held this view. Sir William set strict conditions on his bequest.

The Senate of the University of Sydney accepted the bequest but in 1894, sought to have one of the conditions modified in the Equity Court. Sir William had set the condition that "...it shall be necessary for every student before being admitted to a science or medical degree at the University, to attend a six months' course in Bacteriology". The Senate requested the court to rule on whether "science degree" meant science generally or just biological science. The judge ruled in favour of biological science. The other request was to define "a six months' course of bacteriology". It was put to the court that the science of bacteriology, in its then state of development could not profitably fill a six months' course. The judge ruled in favour of Sir William's original intention. In 1895, the Senate returned the bequest to the executors. The Society then employed its own bacteriologist and set up its own laboratory in Linnean House, Elizabeth Bay.

This state of affairs continued until the late 1920s when the Society became involved in property deals. Linnean House was sold and the office of the Society was relocated to Macleay House, College Street. The new headquarters did not have provisions for a laboratory so the bacteriologist was relocated to Sydney University and the Society paid bench fees to the University. When the Linnean Society and the Royal

Society of New South Wales jointly built Science House in Gloucester Street, it did not have a laboratory either. By this time, in the early 1930s, inflation had eroded the value of the endowment so that it no longer supported a full time bacteriologist. Dr Chan, who held the position at the time, set up the Department of Microbiology at the Sydney University and was appointed to the Chair. He negotiated a deal with the Society and the income from the bequest was put towards a lecturship, and this state of affairs has continued to the present day.

In his lecture, Dr Cho outlined the history of edible fungi. The French first cultivated agarics in the 18th Century. In Australia, mushroom cultivation started in disused railway tunnels. Tunnels at St James, Circular Quay and outside of Sydney were used. In Asia, the highly prized Shi-ta-ke has been cultivated for at least two thousand years and straw mushrooms since the 18th Century. Mushrooms have been so highly regarded that at times in history royalty have reserved them for their own use, on pain and penalty of death. Mushrooms may be used in medicine also, as they contain a polysaccharide with anti-tumour properties and the anti-viral interferon. The place of mushrooms in culture and folk-lore is legend.

Essentially, the biotechnology involves the production of a vegetative biomass then the manipulation of the microclimate to induce fruit body formation. The preparation of the compost is extremely important, as it contains all the nutrients. The compost must be pasturised to eliminate toxic bacteria. The compost substrate is seeded with spawn. The production of fruiting bodies depends on temperature, humidity and carbon dioxide.

Mushroom breeding is very difficult but there are some hybrids. Attempts to produce improved varieties continue. The spawn may degenerate after being sub-cultured for a long time and this may cause the occasional, acute mushroom shortage.

The lecture was followed by a mushroom tasting of seven different species and a dinner - with a menu of mushroom dishes, to complete a most enjoyable evening.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, time table and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional ciricumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

PROGRAMME

WEDNESDAY 22 JUNE, 1988 AT 6 PM

SPEAKER: MR ALAN ANDREWS

TOPIC: MAJOR MITCHELLS MAP OF THE COLONY OF NEW SOUTH WALES "THE MAP OF THE NINETEEN COUNTIES"

Alan, who for more than a quarter of a century has been researching the work of the early surveyors of the Surveyor Generals Department, says that this is the story of the making of an absolutely marvellous map. His enthusiasm for such a mighty project will rub off on his listeners.

Anyone who used tourist maps or any of the county maps produced before aerial photographs and the second World War - and there must have been many naturalists who did - is indebted to the work of the Surveyor General Sir Thomas Michell and his survey assistants. They struggled to survey and map in detail almost every stream, ridge and spur between Moruya and the Macleay and between Molong and the sea during the years 1827-1834.

The talk is illustrated with maps and photographs and there is a guarantee that every listener will emerge from the evening much wiser in regard to the strife and frustrations of an 1830s surveyor, whether in the wilds or in the office - and considerably more knowledgeable about the topography of this gorgeous part of the world.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOMED.

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C'

NEWSLETTER EDITOR:
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NEWSLETTER NO: 49

SEPTEMBER 1988

DONATION TO LIBRARY FUND:

The Society wishes to thank an anonymous donor for a donation of $500 to the Library Fund. The Society retained a nucleus of special books from its former library and funds are required for their up-keep.

All donations to the Library Fund are tax deductible.

NEW COUNCIL MEMBERS:

We welcome two new Council Members: Professor Carrick Chambers, Director of the Royal Botanic Gardens and Dr Robert King, School of Biological Science, University of New South Wales. Under the Rules of the Society, casual vacancies on Council may be filled by invitation but the new members must stand for election at the next Annual General Meeting. The expertise and experience of the new Members will be a welcome addition to the Council.

NEW MEMBERS:

We welcome:
Dr I. Yassini, Department of Geology, Wollongong University.
Dr B. Wannan, School of Biological Science, University of New South Wales.
Mr S. Rose, School of Biological Science, University of New South Wales.

PAPERS ACCEPTED FOR PUBLICATION:

P.G. Kodela & J.R. Dawson - A late Holocene vegetation and fire record from Ku-ring-gai Chase National Park, New South Wales.

W. Zeidler - A new species of *Melita* (Crustacea: Amphipoda: Melitidae) from northern New South Wales.

L.L. Vail & F.W.E. Rowe - Status of the genera *Ophiopeza* & *Ophiopsammus* (Echinodermata: Ophiuroidea) in Australian waters with the description of a new species.

P. Hutchings, J. van der Velde & S. Keable - Baseline Survey of the Benthic Macrofauna of Twofold Bay, New South Wales, with a Discussion of the Marine Species introduced into the Bay.

P.A. Farrant & R.J. King - The Dictyotales (Phaeophyta) of New South Wales.

C. Kennedy - *Pycnodithella harveyi* - A new Australian Species of the Tridenchthoniidae (Pseudoscorpionida: Arachnida).

C.N. Smithers - A distinctive new species and new records of Stilbopteryginea (Insecta: Neuroptera: Myrmeleontidae).

SOCIETY SUBMISSIONS ON ENVIRONMENTAL MATTERS:
The Council follows environmental issues and makes submissions, pointing out in particular the scientific arguments. Recent submissions include the following topics:

* Scientific values of the Woodchip Agreement.
* Australia and World Heritage Listings.
* Lord Howe Island region and its status as World Heritage.
* Support for Ozone depleting Substances Regulation Bill.

The Society receives replies to all of its submissions and some of the replies are informative. The request for support for the Ozone Depleting Substances Regulation Bill came from Senator Coulter, Democrat, who intended to introduce a private members' bill. Our submission was sent to Senator Richardson, Minister for the Environment, who replied that the Government had approved the drafting of legislation, in consultation with the States and interested parties.

LINNEAN MACLEAY FELLOWSHIP:
Applications are invited for the Linnean Macleay Fellowship for 1989. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND GRANTS:
There were 26 applications, far more than has ever been received and the sum of money requested far exceeded the sum available. The Committee was faced with a very difficult task, as all of the projects were worthwhile. Grants may be made only for research, as stipulated by the Commissioner of Taxation, so the Society is unable to fund theses preparation, travel to conferences etc.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible.

AWARDS:

Doyle, Suzanne Frances - Electron microscopist, Biol. Sci., Macquarie University.
Project: Studies on polychaete genus *Scyphoproctus*. This genus belong to a family that is geographically widespread and commonly encountered in marine collections. However, there are many difficulties asssociated with classification due to the homogeneity of the identifying features of many genera. Awarded $500.

Godthelp, Henk - Laboratory Assistant, Biol. Sci., University of New South Wales.
Project: Potassium/Argon dating of the Boat Mtn fossil deposit near Murgon, Queensland. Recent work has revealed fossil mammal teeth which may represent the oldest known Australian marsupials. The aim of this project is to obtain an accurate appraisal of the age of this deposit. Samples of the overlying basalts and interbedded volcanic ash beds have the potential to yield Potassium/Argon dates. Awarded $500.

Heaphy, Linda - Ph.D. candidate, Biol. Sci., University of New South Wales.
Project: Population studies of *Carettochelys insculpta* [pig-nosed turtle] in the Daly River. The request is for a final field trip to complete field data. Awarded $400.

Jacklyn, Peter M. - Ph.D. candidate, Biol. Sci., University of Sydney.
Project: Orientation of 'magnetic' termite nests in Cape York. Work over the last two years suggests that orientation may be a response to local temperatures which will be analysed using the N.O.A.A. satellite system. Four images covering the coldest times from July to August will be analysed. Awarded $360.

James, Craig D. - Ph.D. candidate, Biol. Sci., University of Sydney.
Project: Ecology of syntopic, congeneric lizards (*Ctenotus*: Scincidae) in spinifex dunefields near Alice Springs. There is a very high species diversity of these lizards and the aim is to determine the ecological mechanisms which led to, and maintain, such diversity. This is a joint application with Lin Schwarzkopf for a memory expansion kit to handle very large data files which exceed the capacity of the computer in use. Awarded $436.

Kemp, Ann Rachel - Hon. Research Fellow, Queensland Museum.
Project: Anatomical differences in adults, eggs and juveniles of lungfish (*Neoceratodus forsteri*). Such differences may shed light on the original distribution of the recent lungfish when it was discovered in 1870. Awarded $250 for travel.

Long, John A. - Research Fellow, Geology Dept., University of Tasmania.

Project: Trip to collect fossil vertebrates from Devonian Aztec Siltstone, South Victorial Land, Antarctica. Awarded $500 for a compulsory training camp in New Zealand plus clothing hire etc.

Marlow, Nicky - Ph.D. candidate, Biol. Sci., University of New South Wales.
Project: Ecological role of introduced red foxes (*Vulpes vulpes*) in the arid zone. The predatory impact that they have upon the native and introduced fauna is being assessed. Awarded $300 for travel.

Nikolakopoulos, Nick - Ph.D. candidate, Zoology Dept., University of Melbourne.
Project: Collecting ground crickets of the genus *Bobilla* in Tasmania as part of an investigation into speciation. Behavioural, morphological and biogeographical data collected from these species, in conjunction with data obtained from mainland representatives of the genus, will be used to determine factors responsible for speciation in this insect genus. Awarded $500 for travel.

Nowak, Barbara - Hydrobiologist, Biology 1, University of Sydney.
Project: Establish correlations between pesticide accumulation in fish tissue and population level effects in the field using histopathology. Awarded $300 for travel.

Power, Geoffrey C.J. - Ph.D. candidate, Botany Dept., James Cook University.
Project: Biological survey of the *Acmena smithii, A. hemilampra, A. resa* complex in Australia from morphological, environmental and electrophoretic data. *Acmena* is part of the *Syzygium sensu lat.* complex which is an important component of the rainforest flora of Asia, Pacific Islands and the Americas. Throughout this range many species are used for timber and food, yet little is known of their genetic variability. Awarded $500.

Quinn, C.J. - Senior Lecturer, Biol. Sci., University of New South Wales.
Project: Examination of *Lindernia sens. lat.* and its allies (Scrophulariaceae) in Australia to provide satisfactory species circumscriptions and redefine the genera and subgenera. Awarded $500 for travel.

Schwarzkopf, Lin - Ph.D. candidate, Biol. Sci., University of Sydney.
Project: Determine the ecological consequences of reproductivity mode in a viviparous lizard (*Eulamprus tympanum*), the water skink. In pregnant females, 30-40% of total body weight may be offspring. This substantial weight increase may decrease survival and food intake, alter thermoregulatory behaviour, and increase field metabolic rates. In this study, the effects of pregnancy on survival rates, food intake and metabolic rates are being examined. Gravid and non-gravid individuals are being compared using field observations and laboratory experiments. This is a joint application with Craig James for a memory expansion

kit to handle very large data files which exceed the capacity of the computer in use. Awarded $436.

Selkirk, David Robert - Hon. Associate, School of Biol. Sciences, Macquarie University.
Project: Analysis of macro- and microfossils in two lacustrine deposits exposed in cliffs on Macquarie Island. Radiocarbon dating has established that two such deposits, intensively sampled in the field, extend from Late Pleistocene to modern. Study of macrofossils (intact mosses, aquatic flowering plants, seeds, cladocerans) is well-advanced. Analysis of microfossils has begun. Dr McBride is well-advanced with analysis of diatoms from one deposit. Pollen preparations need to be made from both deposits. Awarded $300 for photography.

Shine, Richard - Senior Lecturer, Biol. Sci., University of Sydney.
Project: To test explanatory hypotheses for observed differences between male and female filesnakes (*Acrochordus arafurae*) in foraging biology, especially choice of water depths and prey species. This work should clarify theoretical models for the evolution of sexual dimorphism through ecological divergence between the sexes. Awarded $400 for experimental enclosures.

Thann Naing - Ph.D. candidate, Earth Sciences, Macquarie University.
Project: Palaeoenvironmental studies of Middle Triassic Narrabeen Group, Sydney Basin: palaeoecological constraints with particular emphasis on trace fossil assemblages. The study so far has found many trace fossils and several new ichnogenera and species. Several minor marine incursions have been confirmed. Awarded $300 for travel.

Wannan, Bruce S. - Research Associate, Biol. Sci., University of New South Wales.
Project: Expand the database for floral morphology, pericarp anatomy and biflavonoid distribution in the family Anacardiaceae, which is a mostly tropical family with 7 of its 70 genera occurring in Australia. Difficulties encountered in the infra-familial taxonomy of the family have led to a reappraisal of generic affinities. There is a lack of data from the Asian members of the family. Thus it is proposed that a study trip will be made to Borneo in November to collect some of the 18 poorly known, indigenous genera of the region. Awarded $300.

A.C.F. 88 NATIONAL CONFERENCE: THE AUSTRALIAN ENVIRONMENT - TAKING STOCK AND LOOKING AHEAD

This conference will be held 7-9 October at the University of Technology.
Programme: Keynote address by Judith Wright and Dr H.C. Coombs
Day 1: Australia - a land worth caring for?
Day 2: Have we cared for it? The future?
Day 3: Overcoming institutional constraints. The way ahead.
There will be a 10 day post conference tour of the northern NSW rainforests. For further information, ring the conference hot line: (02) 27 4083 or contact ACF 88 National

Conference Office, Suite 306, 3rd floor, North Wing, 18 Argyle Street, Sydney, NSW 2000.

TEC TOURS

The Total Environment Centre run day tours to places of interest around Sydney. These are run as a fund raising venture but costs are kept to a minimum and there is a discount if the full programme is booked. Nutritious and delicious lunches and drinks provided.

EARTHWORM - ABC RADIO PROGRAMME ON THE ENVIRONMENT

Earthworm is an environmentally based radio programme which aims to enhance the listener's understanding of the world around us. The programme will investigate a wide range of topical issues concerned with development, protection and the management of the environment. Dr Peter Hunt provides in-depth analysis and comment from informed scientists, commentators and environmental professionals. *Earthworm* is a national programme and may be heard on Wednesdays at 5.30 pm in Sydney.

NEW BOOK: "SURVIVAL IN OUR OWN LAND. ABORIGINAL EXPERIENCES IN SOUTH AUSTRALIA SINCE 1836"

Many people, particularly those living in States other than South Australia, will be unaware of the existence of the magnificent book "Survival in Our Own Land", which has just been released for sale, nor would they be aware of the bureaucratic saga which almost prevented its publication.

The editors of the book, Reverend Ken Hampton and Mrs Christobel Mattingley, had access to previously hidden material in the South Australian Museum and have used material written entirely by Aboriginal people which has never been published before.

The book costs $27.50 soft cover, or $45 hard cover and may be obtained from Ms Sandra Kanck, 41 George Street, NORWARD, S.A. 5067. Please make cheques payable to A.L.D.A.A. Books.

BLUE MOUNTAINS WILDFLOWER WALK

DATE: Sunday 25 September 1988.

MEET: 10am at Wentworth Falls Lookout at the end of Falls Road, Wentworth Falls. This is a fair distance from Wentworth Falls Railway Station.

Jill Dark, co-author of three very successful wildflower books, will guide us through this diverse and prolific area of flora. In a short and easy walk we will experience swamp, heath and open forest communities. Jill will share with us her knowledge of (and enthusiasm for) plants, large and small, showy and shy, common and unusual. Orchids are a feature of this area.

PRICE: $10, concession $8

HUNTERS HILL AND FIELD OF MARS

DATE: Sunday 30 October 1988.

MEET: 10am at 'Vienna', 40 Alexandra Street, Hunters Hill.

We will inspect some of the heritage treasures of Hunters Hill, on foot, being informed as we wander.

After transferring to the Visitors Centre, Field of Mars Field Study Centre, Pittwater Road, North Ryde, we will have lunch. There is a variety of walking tracks of easy grade with flowers, birds and boardwalk viewing of mangroves at Buffalo Creek. Education Officer, Howard Barker and others have much of interest to impart as our guides.

PRICE: $10, concession $8.

For further information and future programmes, telephone TEC, (02) 241 2523 or (02) 27 4714.

PROGRAMME

WEDNESDAY 12 October 1988 at 6 pm in the Seminar Room, National Herbarium, Royal Botanic Gardens. Enter from Mrs Macquaries Road.

SPEAKER: DR BOB WAGNER, Visiting Fellow Department of Geology, University of Newcastle.

TOPIC: CARBONIFEROUS AND PERMIAN FLORAL DISTRIBUTION

Floras are sensitive to climatic zoning and fossil floras, being found mainly (almost exclusively) in wet lowland basins, have proven useful for latitudinal zoning. Early Carboniferous floras of generally similar composition worldwide are followed by late Carboniferous (Pennsylvanian) floras of markedly different composition in different palaeolatitudinal areas, viz the palaeoequational Amerosinian area and the northern Engara area. Floristic diversity is greatest in the palaeoequatorial belt and diminishes sharply both northwards and southwards. The rapidly evolving palaeoequational belt floras contrast with the more conservative Gondawanan flora. With the general ameleoration of the world's climate at the end of the Carboniferous, the possibility existed for thermophilous Amerosinian floral elements to migrate into the colder areas of Gondawana and Engara, giving rise to mixed floras. Very rarely a mixed migration took place as well. Within the palaeoequational belt, drier and wetter patches developed in Permian times with the result that floral associations of different composition came into being. These are known respectively as Euramerian (Atlantic) and Cathaysian type floras.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

PROGRAMME

WEDNESDAY 23 November at 6 pm in the Seminar Room, National Herbarium, Royal Botanic Gardens. Enter from Mrs Macquaries Road.

SPEAKER: DR JOHN CAIRNEY, School of Biological Science, University of New South Wales.

TOPIC: "WHEN I GROW UP, I'M GOING TO BE A TOADSTOOL....I HOPE"

Although mushrooms and toadstools are the most obvious facet of the fungal life cycle, they represent only a very short-lived phase. The mycelium from which they are produced, on the other hand, is present in the soil the whole year round and is involved in a constant struggle to occupy new territory and compete with the other organisms for nutrients. Different species have evolved different strategies in order to maximise their chances of fulfilling their life cycle and, eventually, perhaps the production of mushrooms and toadstools.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C'

NEWSLETTER EDITOR:
Dr Helene A. Martin
School of Biological Science
University of New South Wales
PO Box 1
KENSINGTON NSW 2033

SOCIETY OFFICE:
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MILSONS POINT NSW 2061

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PO Box 457
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Telephone: 929 0253

Office hours:
Tuesday 9.30 am-5.00 pm

NEWSLETTER NO: 50

JANUARY 1989

AWARD TO PROFESSOR BARRY WEBBY:

Congratulations to Professor Barry Webby who has been awarded the Royal Society of Victoria Silver Medal.

NEW MEMBERS:

We welcome:
Mr Bryan E. Pierce, Zoologist of Adelaide.
Dr John Alan Elix, School of Chemistry, Australian National University.

PAPERS ACCEPTED FOR PUBLICATION:

M.R. Gray & G.J. Anderson - A new Australian spider of the genus *Argyrodes* Simon (Araneoidea:Theridiidae) which preys upon its host.

A.B. Bradke & D.R. Murray - Redistribution of Amino Acids and Amides during Seedling Development in *Acacia iteaphylla* F. Muell (Mimosoideae).

C.N. Smithers - Two new species of Amphientomidae (Insecta: Psocoptera), the first record of the Family for Australia.

G.C. Young - New occurrences of culmacanthid acanthodian: (Pisces, Devonian) from Antarctica and southeastern Australia.

H. Campbell - John Vaughan Thompson, F.L.S.

M.J. Lambert & J. Turner - Redistribution of Nutrients in Subtropical Rainforest Trees.

LINNEAN SOCIETY ANNUAL LUNCHEON:

This year's luncheon will be held on 15 March, instead of the usual February date in previous years. A booking slip for the luncheon is included.

RENEWAL OF MEMBERSHIP:

Membership renewals are due now and prompt payment will be appreciated. A form for renewal, including membership categories and rates is included. If you have already paid for 1989, or are a life member, then please disregard this notice.

ANNUAL GENERAL MEETING:

This will be held one week earlier than usual, on 22 March, because of Easter.

"IN THE WAKE OF FLINDERS" - AN OCEANIC RESEARCH FOUNDATION EXPEDITION:

The expedition will circumnavigate Australia, following in the wake of Matthew Flinders, in a voyage of science and discovery, combining adventure and education.

The voyage will commence from Sydney in April and head north. It will provide an opportunity to visit remote parts of the Australian coast and the off-shore islands. Invitations are extended to any interested group to share time on the voyage for scientific research.

For further information, contact ORF at Box 247 Windsor, NSW 2756 or telephone (045) 79.9254.

MR WALTER F. FROGGATT, PROPHET re CANE TOADS:

From time to time, the Society receives requessts for the use of some of its material. A request to reproduce a picture of Mr Walter F. Froggatt from the Proceedings, Vol 67, 1942, accompanying an article by A.B. Walkorn on pages 77 to 81, came from Stephanie Lewis who is publishing a book on cane toads, jointly with her son, Mark Lewis, who wrote and directed the film *Cane Toad, An Unnatural History*.

Mr Froggatt was the first voice, in 1936, to denounce the introduction of the cane toad. What he said then has been fully vindicated since.

If you have not seen the film, it is very worthwhile. Besides being informative, it is highly entertaining.

OVERHAUL OF LORD HOWE ISLAND REP:

Late in 1986, the Regional Environmental Plan for Lord Howe Island was released. It was rejected outright by the Island's environmental group, the Lord Howe Island Preservation Movement, and caused widespread concern. The Linnean Society made representation to the Government for reconsideration of the REP. The Minister for Environment, Mr Tim Moore, has announced that there will be a complete overhaul of the REP and the restructured Board will fairly represent all points of view.

CARONIFEROUS AND PERMIAN FLORAL DISTRIBUTIONS:
Lecture given by Dr Bob Wagner, Visiting Fellow, Department of Geology, University of Newcastle, Wednesday 12 October 1988

In the Carboniferous and Permian Periods, some 345 million to 230 million years ago, the vegetation would have consisted of entirely extinct plants. There were no flowering plants and conifers may have been the highest form of plant life. The geography of the Earth was entirely different to that of today as well, thanks to continental drift. In spite of these enormous differences, palaeobotanists have been able to reconstruct many facets of the floras of the time.

The parts of plants that are preserved are almost entirely from the floras of the wet, lowland basins. In the Early Carboniferous, the floras were generally similar in composition, worldwide. In the Late Carboniferous, the composition of the floras were markedly different in different palaeolatitudes. Floristic diversity was greatest in the palaeoequatorial belt and diminished sharply both northwards and southwards. By the end of the Carboniferous, a climatic ameleoration allowed the thermophilous elements to migrate into colder areas, such as Gondwana, giving rise to mixed floras. During this climatic ameleoration, certain regions of the palaeoequatorial belt became drier, whereas other regions remained wet and there was a marked differentiation of the floras.

Dr Wagner's search for fossil plants has taken him well off the beaten track. We were treated to slides of mysterious places in the Middle East and South America where few tourists venture.

"WHEN I GROW UP, I'M GOING TO BE A TOADSTOOL...I HOPE" was the intriguing title of a lecture given by Dr John Cairney, School of Biological Science, University of New South Wales, on Wednesday, 23 November 1988.

In the past, toadstools and mushrooms have suffered from a bad press, probably because people did not understand where they came from. There were no seeds or spores that could be seen and when they popped up out of the ground, there seemed something slightly sinister about it. The poet, William Browne (*fl.* 1591-1643) provides a typical example.

Downe in a vallye, by a Forest side.
Neere where the christall Thames roules on her waves,
I saw Mushrome stand in haughty pride,
As if the Lillyes grew to be his slaves;
The gentle daiseye, with her silver croune,
Worne in the brest of many a shepheards lasse;
The humble violett, that lowly downe,
Salutes the gaye Nimphes as they trimly passe:
Those, with many more, me thoughte complaind
That Nature should those needless things produce,
Which not alone the Sun from others gain'd,
But turne it wholy to their proper use:
I could not chuse but grieve, that Nature made
So glorious flowers to live in such a shade.

The mushrooms and toadstools, of course, are fruiting bodies produced from the mycelium in the soil and belong to the order Basidiomycetes of the fungi. The fungi utilise carbon from leaf and wood litter and from standing trees. The hyphae of the mycelium extend through the soil and when they meet hypae of another species, they swell up and produce phenolics, thus protecting their territory. The hyphae that extend through damp leaf litter or within rotting logs are fine and delicate threads. To extend territories, such as from one log to another, the hyphae may have to travel through an unfavourable, desiccating environment and for this purpose, they form mycelial cords which may be up to half a centimeter thick. These cords look like roots but have an entirely different structure. They perform many functions of roots, however, such as translocation of water and nutrients to and from the growing front. Mycelial cords may go a long distance, up to 30 m.

Fungi may form a mycorrhizal symbiotic association with trees. The hyphae invade the outer layers of the roots, obtaining carbon from the tree, whereas the fungus makes nutrients available to the tree, particularly phosphorus. The hyphae are able to absorb forms of phosphorus not available to the roots and they may store phosphorus. Thus there is a trade-off; the fungus providing phosphorus and the tree providing carbon. The mushroom is thus not a needless creation of Nature, as the poet William Browne thought, but a necessity to many higher plants.

The talk was illustrated with slides and many of the fruiting bodies are very beautiful. One toadstool (or is it a mushroom?) makes the Guiness Book of records for size. A small boy holding it is mostly hidden from view. The fungus that produces this fruiting body grows only in termite nests in Africa!

NPA SYDNEY BRANCH LECTURE SERIES, 1989
"GOING, GOING, ??? AUSTRALIA'S ENDANGERED SPECIES"

A series of 8 evening lectures running from March to October 1989, will be held in the Hallstrom Theatre, Australian Museum, College Street, Sydney, starting at 6 pm and finishing 7 pm. Fee for the course is $35 (pensioners $22), or $6 payable at the door for a single evening.

There will be a number of excursions to be arranged at the evening lectures. A separate fee for each excursion will be announced according to numbers going. A lecture excursion will be arranged for one Saturday on the Zoo's Captive Breeding Programme.

Mar 13 Lecturer: JOHN DENGATE, NPWS, "*Endangered Species - Why Bother?*", followed by a look at the moral and practical reasons for saving species, and an overview of how species become endangered;
and
KATE BOYD, Convener of NPA's Wildlife Committee, "*Giant Pandas, 3-toed Sloth, Regents Parrot, and National Parks Association*"

Apr 10 Lecturer: JOHN BENSON, NPWS, "*Endangered Plant Communities. A Sydney Overview*"

May 8 Lecturer: DR JOHN MERRICK, Environment and Urban Studies, Macquarie University, "*Australia's Fresh Water Fishes - Problems and Potential*"

June 19 Lecturer: DR HARRY RECHER, Department of Eco-system Management, University of New England, "*Australlia's Terrestrial Vertebrates Fauna - Does it have a Future?*"

Jul 10 Lecturer: DAVE TRIDELL, NPWS, "*Conservation of the Mallee Fowl*"

Aug 14 Lecturer: PHILLIP REED, Koala Research Officer, NPWS, "*Conservation and Management of Koalas in NSW*"

Sep 11 Lecturer: PROFESSOR MIKE ARCHER, University of New South Wales, "*Australian Extinctions - Perspectives in Time*"

Oct 9 Lecturer: DAVID PAPPS, Head of Wildlife Conservation and Regulatory Servics, NPWS
and
IAN FRY, Wildlife Survival Inc., "*Endangered Species - Future Strategies - Government and non-Government View*".

Cheques should be made payable to National Parks Associate of NSW Inc and sent to Heather Roy, 34 Hilltop Road, Clareville Beach, NSW, 2107, Telephone 918 9259. SEND A STAMPED ADDRESSED ENVELOPE PLEASE. DON'T MISS OUT. BOOK EARLY. ONLY 120 SEATS.

Lectures are open to all members of NPA, their friends and the public.

RENEWAL OF MEMBERSHIP FOR 1989: Prompt renewal will be appreciated

The Secretary
Linnean Society of NSW
PO Box 457
MILSONS POINT NSW 2061

Full member	: $35	
Retired member	: $20	- retired, having reached the age of 60 years
Student member	: $20	- full time student. Please include proof of student status
Associate member	: $7.50	- receiving Newsletter, but not Proceedings. No voting rights
Life member	: Nil	- having been a full member of the Society for over 40 years

Please circle the appropriate membership

Cheque for $..... is enclosed

Name ....

Address ....

IF YOU HAVE RENEWED YOUR MEMBERSHIP, OR ARE A LIFE MEMBER, PLEASE DISREGARD THIS NOTICE

THE LINNEAN SOCIETY OF NEW SOUTH WALES.

Council nominations for President, Council and Auditor for 1989/90.

Election at Annual General Meeting, Wednesday, 22nd March, 1989.

*The names of Members who retire (in terms of rules 15(a) and 15(b) are marked with an asterisk.

President:- T.G. Vallance, B.Sc., Ph.D., F.G.S.

Council:-
*A.E.J. Andrews, A.S.T.C. (Civ.Eng.) M.I.E. Aust.
* T.C. Chambers, M.Sc., Ph.D.
J.H.K. Eastman, B.Sc., Dip.Ed., M.I. Biol.
M. R. Gray, M.Sc., Ph.D.
S.J. Hand, B.Sc., Ph.D.
D.S. Horning, M.Sc., Ph.D.
L.A.S. Johnson, D.Sc., F.A.A., F.L.S.
*R.J. King, B.Sc., Dip.Ed., Ph.D.
H.A. Martin, Ph.D.
P.M. Martin, M.Sc.Agr., Ph.D.
*J.R. Merrick, M.Sc., Ph.D.
*P.J. Myerscough,M.A., Ph.D.
*I.G. Percival, Ph.D.
J. Pickard, B.Sc.Agr., M.Sc., Ph.D.
A. Ritchie, B.Sc., Ph.D.
C.N. Smithers, Ph.D.
T.G. Vallance, B.Sc., Ph.D.
K.L. Wilson, M.Sc.Agr.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- P.J. Myerscough, M.A., Ph.D.

Council:- (six vacancies):- Council nominates the following and invites further nominations in accordance with rule 15(e) to complete the list.

R.J. King, B.Sc.(Hons.), Dip.Ed.,Ph.D.
T.C.Chambers, M.Sc., Ph.D.
A.E.J. Andrews, A.S.T.C.(Civ.Eng.), M.I.E. Aust.
P.J. Myerscough, M.A., Ph.D.
J.R. Merrick, M.Sc., Ph.D.
I.G. Percival, Ph.D.

Auditors:- W. Sinclair & Co.

This notice is given under the provision of Rule 15(e).
It is not a voting paper.

RULE 15(e):- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or on before the last day of February, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

For the Council

Barbara J. Stoddard,
Secretary

20th December, 1988.

P.O. Box 457,
Milson's Point,
Sydney, N.S.W. 2061

Telephone - 929.0253 - Tuesdays only.

LINNEAN SOCIETY OF NSW LUNCHEON

WEDNESDAY 15 March 1989, at 12.30 pm in the J.H. Maiden Theatre, National Herbarium, Royal Botanic Gardens.

ENTER FROM MRS MACQUARIE'S ROAD

COST $14 PER HEAD

The luncheon is informal and members are invited to bring spouses and friends.

PLEASE MAKE BOOKINGS BY TUESDAY 7 MARCH

The Secretary
Linnean Society of NSW
PO Box 457
MILSONS POINT NSW 2061

Telephone: 929-0253
(TUESDAYS ONLY)

I wish to make bookings for ...... people at $14 per person for the luncheon on 15 March

Cheque for $...... is enclosed

Name ....

Address ....

LINNEAN SOCIETY OF NEW SOUTH WALES
LIN S'O'C'

NEWSLETTER EDITOR:
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Tuesday 9.30 am - 5 pm

NEWSLETTER NO: 51 **APRIL 1989**

NEW MEMBERS

We welcome:

Ms Margaret Jones, Nursing Management & Education, Waverton, NSW
Mrs Lynette J McLeod, Fowlers Gap Research Station, via Broken Hill, NSW
Mr David Keith, National Parks & Wildlife Service, Hurstville, NSW

PAPERS ACCEPTED FOR PUBLICATION

J. A. Elix & H. Streimann	-	The lichens of Norfolk Island - I. Introduction and the family Parmeliaceae
I. Yassini & M. Mikulandra	-	Mckenziartia and Pectocythere (Pectocytheridae Ostracoda, Crustacea) in Lake Macquarie, New South Wales.
E. W. Groves & D. T. Moore	-	A list of the Cryptogamic and Gymnospermous Plants in the British Museum (Natural History) gathered by Robert Brown in Australia 1801-5, based on the manuscript catalogue of J. J. Benne
R. L. Plessey	-	Wetlands of the lower Clarence flood plain, northern coastal NSW.
R. L. Plessey	-	Wetlands of the lower Macleay flood plain, northern coastal NSW.

AUSTRALIAN SYSTEMATICS BOTANY SOCIETY: Women's College, University of Sydney.

SYMPOSIUM, 28-29 June, PLANT SYSTEMATICS IN THE AGE OF MOLECULAR BIOLOGY

This will be pitched to the non-specialist and will cover fields that are already contributing new and powerful data to systematics.

- Overviews of systematics and macromolecular approaches
- Isozymes
- Protein sequence studies
- Nuclear DNA
- Extra-nuclear DNA
- Chloroplast, mitochondrial and ribosomal RNA
- Rapid sequencing methods
- Analysing the data
- Examples of studies on plants, fungi and viruses

FORUM 30 June 1989, GONDWANAN ELEMENTS IN THE AUSTRALIAN FLORA

- A molecular evolutionary clock
- Studies and evidence form Pittosporaceae, Liliiflorae, Cupressaceae, Casuarinaceae, Proteaceae, Fabaceae and Myrtaceae.

REGISTRATION: standard fee (received before 1 May 1989), $85. Student or retired concession, $55. Late registration fee, $100. College accommodation is available.

For registration forms and information, contact ASBS Symposium, c/o Dr B. Briggs, Royal Botanic Gardens, Sydney, 2000, phone (02)230-8113.

NATURE CONSERVATION COUNCIL SEMINAR: URBAN RUNOFF AND ITS IMPLICATION FOR URBAN BUSHLAND AND WATERWAYS

In response to widespread public concern about the degradation of bushland areas due to stormwater runoff, a public seminar will be held on Saturday, 3 June, 8.45 am to 5 pm in the J. H. Maiden Theatre, Royal Botanic Gardens. Cost $10. Fur further information, contact Judy Messer at the NCC, 27-4200.

MASS MEDIA IN A TIME OF CRISIS: An international conference on media and our common future, 15-17 September 1989, Västeras, Sweden.

In 1987 the Brundtland Commission presented it report to the UN on environment, peace and development: Our Common Future. The report analyses the preconditions for sustainable development, in the context of environmental and ethical issues. Its intent is to establish a practical basis for appropriate changes in national and international policy.

The Commission draws attention to the different ways in which our planet is threatened: soil, fresh water, rivers, oceans and atmosphere. In addition, the stockpiling of weapons aggravates the insecurity of nations. The gap between the haves and the have-nots widens. Misery and distress increasingly affect much of the world's population.

What is the role and responsibility of the media in a time of crisis? How can the media help to raise public consciousness of our common future? The Brundtland Commission considers that it is not too late to turn the tide. Through information, education and cooperation we can all contribute to peace, justice, environmental protection and social development. That is the worldwide challenge.

The program has papers on the following:

Peace and social development
Socialization, Peace, education and equality
Peace, environment and the media
World conflict, images and narratives
Working for peace and the environment in the future
Alternative policies and the future of the mass media

For further information, contact the Institute for Social Policy, Hasseluddsvägen 194, S-132 39 Saltsjö-Boo, Sweden.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth science which come in the range of interest of the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for energy support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

THE

PROCEEDINGS

OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES

For Sale

The Bicentennial Offer of copies of the Society's Proceedings is STILL OPEN

There are many parts and volumes still available

From Volume 19 (1894) to Volume 56 (1931) complete runs may yet be had...and from Volume 60 (1935) to Volume 100 (1975) the majority of volumes is still in supply.

A few of the rare leatherbound copies of the early volumes - Volumes 9 (1884), 14 (1889), and 15 (1890) to 18 (1893) miraculously still are available to early comers.

The Society intends not to stock back-issues in the future, so that it is imperative that you obtain what you want NOW to avoid disappointment.

You do not have to order on the order form - although it helps if you can. Some of the other publications listed on the order form can still be supplied - particularly much of the "Transactions of the Entomological Society of N.S.W."

TO ORDER

all you have to do is ask for any part or volume (or publication). The portion (it may be the whole) of your order that is available will be packaged and you will be invoiced at the prices and charges shown. On receipt of your cheque the package(s) will be forwarded as requested. For prices and charges see copy of the original order form enclosed.

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Guide to the Years: Vol. 1(1875); 10(1885); 20(1895); 30(1905); 40(1915); 50(1925); 60(1935); 70(1945); 80(1955); 90(1965); 100(1975).

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Add other parts here, e.g. "47/3" for Part 3 of vol.47. (Use separate sheet as necessary)

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4 parts per volume @ $3.00 per part.

For parts in volumes 100 to 102
4 parts per volume (normal prices) @ $10.00 per part.

For parts in volumes 103 to 108
2 portions (1/2), (3/4) per volume (normal prices)
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Linnean Society of New South Wales

SALE OF PUBLICATIONS For details of offer see information sheets.

Intending buyers should order on this form or a copy of it. The order form is for ordering one of any item. Should multiple copies of any of any publication, part or volume, be required please indicate as a separate matter. The Society reserves the right to limit the allocation of multiple copies where considered appropriate.
To order any item tick in the box provided.

Office use only

PUBLICATIONS

1. Proceedings of the Linnean Society of N.S.W. Vols 1(1875) to 100(1975) at bargain prices; also current Proceedings at normal prices — For ordering instructions see back page.
2. Macleay Memorial Volume, 1893. (few only) $60
3. Index to Volumes 1 to 50. (few only) $2.50
4. Names of First Series Contributors (few only) $3
5. Linn. Soc. Library Catalogue, 1886. (few only) $3
6. Linn. Soc. Historical Notes. (moderate stocks) $5
7. Transactions of the Entomological Soc. N.S.W.
   Vol.1 Parts 1. 2. 3. 4. 5. each $4
   Vol.2 Parts 1. 2. 3. 4. 5. each $4
   Vol.2 Leatherbound (few only) $20
8. Memorial Series: 9.Carter 10.Hamilton 11.Tillyard 12.Sussmilch 13.Andrews 14.Waterhouse 15.Osborne 17.Mawson 18.Musgrave 19.Roughley 20.Colefax each $0.50
9. The Society's Heritage from the Macleays (II) $3.50
10. Proceedings of the First International Polychaete Conference. 1983. (normal price) $45

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Name and address of Buyer: _

_ _

LINNEAN SOCIETY OF NEW SOUTH WALES

TUESDAY 30 MAY 1989 AT 6 PM

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs. Macquarie Road)

SPEAKER: **DR MICHAEL J. KNIGHT**, Director,
Centre for Groundwater Management and Hydrology,
University of New South Wales

TITLE: **The role of geology and groundwater in Australia's salinity problem**

The salinity problem is costing Australia between $200 million and $500 million/year in lost agricultural productivity. There are active research programs in most States of Australia that are investigating the processes underlying problem and seeking practical solutions.

Much of the salt appearing at the ground surface in dry land and irrigation areas has an original geological origin though the paths travelled to present salted areas may be complex.

Groundwater tables are rising in both highland areas due to increased rainfall infiltration and in irrigation areas due to over supply of added water.

The geological history of an area and land adjacent, is critical to understanding the salinity problem as the salt water can be 1000's or millions of years old. However, groundwaters also interact chemically with rocks weathering now and this can add to the water salinity.

The lecture will present examples where geological and groundwater processes control the observed salinity and how this knowledge can be used to help solve the problem.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 21 JUNE 1989 AT 6 PM

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs Macquaries Road)

SPEAKER: **MR ALAN ANDREWS**

TOPIC: **ON WHALING, WHALE OIL AND LAMP LIGHT: TO DO WITH JOHN WHITE OF THE BLAZING STAR, 1830-1835**

Nearly 160 years ago, the citizens of Sydney were continually informed:

> "If you want a good light, you must come to John White."

And they would have done well to heed that advice, for John White was the town's lamp supplier/lamp lighter extraordinary and proprietor of the Blazing Star where every grade of whale oil and everything to do with light were provided.

The whale in those days wasn't regarded for its cuteness, but was considered as we still regard cattle and chooks - for what their bodies can give us humans. Nor was the obtaining of a dead whale just the matter, as it is today, of pumping a grenade into the mammal, but was a deadly dangerous task for the toughest of men.

The flamboyant John White sold the whale oil, but also was oil refiner, tin and colourman, lamp inventor, street lamp-lighting contractor and versifier who kept Sydney's darkness at bay and its citizens safe, laughing - and buying over some vital years. He personified all the drive and enterprise of Sydney's small business men of a particularly vigorous period.

However . . . intending listeners are warned that once you have met John White, Sydney's Martin Place at George Street can never again seem the same.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

20th Sept.
WEDNESDAY ~~19 JULY~~ 1989 AT 6 PM

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs Macquaries Road)

SPEAKER: **DR ANDREW MCMINN,** Special Services Section
Geological Survey of New South Wales

TOPIC: **DEEP SEA DRILLING ON THE NORTH WEST SHELF**

Dr McMinn was invited to join a cruise of the Ocean Drilling Ship, to the Northwest Shelf, last September. The results of the drilling program are quite surprising and have implications for the northwards drift of Australia. Dr McMinn will talk about shipboard life and the important scientific aspects of the cruise.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

FIELD TRIP TO LITTLE BAY

SATURDAY 26 AUGUST 1989

LEADERS: **DR PAUL ADAM**, School of Biological Sciences, University of NSW
PROF DICK EVANS, School of Applied Geology, University of NSW
DR ANDREW MCMINN, Specialist Services Section, Geological Survey of NSW

Little Bay is a gully in the Hawksbury Sandstone and contains estuarine peat deposits of Early Miocene age - the only known deposit of this age in coastal New South Wales. The vegetation is a species-rich heath which is quite outstanding in the Sydney Metropolitan Area. Our leaders will cover the botany, ecology, geology, geomorphology and palynology of Little Bay.

This site is on land owned by the University of New South Wales, the Prince Henry Hospital and crown lands of the golf course. There has been talk of selling off State Government land, but this site is far too valuable for scientific and education purposes and it should be conserved.

MEET: 10 am, Anzac Parade, at the gate into the University of New South Wales carpark. This gate is a short distance after Long Bay Gaol, travelling from the city.

BRING: Lunch; food and drink

WEAR: Walking shoes

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C'

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Tuesday 9.30 am to 5.00 pm

NEWSLETTER NO: 52 **JULY 1989**

CHANGE OF DATE OF LECTURE BY DR ANDREW MCMIN, from 19 July to 20 September 1989.

The date of this lecture must be changed - see program.

NEW LIBRARY OFFICER

Prof Tom Vallance has become the Library Officer. The Society still has a valuable collection of books, pamphlets, etc., some annotated by Macleay himself. All donations to the library fund are tax deductible.

NEW HONORARY EDITOR

Dr John Merrick has taken on the position of Honorary Editor.

NEW MEMBERS

We welcome:

Dr Thomas P McBride, Environmental Assessment Officer
Dr Edward C Morris, School of Biological Science, University of New South Wales
Ms Suzanne M Schibeci, Wollongong University

PAPERS ACCEPTED FOR PUBLICATION

T. Flannery - *Microhydromis musseri* n. sp., a new murid (Mammalia) from the Torricelli Mountains, Papua New Guinea

R. Buchanan - Pied Currawongs *(Strepera graculina):* their diet role in weed dispersal in suburban Sydney, New South Wales

J. Pemberton - The Ordovician -Silurian stratigraphy of the Cudgegong - Mudgee district, New South Wales

S J Rowland - Aspects of the history and fishery of the Murray Cod, Maccullochella peeli (Mitchell) (Percichthyidae)

SPECIAL OFFER ON THE MACLEAYS

Sir William Macleay, first President of the Linnean Society of NSW was a pillar of Sydney's scientific community, as was his cousin W S Macleay, and his uncle, Alexander Macleay.

The new book, *Mr Macleays Celebrated Cabinet,* recounts the story of this remarkable family, tracing the influence of the Macleays from Regency England to Victorian Sydney. It also tells of the role that the Linnean Society and its members played when the Macleay Museum was threatened by the actions of the University of Sydney after the First World War.

The history of the major collections of the Macleay Museum are summarised. They include the largest exotic insect collection in Australia, a magnificent range of anthroplogical artifacts collected more than 100 years ago, and the recently formed Historic Photograph Collection. There are five appendices of tabular information.

The book is quarto sized and has 171 pages with over 60 illustrations. Normally selling for $26.95, **members can obtain copies for only $22 including postage. Orders should be marked Linnean Society Special Qffer, and should be sent to: The Macleay Museum, University of Sydney, NSW, 2006. For further information telephone Lindy Davidson on 02 692 2274.**

SEMINAR, INTRACTABLE WASTES DISPOSAL - TO INCINERATE OR NOT TO INCINERATE? Saturday 15 July 1989, Maiden Theatre, Royal Botanic Gardens

This seminar, sponsored by the Nature Conservation Council of NSW, addresses the problems of transport, storage, waste creation, incineration, chemical treatment, the community perspective and community consultation.

For further information, contact Barbara Hoffman or July Messer on 27 4206, at 39 George Street, Sydney.

CONFERENCE: GREENHOUSE AND ENERGY - 4-8 December 1989, Macquarie University

This conference, sponsored by the CSIRO Institute of Minerals, Energy and Construction and the CSIRO Institute of Natural Resources and Environment, addresses the topics of Australia's options, social impact, economics, alternative energy, new technology, energy efficiency and energy conservation.

For registration and enquiries, contact Ms Ann Whittaker, Greenhouse and Energy Conference Office, PO Box 93, North Ryde, NSW 2113, telephone (02) 8878204 and Fax (02) 887 8197.

"GOODBYE FOREVER?" A DATABASE OF THREATENED MAMMALS by Colin MacPhersen

"Goodbye forever?" is an educational package which can be used by both primary and secondary students and teachers as well as professionals in the field of conservation. The package includes a computer database that operates on Apple IIe and IBM microcomputers, the reference book, Rare Mammals of the World, by John Burton and Bruce Pearson, and an extensive teacher and user guide which includes activity descriptions that cover many subject fields.

For enquiries, contact Ms Kai-Tin Lee, Centre for Information and Communication, Technology Education, Hawthorn Institute of Education, Private Bag 12, Hawthorn Vic 3122, telephone (03) 810 3349.

THE ROLE OF GEOLOGY AND GROUNDWATER IN AUSTRALIA'S SALINITY PROBLEMS: Lecture given 30 May 1989 by Dr Michael J Knight, Director, Centre for Groundwater Management and Hydrology, University of NSW

Australia's salinity problems are widespread and much of it is natural. Salt pans and salt lakes are found in inland areas. Saline aquifers may discharge in a region to form salt lakes. A remarkable aerial view of the Raak Plains in northwest Victoria showed a complex series of salt lakes, some with islands. Here, the Wimmera groundwater system, which starts in the Grampians and travels several hundreds of kilometres then comes to the surface. The further groundwaters travel, the more salts they pick up.

Yelarban in southern Queensland Border Rivers district is another example where the salinity problem results from entirely natural causes. Here, the flow path of saline groundwater is blocked by a fault line and it is forced up along this line of weakness. Satellite images showed the fault line very clearly.

Salinity problems are undoubtedly induced by land management practices. Trees are deep-rooted and extract water throughout the soil profile, keeping the water table low. When land is cleared, the water table rises, concentrating salts towards the surface and where it comes to the surface, the groundwater seeps out or forms springs. Even if the salinity of the water is not very great, continual discharge and evaporation a the surface concentrates the salts.

Large areas of Australia are affected by salinity problems of one cause or another. The most serious kind, induced by clearing, affect a very large area in southwest Western Australia and numerous discontinuous areas in southeastern Australia and the coastal strip as far north as Townsville. For areas on the map which do not show any salinity problems, one suspects that this is the result of lack of information rather than the absence of problems.

It is important to understand the cause of the problem so that the right solutions may be applied. If clearing has caused the problem, then planting trees is the remedy, but if the cause is natural, such as seepage up a fault line, then planting trees will not solve the problem. Even when planting trees is the solution, if the recharge areas are identified and the trees planted there, they will have maximum effect.

It was though that the salt originated as "cyclic salt", that is, salt is picked up from seaspray, carried inland and deposited with the rain. Cyclic salt is probably a major source close to the coast but inland most of the salt is millions of years old! Some salt originates from rock weathering. Cyclic salt has been accumulating for millions of years. Residual seawater from retreating seas leaves salts behind. The salts have been moved around, either along with the ground water or on the surface, such as the wind blowing salt off the salt lakes.

The composition of the salts is not uniform. In solution, the abundant cations may be sodium, calcium, magnesium or potassium and the nions, chlorine, sulphate, carbonates and biocarbonates. When the salts crystalise, halite or gypsum may be formed.

A bore at Tresco, near Echuca in northwestern Victoria illustrates the complexities of the problem. A black sand aquifer at 26.5-30 m yielded very saline water, with a chloride content about twice that of sea water. The palynology of the underlying clay layer, the Blanchetown Clay, showed that it was deposited by a large, freshwater lake. The black sand layer was also deposited from fresh water but the water body was much smaller or shallower so that the concentration of the organic matter was much higher. The black colour was due to charcoal fragments and where cell detail could be seen, most of the fragments were bark. At the time of deposition, about 2 million years ago, the vegetation was probably an open woodland with eucalypts shedding bark, just as they do today and providing excellent fuel for bushfires. Thus, all of the salinity problems have originated since this time of deposition.

Salt lakes concentrate the salts through evaporation. This saline water is heavy and will sink down into the groundwater below the lake and travel into freshwater aquifers. There have been four such pulses of saline invasions of the groundwater in the last half million years. The pulses are driven by climatic changes of the glacial interglacial cycles. This mechanism accounts for the salinity problems of the Tresco bore. Invasion by seawater is just not possible, geologically, and the composition of the salts is different to that of sea water.

What can be done about such problems? Tree planting and changes in land use practices would be applicable where these problems have been induced. The "engineering solution", putting down bores and pumping out saline groundwaters may be effective in certain specific regions but would be very expensive. Such solutions are beset with the problems of what to do with the salty water when it is pumped out. If simply put into some convenient salt lake nearby, it will find its way back into the groundwaters. Schemes to put in a pipeline to the sea or to Lake Frome would be extremely expensive. "Land retirement", where the poor farmer is advised to find another job is also an option and has been the only one applicable in the Kerang district of Victoria. Solutions to the social problems caused by the salinity problems are probably the most difficult of all. Perhaps areas such as Yelabon in Queensland should be fenced off and made into a national park!

ON WHALING, WHALE OIL AND LAMP LIGHT: TO DO WITH JOHN WHITE OF THE BLAZING STAR, 1830-1835, a lecture given by Mr Alan Andrews, 21 June 1989

Mr Alan Andrews brough alive life in Sydney during the 1830's. John White moved his business from lower George Street to larger premises at 79 George Street, now Martin Plaza, to cope with expansion.

He had invented an efficient lamp reflector and gained the Government lamp lighting contract. A new law requiring all licensed persons to have alighted lamp at their doors would have expanded business.

John White advertised extensively, quoting verse and doggerel of his own invention, making much of moral allusions to his lamp light driving out dark deeds. He carried on wordy battles with his competitor, Thomas White, who occupied premises at what is now Dymocks.

The lamplighting contract had its hazards with bashings and robbings. Vandalism of the street lamps was a problem. A well-lit Sydney relied on whale oil, and John White had his oil refinery on the George Street site. We could only imagine what the smell must have been! Whale oil was stored in wooden casks, which were suitable for cold climates but not Sydney's summer temperatures. So oil spills contaminated wells. John White went to much trouble building metallic containers to prevent oil spillage.

The lecture was illustrated with drawings and newspaper articles: a fascinating glimpse into the past.

5

LINNEAN SOCIETY OF NEW SOUTH WALES

~~WEDNESDAY 19 JULY 1989 AT 6 PM~~

RESCHEDULED
FOR

WEDNESDAY 20 SEPTEMBER

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs Macquaries Road)

SPEAKER: **DR ANDREW MCMINN,** Special Services Section
Geological Survey of New South Wales

TOPIC: **DEEP SEA DRILLING ON THE NORTH WEST SHELF**

Dr McMinn was invited to join a cruise of the Ocean Drilling Ship, to the Northwest Shelf, last September. The results of the drilling program are quite surprising and have implications for the northwards drift of Australia. Dr McMinn will talk about shipboard life and the important scientific aspects of the cruise.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

FIELD TRIP TO YENGO NATIONAL PARK

Saturday 21 October 1989

LEADER: MR JONATHAN SANDERS, Ranger with the National Parks & Wildlife Service of NSW, based at Wisemans Ferry.

Situated between Dharug National Park in the east and Wollemi National Park in the west, the area that is now Yengo National Park was little investigated until recently. The investigation undertaken by the National Parks & Wildlife Service formed the basis of its declaration as yet another national park on Narrabeen and Hawkesbury substrata in the Sydney Basin. It has important scientific values and covers parts of the north-south and east-west gradations in the vegetation of the Basin.

MEET: 9.30 am at Wisemans Ferry by the kiosk in the municipal picnic area on the southern bank of Hawkesbury River near the Wisemans Ferry ramp. Please do not obstruct the ferry approaches with your vehicle.

BRING: Lunch and rain gear.

WEAR: Walking shoes

LINNEAN SOCIETY OF NEW SOUTH WALES

LIN S'O'C'

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Tuesday 9.30 am to 5.00 pm

NEWSLETTER NO: 53

OCTOBER 1989

NEW MEMBER:

We welcome Dr Charlotte E Taylor, Tropical Ecologist, of the University of Sydney.

PAPERS ACCEPTED FOR PUBLICATION

F.W.E. Rowe - A review of the family Caymanostellidae (Echinodermata: Asteridea) with the description of Caymanostella Belyaev and a new genus.

F.W.E. Rowe - Nine new, deep-water species of Echinodermata from Norfolk Island and Wanganella Bank, northeastern Tasman Sea, with a checklist of the echinoderm fauna.

A.S. Steffe - The tidal and diet variation in distribution of larval fishes.

C.M. Kennedy - Redescription of *Austrochthonius australis* Hoff (Chthoniidae: Pseudoscorpionida).

OFFICE ASSISTANCE REQUIRED
Assistance for general office work and typing is required for one day a week, Tuesday.

Contact the Secretary if you are interested.

GRANTS FROM THE JOYCE W VICKERY RESEARCH FUND

This year, the Society is in the fortunate position to be able to fund all worthwhile grants, up to $500 and, if justifiable, to $600. A budget justifying each item and the amount requested is essential. This is particularly important when requesting money for travel. Estimates of mileage, rates of vehicle costs, expected petrol consumption etc. must be presented. If a lump sum is requested and it looks excessive, then the Society may simply award what it thinks the budget should be. It is necessary to explain just how a particular experiment or set of observations fits into the larger picture.

Grants may only be made for research, as stipulated by the Commissioner of Taxation, so the Society is unable to fund theses preparation and travel to conferences. However, if an applicant intends to work in a laboratory or on a research project in conjunction with the conference trip, then the research component may be funded.

All donations to the Joyce W Vickery Research Fund are fully tax deductible.

AWARDS

CHALSON, Jane. PhD research student, School of Biological Sciences, University of N.S.W.
Project: The history of the vegetation and regional climate of the Blue Mountains. The polynology of seven swamps chosen along an altitudinal gradient is being studied. Radio carbon dates are essential. Awarded $600 for two carbon dates.

HUSH, Julia. PhD research student, Dept. Botany, University of Sydney.
Project: To assess the possibility that self-generating steady ionic currents play a role in polarity shifts in higher plant cells, specifically after wounding, or during the initiation of a new axis of growth. Awarded $500 for laboratory consumerables used in cytomorphological and immunofluorescent techniques.

JONES, Malcolm. Electron microscopist, School of Biological Sciences, Macquarie University.
Project: To examine the ultrastructure of egg formation in an undescribed species of cestode (family Tetrabothriidae) found in local seagulls and to assess the current status of the order Cyclophyllidea. Awarded $500 for consumables used in electron microscopy.

LAVERY, Shane. PhD research student, Zoology Dept. University of Queensland.
Project: To provide genetic information for the conservation and resource management of the coconut crab throughout its distribution in the Indian and Pacific Oceans. A collecting trip to the Phillipines is required. Awarded $600 for travel.

LAW, Bradley. Tutor and Honours Student, School of Biological Sciences, University of Sydney.
Project: To investigate the nectar preferences and utilisation of pollen as a protein source by the Blossum Bat *(Syconycteris australis)*. This study will form the basis for assessing the effects of feeding strategies of the Australian fruit bats on pollination ecology. Awarded $350 for travel and maintenance of captured bats.

LEMCKERT, Francis. Postgraduate student, Dept. Zoology, University of Sydney.
Project: Population dynamics and reproductive biology of the frog *Ranidella signifera*. Sex hormone levels over the breeding season and during the rest of the year are being studied. Awarded $400 for hormone radio immunoassay kits.

LEUNG, Luke. PhD research student, Dept. of Zoology, University of Sydney.
Project: To study the distribution, habitat, resource use and demography of endangered species of small mammals in north Queensland rainforests. Recommendations for conservation and future management will be formulated. Awarded $500 for travel and field equipment.

MARSHALL, Brendan. Postgraduate student, Dept. of Archaeology, La Trobe University.
Project: Human subsistence and behaviours associated with hunting and butchery of *Macropus rufogrisens* and other prey species in the late Pleistocene of southern Tasmania, studied through an analysis of faunal remains in caves. Awarded $600 for field work consumables and radiocarbon dating.

MCLEOD, Lynette. Postgraduate student, Fowlers Gap Research Station, University of N.S.W.
Project: The overwintering strategies and emergence patterns of the prepupae of *Lucilia cuprina* and *Chrysomya rufifacies* and the management control of blowflies. Awarded $500 for travel to Sydney for consultation with supervisors and library research.

ROSS, Pauline. PhD research student, Dept. Zoology, University of Sydney.
Project: The effects of shading on recruitment of two mangrove species of barnacles (*Hexaminius popeiana* and *Elminius covertus*). Settlement is equal at all heights and surfaces of the mangrove trunk but recruitment is reduced on upper surfaces. Awarded $250 for materials to set up the experiment.

SCHWARKOPF, Lin. PhD research student, Dept. of Zoology, University of Sydney.
Project: The costs of reproductions in the female water shrinks, *Eulamprus tympanum*, measuring both survivorship and energetics costs. Awarded $400 for travel.

TOLLAN, Andrew. Postgraduate research student, Dept. Zoology, James Cook University.
Project: Resource partitioning between the coexisting goshawks and sparrowhawks in tropical north Queensland. Awarded $550 for travel.

WILSON, Robin. Curatorial Assistant (Museum of Victoria) and Research Student, Dept. Botany and Zoology, Monash University.
Project: A comprehensive taxonomic revision and phylogentic analysis of a major group of polychaete worms. A large collection in the Los Angeles County Museum and must be examined. Awarded $500 for travel.

JOYCE VICKERY NATURE STUDY SITES IN ELOUERA BUSHLAND NATURAL PARK

The Metropolitan Lands Office is establishing a series of Joyce Vickery Nature Study Sites in the Park, the first being in Old Mans Valley, Hornsby. They are named after Dr Joyce Vickery M.B.E., DSc., F.L.S. former Botanist with the Royal Botanic Gardens and the donor of a gift of land now incorporated in the Park.

Dr Vickery was a Council Member of the Society from Dec 1969 to May 1979 when she died. She was Treasurer from March 1971 to August 1978. Her generosity enabled the Joyce W Vickery Research Fund to be established.

AUSTRALIA PRIZE: AN INTERNATIONAL AWARD FOR OUTSTANDING ACHIEVEMENT IN SCIENCE AND TECHNOLOGY, PROMOTING HUMAN WELFARE.
The Government of the Commonwealth of Australia has instituted the Australia Prize as an annual international award. The inaugural award will be made in 1990. The Prize consists of $A250,000 and an inscribed medal. Each year, the Prize will be awarded in a field of scientific endeavour recommended by the Committee. For 1990, the field is Biological Sciences related to Agriculture or the Environment. Nominations will be accepted from learned and professional bodies and from individuals associated with the area of scientific endeavour.

BARREN GROUNDS BIRD OBSERVATORY:
SPECIAL COURSES

The Royal Australasian Ornithologists Union runs four bird observatories at field centres, one of which is at Barren Grounds. They are open to all and run by expert resident wardens. All offer fully catered accommodation, both for the casual visitor and for those attending special courses. The courses at Barren Grounds are as follows:

The Wicked Ways of Wrens, Leader Paul Mulder, 27-29 October 1989. All you ever wanted to know about the scandalous sex life of wrens.

Slithers by Day, Croaks by Night, Leader Ross Bennett, 10-12 November, 1989. All about the reptilian residents of Barren Grounds and some others will be on display, including a diamond python.

Birds for Beginners : Leaders Mick Bramwell and Jacqui Scott, 24-26 November 1989. A Practical Introduction to bird watching.

Fibre, Feathers and Flying Fingers : Leader Charlotte Drake Brockman, 8-10 December 1989. Basket making from natural fibres such as iris leaves, red hot poker, day lilies and grape vines.

New Year's Resolutions : Leaders Mick Branwell and Jacqui Scott, 29 Dec - 1 Jan 1990. A different way to celebrate, as well as the usual food, swimming etc. contribute to the annual Christmas Bell survey, attempt to mist net Ground Parrots and observe the endangered Eastern Bristlebird.

Caves and Waterfalls, Leader Cedric Rutledge, 12-14 Jan 1990. Walk in spectacular country. The caves have aboriginal carvings and paintings. Learn about the history of the aborigines in the Illawarra.

Courses cost $98 (or more) with a discount to members of the Royal Australian Ornithologists Union. For further information contact the Wardens, Mick Branwell and Jacqui Scott, Barren Grounds Bird Observatory, PO Box 3, Jamberoo, NSW 2533. Phone (042) 360195.

XV INTERNATIONAL BOTANICAL CONGRESS:

This congress will be held in the Tokyo area in 1993, with the nomenclature session 23-26 August and the general session 28 August - 3 September. The first circular will be prepared in 1990. For information and comments, contact the Secretariat, XV International Botanical Congress Tokyo, Department of Botany, Faculty of Science, The University of Tokyo, 7-3-1 Hongo Bunkyo-ku, Tokyo 113, Japan

DEEP SEA DRILLING ON THE NORTH WEST SHELF :
Lecture by Dr Andrew McMinn, 20 September 1989.

A programme of deep sea drilling for purely scientific purposes was initiated in 1964. This year, Australia joined the Ocean Drilling Programme, as it is now called, as a part member with Canada. Australians are now entitled to go on cruises and submit their own scientific programmes. Dr McMinn was invited to join a cruise to the Northwest Shelf, Sept-Oct of last year because of his expertise with Jurassic dinoflagellates. Ironically, in all of the drilling, the Jurassic was not encountered at all!

First we were given a guided tour (on slides) of the drilling ship. That the ocean depths can be drilled is a marvel of engineering. The ship cannot anchor but it must remain on the same spot while drilling. There are twelve thruster motors around the periphery of the ship which is positioned automatically using satellite control. Laboratories for a multitude of purposes are equipped with the state of the art technology. Computers abound, even to the dining areas and bathrooms (!) so that all on board are kept up to date with the latest activities.

The drilling programme is definitely not looking for oil or gas, and if it is found, then it is potentially very dangerous. The ship is not equipped to handle a discharge of gas which may come up under the ship, displacing the water, and the ship cannot be supported by gas. There have been tragedies from a gas strike. When the core is retrieved, the first analysis is for hydrocarbon content and once it rises above a critical level, the site is abandoned. The ship cannot drill on the continental shelf, where oil and gas is more likely to be encountered, but companies engaged in oil exploration always drill on the shelf hence the continental sediment shelves are fairly well known.

Two sites were drilled, see Fig 1. The Argyl Abyssal site was drilled under 5,525m of water, through 931m of carbonate turbidite sediment and 231m of the basement. There were 500m of the Neogene when 20m had been expected. The drill hole was located near an abyssal canyon which would have funnelled the sediments onto the site. This thick Neogene sequence probably started when the Australian Plate collided with the plate to the north. Dinoflagellates date the start of sedimentation (and start of continental movement) as Berriasian in Early Cretaceous about 140 million years. Previously, it had been thought that movement started in the mid Jurrassic about 160 million years.

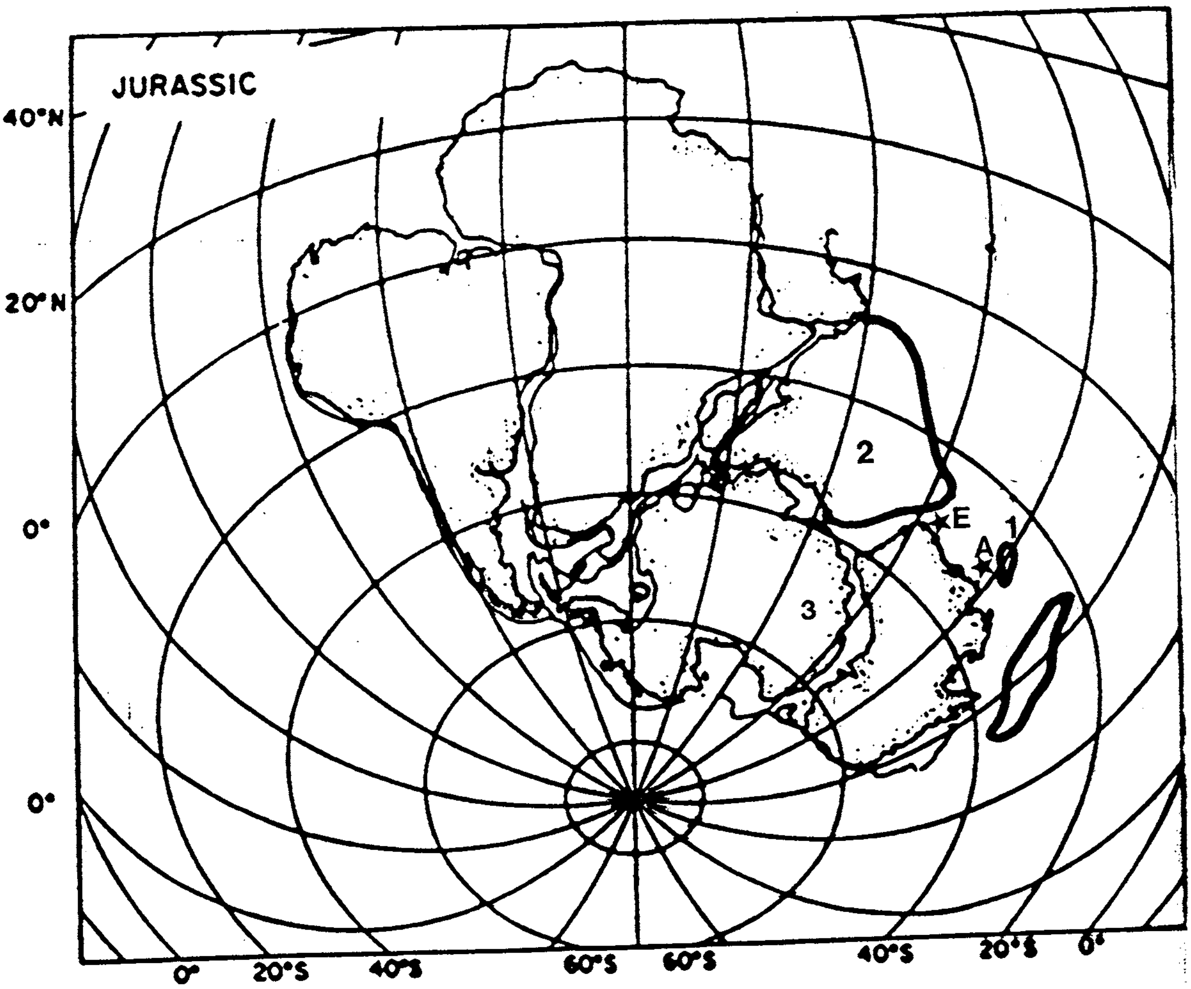

Fig. 1. Continental positions in the Jurassic. A, Argyl Abyssal Plain Site. E, Exmouth Plateau. 1, the continental sliver, now part of Asia. 2, the Indian Plate. 3, Antarctica. See text for explanation of continental movement.

The Exmouth Plateau site was drilled under 4,010m water through 620m of sediment. This site is located just off the continental shelf on crust intermediate between the true oceanic and continental crusts. Dinoflagellates date the start of sedimentation as Valanginian in the Early Cretaceous, about 130 million years, much as expected. It is also more or less the same age as the Argyl Abyssal site.

The conventional view of the opening up of the fracture zone around the western and southern margin of Australia is that a continental sliver (see Fig 1), now part of Asia, moved off in the mid Jurassic. the Indian plate in the early Cretaceous and Australia separated from Antarctica in the Eocene. The fracture zone thus opened up like a zipper, starting in the northwest and running around to the southern margin. The evidence from this drilling cruise shows that the continental sliver and the Indian plate moved off at about the same time, in the Early Cretaceous. Evidence is accumulating that Australia separated from Antarctica in the Early Cretaceous also, but movement was slow at first and speeded up later. What was thought to be the start of separation in the Eocene is probably the start of speeded-up movement.

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 22 NOVEMBER AT 6 PM

GEORGE CAYLEY SEMINAR ROOM, Royal Botanic Gardens (enter from Mrs Macquaries Road)

SPEAKER : DR SUE HAND

School of Biological Science
University of NSW

TOPIC : THE AUSTRALIAN BAT FAUNA : A 30 MILLION YEAR HISTORY?

Reassessment of the age of Australia's oldest bat fossils has important biogeographical implications for Old World biota. Fossil deposits on Riversleigh Station, Northwestern Queensland and the Lake Eyre Basin, South Australia, indicate that 25 million years ago Australia had a diverse bat fauna. Although many elements of this Oligo-Miocene bat fauna are archaic (and do not appear to be ancestral to living Australian bats), the fauna's affinities are broadly Eurasian. Colonization by bats was evidently from the north and first occurred before the Late Oligocene. The theory that Australia was faunally isolated from Asia prior to the Middle Miocene (15 mya) no longer appears to hold water.

WINE AND CHEESE WILL BE SERVED FROM 5:30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

NEWSLETTER NO. 53 SUPPLEMENT OCTOBER 1989

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1990. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

For further information, contact the Secretary.

GRANTS FOR SCIENTIFIC VISIT TO FRANCE : BEDE MORRIS FELLOWSHIP SCHEME

THE Bede Morris Fellowship Scheme is a new programme which will provide in 1990 a grant-in-aid to a senior scientist who is a permanent resident of Australia for travel to France. The successful applicant will be provided with a return air ticket to France and a grant-in-aid contributing to living and travel costs for a period of up to six weeks at the rate of A$500 per week. The visit may be extended at the expense of the participant.

Deadline for applications: 15 Dec 1989.

Application forms are available from the International Exchanges Officer, Australian Academy of Science, GPO Box 783, Canberra ACT 2601, Phone (062) 47 3966.

LINNEAN SOCIETY OF NEW SOUTH WALES
LIN S'O'C

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Office Hours:
Tuesday 9.30 am - 5 pm

NEWSLETTER NO: 54

DECEMBER 1989

COMING EVENTS:

TUESDAY 13 FEBRUARY 1990. The Society Luncheon in the J H Maiden Theatre, Royal Botanic Gardens. The luncheon is informal and members are invited to bring spouses and friends. See the enclosed booking slip.

WEDNESDAY 28 MARCH. Annual General Meeting. Dr Peter Myerscough will give the Presidential Address on the prospects of comparative plant ecology and the quest for understanding of Australian plants. You will receive further notice of the AGM.

WEDNESDAY 18 APRIL, 6PM. An exhibition of historical microscopes in the Macleay Museum. See the enclosed programme.

RENEWAL OF SUBSCRIPTIONS. A pink form for renewal of membership is included. Prompt renewal will be appreciated. If there is a red dot inside your envelope, it indicates that our records show your subscription for 1989 has not been received.

PAPERS ACCEPTED FOR PUBLICATION

M R Leishman - Suburban development and resultant changes in the phosphorus status of soils in the area of Ku-ring-gai, Sydney.

P G Lennox - Quartz veining in multiply folded Greywackes, Bermagui, New South Wales, Australia.

P M Ashley - Calcium borosilicate minerals from Devils Elbow, Nundle area, New South Wales.

LINNEAN MACLEAY FELLOWSHIP

Miss Julia Hush, School of Biological Sciences, University of Sydney has been re-appointed the Linnean Macleay Fellow.

Miss Hush is studying polarity in plants. Polarity establishes the direction of growth, i.e. that the stem grows up and the roots grow down and where the leaves develop. When wounded, plants grow a callous to heal the wound and this is done by a change in polarity of the cells around the wound.

In a normal elongating root, the microtubules in the cytoplasm are orientated transverse to the longitudinal axis of the cell (and root). After wounding, there is a drastic re-orientation such that the microtubules are aligned parallel to the wound edge, which mirrors the position of new cell division. Thus microtubule positioning precedes and predicts polarity in plants, and this is the first report of such evidence.

TOTAL ENVIRONMENT CENTRE NEEDS HELP

TEC works hard to save the environment. They have built up considerable skills and resources which are readily available to everyone who wishes to use them. TEC relies on donations and volunteers. If you wish to make a donation, send it to TEC, 18 Argyle Street, Sydney, NSW 2000. Volunteers would be welcomed also.

INTERNATIONAL GEOSPHERE BIOSPHERE PROGRAM (IGBP): GLOBAL ENVIRONMENTAL CHANGE - IMPLICATIONS FOR AUSTRALIA

IGBP aims for a synthesis of information, on a global scale, for the better understanding of the Earth and its immediate environment. This program is essential if we are to improve our ability to detect and to respond to warnings of significant global change.

Australian participation in the Program is being organised and co-ordinated by the Australian Academy of Science. Planning is in progress and there will be a number of planning workshops in 1990. These workshops include Observatories/Networks/Research Centres (late 1990), Hydrology (mid 1990), Joint Global Ocean Flux Study (Feb. 1990, ANZAAS), Extreme Events (May 1990), World Ocean Circulation Experiments (Feb. 1990, ANZAAS), Land Use/Remote Sensing (March 1990), Palaeo-Environmental Change (mid 1990), Antarctica (Feb. 1990, ANZAAS), International Collaboration (late 1990), Mathematical Modelling of Global Change (April 1990), Utilisation of Renewable Biological Resources and Global Change (late 1990).

For further information, contact the Secretary, National Committee for IGBP, Australian Academy of Science, GPO Box 783, Canberra, ACT 2601, Tele: (062) 47 3966, FAX (062) 57 4620.

POST DOCTORAL FELLOWSHIPS IN JAPAN

The Japan Society for the Promotion of Science in association with the Australian Academy of Sciences is offering three fellowships to conduct research in any field of natural science non-clinical medicine and engineering. The closing date for applications is 1 March. For further information, contact the International Exchanges Officer, Australian Academy of Science, GPO Box 783, Canberra, ACT 2601. Telephone (062) 47 3966 and ask for Mrs Bonnie Bold.

HAEMOGLOBIN IN PLANTS: EVOLUTION REALLY IS CONSERVATION

The Linnean Macleay Lecture given by Dr Jim Peacock, Chief of the Division of Plant Industries, CSIRO, 11 October 1989.

When Dr Peacock was a postgraduate student doing his Ph.D., he studied genetics by counting the chromosomes of plants and dreamt of being able to look at genes themselves to find out what they were doing. With the amazing new techniques that have been developed, Dr Peacock's dreams have come true and he can now analyse the genetic code to find out exactly what the genes are doing. His lecture was quite exciting and sounded as if science ficiton had come true.

Haemoglobin, the red compound in our blood transports oxygen around the body and performs an essential service to all animals. The reddish colour of nitrogen fixing nodules on the roots of legumes is due to the haemoglobin in them. Haemoglobin may be found in other plant tissues, such as roots, but usually in much smaller amounts than in nodules.

The haemoglobin in nodules is necessary for the fixation of oxygen which is used in the formation of nitrates. Its function in other plant tissues is not known.

Other plants besides legumes fix nitrogen and these plants may be found in genera scattered in many families, e.g. *Casuarina*, *Parasponia* (elm family) and *Frankenia*. Nitrogen fixation occurs in the nodule through a symbiotic relationship, usually with bacteria, but in *Frankenia*, the symbiont is an ascomycete.

All nodulating plants have haemoglobin and it is found in some plants which do not nodulate, though in very small quantities. When the genetic code of plants, which do not produce haemoglobin is examined, they are found to have bits of the haemoglobin gene.

It appears that all plants have a haemoglobin gene, often not functioning or it may have a different function. Only some plants use it in the symbiotic fixation of nitrogen. The plant haemoglobin is remarkably like the animal haemoglobin, suggesting that plants and animals had a common ancestor. It is as if evolution, having hit on a good thing, has conserved it and made maximum use of the system.

Another example is the fermentation process or anaerobic respiration. This system is important to plants when their roots become flooded. If plants cannot switch over to anaerobic respiration within a few hours, they die.

The gene(s?) responsible consists of a number of parts. The one critical part, used for turning on the gene, is the same in all plants. Some fungi and bacteria possess this critical part. Sometimes there are extra copies and then extra products of the gene are produced. Again, once evolution found a good system, it has been conserved.

If there had been any doubt about the validity of evolution, Dr Peacock's lecture would have dispelled it. My religious relatives point out the intricacies and beauty of a museum collection and say to me "How could it all just evolve". They do not appreciate just how amazing evolution is.

Dr Peacock's lecture will be published in the Proceedings.

THE AUSTRALIAN BAT FAUNA: A 30 MILLION YEAR HISTORY? Lecture by Dr Sue Hand, 22 November 1989.

Up to 1970, the only bat fossils known from Australia were about 2 million years old, and it was generally believed that bats had only recently colonised Australia from the Old World. Studies on Riversleigh Station, northwestern Queensland have led to a complete re-assessment of the history of the Australian bat fauna.

Dr Hand outlined for us the new evidence that certainly confirms that bats colonised Australia from the Old World (Eurasia) and extends the history of bats in Australia back to at least 25 million years ago. Much of this evidence has come to light over the last decade, largely from Dr Hand's studies of the Riversleigh deposits.

The bats concerned include the ghost bats (Megadermatidae), slit-faced bats (Nycteridae), horseshoe bats (Rhinolophinae) and the Old World leaf-nosed bats (Hipposideridae). It is clear from the fossil evidence that the Hipposideridae had reached Australia 25 million years ago in the Oligocene, and that in the Riversleigh deposits there were already several species of this group, indicating that it had already been in Australia for some time at that stage. This poses a problem, given the southerly position of the continent, the water gap between it and the Old World and the relatively poor-flying capacity of modern Hipposiderids. However, new palaeogeographic evidence suggests that mid-oceanic islands may have been present that could have served as stepping stones for the colonisation of Australia by these bats in the middle of the Tertiary.

Although Australia's bat fossils are accruing from a number of sites, those from sites at Riversleigh Station are currently the most impressive in terms of the completeness of individual remains, the time they span and the various groups of bats they represent. The remains at Riversleigh are of cave-roosting bats preserved in the travertine that accumulated on the floors of caves. The remains include those of archaic bats with no living representatives, those of bats related to certain living bats now only occurring outside Australia, and those of bats with living relatives in the modern Australian bat fauna, including some species that still occur in the Riversleigh area.

It is apparent that study of fossils will continue to play a key role in understanding the history of Australia's fauna, not least its bats.

Peter Myerscough

Editor's Note: In a chat with Dr Hand, I discovered that the fruit bats or flying foxes (Sub-order Megachiroptera, Family Pteropodidae) which camp in trees along the east coast of New South Wales, roost in caves in the tropics. Fossils of the fruit bats have not been found at Riversleigh. Their fossil history in Australia is unknown.

SHOULD SCIENTISTS COMMUNICATE WITH THE PUBLIC?

Science rarely makes the front page of the newspaper or the main story of the television news. Should scientists be doing more to bring science to the notice of the community?

Most of us know a colleague who has had an unsatisfactory encounter with a journalist or who feels his story has not been done justice. Occasionally we meet the idea that seeking publicity is somewhat degrading. Should this deter us from seeking recognition for science?

The Linnean Society wrote to Mr Barry Jones, the Minister for Science and Small Business, about its concern for the lack of funds for research. Mr Jones' reply was, "Ultimately, Australia's scientific and technological advancement depends on wide recognition of the importance of science and technology by the broader community. I believe that in the longer term, one of the most significant problems facing Australia's development is the lack of such support and interest". He then bounced the problem back on the Society: "Organisations such as yours can play a valuable role in this area by further stimulating interest and encouraging debate about science and technology".

With these thoughts in mind, I enroled in a course, "Communicating Science through the Media", held at the University of Technology, Sydney, 9 October to 13 November 1989. This course was devised by Dr Peter Pockley, Planner of the Australian Science and Technology Information Service of the Australian Academy of Science.

The class of about 20 covered a broad spectrum of interest and included research workers in science, medical science, social science, scientists in education, government services, management and industry. For guest lecturers, we had Bob Beale of the Sydney Morning Herald, Robin Williams of ABC Radio and Katrina Kelly of ABC Television. We visited the Sydney Morning Herald, ABC Radio and SBS Television.

The course work included conducting interviews, writing news items, feature articles and press releases. The class made its own radio science show, "Beyond the Science Show, the first and last edition", a mixture of interviews, scripted talks and news items. We did television interviews and produced a television chat show focusing on three questions: Why does science matter? Why are scientists described as wimps? Why should scientists communicate their science and how?

What did I learn from such a course? I discovered that communicating science to the community is very different to writing scientific papers for ones' colleagues. For the community, science needs to be topical, anecdotal, even entertaining. The story is all important. Skip the technical details, and no jargon, ever. As Karina Kelly said, "You have the average Australian sitting in his lounge room after a few glasses of wine and the kids racing around. You must present science so that he/she sits up and says: Hey! this is interesting". As for reporters who ask impossible questions: "Don't answer their questions. Tell them what you want them to know. If politicians can do it, so can you".

Apart from the nuts and bolts of communicating science, the course was thoroughly enjoyable and contact with people in such diverse fields was most stimulating. And for my efforts, I received a certificate from the University of Technology, Sydney, to say I had "completed all the requirements" of the course! I can thoroughly recommend the course and if you are interested, contact the Continuing Professional Education Course, UTS.

Helene A Martin

PROGRAMME

LINNEAN SOCIETY OF NSW

WEDNESDAY 18 APRIL 1990, AT 6PM

Robert Brown Room, Botany Building, University of Sydney

Enter from Science Road, through the door under the archway, then proceed upstairs to the 1st floor

SPEAKER: Mr JULIAN HOLLAND,
Macleay Museum

MICROSCOPY: MINIATURE WORLDS DISCOVERED

This is an exhibition of the most remarkable collection of historical microscopes in Australia, from the late 18th century onwards. The exhibition is set in context of microscopic work - preparation of slides and specimens, and includes accessories such as microtomes and camera lucidas. The displays trace microscopical discoveries and include a 19th century microphotograph, through to electron microscopy. There is a section on precision in manufacturing and an Australian made microscope.

We will start with a short talk and slide show in the Robert Brown Room and then go on to the exhibition in the Macleay Museum.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM IN
THE ROBERT BROWN ROOM

EVERYONE WELCOME

NOTE: The exhibition is open to the public now, 8.30 am-5 pm week days. Groups should book in advance

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LINNEAN SOCIETY OF NEW SOUTH WALES

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NEWSLETTER NO: 55 MARCH 1990

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NEW MEMBERS:

We welcome:
Ms Mandy Reid, School of Biology, University of Wollongong.
Mr B J Copland, School of Biology, University of Wollongong.

PAPERS ACCEPTED FOR PUBLICATION:

C N Smithers - Psocoptera (Insecta) from nest webs of *Badumna candida* (Desidae, Araneae) in Queensland.

W N Holland, D H Benson and R H D McRae - Geology, geomorphology, vegetation, soils, microclimate and hydrology in a typical headwater valley in the Blue Mountains, New South Wales.

GRANTS FROM JOYCE W VICKERY RESEARCH FUND:

The Society makes emergency grants from the Joyce W Vickery Research Fund for requests made at any time if there is a good reason for an emergency. The following emergency grants have been made:

CLAYTON, Dr Paul D, Department of Zoology, James Cook University.
Project: The ecology and significance of perennial waterfalls in upland tropical streams with particular reference to macro invertebrates. Streams are integral to the forest environment and they reflect the conditions of their catchments. Waterfalls are potentially highly productive habitats and form the focal point of many of the world's National Parks and wildernesses and they are

often chosen as sites for hydroelectric power stations. This project will examine the physical and biotic characteristics of waterfalls in tropical north Queensland. Hypotheses generated will be tested by experiments.

Granted $500 for use of a vehicle to survey potential experimental sites.

NORMAN, Mr Mark D, PhD student, University of Melbourne. Project: The identification, distribution, biology, behaviour, phylogeny and biogeography of octopus species on the Great Barrier Reef. There are about 17 species of the genus *Octopus*, and four of *Hapalochleana*, the blue-ringed octopus in the Great Barrier Reef. Only two of the species of *Octopus* have been described and one of them is regularly confused in the literature and is known under many synonyms. Octopuses and other cephalopods are top level predators and are harvested commercially, thus research into their taxonomy and life histories is imperative. Granted $600 to visit museums in the USA to examine type, material of tropical species of octopus. Mr Norman has been invited to attend the Gilbert L Voss Cephalopod Symposium, held at Woods Hole, Massechusetts in June and will visit the museums while in the USA.

Donations to the Joyce W Vickery Research Fund are fully tax deductible.

PROPOSED BIOLOGICAL COUNCIL OF AUSTRALIA:

A meeting was held in Canberra, 31 October 1989 to investigate the propriety of setting up a Biological Council of Australia to look after the interests of Biological Sciences Societies. Professor Michael Archer attended as the Linnean Society's representative.

The meeting focused on the primary purpose of establishing such a council when FASTS (Federation of Australian Scientific and Technological Societies) seemed to many delegates to adequately represent the interests of the biological community to the Government.

It was pointed out that state-based societies (including the Linnean Society of NSW, the Royal Zoological Society of NSW etc.) were not directly represented on FASTS, because of regional limitations.

It was generally agreed that the Council would serve a useful purpose and a working committee was nominated to consider a constitution.

Professor Archer raised the question as to why the Linnean Society of NSW should not change its name to the Linnean Society of Australia which would more accurately reflect the Society's activities and also give the Society representation on FASTS. A name change, however, is not a simple matter since the name is incorporated by a special Act of Parliament. Incorporation is necessary for proper management of the Society's assets. The special Act gives the Society a number of advantages over incorporation in the normal way, not the least being that we do not pay annual fees, which are substantial. To change the name of the Society, we would have to approach the Government for changes to the Act and this would be a difficult and costly exercise. It would probably suit the Government for it could then charge us annual fees. The Council considers that the Society is better off retaining its present name.

AUSTRALIAN ACADEMIC TOURS:

"The beauty of Nature, revealed and explained in simple terms by personable academics".

This organisation runs short trips from Sydney and Melbourne, and longer trips around Australia, Australian flying trips and overseas trips. Many of the trips are geared for special interests, e.g. geology, biology, fossil and gemstone collecting, natural history. For further information, contact **Dr David Roots**, Australian Academic Tours, 12 Sturdee Lane, ELVINA BAY NSW 2105. Telephone (02) 997 6895, Fax (02) 979 5561.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W VICKERY SCIENTIFIC RESEARCH FUND:

The Linnean Society of New South Wales announces the availability of funds from the Joyce W Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising form work supported by the Joyce W Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an approppriate scientific institution.

Application forms can be obtained from the Secretary.

LINNEAN SOCIETY OF NSW

FIELD TRIP TO NORTHERN YENGO NATIONAL PARK

SATURDAY 19 MAY 1990

LEADER: MR JONATHON SANDERS, Ranger with the National Parks and Wildlife Service

This trip is an extension to the previous field trip to the southeastern part of the Park. We will visit the Hunter Range and, hopefully, Mt Yengo. There are differences in the vegetation in the north and the basalt around Mt Yengo has an influence on the vegetation.

MEET 9 am at Mangrove Mountain, on George Downes Drive, first Wisemans Ferry turn off (when travelling from the city), across the road from the Petrol Station. To get to Mangrove Mountain, take Peats Ridge Road off expressway between Mt White and Mooney Mooney Creek.

BRING Lunch (food and drink for the day). Rain gear. Sun screen and hat.

WEAR walking shoes.

If we can muster sufficient four-wheel drive vehicles to take everyone, it will allow us to go much further. Bring four wheel- drive vehicle - if you can.

LINNEAN SOCIETY OF NSW

WEDNESDAY 20 JUNE 1990 AT 6PM

IN THE J H MAIDEN THEATRE

ROYAL BOTANIC GARDENS
(ENTER FROM MRS MACQUARIES ROAD)

SPEAKER: MS SUZANNAH ELIOTT
SCHOOL OF BIOLOGICAL SCIENCES
MACQUARIE UNIVERSITY

TOPIC: MOULDS TO MAN: THE CELLULAR SLIME MOULDS

Evolution from single cells to multicellular organisms took millions of years and undoubtedly many trial-and-error attempts. One organism still alive today gives us some idea of how that first evolutionary step may have occurred. This creature is the cellular slime mould - a half-plant, half-animal misfit that lurks unnoticed in the soil of everyone's backyard.

For most of its unusual life, the slime mould lives as a single amoeba that roams through the soil feeding on bacteria and dividing. This solitary existence continues indefinitely unless the food supply runs low. When this happens, a remarkable series of events takes place which results in the amoebae abandoning their singlular lifestyle and forming a cellular collective which behaves and moves as a discrete organism.

The dual unicellular/multicellular nature of the slime mould life cycle makes it an exciting subject of study and is helping scientists answer some fundamental questions about cellular interactions in more complex eucaryotic systems. Individual slime mould amoebae resembles our own white blood cells in their movement and morphology; aggregation of amoebae into the multicellular phase is a morphogenetic process involving cell specialisation, cell-cell communication, adhesion and recognition, processes that are analogous to animal embryogenesis.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOMED

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LINNEAN SOCIETY OF NSW
SATURDAY, 7 JULY 1990 AT 2PM
3 KELBURN ROAD
ROSEVILLE

(NOTE: This is a battleaxe block. The number is on the letterbox on a stone wall. Walk up driveway.)

AN AFTERNOON IN DR TOM VALLANCE'S LIBRARY

Dr Vallance has collected items of historical interest for many years. He has the remainder of the Linnean Society's historical library collection, including pamphlets, while awaiting permanent housing. These items include presentation copies to the Maclays, and an original pamphlet on Brownian Motion by Robert Brown is amongst them. Dr Vallance built the library to house his collection.

If you intend to come, please notify the Secretary by Tuesday 3 July so that Dr Vallance has an idea of the number coming.

LINNEAN SOCIETY OF NEW SOUTH WALES

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NEWSLETTER NO: 56

JULY 1990

NEW MEMBER:

We welcome Mr Siegfried Kraus of Glebe.

PAPERS ACCEPTED FOR PUBLICATION:

L. Crowley and W. Ivantsoff. Description of two new species of endemic hardy-heads *Craterocephalus centralis* and *Craterocephalus amniculus* previously identified as *Craterocephalus eyresii* (Pisces:Atherinidae).

CORRECTION TO MARCH NEWSLETTER:

It was reported that the paper by Holland, Benson and McRae: *The geology, geomorphology, vegetation, soils, micro-climate and hydrology in a typical headwater valley in the Blue Mountains, NSW*, was accepted for publication. This announcement, however, was premature, but we look forward to its acceptance.

DONATION TO THE LIBRARY FUND:

We thank Dr Tom Vallance for his generous donation to the Library Fund. All donations to this fund are fully tax deductible.

POSTDOCTORAL FELLOWSHIPS IN JAPAN - AWARDS FOR SCIENTISTS - 1991/92:

The Japan Society for the Promotion of Science, in association with the Australian Academy of Science, offers three one-year postdoctoral fellowships annually for young Australian scientists to do research in Japanese universities and other institutions in Japan. The name of the fellowship programme is JSPS Postdoctoral Fellowship for Foreign Researchers.

Applications are invited for research in any field of Natural Science, non-clinical medicine and engineering. Fellowships are awarded for twelve months with a possible extension of up to twelve months.

Deadline for applications, 1 November 1990.

POSTDOCTORAL FELLOWSHIPS IN THE U.K. - AWARDS FOR SCIENTISTS - 1991:

The Royal Society Endeavour Fellowships Programme provides postdoctoral fellowships tenable in the U.K. for young Australian scientists. The programme is administered in Australia by the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering. The fellowships will be awarded to postdoctoral researchers with a proven ability for original work. The primary criteria for selection will be the excellence of the candidate and the scientific merit of the proposed research. The award holders will take up their fellowships between April and October 1991. They are expected to return to Australia on completion of their fellowships.

Endeavour Fellows returning to Australia on completion of their fellowships will be granted two-year Australian Research Council or National Health and Medical Research Council fellowships, provided the fellows continue to meet the conditions for such awards. Separate applications to either Research Council are not required.

The awards cover research in the natural science, mathematics, engineering science, non-clinical medical research and the scientific research aspects of psychology, archaeology and geography.

Deadline for applications, 1 October 1990.

SCIENTIFIC EXCHANGES WITH JAPAN - 1991/92:
The Australian Academy of Science invites applications from Australian scientists who wish to participate in an exchange programme with the Japan Society for the Promotion of Science between 1 July 1991 and 30 June 1992. Proposals in any field of natural science, basic and applied, including engineering science, will be considered. The primary purpose of the programme is to support collaborative research between Australian and Japanese scientists. Support will not be given when the primary purpose of the visit is to attend a conference. Applicants should be Australian citizens or permanent residents.

The exchange may be for short term (3-6 weeks) or long term (6-12 months).

Deadline for applications, 1 September 1990.

SCIENTIFIC EXCHANGES WITH CHINA - 1991/92:
The Australian Academy of Science supports scientific exchanges with the People's Republic of China through an exchange programme with the Chinese Academy of Sciences (Academia Sinica). Scientists who are Australian citizens or permanent residents are invited to apply to participate in the programme between 1 July 1991 and 30 June 1992. Proposals in any field of natural science, basic and applied, will be considered. The primary purpose of the programme is to support collaborative research between Australian and Chinese scientists. Support will not be given when the primary purpose of the visit is to attend a conference. Proposals may be for short term visits (3-6 weeks) to collaborate with Chinese scientists or longer term visits to carry out more extensive research projects. Due to financial restrictions, extensive travel and field surveys in China are difficult to arrange.

Deadline for applications, 1 December 1990.

Application forms and a list of institutes are available from:
International Exchanges Officer
Australian Academy of Science
GPO Box 783
Canberra ACT 2601
Telephone enquiries:
(06)247 3966, Bonnie Bauld.

MOULDS TO MAN - THE CELLULAR SLIME MOULDS:
A lecture given by Ms Suzannah Eliott, School of Biological Sciences, Macquarie University.

Slime moulds conjure up strange images and they are a taxonomic oddity. There are two types, an acellular slimy plasmodium and a multicellular aggregate. This lecture concerns the multicellular aggregate. For much of its life, the slime moulds spend their time in the soil as single-celled amoebae rather like our own white blood cells. Some are pathogenic and they are difficult to diagnose because they are so like our own blood cells.

The amoebae live in the soil eating bacteria and dividing until the food runs out. The first cell to starve secretes a pherone to attract the others which migrate in and aggregate. There is one species which cheats and secretes the pherone of another species, attracts the cells and then eats them up.

The cells aggregate to form a multicellular mound which tips over and migrates as a slug 1 mm long. The slug secetes a slimy sheath which it leaves behind as it migrates. The slug moves towards a light source, even as feeble as a luminous watch, and this behaviour enables it to move up to the top of the soil. At the surface, the slug forms a fruiting body on a long stalk. The spores are tough and survive for a few years. The fruiting body is thus the means of dispersal.

There is a bizarre sexual cycle. Two amoebae of opposite strains fuse and eat up surrounding amoebae to form a large spore which lasts a long time. One species even eats itself!

Slime moulds are widely distributed, from Alaska to the tropics, though there is a greater diversity in the tropics. They live in the leaf litter, hence where there is abundant litter, there are plenty of slime moulds. Up to fourteen species may coexist.

Classification is difficult. The stalk of the fruiting body is cellulose, hence like a plant. The unicellular amoeba is most like a protozoan. The fruiting body is mould-like and the migratory slug animal-like. They could be classified in any one of these groups.

The multicellular slug has many biological processes found in higher organisms. The slime sheath is analogous to that in many animals. The cells adhere with molecules similar to our own adhesion molecules. Communication between cells is by chemical means.

There is a degree of specialisation with a primitive outside skin of elongated cells. The tip of the slug organises the direction and size of the slug. There are two cell types, the pre-spore cells which make up two thirds of the slug and the pre-stalk cells.

The slug has no muscles or nerves but the cells must co-ordinate. The outer layer undergoes co-ordinated contraction on the circumference. The proteins involved in muscle contractions are actin and myosin, the same as those involved in muscle contraction. Both are present in slime moulds, but if myosin is taken away, the cells cannot aggregate. In a single amoeba, the myosin is distributed in the posterior part of the cortex. In the slug, the myosin is around the outside and the back end also.

The lecture was both informative and enjoyable. We were left with the feeling that though slime moulds are such lowly creatures, we could not look down on them as their life processes are basically the same as our own.

BOOK REVIEW: MOTHS OF AUSTRALIA:

I.F.B. Common, 1990. Melbourne University Press, Carlton, South Victoria. 245 x 178 mm cloth 544 pages illustrated 32 pages colour plates. ISBN O 522 84326 3, rrp $150.

Dr Ian Common, co-author with Dr D.F. Waterhouse of *Butterflies of Australia*, has made another outstanding contribution to the entomological world. *Moths of*

Australia is the first comprehensive book discussing the tremendous diversity of Australia's moths. There are about 10,000 named species of moths in Australia with an estimated 12,000 yet to be discovered or described. Species of Lepidoptera (moths and butterflies) are exceeded only by Coleoptera (beetles) on this continent. Hence this book is a most valuable addition to the knowledge of a large and diverse fauna.

The book is divided into two parts. Part I - *Moths and Their Enviornment* treat the structure and life history, biology, population control, economic significance, evolution and geographical distribution, and the family classification of moths (both on a world-wide and Australian basis). Part II - *The Australian Moth Fauna* treats three of the four sub-orders of moths that occur in Australia, superfamily by superfamily. Within each superfamily chapter is a brief review of the families within that group (where there is more than one family) and more detailed descriptions of each family. There is a strong emphasis on the description of immature stages (where known) and the general biology of each family.

There are two appendices: Appendix A - *Collection and Study*; Appendix B - *Food Plant and Larval Host List.* These are followed by an extensive reference list and, most importantly, a glossary of anatomical and technical words used.

The book has many illustrations. There are superb scanning electron micrographs of eggs, excellent line drawings throughout, and stunning colour and half-tone photographs of live adult and immature moths, representing more than 1,000 species. It is fortunate that there are so many illustrations because there are no keys whatever in the book (a serious handicap, I believe). The relatively untrained student may have to rely on the illustrations to determine which family one's specimen belongs.

For the serious student of Australian moths, this book is a must. For those who have a passing interest in this group, the introductory information and the appendices are of considerable value but I believe the treatment of the superfamilies is too technical and detailed for general use. These students would do well to wait for the soon forthcoming second edition of *Insects of Australia*, also published by the Melbourne University Press. (D.S. Horning, Jr., Macleay Museum, University of Sydney.)

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 22 AUGUST 1990 AT 6 PM

J.H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs Macquaries Road)

SPEAKER: MR EDWINO FERNADO,
School of Biological Science
University of New South Wales

TOPIC: Forest Formations and Flowering Plants of the Philippine Islands

An overview of the types of forest formations in the Philippine Islands and the diversity, endemism and geographical affinity of the flowering plants will be presented. The conservation status of the various formations and of the flowering plants will also be discussed. This topic will be illustrated with colour slides.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 26 SEPTEMBER AT 6PM

SPEAKER: MR JONATHON SANDERS, Ranger with the National Parks and Wildlife Service

TITLE: THE VEGETATION OF YENGO NATIONAL PARK

The Catchment of the Macdonald River forms the centre of the area now dedicated as Yengo National Park. Until recently, the vegetation of this area was only known in general terms, with most botanical work being confined to specific features of interest, such as Mt Yengo or the Mellong Swamp sand deposits. Johnathon Sanders led the team which did the first detailed survey of the botany of this area for the National Parks and Wildlife Service, recording 464 species in more than 119 sites. His talk will present the results of this investigation, as well as discussing some of the more interesting finds. The comparative results obtained from different methods of survey and classification will also be discussed.

WINE AND CHEESE WILL BE SERVED FROM 5.30

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 24 OCTOBER 1990

J.H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs Macquaries Road)

SPEAKER: DR MARK A ELGAR,
School of Biological Science
University of New South Wales

TOPIC: Sexual cannibalism, kleptoparasitism and mutualistic associations in spiders

Despite their comparatively poor public relations profile, spiders present some fascinating examples of animal behaviour and ecology. For example, they are notorious for their cannibalistic mating behaviour. Exactly why the female attempts to consume her potential partner is still something of a mystery, but it seems to have had important implications for the differences in size between males and females. With some notable exceptions, web-building spiders are extremely intolerant of other spiders on their web. However, spiders of one genus have specialised on feeding on the prey caught in the web of other species of spiders. This may represent a considerable disadvantage for those 'hosts' that tend to build webs in aggregations. But not all web-building spiders are so anti-social. In Papua New Guinea, there are two species of spiders that apparently both benefit from associating together.

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES
LIN S'O'C' NEWS

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NEWSLETTER NO: 57

OCTOBER 1990

IN THIS ISSUE

RED SPOTS IN YOUR ENVELOPE
If there is a red spot on the inside of your envelope, it means that, according to our records, you hve not paid your subscription. The year owing is included. If your records do not agree, ring the Secretary.

PAPERS ACCEPTED FOR PUBLICATION

1. **A G Cook** - The Geology of the 'Glendale' Area, near Kandos.
2. **E Adamson, H Adamson, M Vesk and R Seppelt** - Morphological, ultrastructural and physiological characteristics of damage to an extensive stand of the lichen *Usnea sphacelata* at Casey Station, East Antarctica.
3. **R W Medd and H H Jones** - Host range, distribution and importance of the fungus *Pyrenophora semeniperda* (Brittlebank & Adam) Shoemaker in Australia.
4. **L Crowley and W Ivantsoff** - Description of two new species of endemic freshwater hardyheads *Craterocephalus centralis* and *Craterocephalus amniculus* previously identified as *Craterocephalus eyresii* (Pisces: Atherinidae).
5. **M Tyler, S Hand and V Ward** - Analysis of the frequency of *Lechriodus intergerivus* Tyler (Anura: Leptodactylidae) in Oligo-Miocene faunas of Riversleigh Station, Queensland.
6. **N Tait, R Stutchbury and D Briscoe** - Review of the Discovery and Identification of Onychophora in Australia.

7. **R Pressey, J Cohn and J Porter** - Vascular plants with restricted distributions in the western division of New South Wales.
8. **M Leishman and M Eldridge** - Life history characteristics of two sympatric species of Onychophora from the Blue Mountains, NSW.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1990. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

For further information, contact the Secretary.

GRANTS FROM THE JOYCE W VICKERY RESEARCH UNIT

The request for grants far exceeded the sum available so that regrettably, not all grants could be fully funded.

Grants may only be made for research, as stipulated by the Commissioner of Taxation, so the Society is unable to fund theses preparation and travel to conferences. However, if an applicant intends to work in a laboratory or on a research project, in conjunction with the conference trip, then the research component may be funded.

All donations to the Joyce W Vickery Research Fund are fully tax deductible.

AWARDS

BLADON, Ms Rebecca, School of Biological Sciences, University of Sydney.
Project: Reproductive ecology of the eastern pygmy possum. Wooden nesting boxes are required as they provide easy access to young possums that are difficult to trap. Awarded $400.

BLOMBERG, Mr Simon, School of Biological Sciences, University of Sydney.
Project: Age and size structure of a population of skink, *Eulamprus tympanum* and its relationship to size dependent niche shifts, foraging mode, habitat use and other behaviour. Growth rings in the toe bones may be used to age lizards, independently of size. Awarded $200.

GOTT, Ms Miranda, School of Biological Science, University of New South Wales.
Project: The ecology of the northern brown bandicoot, *Isodon macrourus* and their relationship to various fire regeneration ages. This study is significant for conservation strategies for the bandicoot and the use of fire in land management. Awarded $188.

HUNT, Ms Alison, Department of Biology, University of Wollongong.
Project: The evaluation of genetic variability of two intertidal starfish species with markedly different dispersal potentials. Larvae of *Patiriella calcar* is widely dispersed in coastal currents, whereas *P. exigua* larvae have very limited distribution. Awarded $400.

HUSH, Ms Julia, School of Biological Sciences, University of Sydney.
Project: To assess the causal role of ionic currents and mechanical stress in the initiation of cell polarity. Microtubule orientation predicts polarity, i.e. the

direction in which the cells divide and the plant organ grows. Manipulation of ionic currents will test the hypothesis that they control polarity. Awarded $200.

KATSIKAROS, Kaliope, School of Biological Sciences, University of Sydney.
Project: The ecological and evolutionary significance of sexual dimorphism in the frog *Adelotus brevis*. Males have a disproportionately large head and small bony tusks on their lower jaw, an unusual condition in frogs. Awarded $500.

KEMP, Dr Anne, Queensland Museum.
Project: Disease related problems in embryos and hatchlings of the Australian lungfish, *Neoceratodus forsteri*. Embryos and hatchlings of the lungfish have a high mortality rate both in the wild and in captivity. Most of the losses appear to be due to bacterial infection and the peak of deaths occurs before the hatchlings develop the ability to breathe air, lungfish are endangered in south eastern Queensland. Awarded $500.

KRAUSE, Mr L K, Department of Biology, University of Wollongong.
Project: The systematics and evolutionary processes within the species complex *Persoonia mollis*. Genetic diversity within three different hybrid zones between closely related sub-species will be analysed using electrophoresis for detection of allozyme variation. Awarded $500.

LEUNG, Mr Luke K-P, Lockhart River, Cape York Peninsular.
Project: The ecology of the spotted cuscus, *Phalanger maculatus*. Mr Leung will enlist the aid of local aborigines who are familiar with the ways of the cuscus, to capture some and attach radio collars. Awarded $500.

LONG, Dr John A, The Western Australian Museum, Perth.
Project: Two new species of Devonian lungfish. Dr Long has only the heads and must visit Monash University and the Museum of Victoria to examine casts of specimens which show details of the body, fins and post-cranial skeleton. Awarded $500.

MANDELEC, Ms Fiona, Jervis Bay.
Project: Habitat utilisation of Bottlenose Dolphins in Jervis Bay. There is a wide range of ecosystems in the Bay which remains relatively undisturbed but is under threat from development. The Bay supports a 'resident' group of Bottlenose Dolphins which have not been studied previously. Awarded $400.

MCLEOD, Ms Lynette, Fowlers Gap Station via Broken Hill.
Project: A study of overwintering strategies, emergence and seasonal distributions of the blowfly species *Lucilia cuprina* and *Chrysomya rufifacies* in the arid zone. This study will be used to predict optimal timing of management strategies to control blowfly strike. Awarded $464.

MITCHELL, Mr S, Department of Anthropology, Northern Territory University.
Project: The tamarind, *Tamarindus indica* was introduced by the Macassans. In some locations, it has become the dominant plant species, whereas in others, there are only large trees which, according to Aboriginal tradition, date back to Macassan times. The distribution, conditions under which it propagates and its impact on the local ecology will be assessed. Awarded $500.

MURRAY, Dr David R, School of Biological Sciences, University of Sydney.
Project: The taxonomy and phylogeny of the seagrass genus *Zostera* using amino acid sequence of zosterin, the main seed storage protein. Seagrass meadows are important productive marine habitats. There are about 12 species worldwide with half available in the southern hemisphere. Awarded $500.

PREDAVEC, Mr Martin, Department of Biological Sciences, University of Sydney.
Project: The effects of predation by *Autechinus struartii* on the community and population structure of leaf-litter invertebrates. Awarded $450.

SCHIBECI, Ms Suzanne, Biology Department, University of Wollongong.
Project: The role of pollinators in the hybridization between two species of *Banksia, B. robur* and *B. obliquifolia.* Awarded $500.

TZIOUMIS, Ms Vicky, Biological Sciences, University of Sydney.
Project: The biology and ecology of the damselfish, *Parma microlepis* or 'white ear'. This fish is very abundant along coastal reefs of New South Wales but little is known of its biology or impact on the environment. Awarded $400.

WOOLCOTT, Mr Geoffry, School of Biological Science, University of New South Wales.
Project: The biology of algae in the genera *Ulva, Enteromorpha, Ulvaria* and *Monostroma* which are often confused. Live material will be brought back from the field for culture in the laboratory. Awarded $300.

AUSTRALIAN MUSEUM SEMINARS

Tuesday November 6, 12.30 pm - Peppermint Room. Mike Gray (Australian Museum: Arachnology. *Filistatid Systematics.*

Tuesday November 20, 12.30 pm - Lilac Room. Max Moulds (Australian Museum: Entomology). *Cicada Biology and Systematics.*

For more information, call Gerry Cassis 339 8221; Alex Szalay 339 8303 or Alex Ritchie 339 8142.

FOREST FORMATIONS AND FLOWERING PLANTS OF THE PHILIPPINES

An illustrated lecture given by Mr Edwino Fernando, School of Biological Science, University of New South Wales.

There are 7,100 islands in the Philippines and a land area about one third that of New South Wales. With a population of 65 million people, pressure on the resources of the land are extreme. Studies of the forests are few so that much remains unknown. The need for conservation is recognised, but these needs are in conflict with those of the people. Twelve forest types have been defined and all are rainforest except for one, the moist deciduous forest. Mr Fernando's descriptions of the forest types were accompanied by beautiful colour slides, which, unfortunately, cannot be included here.

Tropical lowland forest in the largest type and is dominated by dipterocarps which may make up to 82% of the cover. The large trees have buttressed roots and there are large, woody vines and a dense growth of saplings in the light breaks. *Calamus rotans,* the vine used for making cane furniture is found here. There are numerous palms.

Lowland evergreen rainforests are drier and dipterocarps are also important here.

The semi-everygreen rainforest is not a large area. There is a tendency to deciduousness and the deciduous trees tend to grow in patches.

The limestone forest formation has open areas and outcrops of limestone. The crowns of the trees are very large, the stems are short and the roots are widespread. The humus layer is thin and the plants are slow growing. This forest does not look like your average rainforest with its tall, straight trunks.

The ultrabasic forests, found only on soils formed from ultrabasic rocks, have sharp boundaries with other forest types. The soils have high concentrations of heavy metals. Here, the vegetation is sclerophyllous with many endemics. *Gymnostoma* which is in the family Casuarinaceae, and looks like a *Casuarina*, is found here.

The beach forest is a narrow strip along sandy beaches and merges with the mangroves. Species here are very similar to those in beach forest throughout south east Asia.

The mangrove forests are found on clay shores and in deltas and are similar to those throughout south east Asia, *Camptosteman*, however, present in Australia and the Philippines, is not found in Borneo. *Osbornia*, in the family Myrtaceae is present also. In brackish water, forest of the palm *Nypa* is present at the water edges of mangroves.

Freshwater swamp forests are found in the most fertile soils and most of them have been cleared for rice paddies. the palm *Metroxylon* grows here. The leaves are used for thatching and the stems for the starch, sago.

The montane pine forests are maintained by summer burning. There are two species of pine here.

The upper montane rainforest, or mossy forest is found above 1,000 m altitude. The trees have crooked stems and are festooned with mosses and algae. The trees are the conifers *Dacrydium, Dacrycarpus* and *Podocarpus* with Myrtaceae in the understorey.

The Philippines has a rich flora, with more woody species than in all of the USA and Canada combined. In a quarter hectar plot, there are more than 90 species, with many endemics. There are 13 species of *Rhododendron*, nine endemic. Many are epiphitic, and we saw a slide of a magnificent, brilliant red one.

The flora of the Philippines show relationships with its neighbours. In the north of the country, the relationship is with Taiwan, to the west, with Borneo and to the south, with Sulawesi and even Australia. There is one species of eucalypt in the rainforest, *Eucalyptus deglupta*.

The forests are disappearing at an alarming rate. The dipterocarps are sought out and the timber is called mahogany, although this is not the true mahogany, which is a South American species. National parks are not immune and are assaulted in many ways: logging, both legal and illegal, exploration, shifting agriculture, potato fields: when MacDonalds came to the Philippines, the demand for potatoes increased (!). With such a high population, conservation is a particularly difficult task, and the political will is not there.

There are many endangered species, including a species of *Rafflesia*, the saprophytic flowering plant which has no leaves and only produces a large, spectacular flower, smelling of rotting meat to attract the flies which pollinate it. This species is a small one, only about one foot, or 30 cm in diameter, much smaller than the Malaysian giant.

The flora of the Philippines is about to be commenced, and Mr Fernandez is the co-ordinator of writing up. He will return to this position in the Department of

Forest Biological Sciences and the Museum of Natural History, University of the Philippines at Los Banõs when he finishes his studies in Australia.

THE VEGETATION OF YENGO NATIONAL PARK

A lecture given by Mr Jonathon Sanders, Ranger with the National Parks and Wildlife Service.

Yengo National Park, on the Hornsby Plateau, is part of the 'sandstone belt'. It was declared a National Park by the Unsworth Government.

Airflow from the coast is very important for rainfall. There is uplift at the edge of the Hornsby Plateau, then again at the edge of the Blue Mountains, thus the Park is in a rainshadow, except for Mt Yengo itself. This rainshadow is the reason the area has remained vacant for so long, and is very important for the vegetation itself.

The Hawkesbury Sandstone overlies the Narrabeen Group, as elsewhere, but it is not easy to distinguish the two in the Park. There are cappings of Wainamatta shale also. Mt Yengo is a basalt diatreme and together with its wetter climate, is very important for certain communities. Alluvial transport down slopes to the valley floor is also important for the vegetation.

In a study of the vegetation, all types of habitats were selected; gullies, ridgetops and the different slopes. The study showed 13 different vegetation communities.

Melaleuca swamps are found in the valley bottoms. These had mostly been cleared by farmers before the Park was declared.

Rainforest on the northern slopes of Mt Yengo, contains the stinging treet, *Dendrocnide excelsa* and *Ficus rubiginosa* on the boulders.

Rainforest on the southern slopes of Mt Yengo has *Toona australis*, the red cedar, dominant, and lianes. These two rainforest communities on Mt Yengo have about 40 species but there are only six in common to both.

On the east-facing slope, on basalts, there is an *Eucalyptus tereticarnis - E. mollucana* open forest with a grassy understorey and *Acacia fulva* in places. There are some rainforest species mixed in.

Angophora floribunda - Acacia filicifolia woodland with *Eucalyptus xanthifolia* and *E. eugenioides* woodland is found on the alluvial sands. There are a large number of herbs and grasses. This community has been mostly cleared.

There are three communities of sheltered forests on rich soils in gullies, on slopes and patches of basalts. The shrubs define the community and moist, rocky areas are rich in orchids. *Eucalyptus deanii* is present in the overstorey. *Allocasuarina torulosa* and *Angophora floribunda* are present and there is a fair amount of herbs and grasses.

Rainforest is found on rich sites in the creek bottoms running off Mr Yengo, where basalt downwash enriches the soils. There is a *Backhousia myrtifolia* canopy and *Acmena smithii* and *Rhodamina trinerva* are also present. Quite a few species found here do not occur anywhere else. Mt Yengo is a refugia. Scrubby rainforest is found in less sheltered valleys.

All of the above communities are found on special sites and are qutie small in area. The ones following are much larger.

There are four communities found on the Hawkesbury Sandstone. In sheltered places on skeletal soils at the bottom of slopes, there is a well-structured forest of *Syncarpia glomulifora, Angophora costata* and *Allocasuarina torulosa*. Ridgetops and upper parts of sheltered slopes support a second community. The third, on exposed slopes, is the most common and characterises Yengo. It is quite diverse with a low, open canopy and a well-developed shrub layer. The ground cover is sparse and the soils skeletal. *Eucalyptus eximia* is found here. The fourth, an ironbark community, is found on soils with a higher clay content, on shale lenes found occasionally in the sandstone. *Eucalyptus eximia* and the ironbarks *E. fibrosa, E. crebra, E. beyeri* are found here. The understorey is grassy in places.

This study has shown that the soils are very important in determining the type of vegetation. Mr Sanders is currently preparing a report on the vegetation of Yengo National Park.

SEXUAL CANABALISM IN SPIDERS

A lecture given by Dr Mark Elgar, School of Biological Science, University of New South Wales.

Animals are expected to behave in a manner best suited to their own ends, or selfishly, and not for the best interests of the group. Sexual canabalism is an extreme of the old adage, 'nature red in tooth and claw'.

Sexual canabalism is found in a number of groups; the Arachnids, spiders and scorpions. Insects, midges, dipterids, praying mantis, Coepods and Nudibranchs. It is extensive in spiders and widespread in scorpions, but not manditory in any group. Obviously, it has evolved a number of times.

Why? What advantage might it offer over normal and more mundane types of sexual behaviour? There are many ideas which, when examined more closely, seem unlikely.

It is unlikely to be a case of mistaken identity. The behaviour of the female to prey and to the courting male are quite different. Sexual canabalism is more frequent in web building spiders, hence the idea, but not all web builders are canabalistic.

There is an idea that if the male sperm is stored by the female, then the male is eaten, his addition to the diet contributes to greater egg production. Examples which contradict this idea are not hard to find. If a male and female of the orb leaf spider are put in a confined space, the female eats the male, so they are capable of canabalism. The male is about the same size as the female so he would make a substantial addition to the diet. Under normal circumstances, this does not happen. The male and female cohabit in a curled up leaf and when his time comes, the male crawls out and dies a natural death.

Another idea is there is some complicity of the male. In some species, the male builds a mating thread on to the female's web, plucks it and entices her out of her web. When the male is about the same size, he can jump away after mating. It is the smaller males that tend to get eaten. Sometimes the male is eaten before mating and this may be a form of mate selection - the female either finds a good (large) male or has a feed off the small males! Some males adopt tactics which help them to survive, such as mating after the female has had a good feed so that at least she is not hungry, or just after moulting when she is weak and unable to attack. There is even the 'bridal veil' strategy - a male spins webs over the female's legs to immobilise her during mating! Thus not all males of a species are eaten. In the European common garden spider, 25% of males are eaten before mating, 19% are not eaten and live to mate again.

Of the wealth of ideas, most are not tested. One fact emerges, body size is very important, the smaller males get eaten. Not just males get eaten either. Nudibranchs are hermaphrodite. Mating is rapid and after mating, there are repeated attacks and it is the smaller one that gets eaten.

Dr Elgar is writing a book on sexual canabalism and its evolutionary significance. Though a weird subject, his lecture was quite fascinating.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C'

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NEWSLETTER NO: 58

DECEMBER 1990

IN THIS ISSUE

DEDUCTION FOR PROMPT PAYMENT OF DUES

If subscriptions are paid before 30 April, there is a $5 deduction. See blue subscription renewal form.

NEW MEMBERS

We welcome Ms Candida L. Briggs, Botanist of Padstow

DONATION TO JOYCE W. VICKERY RESEARCH FUND

Dr. Rod Gould has made a donation to the Joyce W. Vickery Reasearch Fund, with a comment on the wide range of projects supported by the fund. We thank Dr Gould for his generosity

All donations to the Fund are tax deductable.

PAPERS ACCEPTED FOR PUBLICATION

A.G. COOK - The geology of the Glendale area near Kandos.

E. ADAMSON, H. ADAMSON, M. VESK AND R. SEPPELT - Morphological, ultrastructural and physiological characteristics of damage to an extensive stand of the lichen *Usnea sphacelata* at Casey Station, East Antarctica.

R.W. MEDD AND H.H. JONES - Host range, distribution and importance of *Pyrenophora seminiperda* (Brittlebank and Adam) Shoemaker in Australia.

CENTENARY OF THE DEATH OF SIR WILLIAM MACLEAY

Sir William Macleay died, 7 December, 1891. The Society plans a Linnean Macleay Memorial Lecture and probably a symposium to commemorate the centenary. If any Member has ideas for topics in the symposium or would like to be involved, we would be pleased to hear of them.

RUDI LEMBERG TRAVELLING FELLOWSHIP, 1992/93

The Lemberg Fellow may be drawn from any field of biology but special consideration will be given to those areas in which Professor Lemberg had an especial interest, namely biochemistry, conservation and the Australian flora.

Felowships are awarded to enable Australian or overseas scientists of standing to visit scientific centres in Australia and to deliver lectures. Fellowships are tenable for visits to and within Australia of not less than two weeks and not more than three months.

Nominations close on 30 April 1991

For futher information, contact the Executive Secretary, Australian Academy of Science, GPO Box 783, Canberra, ACT 2601 Telephone inquiries to Mrs Faye Nicholas, 06 247 5777

WHEN DID GRASSIANDS DEVELOP?

Grass pollen first appeared in the Eocene, some forty million years ago. It was rare then, and remained rare for many millions of years. The reason for this rarity is that the vegetation of the time was predominately rainforest where grasses are rare; not enough light reaches the ground for a herbaceous ground cover.

There is a well established story that there were extensive grasslands in central Australia in the early Miocene, some 20 million years ago, at a time when southeastern Australia was heavily forested. This story is based on work on bore near Lake Frome, done a long time ago. Recently, evidence has been accumulating which questions this story.

Palynology on sediments of the same age in western New South Wales, not very far from Lake Frome, failed to reveal any grasslands. A little

grass pollen is present, but the vegetation was predominantly rainforest. The vertebrate fossil faunas of this time do not contain any grass eating animals, and it seems odd that if there were grasslands, there were no grass eating animals. This dilema required investigation.

I was able to re-examine the original slides. There is a little grass pollen present, but the *Restio* pollen type of the Restionaceae is very abundant. Grass pollen and the *Restio* type are superficially similar. Both are spherical with one small pore that has a thickened rim. The *Restio* type, however, has very fine pits which are only seen under the highest magnification, and are not present on grass grains, hence the two types are distinguishable with careful examination. Besides the restionaceous pollen, some Cyperaceae and Sparganiaceae, all common in swamps, the algal species *Botryococcus* and *Pediastrum* are both abundant, showing that this was a swamp or lake. Grasses may be common in swamps also. Excluding the swamp and aquatic species, the vegetation was rainforest.

With this correction, the development of grasslands is thus: Grasses are rare until the late Miocene - Pliocene, some ten million years ago, when they increae a little. At the same time, rainforest declines and the dominant vegetation becomes wet sclerophyll forest. There may be some grasses under the more open canopy of eucalypts, hence the small increase in grasses may indicate open forest or very limited grassy patches, but it is insufficient for extensive grasslands. Grass pollen becomes abundant, and grasslands extensive, in the late Pliocene - Pleistocene, some 2 - 3 million years ago.

The development of grasslands is now in accord with the vertebrate fossil record. Grass eating animals are rare in the mid Miocene, some fifteen million years ago, and become significant in the Pliocene.

More recently, work on a deep sea core on the Northwest Shelf has revealed a simlar story. Grasses are rare in the Miocene, increase somewhat in the Pliocene, becoming abundant only in the late Pliocene - Pleistocene. Thus what evidence we have, from southeastern, central and northwest Australia, suggests that grasslands became extensive at about the same time.

Helene A. Martin.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

Council nominations for President, Council and Auditor for 1991/92

ELECTION AT ANNUAL GENERAL MEETING, WEDNESDAY, 27th MARCH, 1991

*The names of Members who retire (in terms of rules 15(a) and (15b) are marked with an asterisk.

President:-	D.S. Horning, M.Sc., Ph.D.
Council:-	A.E.J. Andrews, A.S.T.C.(Civ. Eng.) M.I.E. Aust.
	T.C. Chambers, M.Sc., Ph.D.
	J.H.K. Eastman, B.Sc., Dip.Ed., M.I.Biol.
	*M.R. Gray, M.Sc., Ph.D.
	*S.J. Hand, B.Sc., Ph.D.
	*D.S. Horning, M.Sc., Ph.D.
	L.A.S. Johnson, A.M. DSc., F.A.A. Hon. F.L.S.
	R.J. King, B.Sc., Dip.Ed., Ph.D.
	*H.A. Martin, M.Sc., Ph.D.
	P.M. Martin, M.Sc.Agr., Ph.D. Dip. Ed., F.L.S., F.A.I.A.S.
	J.R. Merrick, M.Sc., Ph.D.
	P.J. Myerscough, M.A., Phil.D.
	I.G. Percival, Ph.D.
	*J. Pickard, B.Sc. Agr., M.Sc., Ph.D.
	*A. Ritchie, B.Sc., Ph.D.
	C.N. Smithers, Ph.D.
	T.G. Vallance, B.Sc., Ph.D., F.G.S.
	K.L. Wilson, B.Sc. Agr., M.Sc.
Auditors:-	W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:-	D.S. Horning, M.Sc., Ph.D.
Council:-	(Six vacancies) - Council nominates the following and invites further nominations in accordance with rule 15(e)
	M.R. Gray, M.Sc., Ph.D.
	S.J. Hand, B.Sc., Ph.D.
	D.S. Horning, M.Sc., Ph.D.
	H.A. Martin, M.Sc., Ph.D.
	J. Pickard, B.Sc. Agr., M.Sc., Ph.D.
	A. Ritchie, B.Sc., Ph.D.
Auditors:-	W. Sinclair & Co.

This notice is given under the provision of Rule (15(e).
It is not a voting paper.

RULE 15(e):- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

P.O. Box 457,
Milsons Point
SYDNEY NSW 2061
Telephone - 929 0253 - Tuesdays only.

For the Council

Barbara J. Stoddard
Secretary 18th December, 1990.

LINNEAN SOCIETY OF NEW SOUTH WALES

RENEWAL OF MEMBERSHIP FOR 1991

The Secretary
Linnean Society of N.S.W.
PO BOX 457
Milsons Point, N.S.W. 2061

	PAID AFTER 30 APRIL	PAID BEFORE 30 APRIL	
FULL MEMBER	$45	$40	
RETIRED MEMBER	$25	$20	- retired, having reached the age of 60 years
STUDENT MEMBER Please	$25	$20	- full time student.
			included proof of
student			status
ASSOCIATE MEMBER	$7.50	$7.50	- receiving Newsletter but not Proceedings. No voting rights
LIFE MEMBER	NIL	NIL	- having been a full member of the Society for over 40 years.

PLEASE CIRCLE APPROPRIATE MEMBERSHIP

Cheque for $................. is enclosed

NAME...

ADRESS..

If you have renewed your membership, or are a Life Member, please disregard this notice.

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 20 FEBRUARY 1991, AT 12.30 pm IN THE J H MAIDEN THEATRE, NATIONAL HERBARIUM, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

PLEASE MAKE BOOKINGS BY TUESDAY12 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 475
Milsons Point N.S.W. 2061 Telephone: 929 0253
(Tuesdays only)

I wish to make bookings for .... people at $14 per person for the luncheonon 20 February

Cheque for $ ....is enclosed

NAME: ....

ADDRESS: ....

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER EDITOR:
Dr Helene A Martin
School of Biological Science
University of New South Wales
PO Box 1
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PO Box 457
MILSONS POINT NSW 2061

Telephone: 929 0253

Office Hours:
Tuesday 9.30 am - 5 pm

NEWSLETTER NO: 59

APRIL 1991

IN THIS ISSUE

NEW MEMBERS

We welcome Ms Simone Gordon, School of Biological Science, University of Sydney.

LINNEAN MACLEAY FELLOWSHIP

Congratulations to Mr. Siegfried Krause, Dept. Biology, University of Wollongong, who has been awarded the Linnean Macleay Fellowship for 1991. Mr. Krause will work on the systematics, evolution and dynamics of the complex species *Persoonia mollis* (Proteaceae). *P. mollis* is particularly interesting because it is extremely complex and variable, with a number of subspecies.

DONATION TO THE SOCIETY

Donations have been received from Dr. Helen Hewson, Dr. David McAlpine and Dr. Tom Vallance. We thank them for their generosity. Donations to the Joyce Vickery Research Fund and to the Library Fund are fully tax deductible.

PAPERS ACCEPTED FOR PUBLICATION

M. A. Rimmer - Gonadal structure of *Arius graeffei* Kner & Steindachner (Pisces: Ariidae) from the Clarence River, New South Wales.

J. A. Elix, H. Streimann and A. W. Archer - The lichens of Norfolk Island. 2: The Genera *Cladonia Pertusaria*, *Pseudocyphellaria* and *Ramalina*.

T. Kobayashi - A study of physico-chemical conditions, phytoplankton, and microcrustacean zooplankton in Wallerawang Reservoir in New South Wales.

Adam Smith - (a short note) Tropical scallop found in Jervis Bay.

GOOD NEWS ON THE CONSERVATION FRONT: PROPOSED ENTRY OF LITTLE BAY IN THE REGISTER OF THE NATIONAL ESTATE

The Little Bay Geological Site has been included in the interim listing of the National Estate. This is good news indeed, and the Society started the ball rolling with its field trip to the site in August of 1989. The publicity generated from the trip ensured that the value of the Site became common knowledge. The local activists were very interested also. The University of New South Wales is the owner of the site, and to its credit, has developed plans for its use in full consultation with the leaders of the field trip. The Geological Site will be left untouched in any development.

The Jennifer Street bushland was also proposed for listing but has not appeared. As the Interim List is available for comment, the Society will protest about its omission.

The whole of the Prince Henry Hospital area has been listed. The area was very important to the Aborigines and the Hospital has great historical significance.

The significant areas of bushland on the Long Bay (Anzac) Rifle Range have been listed on the Register. Being listed in the Register of the National Estate does not guarantee that the sites will not be destroyed, but it makes it much harder for developers and planners to ignore the significant value for conservation of the sites.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W VICKERY SCIENTIFIC RESEARCH FUND:

The Linnean Society of New South Wales announces the availability of funds from the Joyce W Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applciations will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

INTENDING APPLICANTS PLEASE NOTE:

- There are new application forms this year please read instructions carefully.
- Original plus five (5) copies are required.

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 19 JUNE 1991 AT 6 PM

**J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs. Macquaries Road)**

SPEAKER:

A/PROF PETER GREENAWAY
SCHOOL OF BIOLOGICAL SCIENCE
UNIVERSITY OF NEW SOUTH WALES

TOPIC:

THE LAND CRABS OF CHRISTMAS ISLAND

Land crabs are the dominant terrestrial fauna on the island which has the best representation and highest number of species in the world.

WINE AND CHEESE WILL BE SERVED FROM 5:30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 24 JULY 1991 AT 6 PM

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs. Macquaries Road)

SPEAKER:

PROFESSOR CARRICK CHAMBERS
DIRECTOR, ROYAL BOTANIC GARDENS

TOPIC:

PLANT HUNTING IN WESTERN CHINA

Professor Chambers visited China late last year on a collecting trip for the Royal Botanic Gardens.

WINE AND CHEESE WILL BE SERVED FROM 5:30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER EDITOR:
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Telephone: 929 0253

Office Hours:
Tuesday 9.30 am - 5 pm

NEWSLETTER NO: 60

JULY 1991

IN THIS ISSUE

NEW MEMBERS

We welcome Ms Jocelyn Howell of the Royal Botanic Gardens, Sydney.

PAPERS ACCEPTED FOR PUBLICATION

L. J. McLeod and J. M. E. Anderson - Distribution patterns, dispersal, seasonal abundance and reproduction of *Chrysomya rufifacies* (Macquart) (Diptera: calliphoridae) in the arid zone of New South Wales.

B. D.. Millsteed - The geology of an area to the north-east of Cudgegong, New South Wales.

R. L. C. Pilgrim - An historic collection of fleas (Siphonaptera) in the Macleay Museum, Sydney, Australia.

EDGEWORTH DAVID MEDAL AWARDED TO DR. TIM FLANNERY

Our congratulations to Dr. Flannery for this prestigious award from the Royal Society of New South Wales.

POSTDOCTORAL FELLOWSHIPS AND SCIENTIFIC EXCHANGES

The Australian Academy of Science has information and application forms for the following postdoctoral fellowships:

JAPAN, 1992/1993, JSPS Postdoctoral Fellowships for Foreign Researchers, for research in any field of natural science, non-clinical medicine and engineering.
Deadline for applications, 1 November 1991.

UNITED KINGDOM. The Royal Society Endeavour Fellowships Program in the natural sciences, mathematics, engineering science, non-clinical medical research and scientific aspects of psychology, archaeology and geography.
Deadline for applications, 1 October 1991.

Scientific exchanges are as follows:

JAPAN, 1992/1993. These may be for short-term visits (3 - 6 weeks) to collaborate with Japanese scientists or for long term visits (6 - 12 months) to carry out collaborative research projects. Proposals in any field of natural science, basic or applied, including mathematics and engineering science, will be considered.
Deadline for applications, 1 September 1991.

CHINA, 1992/1993. Proposals in any field of natural science, basic and applied, will be considered. The programme supports collaborative research between Australian and Chinese scientists.
Deadline for applications, 1 December 1991

FRANCE, 1992. Rhône-Poulenc Fellow under the Bede Morris Fellowship scheme. Collaborative proposals in any field of natural science, basic and applied, or in a field which embraces cultural aspects of science will be considered.
Deadline for applications, 1 August 1991.

Further information and application forms are available from:

International exchanges
Australian Academy of Science
GPO Box 783
Canberra ACT 2601
Telephone Enquiries: (06) 247 3966, Bonnie Bauld or Judith Hlubucek.

THE LAND CRABS OF CHRISTMAS ISLAND: A LECTURE GIVEN BY A/PROF PETER GREENAWAY, SCHOOL OF BIOLOGICAL SCIENCE, UNIVERSITY OF NEW SOUTH WALES

Christmas Island is coral limestone draped over a volcanic mountain. The island was covered with rainforest, at least until the phosphate miners moved in. The perimeter is largely sea cliffs and there are very few beaches. Phosphate mining has become uneconomic and very little of it goes on today. The Australian National Parks and Wildlife Authority is attempting to revegetate the scars.

There are some 20 species of land crabs on Christmas Island and they are the dominant fauna. Crabs are ideal colonisers of oceanic islands where there is little competition from vertebrates. Sea birds may be prolific, but they use the island for nesting and feed at sea, hence there is little competition with the crabs.

Colonising land has been easy for crabs. They have legs and a hard exoskeleton, hence can walk out of the sea. Living on land, however, presents a number of problems for the crabs. The first is gas exchange. Gills adapted to extracting oxygen from water are delicate and collapse, retaining a film of water in air, making them inefficient for gas exchange in air. The gills of land crabs have thickened ribs and button-like projections to prevent their collapse. Some crabs have developed lungs and the scientific world found this hard to believe when Prof. Greenaway first described them. Excretion of nitrogenous waste products is a problem for land crabs. Marine creatures excrete mainly ammonia which is very toxic and requires large amounts of water to wash it away. On land, the necessary water is not available. Some species excrete urea which requires less water, or uric acid which is solid and does not require water. The crabs drink fresh water by dipping a hairy leg in the water then sucking the water off the hairs.

Crabs of marine stock must return to the sea to breed. At the appropriate time, they must migrate to the sea.

There are about 130 million adults of the red crab *Gecarcoidea natalis*, on Christmas Island. Each year, there is a spectacular migration to the sea to breed. Strangely, no mention is made of these migrations in early journals, and they would have been noticed if they occurred. The reason for this is not known, but it is thought that a native rat probably preyed upon the juveniles which are as big as a 20 cent piece after one year. The adults, with their hard exoskeleton would be immune to all predation. The native rat was eliminated soon after European settlement, probably by cats.

A question often asked of Prof. Greenaway is: Could the huge numbers of red crabs be harvested on a commercial basis? The residents of the island need some economic activity (a casino is planned!). The red crab has a very hard exoskeleton and the flesh is rather coarse. It is not eaten by the residents who prefer other species which have become endangered and are now protected species.

There are land crabs in inland Australia and they are active when it is wet. These are not of marine stock and do not return to the sea to breed. The female retains the large, yokey eggs under her tail and the juveniles hatch out at an advanced stage of development.

NEW BOOKS

THE ZOOLOGICAL EXPLORATION OF SOUTH AFRICA 1650 - 1790 by L. C. Rookmaaker, 1989. 23 x 30 cm, 544 pp, 165 photos, 16 colour plates, $US95/£57, ISBN 90 6191 8677.

The 18th century research was undertaken at the Cape of Good Hope by seven explorers. All their books, manuscripts, and drawings concerning mammals and birds are listed and discussed in this publication. Many of the contemporary drawings, largely unpublished, have been included.

These early authors include Robert Jacob Gordon, Mammals: Anders Sparrman and Carl Thunberg, applying the methods of Linnaeus: J. R. Forster: Francis Masson: William Paterson and Francois Levaillant, the pioneer of African ornithology. Extinct species like the guagga and the bluebock are included.

LUIGI BALUGANI'S DRAWINGS OF AFRICAN PLANTS from the collection made by James Bruce of Kinnaird on his travels to discover the source of the Nile 1767 - 1773, by Paul Hulton, F. Nigel Hepper & IB Fris, 1990. 20 x 28 cm, 272 pp., 297 b/w & 48 colour plates, $US175/£92, ISBN 90 6191 7794.

James Bruce's journey to the source of the Blue Nile is an epic of exploration. But little has been known or published about his travelling companion and artist Luigi Balugani. For years James Bruce was presumed to be the artist of the field sketches and of the magnificent finished watercolours of African plants. This work of the Italian artist, Luigi Balugani, is published for the first time. The authors have identified the drawings and their studies show the scientific value as well as artistic merit of Balugani's observations.

These books may be obtained from D. A. Book (Aust) Pty Ltd, PO Box 163, Mitcham VIC 3132.

AUSTRALIAN ACADEMY OF SCIENCE/GEOLOGICAL SOCIETY OF AUSTRALIA LECTURE: Wednesday 2 October at 6 pm, Lecture Threatre L1, Applied Science Building, Lower Campus, University of New South Wales.

Speaker: Dr. E-an ZEN
Topic: Zen and the art of Scientific Literacy

Light refreshments will be served from 5:30 pm and after the lecture.

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 21 AUGUST 1991 AT 6 PM

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs. Macquaries Road)

SPEAKER:

DR. PETER BERNHARDT
ROYAL BOTANIC GARDENS, SYDNEY

TOPIC:

THE WHY OF THE WATTLE SEASON

Over 900 *Acacia* spp. dominate Australian habitats as small shrubs-short trees. Microscopic distinctions within wattle flowers is responsible for much of their natural diversity. The success and spread of *Acacia* depends, in large part, on a reproductive system ensuring that many animals play a role in pollination.

WINE AND CHEESE WILL BE SERVED FROM 5:30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 18 SEPTEMBER 1991 AT 6 PM

In Seminar Room L403, Biological Sciences Building
University of New South Wales
(Enter from Gate 9, High Street OR
for parking , Gate 11, Botany Street)

LINNEAN MACLEAY MEMORIAL LECTURE

SPEAKER:

PROF. ANNE HENDERSON-SELLERS
DIRECTOR, CLIMATIC IMPACTS CENTRE AND
PROFESSOR OF PHYSICAL GEOGRAPHY
MACQUARIE UNIVERSITY

TOPIC:

CLIMATIC IMPACT: POSSIBILITIES AND PROBLEMS IN INTERDISCIPLINARY RESEARCH

ABSTRACT:

The importance of the vagaries of weather and climate to everyday life was well understood by early civilizations and ancient religions. Indeed, they symbolic domination of the weather is so persistent that the English umbrella (ideally suited to the native climate) became a global phenomenon at the height of Britain's imperial power. Climatic scientists are faced with a particularly difficult signal detection problem in this, the era of apparent human-induced climatic change. At present, there is suggestive evidence of global warming and a sound physical basis for the model predictions but no-one can say with certainly that the human-enhanced greenhouse has already arrived and, more importantly, no-one can yet predict the impacts of the anticipated climatic changes. In this talk, I illustrate some of the problems and the possibilities of interdisciplinary research by reference to my own research in atmospheric science and by the application of atmospheric science to the study of climatic impacts.

WINE AND CHEESE WILL BE SERVED FROM 5:30 PM

EVERYONE WELCOME

LINNEAN SOCIETY OF NSW

FIELD TRIP TO YENGO NATIONAL PARK

SATURDAY 28 SEPTEMBER 1991

LEADER: MR. JONATHAN SANDERS
NATIONAL PARKS AND WILDLIFE SERVICE

Meeting Place: Assemble at the Colo Heights Service Station, Colo Heights, on the Putty Road north of the Colo River. Meet at 9:00 a.m. at the Service Station (don't block the customers). The tour will be travelling north along the Putty Road from the meeting place, so if you arrive late, you may catch us by looking out for us on the road travelling north.

What we'll see: Yengo National Park and Parr State Recreation Area comprise a large and diverse area of landform and vegetation. On this tour, we will be looking at the landforms along the Putty Road, which follows the western edge of the Hornsby Plateau. We will also have a short look at the Mellong Plateau, with its deep sand deposits and unusual vegetation, including swamps. Most of the day will be spent travelling east toward the Macdonald River, from the Wallaby Swamp area, to look at an unusual area of Ironbark forest on extensive shale benches.

We will be attempting a short walk in toward the Macdonald river itself, (or one of its tributaries, depending on conditions). The tour should re-emerge on the Putty Road at around 5.00 p.m., with about 2 to 2 and-a-half hours travel back to Sydney by road from this point.

What To Bring: You will need lunch and snacks, water, and a billy for a cuppa, if you wish. Wear comfortable clothing for bushwalking including good strong shoes or boots, sun protection, and any binoculars, field guides etc. that you want to take. You will also need **access to a four-wheel-drive vehicle if possible.** We will be driving through formed bush tracks, with no really difficult off-road driving. If you can't get a four-wheel-drive don't worry too much, as there is likely to be a few spare seats in some vehicles. However, if you know others with a four-wheel-drive who are coming, it is probably worth seeing if they can seat you. The walk will not be very long (2-5 kms), but it will not all be on formed tracks. I recommend strong clothing with long sleeves and pants, as some of the vegetation in the Ironbark forest can be quite prickly.

Guide and Other Information: Jonathan Sanders (8957419)

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 23 OCTOBER 1991 AT 6 PM

J. H. Maiden Theatre, Royal Botanic Gardens
(enter from Mrs. Macquaries Road)

SPEAKER:

DR. JENNY READ
SCHOOL OF BOTANY, MONASH UNIVERSITY

TOPIC:

ECOLOGICAL STUDIES OF AUSTRALASIAN *NOTHOFAGUS* SPECIES AND THEIR VALUE IN INTERPRETING THE FORM AND FLORISTICS OF PAST AND PRESENT RAINFOREST COMMUNITIES

Fossil leaves, cupules and pollen of the group of *Nothofagus* which is now confined to the tropics (New Guinea and New Caledonia) have been recorded in Tertiary deposits in south-eastern Australia. Many of these deposits also contain pollen and macrofossils of *Nothofagus* species which today only grow at high latitudes. The ecology of these taxonomically distinct groups will be compared and the results of some ecophysiological studies will be used to discuss the cooccurrence of these groups during the mid-Tertiary, the extinction of the tropical group of *Nothofagus* from south-eastern Australia during the late Tertiary, and the floristics and physiognomy of the modern cool rainforests.

WINE AND CHEESE WILL BE SERVED FROM 5:30 PM

EVERYONE WELCOME

PRINTED ON 100% RECYCLED PAPER

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

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Office Hours:
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NEWSLETTER NO: 61

OCTOBER 1991

IN THIS ISSUE

CENTENARY DINNER FOR SIR WILLIAM JOHN MACLEAY

The Linnean Society of New South Wales, in conjunction with the Macleay Museum, is hosting a dinner on Wednesday, 20 November, 7:30 pm, at the Macleay Museum, to celebrate the centenary of the death of Sir William John Macleay. Sir William was a founder of the Society and a guiding light for the establishment of the Museum. A three course dinner interspersed with toasts is planned and the renown and most entertaining Dr Peter Valder will speak on the life and times of Sir William. The cost will be $30.00 per person. Please send your cheque to the Secretary, Linnean Society of New South Wales, PO Box 457, Milsons Point 2061 as soon as practical. Please make cheques payable to Linnean Society NSW Centenary dinner. All reservations must be with the Secretary by Tuesday 12 November. But hurry, the number of participants is limited to 40.

Booking form is on page 7.

NEW MEMBERS

We welcome:

Mr. Leigh Winsor, Dept. of Zoology, James Cook University

Ms. S. Papassotiriou, School of Biological Sciences, University of Sydney

PAPERS ACCEPTED FOR PUBLICATION

K.H. Choi, D.T. Anderson and C.H. Kim - Larval development of the Megabalanine Balanomorph *Megabalanus rosa* (Pilsbry) (Cirripedia, Balanidae).

M.R. Gray - The Troglobitic spider genus *Tartarus* (Araneae: Stiphidiidae) from the Nullarbor Plain, Western Australia.

F. Lewis - *Revolutus spinosus*: a new genus and species of Akermaninae (Isopoda: Oniscidae: Armadillidae) from Queensland.

F. Lewis - Two new species of *Armadilloniscus* (Isopoda: Oniscidea: Scyphacidae) are described from northern Queensland.

J. R. Dodson and B. G. Thom - Holocene vegetation history from the Hawkesbury Valley, New South Wales.

K. Campbell - The occurrence of three species of *Cardiaspina* (Homoptera: Psyllidae) defoliating *Eucalyptus* spp. in New South Wales.

LINNEAN MACLEAY FELLOWSHIP:

Applications are invited for the Linnean Macleay Fellowship for 1992. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

GRANTS FROM THE JOYCE W. VICKERY RESEARCH FUND

There were fewer applications than in the last few years, and the Society was in the fortunate position to be able to fund all requests of sufficient merit, to the level requested. Overall, the applications were of a high standard.

Bladon, Rebecca, School of Biological Sciences, University of Sydney

Project: Reproductive ecology of Eastern pygmy possums. The reproductive biology of NSW populations apparently differs from that in Victorian populations, but this has not previously been investigated. Granted $500 for fieldwork.

Holdaway, Terena Linda, School of Biological Sciences, University of Sydney.

Project: Electrophysiological studies on intercellular communication in higher plant cells. The plasmodesmata in higher plant cells have not been investigated as thoroughly as those in giant cells of Characeae. Granted $515 for a computer monitor.

Krauss, Siegfried Lothar, Dept. Biology, University of Wollongong

Project: Pollen compatibility and choice across parapatric subspecies in the complex species, *Persoonia mollis*. This particular part of the study investigates the interaction of two subspecies, looking at intersubspecific pollen compatibility and preferences. Granted $500 for field work.

Mcleod, Lynette Jean Fowler's Gap Field Station, University of New South Wales.

Project: The overwintering strategies and distribution patterns of the Australian sheep blowfly and hairy maggot blowfly, in the arid zone of N.S.W. The strategies apparently differ between the two species. Understanding of them will lead to an early warning system for graziers. Granted $402 for travel between Sydney and Broken Hill.

Maloney, Shane Kevin, School of Biological Science, University of New South Wales

Project: Thermoregulation in the emu. The aim is to assess the importance of plumage as protection against heat stress from solar radiation. Heat flow through plumage is to be tested in a wind tunnel. Granted $500 for wind tunnel/hot plate equipment.

Pavey, Christoph Robert, Dept. Entomology, Uni. of Queensland

Project: Feeding ecology of Horseshoe and Leaf-nosed bats in Australia. This will be one of the first detailed studies of feeding ecology in insectivorous bats. The study aims to compare different species. Granted $500 for travel in north Queensland.

Richie, Alexander, Australian Museum.

Project: Studies on Lower Palaeozoic agnathans or jawless fishes (Heterostraci, Thelodenti, Anaspida). Before these studies can be completed, Australian specimens must be compared with collections in the United Kingdom. Granted $500 for expenses in the U.K. Institutional support is not available for this project.

Scarborough, Richard Langly, Geography Deptartment, Uniiversity of Wollongong.

Project: A modern pollen rain study from Barren Grounds Nature Reserve. Pollen will be collected in traps, the first step in assessing the vegetation history of the area. Granted $500 for laboratory consumables fieldwork.

Smith, Judy Elizabeth, Graduate School of the Environment, Macquarie University.

Project: Birds and resources of the Peery Lake area. The aim is to supply baseline data (currently lacking) on bird communities in semi-arid grazed lands of western NSW Granted $500 for fieldwork.

Wallis, Elycia Janet, Deptartment of Zoology, University of Melbourne.

Project: A comparative study of the behaviour, natural history and neurobiology of primitive and advanced malacostracan crustaceans. The life history is only partly known of a Tasmanian 'living fossil' *Anaspides tasmaniae*. The aim is to study further aspects in the field. Crustaceans are ideal for comparative neurobiological studies, ultimately leading to understanding of evolution of nervous systems of animals generally. Granted $500 for fieldwork.

All donations to the Joyce W. Vickery Research Fund are fully tax deductable.

PLANT HUNTING IN CHINA: A lecture given by Professor Carrick Chambers of the Royal Botanical Gardens.

This lecture commenced in the traditional Chinese fashion, with Chinese tea. We charged our tea cups and settled down to listen to the lecture.

Prof. Chambers had been negotiating to make this trip for sometime. Permission came and the three member team from the Botanic Gardens had to leave immediately. They had planned to go north, but they went south to near the Burmese border. The party had two drivers, and experienced drivers are necessary for survival on the roads in China, and Professor Yang of the Kuming Botanical Institute accompanied them. The drivers were paid more than the Professor of Botany!

Many well known collectors travelled in the region and the Catholic missionaries collected plants as well. George Forest collected from 1904 to 1932 and died in Tenshing. Prof. Chambers visited the grave site which had been destroyed in the cultural revolution, much to the embarassment of his Chinese hosts. Even with all this collecting, the botany of the region is little known. Most of the vegetation is this part of China is tropical/sub-tropical and the flora is very rich. One tree supported 14 species of orchids. There are woodlands of Plane trees, Camelia, Gardenia, Magnolia and Maples.

The scenery was stunning, with vistas from the mountains over the patchwork of landuse in the valley. The city of eternal spring was always decorated with flowers. Forests of all kinds included a montane forest of gnarled Rhododendrons and one with the neat conical trees of *Cunninghamia* . Prof Chambers never tired of the scenery and we felt privaleged that he shared it with us.

The team from the Botanic Gardens made extensive collections. Every collection had to be well documented so that it would be possible to go back to the site and recollect if necessary. The documentation, labelling, preparation and packing of plant materal was a lot of work. The plants were brought back by courier so that they were carried onto the plane and were not put in the hold. They were given to the quarantine officer who processed them efficiently, and within 12 hours, were planted in the quarantine house where they will stay for 6 months. Most of the collection will not be available for public viewing for two years. Any species showing weedy tendancies will be destroyed. Already, four species have been destroyed.

THE WAY OF THE WATTLE SEASON: A lecture given by Dr. Peter Bernhardt, Royal Botanic Gardens.

Dr. Bernhardt introduced his talk with pictures ofthe delightful Wattle Babies of May Gibbs' imaginative art. Wattles, or *Acacias* are part of our culture as well as science. The genus *Acacia* is one of the most important in Australia, with some 700-900 species. There are probably 1,200 species in NSW, when it is properly explored. The life form is anthing from a prostrate shrub to a forest canopy tree such as the blackwood. Wattles are found all over Australia and are dominant in central Australia.

Most wattles flower in August - September, but there are some in flower all through the year. In the arid regions, flowering depends more on when it rains.

The fluffy wattle flower is a small bunch of florets. Each anther produces pollen in polyads or aggregates of 4, 8 or 16 cells. There is very little variation of the polyad in the same plant. Each anther sac produces two polyads, thus each stamen produces only eight polyads. The receptacle is shaped like a wet donut and one polyad fits into it neatly. Each cell of the polyad grows a pollen tube and it is then a race against time, for the sperm only last two hours at room temperature. There are always fewer ovules than cells in the polyad, thus for a 16 celled polyad, there is 6 - 10 ovules.

Wattles, in common with most flowers, are hermaphradite and possess both male and female parts, but most species do not self-pollinate. The means of ensuring out crossing is biochemical. If self pollination occurs, the pollen tubes grow so far and then stop. They do not fertilise the ovules. Often parents cannot cross with offspring and siblings cannot cross with each other.

The conversion of ovaries to seed pods is low, about one in 50, sometimes one in 1,000. It is a mystery as to why this is so. If known compatable parents are crossed, the pod set can triple or quadruple. The stigma become receptive when the flower first opens, then dries up before the stamens unfold, so self pollination should be avoided. Most wattles rely on generalist pollinators and have no nectar to entice them, but the plentiful pollen is nutritious. Native bees are probably more important than once thought.

Acacia terminalis, a species of East Gippsland may have bright yellow or pale creamy flowers. The bright yellow flowered plants are found on the ridge tops and are bird pollinated. The pale flowered plants are found in the gullies and are insect pollinated. If the pale and yellow flowered plants are crossed, the offspring is fertile. This system does not apply to all of *Acacia terminalis* and it is not seen further north in N.S.W.

Survival of a species of *Acacia* is thus a complex business, but the way of the wattles work very well, given that they are so common over all of Australia.

NEW BOOKS

Birds of Lord Howe Island, Past and Present, by Ian Hutton. 160 pages, 60 colour photographs and many black and white photographs, including unique historical prints.

One of the major interests on the island has been the birdlife. When discovered, Lord Howe Island had 15 species of landbirds, 9 of which were forms unique to the island. Unfortunately, various factors have led to the extinction of nine species of landbirds, though new species have been colonised in their place. Fourteen seabird species breed on its shores and migratory shorebirds visit for the summer.

Lord Howe is Australia's most interesting island and in recognition of its unique features, including the birdlife, it was placed on the World Heritage List in 1982.

Ian Hutton entered his book in the 1991 Whitley Book Awards and received a certificate for a highly recommended zoological text.

The book is obtainable from Lord Howe Island Bird Tours, P.O. Box 6367, Coffs Harbour Plaza, N.S.W. 2450, for $29.95 per copy.

Monsoonal Australia, Lanscape, Ecology and Man in the Northern Lowlands.
Edited by C.D. Haynes, Department of Conservation and Land Management, Perth, M.G. Ridpath, CSIRO Tropical Ecosystems Research Centre, Darwin and M. A. J. Williams, Department of Geography, Monash University, Melbourne.
ISBN 90-6191-638-0 July 1991, hardcover, 243 pages with 35 b/w photos, 31 colour photographs, figures and tables. $A85.50.

This book describes a little-known tropical environment, the unique lowlands of Northern Australia, where a monsoonal climate dominates every aspect of life. The book draws substantially on recent research, much still in progress, including that of the 19 authors.

It emphasizes the feature which distinguish monsoonal lowlands and their biota from those of temperate regions. It explores afresh some of the processes which govern tropical ecosystems. The sysnthesis also throws new light on important issues affecting management, such as the impact of feral animals, the use of fire and the needs of conservation. The importance of this is highlighted by the now rapid development of uranium mining and tourism within the region.

There are four main sections covering evolution of the landscape, vegetation and fire, the vertebrate animals and people, the environment and the future.

This publication is available from D.A. Books, P.O. Box 163, Mitcham. Vic. 3132

DISEASES OF FRESH WATER FISHES, by Stuart J. Rowland and Brett A. Ingram, N.S.W. Fisheries Bulletin 4, 1991.

This bulletin puts particular emphasis on the ectoparasitic and fungal diseases of Murray cod (*Maccullochella peeli*), golden perch (*Macquaria ambigua*) and silver perch(*Bidyanus bidyanus).*

This publication is the first major report on the diseases of Australian native freshwater fishes and is based primarily on research conducted at the N.S.W. Fisheries' Inland Fisheries Research Station, Narrandera, since 1978, and the Eastern Freshwater Fish Research Hatchery, Grafton. This Fisheries Bulletin was written to serve as a review, and as a practical guide to native fish hatchery operators, fish farmers in the emerging native fish aquaculture industry, and biologists, other fisheries staff and veterinarieans involved in the monitoring of diseases and fish kills on farms and in the wild.

The bulletin is well illustrated with pictures of the parasistes and disease organisms and their life cycles. It is available for N.S.W. Fisheries.

LORD HOWE ISLAND NATURE TOUR, LEADER IAN HUTTON, AUTHOR/NATURALIST.

Spend 8 days exploring this island paradise, taking in all the usual highlights of a Lord Howe holiday, with visits to all points of interest including visits to seabird colonies, glass bottom boat lagoon, rainforest walks to scenic lookouts and remote rocky coves.

Cost, ex Sydney, $1,440 which includes nearly everything. Proposed dates of tours: Nov. 10-17, 1991 and Feb/March 1992.

Four further information, contact Ian Hutton, P.O. Box 6367, Coffs Harbour Plaza. NSW 2450.

LINNEAN SOCIETY OF NEW SOUTH WALES

CENTENARY DINNER FOR SIR WILLIAM MACLEAY

WEDNESDAY 20 NOVEMBER 1991, AT 7.30 pm IN THE MACLEAY MUSEUM, UNIVERSITY OF SYDNEY

ENTER FROM SCIENCE ROAD

COST PER HEAD, $30

Members are invited to bring spouses and friends

PLEASE MAKE BOOKINGS BY TUESDAY 12 NOVEMBER
Numbers are limited to 40

The secretary
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Milsons Point N.S.W. 2061

Telephone: 929 0253
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I wish to make bookings for .... people at $30 per person for the Centenary Dinner, 20 November

Cheque for $ ....is enclosed

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LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

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NEWSLETTER NO: 62

JANUARY 1992

IN THIS ISSUE

DEDUCTION FOR PROMPT PAYMENT OF DUES

If subscriptions are paid before 30 April, there is a $5 deduction. See pink subscription renewal form.

NEW MEMBERS

We welcome:

Dr. Adele Post, School of Biological Sciences, University of Sydney.

Dr. Katrina Fairley-Grenot, Dept. Botany, University of Sydney.

Dr. Raymond J. Ritchie, Dept. Botany, University of Sydney.

Dr. Peter J. Lockhart, Dept. Zoology and Botany, Massey University, New Zealand.

Dr. Margaret R. Dwyer, Archives, University of Sydney.

PAPERS ACCEPTED FOR PUBLICATION

P. Brown - Confirmation of a neosilurid catfish (*Neosilurus* sp.) occurring in the Paroo River, Murray-Darling Basin.

W. Holland, D. Benson and R. McRae - Spatial and temporal variation in a perched headwater valley in the Blue Mountains (2 papers).

T. Kobayashi - A study of phytoplankton and microcrustacean zooplankton in Lyell Reservoir in New South Wales.

S.J. Rowland - Diet and feeding of Murray Cod (*Maccullochella peeli)* larvae.

R.L. Pressey and S.J. Griffith - Vegetation of the coastal lowlands of Tweed Shire, northern New South Wales: plant communities, species and conservation.

P. Selkirk and R. Seppelt - *Lycopodium australianum* (Herter) Allan on Subantarctic Macquarie Island.

W.B.K. Holmes and F.M. Holmes - Fossil flowers of *Ceratopetalum* Sm (family Cunoniaceae) from the Tertiary of eastern Australia.

COUNCIL NOMINATIONS FOR 1992/1993

A notice of Council Nominations for election at the Annual General Meeting, 25th March, 1992 has been sent to each member, under separate cover.

NOTHOFAGUS: ITS PAST AND PRESENT LIFE

Report of a lecture given by Dr. Jenny Read, Dept. Ecology and Evolutionary Biology, Monash University.

The genus *Nothofagus*, the southern or Antarctic beeches, has a remarkable distribution: New Guinea, New Caledonia, Australia, New Zealand and South America. Its latitudinal range is from the tropics to the southern-most tip of South America and such a wide range is unusual for a genus. *Nothofagus* also has a long and fascinating fossil history in southern lands. Dr. Jenny Read chose *Nothofagus* for eco-physiological studies with the hope of finding reasons for changes in past distributions.

Dr. Mary Dettmann of the University of Queensland and her colleagues have recently reviewed the history of the genus *Nothofagus*. This excellent work pinpoints the origin of *Nothofagus* in southern Australia, slightly ahead of its appearance in Western Antarctica, some 84 million years ago. It must be remembered that the "resolution" of the fossil record for this time would be millions of years. *Nothofagus* became widespread in South American, Antarctica, New Zealand and Australia, and was common from about 40 to 15 million years ago. Its present day distribution is a tiny fraction of that in its heyday.

The modern species are readily placed in three groups according to their pollen type. The fossil pollen of the very first *Nothofagus* is different to all of the modern species, hence it forms a fourth, now extinct, ancestral group. The three modern pollen groups all originated in Western Antarctica, slightly more than 75 million years ago. Through most of their long history, species of all of the pollen groups grew together throughout their distribution.

The distribution of *Nothofagus* contracted in response to cooling temperatures, and in Australia, the development of aridity. The very beginning of this contraction was 20 million years ago in inland Australia, and its range had decreased significantly by 15 million years. Along with this restriction of distribution, there was a separation of the *brassii* pollen type species from species of the other groups. Today the *brassii* species grow in New Guinea and New Caledonia whereas species of the other two pollen groups are found in Australia, New Zealand and South America, and may grow in the same regions. The reasons for the separation are a mystery.

Today, *Nothofagus* is found in rainforests, up to the tree line where it grows as a prostrate shrubs. In high latitudes, very little grows under the canopy of *Nothofagus* forests. The low latitude forests have a rich diversity of species.

Leaves are sensitive to the environment as they must photosynthesis under whatever the environmental conditions. Dr. Read experimented with *Nothofagus gunnii*, the alpine shrub from Tasmania, *N. cunninghamii* from Tasmania and Victoria, *N. moorei* from northeast New South Wales and several species from New Zealand and from New Guinea. Photosynthesis measured at different temperatures showed that the optimum was much the same for all species, but the range over which 80% of maximum photosynthesis occurred, varied considerably. The Australia species all have a fairly broad range, but species from New Zealand have a narrow range. Both wide and narrow ranges were found amongst the New Guinea species. The Australian species have a fairly high resistance to extremes, *N. cunninghamii* more so than *N. moorei*, whereas the New Guinea species have low resistance and do not respond to hardening. These results are consistent with the environment where the species grow. In New Guinea, there are no extremes.

Dr. Read tested the water use efficiency of the species as well. The tropical species have a high water use efficiency whereas the extratropical species have a lower efficiency. The best correlation was with precipitation for the period December to March, when temperatures are highest. It seems strange that the tropical species had the highest water use efficiency when moisture is most abundant there. The response to a water deficit, however, is probably the most important part of the water relationships. With a slight deficit, the New Guinea species close their stomates, hence cutting down photosynthesis. Thus growth of the New Guinea species would be restricted with a slight water deficit. *N. cunninghamii*, on the other hand, keeps its stomates open with a deficit, hence growth would not be restricted in this way.

The results of these experiments suggest that there was sufficient biological differences between the groups of species to allow their separation. The decreasing moisture and temperature with greater extremes, during the last 15 million years, would have favoured the extratropical species which could continue to grow in regions where the *brassii* species had been eliminated.

Nothofagus is well known for its high light requirement for regeneration. Disturbed sites favour regeneration of *Nothofagus* in many forests. Dr. Read found that while *Nothofagus* has a high light requirement for regeneration, it will regenerate in an undisturbed forest if there are no species more shade tolerant than it, in the community. Thus in southernmost South America, where the climate is harsh and there are few other tree species, *Nothofagus* is equivalent to *Eucalyptus* in Australia. In forests with a greater diversity of species, the more shade tolerant saplings out compete those of *Nothofagus*, under the canopy.

The distribution of the *brassii* type species in Australia was whittled away for millions of years and the last remnants were found around Lake George and in the Atherton Tablelands, about 2 million years ago. The *brassii* type species were in New Guinea, 15 million years ago, but species of the other pollen groups did not reach New Guinea, and the reasons for this are not known. The *brassii* type species were in New Zealand until 1-2 million years ago, also. Thus the disappearance of these species from both Australia and New Zealand is a relatively recent event.

BOOK REVIEW

"Wattle" by Maria Hitchcock, Australian Government Publishing Service, 1991, 190 pp. illustrated, Cat. No. 90 1383 1 rrp. $29.95

The Australian Government in 1988 eventually gave in to pressure of public opinion and adopted *Acacia pycnantha*, - The Golden Wattle, as our National Floral Emblem, a species which had already achieved almost official status. It was an appropriate and long overdue move, first made in Parliament in 1913. However, the symbolism of the sprig of wattle in spring time has been traced back in this publication to at least 1838 in Tasmania.

The green of the *Acacia* shrub or tree and the gold of its flowers, its nitrogen enriching status for our soils and the very numerous allied species give this genus an almost ubiquitous presence throughout Australia and so the genus was a particularly appropriate choice. Included in this publication is a major list of species, giving data on distribution and habit and also giving State lists classified according to their climatic zones. This is not a taxonomic work, but rather a popular survey dealing with aspects of the horticulture, utilisation, folklore, poetry, music and memorabilia and some aspects of the science of the genus Acacia and especially of *Acacia pycnantha,* The Golden Wattle. The work includes some advice on the selection of suitable species and their cultivation and the work overall demonstrates how the wattle has become intertwined with the Australian ethos.

Carrick Chambers

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 19 FEBRUARY 1992, AT 12.30 pm IN THE J. H. MAIDEN THEATRE, NATIONAL HERBARIUM, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

We need to know numbers for catering,so please let us know if you are coming BY TUESDAY12 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061

Telephone: 929 0253
(Tuesdays only)

I wish to make bookings for .... people at $14 per person for the luncheonon 19 February

Cheque for $ ....is enclosed

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LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

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NEWSLETTER NO: 63

APRIL 1992

IN THIS ISSUE

NEW COUNCIL MEMBER

We welcome Dr. David Murray to the Council. Dr. Murray, a botanist, works mainly in plant physiology and will give a lecture about his work (see Programme for July). He has edited a book, "Advanced methods in Plant Breeding and Biotechnology" which has just been published by CAB International (Oxford) and is available through DA Books and Journals, Melbourne.

NEW MEMBERS

We welcome:

Dr. Murray J. Henwood, School of Botany, University of Sydney.

Ms. Judith Smith, Graduate School of the Environment, Macquarie University.

PAPERS ACCEPTED FOR PUBLICATION

J.M. Hush, C.R. Hawes and R.L. Overall - A novel method for the visualization of microtubules in plant tissues.

C.A.M. Reid - Descriptions of the pupae of nine genera of Australian paropsine Chrysomelinae (Coleoptera: Chrysomelidae).

COMING EVENT, ANTARCTIC SOCIETY OF AUSTRALIA

Dr. Barry McKelvey will talk on "The last forests in Antarctica" in mid July: the date is yet to be fixed. Contact Dr. Alex Richie for further information.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W VICKERY SCIENTIFIC RESEARCH FUND:

The Linnean Society of New South Wales announces the availability of funds from the Joyce W Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

INTENDING APPLICANTS PLEASE NOTE:

- Please read instructions carefully.
- Original plus five (5) copies are required.

Donations to the Joyce W Vickery Scientific Research Fund are tax deductible.

POLAR FORESTS - HOW DID THEY EXIST?

Helene A. Martin

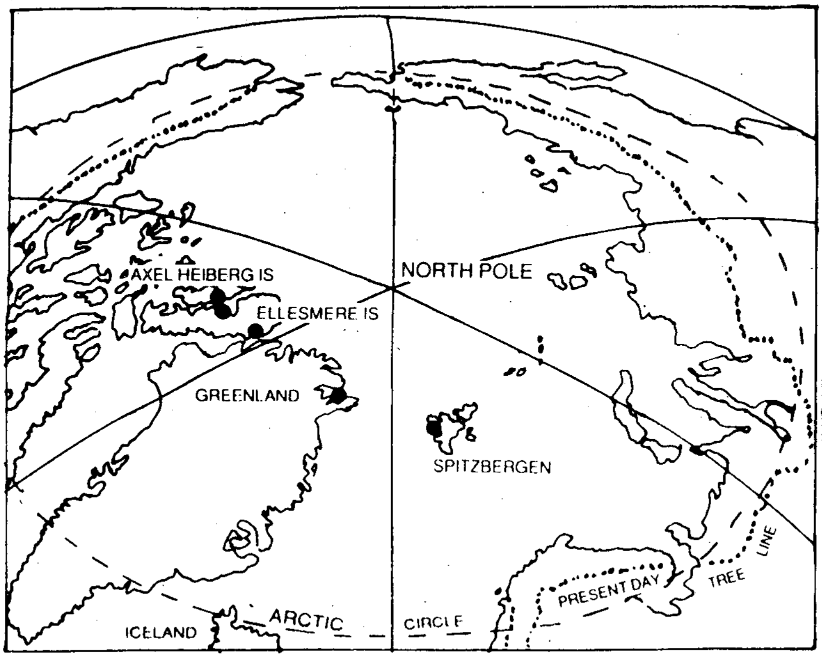
There is little doubt that the harsh and inhospitable tundras of polar regions once supported forests. Fossil wood and leaves are found in Canada's Arctic islands, Greenland and Spitzbergen. Even tree stumps, still rooted in their original position, may be found as fossils. On Axel Heiberg Island (Fig 1), Dr. Jane Francis[1] describes walking amongst enormous tree stumps and fallen logs, on a carpet of leaves, blackened and looking as if recently destroyed by fire, yet this forest was some 45 million years old.

In all of these arctic forests, the dawn redwood, *Metasequoia*, is common. It had been thought that *Metasequoia* was extinct, but it was found growing in Central China. Swamp cypress, cedar, pine, larch, spruce and other conifers occur with the redwood. Deciduous angiosperms such as birch, alder and katsura (another tree now found only in China and Japan) are present also. Some evergreen angiosperms would have grown in these forests and there is a large-leafed monocotylodon, like Musaceae (banana!) - Strelitziaceae (bird-of-paradise)[2]! Amazing as this seems, there are some species of Musaceae which grow today in areas close to *Metasequoia*.

These remarkable fossil forests grew on flood plains which were periodically inundated and thick layers of sediment buried the forest floor, preserving the stumps and leaves.

The animal life in these forests was just as exotic. On Ellesmere Island (Fig 1), bones of alligators, crocodiles, turtles, snakes, salamanders, giant land tortoises, tapiers, rodents, carnivores, lemurs, primates[3], hippolike tusked animals, several kinds of extinct mammals and cranes have been found.

Antarctica had its fossil forests also. On Alexander Island (Fig 2), forests were buried by extensive volcanic muds. *In situ* stumps allow reconstruction of the forest flood over at least a square kilometer. Up to 6 m of a standing forest is found in a cliff face! These forests are Early Cretaceous, about 120 million years old and are all conifers as they predate the evolution of angiosperms[4].



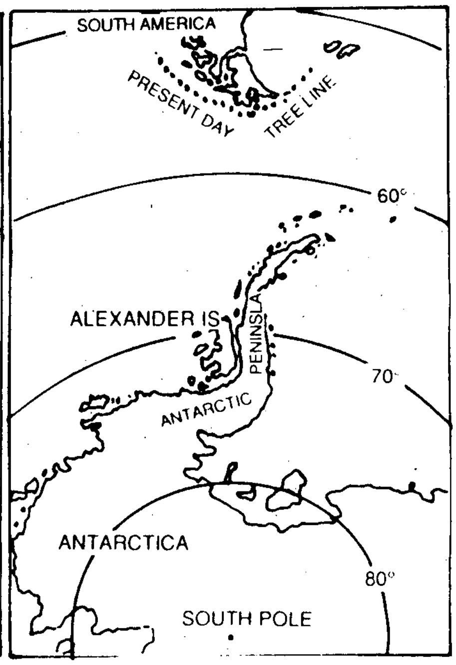


FIG 1. Early Tertiary Arctic fossil forest sites. All of these locations were about the same latitudes then as they are today.

FIG 2. An Early Cretaceous Antarctic fossil forest site on Alexander Island. Latitudes have hardly changed since the Early Cretaceous.

These fossil forests are polewards of the tree line and the climate must have been warmer to allow forest growth. Mean annual temperature is estimated at 10 - 20 °C, with a low mean annual range of 10 - 15 °C. In some places, frosts would have been rare. And most important for plant growth, the forests would have grown in the polar summer of almost continuous daylight and the long, dark polar winter, with temperatures barely as low as freezing point. Forest conditions such as these are unknown today, and to some, are inconceivable.

Growth rings in the wood reveal strongly seasonal growth, with abrupt cessation and very little late wood. Growth rings of about a half to 1 cm are common, whereas trees of high latitudes today usually produce rings of less than a half centimetre[5]. These polar forest had a productivity more comparable with temperate and subtropical forests[6].

How could such forests exist? Was there enough sunlight for tree growth in polar latitudes? Why were temperatures so much higher than those of today? How could the rich biota survive the long polar winter?

Measurements of solar radiation show that there is sufficient light for tree growth. A deciduous tree in temperate latitudes would intercept less solar radiation during the time the leaves are on the tree than these polar forests. The light would have been low incident, as the sun does not rise above 43° in the polar latitudes. The fossil stumps show comparatively widely spaced trees, hence reducing shading from neighbours. If the trees were a tall conical shape, there would be minimal shading. Models show that a tall conical shaped tree is ideal for maximum interception of light in polar latitudes[5].

Woody species may have ecotypes especially adapted for growth in high latitudes. The cambium which produces the wood, may divide much faster, thus allowing very rapid growth in the short polar summer. If these ecotypes are transplanted to lower latitudes, they do not grow well at all. Dormancy would allow survival through the polar winter. Ways of avoiding an unfavourable season include deciduousness, annuals whose seeds over winter and perennials, which die back to bulbs or root stocks. Evergreens which retain their leaves may become physiologically dormant, thus avoiding a heavy loss of reserves through respiration during the warm, dark winter[5]. The animals could hibernate if food was scarce during the winter.

How could such equitable climates exist in polar latitudes? A number of explanations have been offered. The obliquity of the earth's rotational axis was less, hence the polar regions received more uniform solar radiation throughout the year. Modelling of what would happen if the earth's present inclination of 23° was reduced to a hypothetical 10° shows that the sun would never rise above the horizon, more than 30°, whereas it reaches

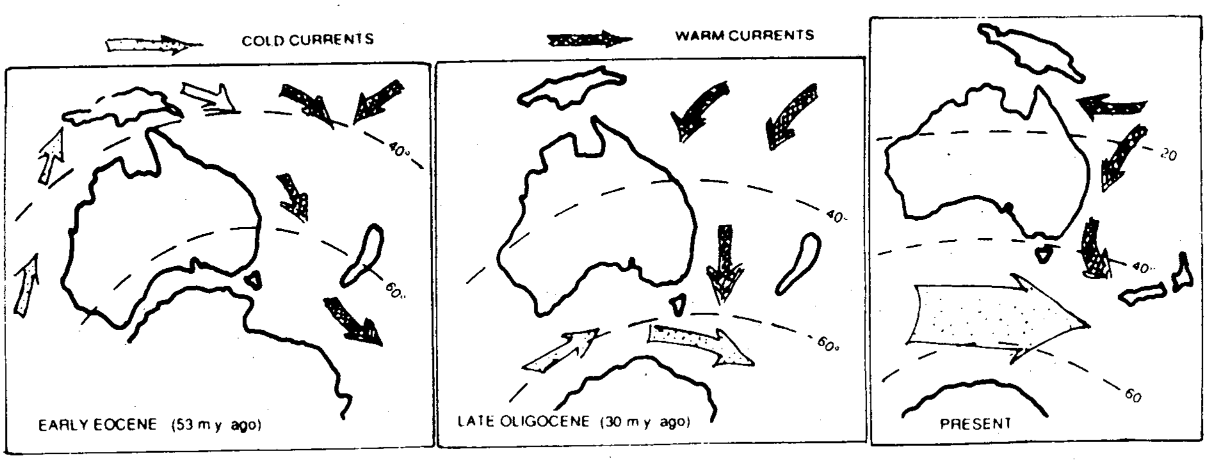


FIG 3. The development of the Circum Antarctic Circulation, the largest ocean current in the world today, and its effect on the heat transfer to polar latitudes

43° now, thus both temperatures and solar radiation would be less[5]. It has been suggested that the incoming solar radiation was higher. While this would warm polar regions, it would bake the tropics to death. Explanations of this kind create more problems than they solve.

The polar regions are warmed both by solar radiation and heat transfer from the tropics to the high latitudes. Both atmospheric and oceanic circulation transfer heat. The rotation of the earth determines patterns of circulation, but oceanic circulation is constrained by the position of the continents. Warm currents in equatorial latitudes are deflected by the east coasts of the continents into the higher latitudes. Today, the south-travelling warm currents are blocked by the Circum Antarctic Circulation which is driven by the westerly winds. When the southern continents were attached to Antarctica, as they were when these polar forests flourished, this circulation could not operate and the warm currents travelled into higher latitudes, thus affecting a greater heat transfer to the polar regions (Fig 3).

Polar glaciations are the exception, rather than the rule, through geological time. The present ice cap on Antarctica started developing about 35 million years and it reached its present extent about 15 million years (but it has waxed and waned somewhat during this time). The glaciation before the present one was in the early Permian some 270 million years ago[7]. Thus for more than 200 million years, the poles were virtually free of ice. Indeed, we owe our substantial black coal deposits, which are economically very important, to forests which grew in polar latitudes, some 240 million years ago.

References

1. Francis, J.E. 1991. Arctic Eden. *National History* 1/91, 57-62.
2. Boyd, A. 1990. The Thyra Ø flora: towards an understanding of the climate and vegetation during the Early Tertiary in the high Arctic. *Rev. Palaeobot. Palynol.* 62, 189-203.
3. McKenna, M.C. 1980. Eocene Palaeolatitude, climate and mammals of Ellesmere Island. *Palaeogeog, Palaeoclim. Palaeoecol.* 30, 349-362.
4. Jefferson, T.H. 1982. Fossil Forests from the Lower Cretaceous of Alexander Island, Antarctica. *Palaeontol.* 25, 681-708.
5. Creber, G.T. & Chaloner, W.G. 1985. Tree growth in the Mesozoic and Tertiary and the reconstruction of Palaeoclimates. *Palaeogeog. Palaeoclim. Palaeoecol.* 52, 35-60.
6. Chaloner, W.G. & Creber, G.T. 1989. The phenomenons of forest growth in Antarctica: a review. In Crame, J.A., Ed., *Origins and Evolution of the Antarctic Biota.* Geol. Soc. Spec. Publ. 47, 85-88.
7. Brown, D.A., Campbell, K.S.W. & Crook, K.A.W. 1968. *The Geological Evolution of Australia and New Zealand* Permagon Press.

PROGRAMME

LINNEAN SOCIETY OF NEW SOUTH WALES

Joint meeting with the
ANTARCTIC SOCIETY OF AUSTRALIA

Dr. John Long

Curator of Vertebrate Palaeontology,
Western Australian Museum

Hallstrom Theatre, Australian Museum
Thursday, 30th April

"NEW DISCOVERIES OF DEVONIAN ANIMALS IN ANTARCTICA"

John Long has collected fossils in many parts of Australia, in Thailand and Vietnam and, more recently (1991-2), in Southern Victoria Land, Antarctica. He has been actively involved in the search for fossil vertebrates in Western Australia and has spent five seasons collecting remarkably preserved Devonian fishes from ancient reef complexes in the Kimberleys. He also led field teams which found many new dinosaur footprint sites along the north west coast of W.A. and recovered bones of the first pterosaur (flying reptile) ever found in W.A.

John Long will give an illustrated talk on his 1991-2 expedition to Antarctica with a New Zealand team during which he recollected from known fossil fish sites in the Transantarctic Mountains and also visited and collected from rich new sites of the same age in the Cook Mountains.

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 20 MAY 1992

at 6.00 pm

Caley Seminar Room, Herbarium

Royal Botanic Gardens

(Enter from Mrs. Macquaries Road)

DR. ALBERTO ALBANI

School of Applied Geography

University of New South Wales

SEA LEVEL CHANGES AND COASTAL MORPHOLOGY

Fluctuations of sea level during last 2 million years have affected coastal morphology world wide. The purpose of this discussion is to present findings of work being conducted offshore of metropolitan Sydney. This work documents the evolution of coastal rivers during last 2 million years.

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 17 JUNE 1992

at 6.00 pm

Caley Seminar Room, Herbarium

Royal Botanic Gardens

(Enter from Mrs. Macquaries Road)

A/PROF. JOHN DODSON

School of Geography

University of New South Wales

LATE QUATERNARY VEGETATION, CLIMATE, FAUNA AND PEOPLE IN NORTHWEST N.S.W.

Little data on the development and Quaternary history of the north west slopes and plains of N.S.W. have been available until recently. Analyses of pollen, sediment, bone and archaeological remains have made a substantial contribution to Quaternary climate and a number of other questions in Australian biogeography.

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

WEDNESDAY 22 JULY 1992

at 6.00 pm

J. H. Maiden Theatre,
Royal Botanic Gardens
(Enter from Mrs. Macquaries Road)

DR. DAVID MURRAY
School of Botany
University of Sydney

SEED PROTEIN ELECTROPHORESIS IN RELATION TO PLANT SYSTEMATICS

Seed protein electrophoresis first flourished in the 1960's, with the advent of polyacrylamide gel. How useful for systematic purposes are the banding patterns generated by seed proteins on polyacrylamide gels? This depends on the type of gel, e.g. uniform pore, or pore-gradient, and also whether proteins are dissociated with detergents like SDS (sodium dodecylsulphate) or not.

Examples of useful comparisons will be given from legumes including chick pea and *Acacia*, and the marine genus *Zostera*.

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO 64 JULY 1992

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IN THIS ISSUE

CONGRATULATIONS DR. PAT MATHER, A.O.

Dr. Mather of the Queensland Museum became an Officer of the Order of Australia, for recognition of her services to Marine Sciences.

NEW MEMBERS

We welcome:

Ms. Judith Furby, School of Geography, University of N.S.W.
Mr. Michael A. Cole, School of Biological Science, University of Sydney

PAPERS ACCEPTED FOR PUBLICATION

J.M. Hush, C.R. Hawes & R.L. Overall. A novel method for visualization of microtubules in plant tissues.

CLARKE MEDAL TO DR. SHIRLEY JEFFREY

The Society nominated Dr. Shirley Jeffrey, Chief Research Scientist, C.S.I.R.O. Division of Fisheries, Marine Laboratories, Hobart to the Royal Society of New South Wales for the Clarke Medal, awarded for distinguished work in Natural Science. Our nomination was successful and we congratulate Dr. Jeffrey.

Each year awards such as this are made. If you know of someone, especially a member, who should be awarded an honour, we would be pleased to hear of him/her.

SELBY FELLOWSHIP

The fellowship is awarded to distinguished overseas scientists to visit Australia for public lectures/seminars. The fellowships are tenable for 2 weeks to 3 months and air fares and a daily allowance are provided.

Nominations for 1993 close 31st July, 1992. For further information, contact The Executive Secretary, Australian Academy of Science, G.P.O. Box 783, Canberra. ACT. 2601. or phone Faye Nicholas, (06) 247 5777.

THE FENNER CONFERENCES ON THE ENVIRONMENT

A grant of $5,000 is available to support a conference in which relevant scientific, administrative and policy expertise consider current environmental and conservation problems in Australia, thereby contributing to the formation of policies that can alleviate some of these problems.

Applications for a meeting in 1993/1994 close 31st August 1992. For further information, contact The Executive Secretary, Australian Academy of Science, G.P.O. Box 783, Canberra. ACT. 2601, or phone Faye Nicholas, (06) 247 5777.

SEA LEVEL CHANGES AND COASTAL MORPHOLOGY: A lecture by Dr. Alberto Albani, 20th May, 1992

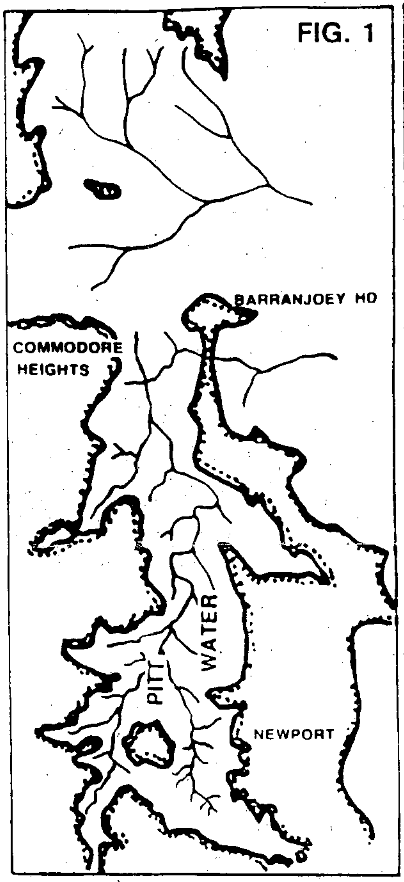
The coast line is dependant on the sea level which changes almost continuously. In glacial times, huge volumes of water are piled up on the land in the ice caps. An estimated 27% of land was covered by ice which was equivalent to 5% of the water in the oceans, during the last glacial period. Five percent of the oceans means a drop of 120m in sea level and the coastline would have been at the edge of the continental shelf. With a lower sea level, the water in rivers flows with increased hydraulic energy because of the greater drop to the ocean, and the rivers cut huge V-shaped valleys. When the the sea level rises, it drowns there valleys, producing a much indented coastline.

As the rivers cut back, they remove huge amounts of sand, silt and clay and transport it out to sea. The finer particles of clay and silt are transported the furthest away, but the larger sand particles are deposited close to the coastline. As the sea level rises, it reworks the sand. Wave action throws the sand up on beaches and wind action blows it further inland as dunes.

Sand is a very important economic resource. Cement requires sand. One and a half million tonnes of sand per year are required for the building industry around Sydney. Sand is cheap and there is plenty of it around, but transport costs are high. Thus it is necessary to exploit resources close by. The large sand deposit on Kurnell is being removed and will run out. The building industry is looking to Dr. Albani's work to solve some of their problems. So what began as scientific study has become economically important.

Dr. Albani had to develop his own methods for a study of the coastal environment. These methods are being used around the world, and especially in the Mediterranean to find out what is beneath the sea, on the continental shelf. A boat trails a sparker, the noise source, and much further behind it, a set of hydrophones. The hydrophones pick up the noise and echoes reflected from the surface of the sediment under the water, any layering of the sediments as a result of changes in density, and the bedrock.

The first task was to identify the course of the major rivers when the sea level was low. The rocky headlands of Broken Bay confine the course, of the Hawkesbury River and the outlet was the same as today. The bottom of Pitt Water had a meandering stream which flowed out south of Barrenjoey Head (Fig. 1). The neck of sand obscures it today. Jervis Bay had two parallel drainage systems which joined close to the mouth of the bay (Fig. 2).



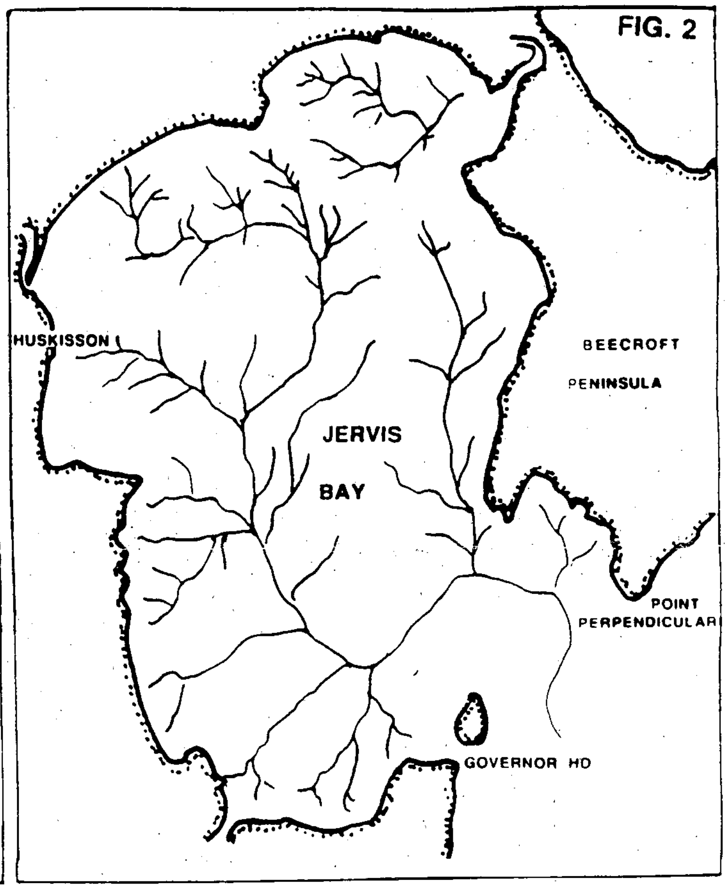


Fig. 1 The drainage system in Pitt Water and the entrance to Broken Bay, at the time of the last glacial period 18,000 years ago. From Albani & Johnson (1974).

Fig. 2 The drainage system in Jervis Bay at the time of the last glacial period 18,000 years ago. From Albani *et al.* (1973).

In Botany Bay, the region of Captain Cooks Bridge was the last rocky constraint on the Georges River, the main catchment of the area. Cooks River had a small catchment and flowed south to join with Georges River under the Kurnell sandmass. There was a third, minor stream which drained the northern side of Botany Bay, as far as the Paddington high and this stream flowed out through the main outlet (Fig.3). Rising sea level brings the sand back and sand bars increase in the mouth of the outlets. At 30m below sea level, the divide between the two systems was flooded and the minor outlet became the only one. Sand piled up further to produce the large Kurnell sandmass.

Once the streams made their exit from our present coastline, they would have had to cross the coastal plain (now continental shelf) before reaching the sea, during times of low sea level.

Drowned coastal terraces are found on the shelf, and there is one 5-7km offshore. As sea level rose and brought the sand back with it, the cliffs of these terraces trapped the sand, so that there are sand bodies in 50m depth of water, well below wave action which can move sand down to 30m. Would it be environmentally acceptable to remove this sand? It has no connection with beaches and is not touched by waves. A giant vacuum cleaner would suck up the sand into a barge, and one or two barges per day would supply Sydney with all its needs of sand. The sand would not require treatment, the small amount of residual salt does not cause any problems. Industry is seriously considering this proposal.

The soft sediments rest on a hard surface, too hard to be dredged. This surface is thought to be Miocene in age. Bedrock is found beneath this surface. 52km east of Botany Bay, there is an extinct, underwater volcano capped with a coral reef. This volcano is probably Mesozoic in age.

So next time you stand on a rocky headland and gaze out to sea, travel back in time and imagine what the view would have been 18,000 years ago, when the coastline would have been at the edge of the continental shelf.

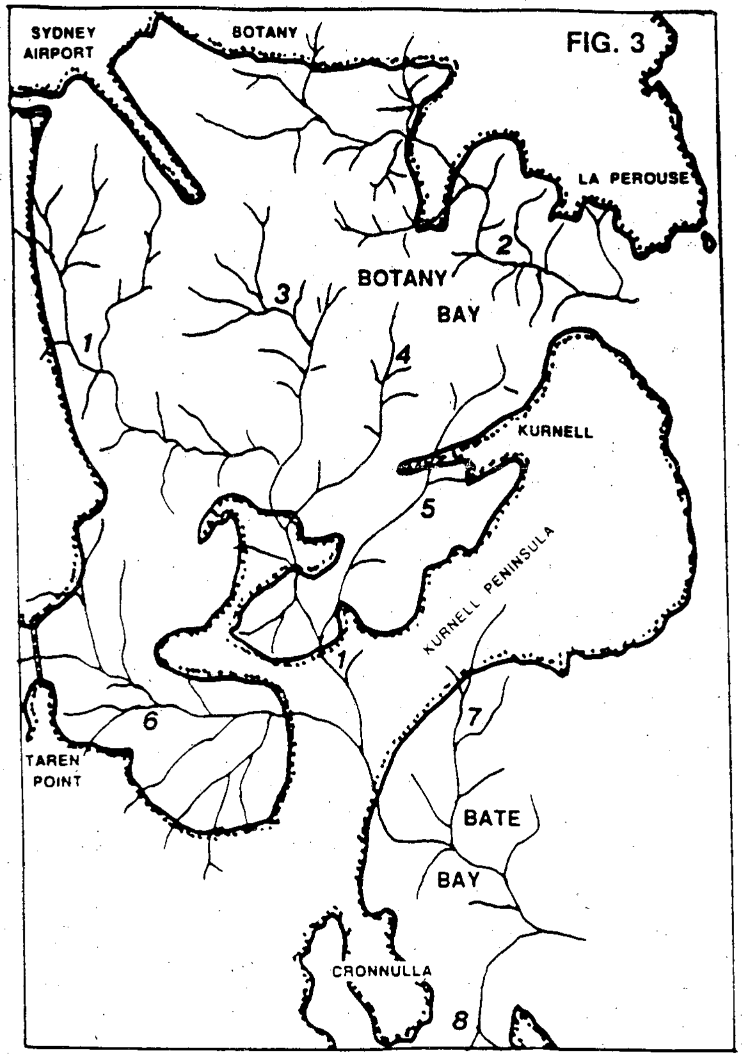


Fig. 3 Botany Bay 18,000 years ago.1) 'Cooks River' 2) 'Botany River'3) 'Towra River' 4) 'Bonna River'5) 'Kurnell River' 6) 'Georges River' 7) 'Osborn River' 8) 'Port Hacking River'. From Johnson *et al.* (1977).

References:

Albani, A.D., Carter, A.N. & Johnson, B.D., 1973. The bedrock topography of Jervis Bay, New South Wales. *Oceanography of the South Pacific* 1972, comp. R.Fraser. N.Z. Nat. Comm. for UNESCO, Wellington 179-183.

Albani, A.D. & Johnson, D.B., 1974. The bedrock topography and origin of Broken Bay, N.S.W. *J. Geographical Soc.,Aust.* 21, 209-214.

Johnson, D.B., Albani A.D., Rickwood P.C. & Taylor, J.W. , 1977. The bedrock topography of the Botany Basin, New South Wales. *J. Geol. Soc. Aust.* 24, 403-408.

LATE QUATERNARY VEGETATION, CLIMATE FAUNA AND PEOPLE IN NORTH WEST NEW SOUTH WALES. A lecture by A. Prof. John Dodson, 17th June, 1992

Prof. Dodson's work is remarkable in that he has been able to find pollen for study in a semi arid environment. It is usually assumed that lakes, swamps, bogs and peat deposits are necessary for palynology. His scenic slides showed semi arid sclerophyllous forest and woodland with open grassy patches or clay pans, and perhaps a small, swampy patch where there was seepage from a spring: not the places usually chose for palynology.

Ulungra Springs near Mendooran (between Gilgandra and Dunedoo) is a small swampy hollow in the creek flats receiving seepage from the Pilliga Sandstone, which forms the surrounding ridges. Prof. Richard Wright had discovered the springs in early surveyor's reports and excavated the site in a search for artifacts and megafauna, but it was not a very productive site for archaeology. Pollen is found in some seven metres of clay and extends back about 30,000 years, to before the last glacial period. Thirty thousand years ago, a eucalypt/*Angophora* forest with the sclerophylls *Lonandra, Bossiaea, Pimelea* and *Hibbertia* was present, much the same as is found on the sandstone today. These dwindle and at the last glacial maximum, some 18,000 years ago, were replaced by grasses, chenopods, Asteraceae (daisies) and *Plantago*: arid vegetation. Thus in the last glacial period, the arid zone migrated some 500-600km towards the coast. In the last 10,000 years, the forest returned, much the same as it was before the glacial period. *Callitris*, significant on the Pilliga Sandstone was hardly present in these forests. The last few thousand years are missing from the record, hence it is not known when *Callitris* became important in the Pilliga forests. There are more fresh water algae in glacial times; the spring was more active. Trees are good at soaking up ground water, but the glacial was treeless and the water table higher.

Cuddie Springs (near Carinda, between Walgett and Nyngan) is a dry clay pan, not a spring. In the 1930's, the Museum excavated the site and recovered crocodiles, turtles and a giant, 3 metre, flesh eating goanna. These are undated, but are well beyond the range of human habitation. The site was a lake, a watering hole for the animals. In March, 1992, A/Prof. Dodson drilled the centre of the former lake and found stones, many of them artifacts. In this setting, a lake with no inflow or outflow,which would fill up very gently, any stones in it would have to be carried there. Charcoal throughout was very good for dating, and there were bones mixed throughout. This layer of artifacts and bones dated 28-30,000 years old: the aborigines would have used it at a time that the lake level was very low. Such a find was a job for a team - an archaeologist, a palaeontologist (to work on the bones), a geomorphologist and the palynologist (Ms. Judy Furby, our new member). A hole has been excavated to seven metres, with the assistance of volunteers and cooperation of the Aboriginal Land Board representative. The most exciting find was a diprotoden jaw bone and a giant emu bone, with an artifact between them: undisputed evidence that man and megafauna were associated, and this may be the first undisputed evidence in the world for this association! The artifacts have blood cells on them, evidence that they were used for butchering. There are grindstones with traces of plant remains on them, and at 28-30,000 years old, they are the oldest in the world! Ochre was found at the site also, showing that it was used for ceremony.

Today a semi-arid woodland of black box and coolibah, with lignum, acacias and herbs surrounds the clay pan. Thirty thousand years ago, there were some trees, and they decrease in the glacial period. The lake dried up about 15,000 years ago and has remained dry since then.

The teamwork continues on all aspects of the project. A/Prof. Dodson intends to investiage other sites in the area. Lake Narran, it is hoped, will provide the last 15,000 year record missing from Cuddie Springs. The results will be a most comprehensive record of life in the semi arid zone. It is also one of the oldest dated aboriginal sites. Only the Lake Mungo fire place at 38,000 years is older.

Reference

Dodson, J.R. and Wright, R.V.S., 1989. Humid to arid to subhumid vegetation shift on Pilliga Sandstone, Ulungra Springs, New South Wales. *Quaternary Research*, 32, 182-192.

PROGRAMME

A smaller, more economical format for the programme is adopted to save costs. However, the old large format, suitable for notice boards is available on request. Ring Dr. Helene Martin, 697 2071 and your name will be put on the mailing list large notices.

☞ **Friday, 17th July,** 7.30pm, Hallstrom Theatre, Australian Museum (Antarctic Society meeting)

Dr. Barry McKelvey will speak on **The Last Forests in Antarctica**

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☞ **Wednesday 22nd July,** 6pm in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road).

Dr. David Murray, School of Botany University of Sydney.

Seed protein electrophoresis in relation to plant systematics
Seed protein electrophoresis first flourished in the 1960's, with the advent of polyacrylamide gel. The use of the banding patterns generated by seed proteins on polyacrylamide gels depends on the type of gel, e.g. uniform pore, or pore-gradient, and also whether proteins are dissociated with detergents like SDS (sodium dodecylsulphate) or not. Examples of useful comparisons will be given from legumes including chick pea and *Acacia*, and the marine genus *Zostera*.

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☞ **Wednesday, 19th August** at 6pm in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquarie Road).

Dr. Helen Martin, School of Biological Science, University of N.S.W.

Late Cainozoic history of the vegetation of northern Australia
Very few sites in northern Australia have been studied palynologically. Recent work on deep ocean cores drilled off the northwest and northeast coasts of Australia add substantially to the history of the vegetation of the last 15-20 million years. The vegetation was different on the two sides of the continent, and different to that of southeastern Australia.

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☞ **Wednesday 23rd September** at 6pm in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road).

Ms. Kerryn Parryn-Jones, School of Biological Science, University of N.S.W.

How and why is the Grey-head Flying-fox Colony Site at Gordon, Atypical?
Grey-headed Flying-foxes (*Pteropus poliocephalus*) form large autumn mating colonies at intervals of approximately 30km along the coast of N.S.W.. The matting site which is located in the Sydney suburb of Gordon is atypical in that it is occupied not only in autumn but throughout the year by substantial numbers of flying-foxes and its pattern of occupation is similar from year to year.

The variety and patchy distribution of plants within the city of Sydney is largely responsible for the atypical nature of the Gordon colony. Exotic and introduced native species have enriched the winter and spring food supply and so permitted large numbers of flying-foxes to be resident in the area during these seasons. While the scattered distribution of the available food resources has resulted in a concentration of these flying-foxes at one site rather than the numerous sites commonly seen in less urbanised areas.

☞ **Wednesday 21st October** at 6pm, in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road).

Prof. P.R. Reeves, University of Sydney and Linnean Macleay Fellow in Bacteriology will speak on the surface properties of Salmanilla which relate to its virulence, the genetics and evolution of bacteria and its bearing on the development of vaccines.
TO BE CONFIRMED IN THE SEPTEMBER NEWSLETTER.

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☞ **Wednesday 18th November** at 6pm in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road).

A/Professor Paul Adam, School of Biological Science, University of N.S.W

Some mysteries in Australian rainforest ecology
The development of the historical ecology of Australian rainforests provides a classic example of a paradigm shift. From being seen as recent immigrants, many rainforest taxa are now recognised as being long standing occupants of the continent. The new story still has many loose ends. In this lecture attention will be drawn to some of these.
A/Prof Adam has written a book "Australian Rainforest" which should be out by the time of the lecture.

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EVERYONE WELCOME

Wine and cheese will be served from 5.30pm for the lectures held at the Botanic Gardens.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 65 OCTOBER 1992

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IN THIS ISSUE

NEW MEMBERS

We welcome:
Mr. John A. Irvine, Retired Chemist, Chatswood.
Mrs. Betty J. Rees, School of Biological Science, University of NSW.
Mr. Gerasimos Cassis, Entomologist, Australian Museum.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1993. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close **6 November 1992.**

AWARDS FROM JOYCE W. VICKERY RESEARCH FUND

Dunstan, Catherine Elizabeth, School of Biological Science, University of NSW
PROJECT: The effect of habitat disturbance and fragmentation on cool temperate rainforest remnants. Remnant vegetation patches can be considered habitat islands. Temperate communities are usually considered to be more resistant to fragmentation than tropical communities. This study of the mammal and arthropod diversity of the Yarrawa Brush near Robertson is designed to complement the vegetation surveys that have already been undertaken. Awarded $500 for travel and equipment expenses.

Forster, Paul Irwin, Queensland Herbarium
PROJECT: Revisionary studies in *Marsdenia* R. Br. (Asclepiadaceae) in Australia and Papuasia.
The genus *Marsdenia* includes 72 species in Australia, New Guinea and the Solomons, half of them new. Several of the new taxa require illustration. The leaves and flowers of this group are rather succulent and the flower structure is complex. Awarded $500 for 2.5 botanical plates.

Furby, Judith Heather, School of Geography, University of NSW
PROJECT: Humans, megafauna and environment in the late Pleistocene in northwestern New South Wales.
The aim is to examine the palaeoecology and possible interaction of populations of humans, megafauna and vegetation in an arid zone in response to climatic changes. Cuddie Springs is an ephemeral lake, with many fossil fauna remains, abundant pollen, and artefacts, dated at about 29,000 years BP. Bone is scattered through the deposits and dating is needed to establish whether it is contemporaneous with the associated artefacts. Awarded $500 for a Fluorine Ion Selective Electrode for bone analysis and relative dating.

Gore, Damien Bruce, Graduate School of the Environment, Macquarie University
PROJECT: Morphology, genesis and hydrological processes in ice gullies in the Vestfold Hills.
There are several opposing models for variation of ice volume on East Antarctica during the last 3 - 4 million years. One view is that during the Pliocene, the Antarctic ice sheet was cut in two, and the other view contends that it was not. Contradictory evidence supports both views. However, no-one has yet considered the processes which may have been responsible for the rapid decay of a terrestrial ice sheet margin. The ice gullies appear to be sites where very rapid incision and downwasting of the ice sheet occurs. This study will determine the significance of the large superaglacial ice gullies. In sediments and soils, fluvial incision occurs when certain critical thresholds (of stream power and shear stress) are exceeded. This research is designed to test the hypothesis that the ice gullies are created by supraglacial streams which pass those thresholds. Awarded $504 for airfare, Sydney - Hobart to join "Aurora Australis' and film.

Graham, David Stuart, Department of Zoology, University of Queensland
PROJECT: A taxonomic study of the trochid genus *Austrocochlea* Fischer 1985.
The genus *Austrocochlea* is an ecologically important intertidal group. Its taxonomic composition and delimitation from other genera need study. The current project aims to examine various morphological characters, making particular use of the SEM to examine the radulae. Awarded $200 for SEM materials and use, and photocopies of literature.

Hay, Alistair, Horticultural Botanist, Royal Botanic Gardens Sydney
PROJECT: Natural history of the endemic flora of the granitic Seychelles.
The Seychelles Islands represent relic fragments of Gondwana, and are rich in endemic plant taxa, many related to Australian taxa. The entire endemic flora is considered endangered. The aim is to study the natural history of the endemic species, both in the wild and subsequently in cultivation, resulting in a chapter in a book on the natural history of the Seychelles. Awarded $500 for collecting expenses, field assistance and freight.

Henwood, Murray James, School of Biological Science, University of Sydney
PROJECT: Taxonomy of *Astrotricha* sp. aff. *asperifolia*.
The genus *Astrotricha* is of particular interest because it is morphologically intermediate between the families Araliaceae and Apiaceae. Its taxonomy is poorly known and is being studied. Funding is sought for fieldwork in Victoria to complement work already done in NSW and Queensland. This apparent new species from the Grampians is geographically isolated from other species but is morphologically intermediate between two other species. Awarded $500 for fieldwork expenses.

Karsten, Ulf, School of Biological Science, University of NSW
PROJECT: Ecophysiology of marine and red algae in Australian mangroves.
Intertidal marine red algae are subjected to wide ranges of salinity and desiccation. The aim is to investigate physiology and osmoregulation in species around Sydney and to compare other species from Queensland and Victoria. Awarded $500 for fieldwork.

Morris, Deborah Anne, School of Biological Science, University of NSW
PROJECT: The evolution and mechanics of flight in bats and gliding in marsupial gliders.
The possible evolution of the flight musculature of bats from gliding ancestors is being investigated. Dissection of bats and gliders will be supplemented by electromyography and cineradiography of bats in flight. The latter will be undertaken at Harvard University, where equipment and expert advice are available. Awarded $500 for travel expenses.

Mostaert, Anika Simone, School of Biological Science, University of NSW

PROJECT: Ultrastructure and osmotic adjustment in *Caloglossa leprieurii*.
Cell structure and osmotic adaptation to changes in external salinity are being studied in this intertidal marine red alga. Funding is needed for extensive analysis of inorganic ions. Awarded $500 for ICP (inductively coupled plasma atomic emission spectroscopy) analysis of inorganic ions.

Murray, David Ronald, University of Sydney
PROJECT: The affinities of island species *Acacia* that bear phyllodes.
The four major subgroups of *Acacia* are characterised by the presence of particular 'non-protein' amino acids. Not all phyllodinous species from islands have the same array of non-protein amino acids as the Australian phyllodinous species. Two island species (from Taiwan and Hawaii) are to be studied to determine whether their seed proteins indicate relationship with an African-Asian group rather than with the Australian group. As well, distinct ecotypes of one species, *Acacia koa*, a timber species from Hawaii, will be examined to determine whether these ecotypes can be characterized by seed protein electrophoresis. Awarded $220 for chromatographic materials.

Scanlon, John David, School of Biological Science, University of NSW
PROJECT: Palaeontology and systematics of Australian snakes.
Little work has been done in Australia on fossil snakes, although there has been much research in Europe. It is sought to extend a study of snakes mainly from the Tertiary deposits at Riversleigh by working at the University of Bonn for a year. An exchange scholarship covering expenses within Europe has been received but this does not include airfare from Australia. Awarded $500 to partially cover return airfare to Europe.

Willis, Paul Michael Arthur, School of Biological Science, University of NSW
PROJECT: Phylogenetic systematics of Australian Crocodilians.
A study on the crocodilians is nearing completion. An exchange scholarship to the University of Bonn will enable examination of comparative material of both fossil and extant crocodilians in European collections. Awarded $500 towards return airfare to Europe.

Donations to the Joyce W. Vickery Research Fund are tax deductible.

GARGANTUANS FROM THE GARDEN
At the Australian Museum, 26 September 1992 - 5 February 1993

Take a walk into the world of insects. You'll come face-to-face with giant robotic insects and spiders in this amazing new exhibition at the Australian Museum, where blades of grass stand as high as humans. There are live bee and ant colonies, films and interactives, spectacular closeup photography and all sorts of insects as you've never seen them before! You can join in the fun of the regular insect activities too.

SEED PROTEIN ELECTROPHORESIS IN RELATION TO PLANT SYSTEMATICS.
A talk given by Dr. David Murray

The proteins found in plants may be very different. Osborne in 1916 established that zein, the major seed protein fraction from maize, had no lysine, an essential amino acid. Most cereals are deficient in lysine. There are vast differences in the protein fraction between monocots and dicots. These differences may be analysed and used in systematics.

Seed proteins are extracted and they may be treated with certain chemicals to break specific bonds. The extract is put on a polyacrylamide gel and subjected to an electric field, which separates different proteins and this process is called electrophoresis. The type of gel used in is very important. The gels may have a uniform pore size, but gradient pore size gels are more convenient and they act as a molecular sieve, ordering proteins by size.

Seed protein electophoresis may answer questions such as: Are *Acacia longifolia* and *A. sophorae* distinct species? There is sufficient evidence to maintain the two separate species. All *Acacias* analysed have a particular protein component which suggests the genus should not be split up.

Is *Sophora macrocarpa*, endemic to Chile, descended from *S. microphylla* found in both Chile and New Zealand? The two will hybridise and the hybrids are fertile. There is a tree of *S. microphylla* of unknown origin in the Melbourne University System Gardens. An analysis of the proteins show that they are very similar and came from New Zealand (Fig. 1). *Sophora tomentosa* and *S. davidi*, however, are clearly different and may have to go into another genus.

There are two wild chick peas in Turkey. Which one is the progenitor of the cultivated type? All three are very similar showing a close relationship.

Zostera, an aquatic plant, has a small seed like a sesame seed. Protein analyses reveal the distinctive protein, zosterin. All species of *Zostera* have zosterin, but there are clear differences between the species.

The seed protein electrophoretic profiles are most useful when relationships between taxa have been defined on the basis of other information. The protein profile may establish the closeness of relationships.

Reference: Murray, D. R., Ed., 1986. *Seed dispersal* Academic Press, Sydney.

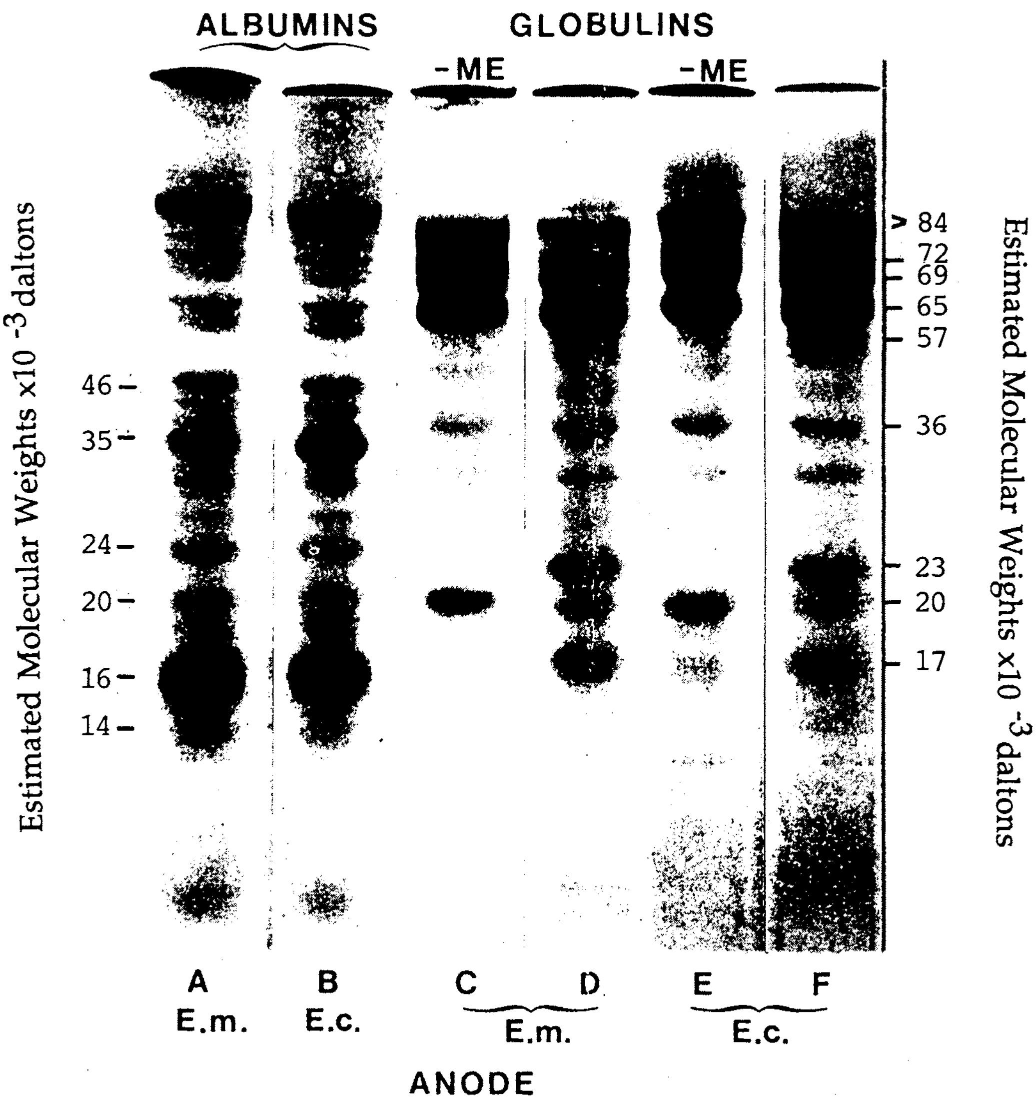

Fig. 1 Electrophorectic profiles of albumen (A, B) and glolulin (C - F) fractions from embryos of *Sophora microphylla* (S.m.) and *Sophora macrocarpa* (S.c.), both from Chile C and E have been treated with a reagent to break specific chemical bonds. From Murray (1986).

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

☞ **Wednesday 21st October** at 6pm in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road).

Professor Peter Reeves, School of Microbiology, University of Sydney and Linnean Macleay Fellow in Microbiology.

How to study evolution in bacteria when they all look so alike and fossils are not very helpful
Bacteria are very simple in shape, and the relationship between groups cannot be worked out by studies on shape, structure etc. as is often the case for plants or animals. However DNA gene sequence data is revealing the relationships and evolutionary past of this ancient group. We have been working on the evolution of some of the surface components which are important in *Salmonella,* some strains of which give food poisoning and one is the cause of typhoid fever. We have found much to surprise us in the study of this one component of one species. I will talk about some of the general aspects of studying evolution by using sequence data and some of the conclusions we come to as we get to understand the origins of this remarkable group of organisms. Technical terms will be kept at bay as far as possible.

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☞ **Wednesday 18th November** at 6pm in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road).

A/Professor Paul Adam, School of Biological Science, University of N.S.W.

Some mysteries in Australian rainforest ecology
The development of the historical ecology of Australian rainforests provides a classic example of a paradigm shift. From being seen as recent immigrants, many rainforest taxa are now recognised as being long standing occupants of the continent. The new story still has many loose ends. In this lecture attention will be drawn to some of these.
A/Prof Adam has written a book "Australian Rainforest" which should be out by the time of the lecture.

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EVERYONE WELCOME

Wine and cheese will be served from 5.30 pm for the lectures held at the Botanic Gardens.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 66 JANUARY 1993

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IN THIS ISSUE

STOP PRESS. The Annual General Meeting will be on Wednsday 24 March, not 31 March, as advertised previously.

DONATION FROM PROF. D. HILL

We thank Prof. Hill for a donation to the Library Fund. All donations to the Library Fund and the Joyce W. Vickery Research Fund are tax deductible.

PAPERS ACCEPTED FOR PUBLICATION

A.W. White, R.W. Whitford and M.J. Mahoney (Communicated by D.S. Horning) - A new species of *Litoria* (Anura: Hylidae) from eastern Australia.
H.A. Martin - The stratigraphic palynology of the Namoi River Valley, Baan Baa to Boggabri, Northern New South Wales.
Y.R. Suhardjono and P. Greenslade (communicated by D.S. Horning Jr.) - *Folsomides arnoldi* n. Sp. (Isotomidae): a new Collembolon abundant in arid Australia, with a redescription of *Folsomides denisi* (Womersley).
D.S. Horning - The natural history collections of William John Macleay as reflected through his known diaries (1874-1876, 1878-1881). Presidential address.

CONSERVING BIODIVERSITY: THREATS AND SOLUTIONS PRELIMINARY NOTICE OF A CONFERENCE TO BE HELD AT THE UNIVERSITY OF SYDNEY 29TH JUNE - 2ND JULY 1993

The New South Wales National Parks and Wildlife Service will host a four day conference on the conservation of biodiversity. The conference will be held at the University of Sydney as part of the 25th Anniversary of the Service.

The conference will focus on threats to biodiversity (natural species and systems) and will review the impact of these threats and the range of solutions available to counter them, to ensure the conservation of wildlife into the next century.

The aim is to define a framework for action, ranging from practical management in the field to planning and legislative requirements needed to sustain biodiversity into the 21st century.

Invited, prominent Australian and overseas speakers will present papers on the following topics:

Why Conserve Biodiversity?
Habitat Loss and Restoration
The Impact of Exotic Plants and Animals on Biodiversity
Pollution and Degradation of Water Resources
Changes to Fire and Climate
Ecologically Sustainable Exploitation of Biodiversity?
Can Governments Solve the Problems?

Display space for poster papers will be available at the conference. If you are interested in submitting a poster paper or you would like to receive registration papers, please contact Lynda Wild, Conference Coordinator, National Parks and Wildlife Service, PO Box 1967, Hurstville NSW 2220, telephone (02) 585 6417.

ANH "Australian Natural History" MAGAZINE: SPECIAL OFFER

ANH has an Associate Membership Scheme designed to benefit the subscriber, clubs and organisations.

The Linnean Society has become an Associate Member (at no cost). If you wish to subscribe and receive a $5 discount, obtain a subscription order form from the Society's Secretary (phone number and office hours are on the first page). A year's subscription becomes $25, not $30. You may subscribe for more than one year and receive a $5 per year discount.

As well as you, the Subscriber receiving a discount, ANH will contribute $5 to the Society. ANH has decided to use its promotional budget this way, instead of spending it on more conventional advertising.

If you have not seen a recent issue of ANH, it is well worth examining. It is an excellent production with some very topical articles on conservation. ANH may be viewed at the Australian Museum.

NEW BOOK: "Masterworks of Man and Nature: Preserving our World Heritage".

The World Heritage Committee has identified 360 natural and cultural sites throughout 80 countries around the world and pronounced them worthy of preservation for all humankind.

Harper-MacRae publishers, have captured the timeless grandeur of these treasures in magnificent colour photography and produced the definitive reference book for the World Heritage List titled "Masterworks of Man & Nature: Preserving our World Heritage".

A stunning, imposing (305mm x 230mm) hardback book, over 400 colour photos, Masterworks offers 448 pages not only of spectactular visual images, but dozens of essays written by the world's most prominent writers, Statespersons and conservationists.

The book is available only through the publishers or conservation groups at considerable savings. If you are interested contact Harper McRae Aust., 30 Carrington Road, Guildford NSW 2161.

HOW TO STUDY EVOLUTION IN BACTERIA WHEN THEY ALL LOOK SO ALIKE AND THE FOSSIL RECORD IS NO HELP, a lecture by Prof. Peter Reeves.

Prof. Reeves began his talk by holding up a small tube containing about 50 ml of a soup of *E. coli* bacteria. The number of bacteria in the tube was equal to the world's population of people!

The characters for study on such small organisms are limited. They are spheres or rods which sometimes remaining linked together in chains. Staining shows some differences of the surfaces and walls. With the electron microscope, more variation in the walls and internal membranes may be seen. Some have add-ons, such as flagellae. The flagellae of bacteria are unique in that they rotate like a propeller. In all other organisms, they are whip-like.

The complexity of bacteria is not their structure, but it is biochemical, metabolic and physiological. Bacteria respond to different media and colonies grow only with the appropriate nutrients. This method limits what is identifiable. For example, it was long believed that *E. coli* was the major organism in the intestine, but it is not. About 99% are other organisms, but they do not grow on the agar medium designed for *E. coli.*

Procaryote cells similar to bacteria are found as fossils, about a billion years old, at Bitter Springs in Central

Australia, but we don't know if they are the same. Fossil stromatolites are similar to those living today, and this is about as much as the fossil record can tell us about the evolution of bacteria.

The taxonomy of bacteria is difficult and real taxonomy only started when sequencing the DNA became possible. The DNA in *E. coli* is about 1mm long, or 1,000 times as long as the organism. It has 4.9 million bases. *E. coli* and *Salmonella* are closely related, with about 15% of the DNA different.

In the small bacterial cell, the DNA, the ribosomes and m RNA are all close together and this allows rapid growth. The ribosomes run along the DNA, reading the code and building up m RNA which goes off and builds proteins. Ribosomes do the same job of reading the RNA in all organisms. They are present in all species and are very conservative, so the RNA in ribosomes is used for the study of evolutionary trends.

Purple sulphur photosynthetic bacteria are anaerobic and have given rise to a number of aerobic bacteria. *Clostridium*, also anaerobic, is the likely ancestor of a number of aerobic forms. *Salmonella* has six different forms of the 165 r RNA gene in the one species. The differences are expressed in the polysaccharides on the outer membrane. The polysaccharide chains may have different sugars and different linkages. One of these strains causes typhoid, but the bacterium may live a long time without causing disease. When the DNA is studied, most of the variation is neutral, but this neutral variation fits it to different habitats. The type of surface structure is important also, as a means of adapting to different habitats.

Using serology, 60 different strains may be detected in *Salmonella* and 160 in *E. coli*. All of these strains are incipient species. There may be exchange of DNA between strains of the same species and between *Salmonella* and *E. coli*, and even very different species. Whole clusters of genes may be transfered. Nature practices its own genetic engineering on a grand scale!

Well adapted genes are conserved. Such genes as ribosomes and haemoglobin, and other 'housekeeping' genes to do with basic life processes. If there is any incentive for change in genes which adapt the organism to its environment, then there is extensive change. Toxins enable a bacterium to get through the gut, and are thus an advantage to the bacterium. There are different toxins for different types of animals, and they are different in their effectiveness. Genes for toxins are quickly picked up by other bacteria. They get nastier all the time!

Resistance to drugs is a definite advantage to the bacteria and is quickly acquired. Resistance to *Penicillium* in gonorrhea was picked up from *E. coli*, a normal resident of the gut.

No doubt Prof. Reeve's studies will aid the fight against disease bacteria, but I was left with the suspicion that the bacteria will always be one jump ahead of us.

LATE CAINOZOIC HISTORY OF THE VEGETATION FROM DEEP SEA CORES OFF NORTHERN AUSTRALIA: a talk by Helene A. Martin

Northern Australia with its tropical element holds a special fascination. Kakadu and the northeast Queensland wet tropical rainforests have received world heritage listing, yet very little is known of the history of the vegetation of these regions. We have a Tertiary history of the vegetation of south eastern Australia but just as northern Australia is very different to the south east today, it would have been different throughout the Tertiary also. Recent work on deep sea cores, one off the northwest coast of Australia and several off northeastern Australia, add substantially to our knowledge.

Does pollen deposited at sea adequately reflect the vegetation on the land? Numerous studies around the world show that the pollen from oceanic sites give a true representation of the regional vegetation and some studies claim marine sediments contain a better record than continental deposits. When pollen deposition in offshore sites is monitored throughout the year, seasonal variation in the pollen on land is observed at sea also.

Site 765 off northwestern Australia, west of Broome, is some 400 km from the shelf margin. The pollen here is redeposited from turbidity currents which carried sediments from the outer shelf slope onto the abyssal plain. There is not much pollen in the sediments, but it is sufficient to show changes.

Ten million years ago, the vegetation was mainly casuarinaceous forests. Acacias and Gyrostemonaceae, which may be trees or shrubs, were important also. With time, the tree cover was reduced and grasslands became predominant. Surprisingly, there is very little of the eucalypt family, so eucalypt dominated vegetation is unlikely.

This part of the northwest was very different to southeastern Australia where eucalypts were dominant in the vegetation over this same time period.

In the present day vegetation of this part of the northwest, eucalypt dominated vegetation is restricted. There are large areas of *Acacia* shrublands, tussock and hummock grasslands and the desert complex. The modern vegetation developed from casuarinaceous forests and woodlands.

Two deep sea sites east of Cairns and Townsville respectively, cover the same time period. The vegetation was very different: spores of ferns (etc), araucarians, podocarps and Casuarinaceae make up most of the pollen count. The low frequency pollen types record a wealth of rainforest and sclerophyllous species. The vegetation over the last ten million years was rainforest and some sclerophyll. Surprisingly, there is very little Myrtaceae or eucalypts. There is little change throughout the sequence. The vegetation became slightly more open with an increase in cyperaceous fresh water swamps in the late Pliocene, but rainforest remained in the region. The Quaternary pollen spectra covering the last one and a half million years show little variation until the last 100 - 150,000 years, when araucarians decrease dramatically. Rhizophoraceae, which includes mangroves, increases. Dr. Peter Kershaw of Monash University thinks aboriginal burning may have destroyed the rainforest, but the Aborigines could not set rainforest alight if it was not dry enough. They would have required assistance from the climate. At the same time, accelerated erosion silted up the estuaries, providing increased habitats for mangroves. Surprisingly, there is very little mangrove pollen prior to the change.

These deep sea sites may be compared to others in northeast Queensland. Aquarius, a well on the shelf, east of Mackay, has a similar spore, araucarian and Casuarinaceae content, but there is appreciable Myrtaceae. *Nothofagus* is present in Aquarius, but it disappeared 15 million years ago, hence it predates the deep sea cores of ten million years. Butchers Creek on the Atherton Tablelands, probably 2-3 million years old, has appreciable *Nothofagus* and Myrtaceae, but very little Araucariaceae.

Quaternary sites on the Atherton Tablelands show cyclic variation in the vegetation corresponding to the glacial/interglacial cycles, which in turn correspond to high and low sea levels, respectively, in contrast to the uniformity of the deep sea cores. The deep sea sites would mainly the coastal vegetation closest to it, and with changes in sea level, the cooastal vegetation was always the closest. With changes in sea level, the coastal and other vegetation zones migrated in unison and thus sites on land would register more change than those at sea. Sites on the shelf would alternate between land and sea, with changes in sea level.

Rainforest was thus maintained continuously throughout the late Miocene-Pliocene in coastal northeast Queensland, in contrasts to most of Australia where rainforest disappeared and the development towards aridity occurred in the late Miocene. The Cairns region today is the wettest part of Australia with the most extensive rainforest. Many primitive angiosperms which evolved under warmer and wetter climates are found there. This region is a refuge for taxa which could not tolerate the climatic change, and the maintenance of a relatively stable environment for rainforest was crucial to their survival.

References

Hekel, H., 1972. Pollen and spore assemblage from Queensland Tertiary sediments. *Geol. Surv. Queensland Publ.*, 355; *Palaeontol. Pap.*, 30:1-32.

Kershaw, A.P., 1985. An extended late Quaternary vegetation record from north-eastern Queensland and its implications for the seasonal tropics of Australia. *Proc. Ecol. Soc. Aust.* 13, 179-189.

Kershaw, A. P., McKenzie, G. M. & McMinn, A. (in press) A Quaternary vegetation history of northeast Queensland from pollen analysis of ODP site 133-820. *In* Davies, P.G., McKenzie, J.A. et al, 1993. *Proc. ODP Sci Results 133*: College Station TX (Ocean Drilling Program).

Kershaw, A. P., and Sluiter, I. R., 1982. Late Canozoic pollen spectra from the Atherton Tableland, northeastern Australia. *Aust. J. Botany*, 30:279-295.

Martin, H. A. & McMinn, A., in press. Palynology of Sites 815 and 823; the Neogene vegetation history of coastal northeastern Australia. *In* Davies, P. G., 'McKenzie J. A. et al, 1993. *Proc. ODP Sci Results 133*: College Station TX (Ocean Drilling Program).

McMinn, A., & Martin, H. A., 1992. Late Cainozoic pollen history from Site 765, eastern Indian Ocean. *In* Gradstein, F. M., Ludden, J. N., et al., *Proc. ODP, Sci. Results, 123*: College Station, TX (Ocean Drilling Program).

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 17 FEBRUARY 1993, AT 12.30 pm IN THE J. H. MAIDEN THEATRE, NATIONAL HERBARIUM, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

We need to know numbers for catering,so please let us know if you are coming BY TUESDAY 9 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061
Telephone: 929 0253 (Tuesdays only)

OR before the 12th, on 848-3616

I wish to make bookings for .... people at $14 per person for the luncheonon 17 February

Cheque for $ ....is enclosed

NAME: ....

ADDRESS: ....

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 67 **APRIL 1993**

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IN THIS ISSUE

VALE DR. TOM VALLANCE

It is with regret that we report the death of Dr. Vallance on 7th March. Dr. Vallance was elected to membership of the Society in 1949 and became a member of Council in 1956. He served four terms as President, in 1959, 1968, 1974 and 1988, and edited the Proceedings from 1979 to 1989. He was Honorary Librarian from 1989. In January 1993, Dr. Vallance was appointed "Councillor Emeritus" in recognition of his long and devoted service to the Society and to its Council, of which he was the longest-serving member at the time of his death.

Tom Vallance will be remembered with admiration and affection by many scientific colleagues for his comradeship as well as his never-failing helpfulness and the highest of standards. These were evident in Linnean Society affairs in both troubled and favourable times, as they were in his teaching and distinguished research in petrology and in the history of Australian geology and botany.

AWARD TO DR. TOM VALLANCE

The Geological Society of London has awarded Dr. Vallance the "Sue Tyler-Friedman Medal" for services to the History of Geology. Dr. Vallance knew of the award before his death, and his son well accept the medal on his behalf.

NEW MEMBERS

We welcome:

Dr. Fiona Lewis, School of Biological Sciences, Macquarie University

Ms. Anne Musser, School of Biological Science, University of NSW.

PAPERS ACCEPTED FOR PUBLICATION:

T. Flannery, D. Colgan and J. Trimble - A new species of *Melomys* from Manus Island, Papua New Guinea, with notes on the systematics of the *M. rufescens* complex.

T. Kobayashi and A. Kotlash - Short communication - Vorticellids (Protozoa: Peritrichida) - planktonic algae interaction in the Hawkesbury-Nepean River, New South Wales.

I.D. Naumann, J.C. Cardale, R.W. Taylor and J. MacDonald - (communicated by D.S. Horning) - Type specimens of Australian Hymenoptera (Insecta) transferred from the Macleay Museum, University of Sydney to the Australian National Insect Collection, Canberra.

DONATION TO THE J.W. VICKERY SCIENTIFIC RESEARCH FUND

We have received an anonymous donation to the J.W. Vickery Scientific Research Fund. Our many thanks to the generous donor. All donations to this fund are tax deductible.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND:

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $500.

Applicants need not be graduates: the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year: however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

INTENDING APPLICANTS PLEASE NOTE:

- Please read instructions carefully.

- Original plus five (5) copies are required.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible.

AUSTRALIAN ACADAMY OF SCIENCE EXCHANGE AND FELLOWSHIP PROGRAMS FOR 1994.

Applicants should propose a collaborative research project, or a specific activity, which has been developed in consultation with scientists or technologists in host institutions in the host country. Letters of invitation from each institution to be visited must be submitted with applications. Proposals will be assessed on their scientific and/or technological merit and the demonstrated achievements of the applicant. The expected outcome of research projects should be of value to Australian science or technology.

Successful applicants will be provided with return airfares, some living expenses, and/or travel expenses.

For some countries, there are both short-term and long-term programs, and there may be fellowship visits as well.

The countries and deadlines for applications are as follows:

France, 1st June 1993

United Kingdom, 1st July, 1993

Korea, 1st August, 1993

Taiwan, 1st September, 1993

China, 1st October, 1993

Japan, 1st November, 1993

Postdoctoral fellowships in Japan are being offered also. The deadline for applications is 1st September, 1993.

Written requests for application forms would be appreciated:

International Exchanges
Australian Academy of Science
GPO Box 783
CANBERRA ACT 2601

Telephone enquires: (06) 247 3966, Judith Hlubucek (9.30am - 1.30pm)

HOW AND WHY IS THE GREY-HEADED FLYING-FOX COLONY SITE AT GORDON, ATYPICAL?

A talk by Ms Kerryn Parry-Jones.

Ms. Parry-Jones monitored sixteen traditional colony sites from Whingham Brush to Narooma. Sydney is situated in the middle of the study area. The flying foxes form colonies for a reason, for feeding, mating, giving birth and nursing. The colonies depend on a good food source. When the food runs out at one site, they move on to another. Gordon is atypical in that the bats remain there the year around.

The bats mate during March, April and May. The young are born in September, October and November. The mothers carry their young babies with them on their nightly foraging trips for about three weeks. When they become too big to carry, they are left at the site at night. In December, the oldest of the young are starting to fly with the adults and by February, there are no young left at the camp site during the night.

The flying foxes prefer native blossom and eucalypt pollen and nectar will form the bulk of their diet if it is available. Banksia flowers may be a substantial part of their diet also. Other native flowers are a food supply as well. Native fruits, such as figs and some leaf material are eaten, but introduced fruits in the orchards are not prefered. They are eaten, however, when food is scarce and in bad seasons. The continual clearing of their native resources means the flying foxes rely on the orchards more. Planting of the native food trees will alleviate the orchardists problems, but it will take time before this remedy becomes effective.

The Sydney flying foxes rely heavily on eucalypt and other myrtaceous blossoms just as much as their country cousins. Most of the winter Myrtaceae, however, have been planted. Other pollen resources utilised by the flying foxes around Sydney are either exotic species or species outside of their natural range and include Illawarra flame tree, loquate blossom, coral tree, silky oak, avocado buds, tulip tree, apricot blossom, umbrella tree and athel pine (*Tamarix*). Most of these are spring flowering.

Figs form a large part of the flying foxes diet around Sydney, and there are many plantings of figs. The enriched food supply around Sydney is the reason the bats stay the year round.

The flying foxes travel about 16km per night around Sydney and up to 50km both ways have been recorded. A trip of 10km in the bush is normal. Some of the Gordon flying foxes moved into the Botanic Gardens in September 1990 and started a satellite colony. The Botanic Gardens are on their traditional flight path to the figs around Moore Park, so moving into the Botanic Gardens cut down their commuting time. The Botanic Gardens have been used as a camp site, on and off, through the years. The flying foxes are not welcomed in the Gardens for they damage the trees and the authorities were worried they would loose some valuable plantings. Everything was tried to frighten them off, but they ignored almost everything. Even a rock concert failed to persuade them to leave. A person beating a metal garbage bin caused the most disturbance. In September, 1992, they left, and peace descended on the Botanic Gardens. Relics of attempted eviction can be seen in a walk through the palm groves. Tall trees are festooned with plastic shopping bags which once held blocks of toilet deodoriser. Soon after the bags were put in place, with the help of a cherry-picker, the blocks were found on the ground. Teeth marks on the blocks showed they had sampled the deodoriser and judged them unfit for flying fox consumption.

It is not known why the fruit bats prefer Gordon as there are other bushland sites that they could occupy. They moved their roosting site further along the valley after the lantana under the colony was removed. They are thus susceptible to disturbance, but the effect may be delayed.

SOME MYSTERIES IN AUSTRALIAN RAINFOREST ECOLOGY:

a Lecture given by A/Prof. Paul Adam.

Some of the problems regarding rainforests are historical. Rainforests have been traditionally regarded as recent immigrants into Australia, the so-called the invasion theory. This view was probably part of the cultural cringe. Herbert, writing about 60 years ago, maintained that rainforests have been in Australia a very long time, but he was a lone voice in the wilderness. Palynology has shown that rainforest is ancestral, and covered most of Australia long before the desert and eucalypt sclerophyll vegetation developed.

Where did rainforests come from? How much came from outside of Australia? Angiosperms did not evolve in Australia. After the Australian plate came in contact with southeast Asia, the island "stepping stones" might allow an invasion of rainforest into Australia, but there is little evidence to support this view. The fossil record has done much to shed light on the origins of rainforest, but geographic variation is not apparent.

The major rainforest types are related to climate. They occur in the wetter climates along the north and east coast. Cedar Brush in the Liverpool Ranges is the furthest inland of all rainforests in New South Wales.

In the mid Miocene, when the climate became drier, rainforest retreated to the Great Divide and sclerophyll forests became dominant. Only a few rainforest taxa gave rise to sclerophyllous vegetation. Some sclerophyllous forests, however, are found under high rainfall and some rainforests are found under low rainfall. Sheltered gorges give protection against fire and are relatively nutrient rich, and in these environments, rainforests may be found with a 700mm rainfall, half of what is usually thought necessary. Is rainfall critical? Probably not. Fire, or rather the exclusion of fire is probably more critical. These 'dry rainforests' are found in the north.

Subtropical rainforests have given rise to dry rainforests. The monsoon forests in northern Australia could have been derived from subtropical rainforests, but they contain many elements found in dry monsoonal forests elsewhere in Asia. Have these monsoonal forests been in Australia a long time? A study of the population genetics of monsoonal forests in Australia and Thailand would be interesting.

The cool temperate rainforests of southern New South Wales, Victoria and Tasmania did not give rise to dry rainforest.

Nothofagus is very restricted to-day, but it had a substantial presence in the past. Today, disturbance is required for its regeneration but the fossil species were probably more climax-like. The climate of the glacial periods during the last two to three million years were dryer than the present, and the patches of rainforest would have contracted considerably. Where were the refuges? The Illawarra, Washpool, Border Ranges and the wet tropics of north Queensland probably always had rainforest, but in much reduced areas. The continental shelves were exposed in the glacial periods and they would have had rainforest. One reason for setting reserves is that they are refuges and have had rainforest for millions of years.

Rainforests have a tight, efficient cycling of nutrients. The activity of termites result in quick recycling, but Australian rainforests have low diversity and abundance of termites. There are more termites in savannah and sclerophyll. It is thought that beetle larvae are the major recyclers in Australian rainforests.

Rainforest are being destroyed at an alarming rate. There is only one example of substainable yield in tropical forestry in northeast Queensland, but many would dispute it. If canopy reduction is followed by a recovery time of 200-300 years, then sustainable yield is very low and not viable economically, especially when compared with eucalypt forests. In the warm temperate *Ceratopetalim* forests, a 50% canopy removal results in massive dieback. Unlogged forests show dieback also, but logging makes it much worse.

In sclerophyll forests, ants are the major dispersers of seeds, but there are only two reports of ant dispersal in rainforests. Birds are the main distributors in rainforests, and the cassowary may be the keystone species. The decline in cassowaries may be a threat to rainforest. Large seeded species, however, are found a long way south of the range of the cassowary. Did cassowaries have a wider distribution in the past, or do emus disperse the large seeds. Does the flora change more slowly than the fauna?

Birds are the major pollinators of sclerophyll, but there are few reports of bird pollination in rainforests. Insects are the major pollinators in rainforests. Most interactions are relatively generalist and robust. *Eupomatia* is pollinated specifically by a weevil, but *Eupomatia* does not flower every year. What does the weevil do in the years it does not flower?

Have conservation efforts succeeded? There are some big gaps. In north Queensland, the McIlwraith and Iron Ranges have missed out, but the forests here are different to the wet tropics. In Victoria and southern New South Wales, the warm temperate and cool temperate *Eucryphia moorei* forest are poorly represented in national parks. The drier end of the rainforests is distinctive and should be conserved in national parks. Many of the fragments of rainforest are on private land and there is no control over their destruction.

In spite of all his study, Prof. Adam still has trouble defining rainforest. What of a canopy with tall eucalypts, and a rainforest understorey that would revert to rainforest if not burned? Tall eucalypts over a closed rainforest canopy is unique.

PROGRAMME

☞ Wednesday 19th May, 6pm in the J. H. Maiden Theatre, Royal Botanic Gardens (Enter from Mrs. Macquaries Road)

Mr. M. S. Moulds, Entomology Dept. Australian Museum.

An overview of the systematics and biology of Australia Cicadas.
Cicadas are the most efficient sound-producing insects. There are more than 200 described Australian species and some 2,000 worldwide. Although they are familiar insects to most Australians much basic research remains to be done. We still do not fully understand sound production or auditory systems and probably less than half of the Australian species have been named.

☞ **Wednesday 23rd June, 6pm** in the Caley Seminar Room, Royal Botanic Gardens . (Enter from Mrs. Macquaries Road).

Dr. Greg McNally, Dept. Applied Geology, University of New South Wales.

Coal mining subsidence and the environment.
The address will cover mining methods, both partial and total extraction techniques, and their influence on subsidence behaviour. However most emphasis will be placed on problems associated with abandoned shallow workings, using examples from the Newcastle area. These problems include subsurface fires, open fissures, sinkholes and long term 'creep'. Remedial measures will also be discussed.

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☞ **Wednesday 21st July, 6pm** in the J.H. Maiden Theatre, Royal Botanic Gardens (enter from Mrs. Macquaries Road)

Dr. David Keith, National Parks and Wildlife Service, NSW.

Moorland vegetation in the Bulli district (NSW) and New Harbour district (Tas): retracing the steps of Consett Davis.
The studies of Consett Davis in moorland vegetation are among the early classical works in Australian plant ecology. Davis identified striking similarities in the structure and floristics of moorlands in these widely separated localities. Advances in ecological theory, field techniques and methods of data analysis allow these similarities and differences to be explored in a manner not possible when Davis completed his work more than 50 years ago. In this talk I will compare floristics, diversity and structure of moorland vegetation near Bulli and New Harbour. An analysis of environmental gradients will form the basis of a discussion about patterns and process in these communities.

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EVERYONE WELCOME

Wine and cheese will be served from 5.30pm

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 68 JULY 1993

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IN THIS ISSUE

NEW MEMBERS

We welcome Mr Geoff Williams of Taree

CORRECTION TO APRIL NEWSLETTER

Ms Fiona Lewis, a Post Graduate Students was welcomed as Dr. Lewis. The title is somewhat premature. We apologise for the error.

PAPERS ACCEPTED FOR PUBLICATION

A.C. Chalmers and J.C., Turner - Climbing plants in relation to their supports in a stand of dry rainforest in the Hunter Valley, New South Wales.

L. Morin, B. Auld, J. Brown and M. Cholil - Pathogenic fungi occurring on the Noogooraburr complex.

A.G. Johnson - Late Holocene environmental changes on Kurnell Peninsula, New South Wales.

NEW BOOK: FRESHWATER CRAYFISHES OF NEW SOUTH WALES, author John Merrick, publisher the Linnean Society of New South Wales

This small handbook (145 x 208 mm; 128pp) provides a comprehensive introduction to the biology and conservation of Australian representatives of this important group of aquatic invertebrates. The contents cover those species that occur in the state of New South Wales - about 25% of the Australian fauna - but many observations and recommendations have relevance for other areas.

The text is fully sourced but tries to maintain a clear, readable style for readers without any specialised knowledge of crays. Environmental management, anatomy and identification are covered and a glossary of technical terms, and an index are included. Diagrams and the excellent colour plates of live crays or habitats have been placed next to the relevant text. Some plates are the first published colour photographs of rare or poorly known species.

The cover is conspicuous for easy identification and laminated for hard wear; there is no dust jacket. The tough water-repellent cover enables the book to be used in field conditions with reduced risk of damage.

BOOK LAUNCH

Dr. Merrick's new book on the freshwater crayfishes will be launched at the University Co-operative Bookshop, Macquarie University on Tuesday 6 July 1993, at 5.30pm for 6.00pm. All members are invited. Refreshments will be served. Please RSVP on 805-7974.

NOMINATIONS CALLED FOR ROYAL SOCIETY OF NEW SOUTH WALES MEDALS

The Edgeworth David Medal is awarded for distinguished contributions by a young scientist, under the age of 35, for work done in Australian Science.

The Clarke Medal is awarded for distinguished work in natural science done in Australia. The 1993 medal will be awarded in the field of Zoology.

Nominations close 30th September 1993. If you know of someone who should be nominated, for further information, contact The Honorary Secretary, Royal Society of NSW, P.O. Box 1525, Macquarie Centre NSW 2113.

IMPACT SERIES: PEOPLE AND THE ENVIRONMENT IN THE SYDNEY REGION

ANZAAS and the Royal Society of NSW have organised a series of meetings, starting at 6.30pm, in the Hallstrom Theatre, Australian Museum (enter via William Street). Dates, titles and speakers are:

7th July, The Air Environment - Dr. G. Johnson, CSIRO

4th August, Soil and Soil Landscapes- Dr. P. Mitchell, Macquarie University

1st September, Managing for the Future - Ms. B. Adams, Department of Planning

AN OVERVIEW OF THE SYSTEMATICS AND BIOLOGY OF THE AUSTRALIAN CICADAS: A lecture given by Mr. Max Moulds.

Members at the lecture had fond childhood memories of cicadas: the green grocer, red eye, cherry nose and floury miller: all common names dating back to the last century. There are some 220 described species with as many undescribed species. Cicadas are part of the Hemitra or bugs, and are classified in the Homoptera or leaf hoppers.

Cicadas are world wide, but Australia is unique in having such large cicadas in urban areas. Australia's biggest cicada, the double drummer, has a wing span of 4 inches or 10cm. They were classified into nine families, but present taxonomy places them in two families. Cicadas all look much alike, with only a few bizarre forms. The bladder cicada, found from Gosford to north Queensland, has an inflated shape and a low-pitched gutteral call, so that it does not look or sound like a cicada.

Only the males call or sing. A tymbal membrane vibrates to produce the sound. There has been much study into sound production and the frequency of the note produced. One species produces an almost pure note. The two tymbals may work together, but with very high frequencies, they alternate. The black prince of the Shoalhaven River region flexes its abdomen to produce a sort of yodel.

The bent wing cicadas of inland Australia clap their wings together, and the females may do this too. There may be rasps on the wings to produce sound. Razor grinders aggregate in large numbers and will only sing when aggregated. The noise level may be so high that it irritates birds and they vacate the tree.

Cicadas may be found in almost every habitat even in mangroves. The black prince is quite green in mangroves around Brisbane, but is jet black further south where it lives in eucalypts. The green grocer has a number of colour variants: it may be yellow, or even turquoise. The yellow form has black markings under cold conditions.

Hairy cicadas are found in cold climates of southeastern Australia and Tasmania. There is even one species in Tasmania which is out and about in June and July. In this species, both males and females call, but it is not audible. Fossils of hairy cicadas have been found in the northern hemisphere, and they are an old group. The floury baker or floury miller has a fine pubescence which rubs off as "flour". This genus is unusual in that they perch upside down.

Near the coast, cicadas live in trees, but in inland Australia, they live on grasses. The grass cicadas are much smaller, they all emerge together and have a short life span. The life span of the large cicadas is not known, but it is probably 6-7 years.

Cicadas cannot be bred in captivity. The green grocer makes slits in bark to lay eggs. If the eggs take a long time to hatch, they are laid in dead or dying branches, or the tree will grow scar tissue over them. Eggs which hatch rapidly, before the tree has time to grow scar tissue, are laid in living branches. The eggs hatch and the nymph falls to the ground and burrows in. It lives on roots and spends several years in the ground. The adults, when they first emerge, are a different colour, and it may take 24 hours for the normal colour to develop.

The cicadas feed on sap of plants. They spend hours feeding. They suck up large quantities of sap, as it is very dilute. The excess water must then be excreted, and they do this by shooting out a stream of water, at intervals. A person standing under a tree where large numbers of cicadas are feeding, would think it was raining.

COAL MINING SUBSIDENCE AND THE ENVIRONMENT: A lecture given by Dr. Greg McNally

Dr. McNally started with examples of subsidence. A railway viaduct was shortened a bit, only about 8mm, but this was disastrous for the brickwork. Extensive repair work involved replacement of some of the arches with reinforced concrete and steel ties between the arches. The railway line was closed for months. Coal mining up valley had caused compressive forces, although the coal mining company had obeyed all the rules and had not mined within 60 m of the viaduct, as required by regulation.

The Pacific Highway, in one place, was lowered by 2.4m, an Australian record and probably a world record. This drop was not a hazard to the motorist, as the cracks and disrupted road surface were quickly repaired.

These are spectacular examples of subsidence. There are many more subtle and minor examples that only a surveyor would detect. A person may remember seeing a landmark over the back fence, that he can no longer see. The water in the shower no longer all runs down the plug hole: a puddle remains in one corner because of a slight tilt. Doors and windows do not shut properly. While mining companies will rectify the tilt, the remedy is drastic: huge hydraulic jacks used to level the house completely destroy the garden.

Subsidence is not new, it has been happening since mining started about 1800. The old methods of mining were rather haphazard and without modern machinery, were usually quite shallow 30m or less. Under these circumstances large cracks form and the blocks between cracks subside differentially. A former level surface becomes irregularly stepped. Some rockfall and cliff face collapse is natural, but subsidence is definitely the cause in some cases.

The old style of mining is called board and pillar. In mining jargon, a board is a tunnel. A map of board and pillar workings looks like a town plan, where the boards are the roads and the pillars the house blocks. Once the system of tunnels is established, the coal is taken out of the pillars, starting with those furthest from the entrance. Rockfall fills in the workings once the pillars are extracted. To save a house, only 20% of the coal is extracted, at a cost of about half a million dollars to the coal company. Today, arched tunnels are used, and if the pillars are left intact, there is very little subsidence.

Long wall mining uses a machine with cutting wheels which nibbles away at the coalface of 200m width. Once cut, the coal is taken out by conveyor belt. Armoured chocks form a tunnel for a safe working place behind the machine. These machines cut a swathe 200m wide and 1-2km long. Rock fall keeps pace with coal extraction. Because longwall mining extracts coal from much deeper seams, subsidence occurs immediately, is more uniform, and most houses survive, statistically, although a few may be wrecked. Longwall mining takes out 90% of the coal and is more economic.

The subsidence of 2.4m under the Pacific Highway was caused by a combination of old workings in a shallow seam, which had caused little subsidence, and long wall mining of a deeper seam. Together, they produced record subsidence.

A straight out lowering of the ground is not such a problem. It is the stretching and compression that comes with a wave-like motion of the ground that causes the damage. Tilting may occur to a house on a slope. Tensile strains are the worst of all and cause the most damage to buildings. Subsidence starts about a day before the mining passes underneath and continues for about four weeks afterwards. The rock flows slowly into the space.

Mine fires may burn out the coal seam and subsidence follows. One such mine fire has been going for 20 years. Steam rises out of the ground, but trees still grow and cows still graze in the area. Subsidence has created very broken ground. The fire will only burn the coal between the outcrop and the watertable. The owners have tried a number of things such as filling up the cracks, but to no avail. Currently, they are pumping treated effluent into the fire holes. The water trickles underground to a nearby quarry where they use it to wash gravel, an example of a double use of a waste product! The only real solution of mine fires would cost millions of dollars, and requires extensive earthworks and filling of the workings with fly ash, another waste product.

The Department of Main Roads has had to cope with old mine workings in their extension of the highway. These old workings must be filled in with cement and flyash before the roads can be built. The road cuttings show sections through subsidence and filled workings, as well as the coal seam not mined.

With coal mining, subsidence is inevitable, but coal is economically very important. It is important for domestic power generators and export as well. With proper practices, damage to the environment can be minimised.

PROGRAMME

☞ Wednesday 18th August 1993, 6pm in the J. H. Maiden Theatre, Royal Botanic Gardens (Enter from Mrs Macquaries Road)

Mr. John Verhoeven, Manager, Environmental Branch, New South Wales Department of Water Resources.

New South Wales Algal Management Strategy.

The algal problem has multiple causes and impacts. A broad suite of measures is being implemented to alleviate the problem. Much has been accomplished in the last year and a half. The talk will concentrate on the present situation and where the management strategy is taking us. In five years time, the problem should be solved.

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☞ Wednesday 22nd September 1993, 6pm in the Caley Seminar Room, Royal Botanic Gardens (Enter from Mrs Macquaries Road)

Ms Jay Stricker, Manager, Natural Resources, Environment Management Unit (EMU), Sydney Water Board.

The Rehabilitation of Urban Wetlands and their Role in the Catchment.

In the Sydney Region approximately 50% of the area of pre-European freshwater wetlands and 80% of the area of saltmarsh has been lost inthe past 200 years. Although direct and intentional destruction by drainage and filling has been a significant cause, general degredation from the unintentional effects of urbanisation causes the loss of many freshwater and saline wetlands. Wetlands remaining in the urban areas exhibit symptoms of failing processes, limited functions and visual degradation. We are fortunate that in the Sydney region we have at least some nineteenth and early twentieth century botanical descriptions of wetlands by which to assess the changes in our wetlands.

This presentation will not only examine the symptoms and causes of wetland loss and degradation in Sydney but will provide a management viewpoint of the rehabiitation of urban wetlands, using a small tidal marsh at Arnclliffe and the 62ha freshwater wetlands at Botany as examples.

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☞ Saturday 2nd October 1993, 10am, at the Mount Annan Botanic Gardens car park, near the main office area . Announce at the gate that you are with the Linnean Society and you will be directed to the car park.

Professor Carrick Chambers Director , Royal Botanic Gardens will be our Leader.

Excursion to the Mount Annan Botanic Gardens

The Mount Annan Botanic Gardens, an annex of the Royal Botanic Gardens Sydney, is devoted to the native flora of Australia. It covers 540 hectares, and has 25 km of walking tracks and 11 km of roads. There are about 3-4,000 species and 40,000 individuals growing there now. When fully developed, it could grow about 80% of the Australian flora. The large collections of Eucalypts, Acacias and Callisemtons are open to the public, but the spectacular collection of Grevilleas is not yet open for public viewing.

The Mount Annan Botanic Gardens, near Campbelltown, is well signposted on the freeway to Canberra. Driving time is one to one and a quarter hours from the GPO, Sydney. There is an entrance fee of $5 per car, and we will need cars to tour the gardens. For Friends of the Botanic Gardens entry is free.

After meeting at the car park, we will make a cup of tea, then tour the gardens and return to the car park for a barbeque lunch in th e nearby barbeque area.

Bring food and drink

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☞ Wednesday 20th October 1993, 6pm in the J. H. Maiden Theatre, Royal Botanic Gardens (Enter from Mrs Macquaries Road)

Dr Alistair Hay, Royal Botanic Gardens.

Form and Evolution: Process and Metaprocess

Plant form has generally been seen as fragmented and static, as though produced by dynamic processes. Form is now seen as a dynamic process itself. The fragmented, static view allows distorting and artificial dichotomies to arise between form and process, form and function, and organism and environment. Evoluton has been seen as dynamic processes of altering fragmented and static structures. It is now seen as dynamic processes of changing dynamic processes - i.e. metaprocess. Systematic pattern derives from comparison between pattern within organisms, and is therefore a higher order of pattern than is structure - i.e. metapattern. Metapattern and metaprocess are complementary aspects of the same dynamic phenomenon - evolving lineage of environment-intergrated organism. There is not a causative sequence from one to the other, and phylogenetic classification, vital to study of evolution, may be inadequate to the task if attempts are made at dealing exhaustively with systematic pattern prior to evolutionary process.

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EVERYONE WELCOME

Wine and cheese will be served from 5.30pm ,

before the lectures at the Royal Botanic Gardens

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 69 **OCTOBER 1993**

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IN THIS ISSUE

NEWS OF MEMBERS

We regret the death of:

Dr. Dare Edwards on the 24th August, 1993.
Dr. Edwards was a forest microbiologist, and a member of the Society from 1953. He was a member of the Council from 1973 to 1978, and President in 1975.

Dr. Elizabeth Pope died the 18th September, 1993. Dr. Pope was a marine biologist at the Australian Museum

Dr. Gwenda (Consett) Davies (nee Rodway) who is known for her pioneering work on the embryology of Asteraceae.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1994. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 20 November 1993.

PAPERS ACCEPTED FOR PUBLICATION

S.J. Rowland and R. Snape - Labile protogynous hermaphroditism inthe black bream, *Acanthopagrus butcheri* (Munro) (Sparidae).

E.J. Cother and R.L. Gilbert (communicated by B. Auld) - The endophytic mycoflora of bladder saltbush (*Atriplex vesicaria*) and its possible role in its periodic decline.

AWARDS FROM THE J.W. VICKERY RESEARCH FUND

Evans, Barry Roy, University of Queensland

PROJECT: Development of edible nut tree crops in Solomon Islands. Mr. Evans worked during 1988-91 in the Solomons on the potential of nuts of *Canarium* spp. and other indigenous forest trees as cash crops for smallholders. Research results were documented in various unpublished reports, which are in demand as they are the only documents on the subject. Mr. Evans will spend six months as a research fellow at University of Queensland preparing parts of this material (on taxonomy, biology and uses of the species) for publication in journals. He seeks funds for preparation of illustrations for the papers. Awarded $600.

Forster, Paul Irwin, Queensland Herbarium

PROJECT: A new species of *Sarcolobus* (Asclepiadaceae: Marsdenieae) from New Guinea. Mr. Forster published a revision of the genus in 1991, but has since found a new species in New Guinea. He is publishing this species, and seeks funds for preparation of line drawings to accompany the description. Awarded $200

Mostaert, Anika Simone, School of Biological Science, University of New South Wales

PROJECT: Effect of salinity on the cell structure and physiology of the red alga *Caloglossa leprieurii*. Osmotic regulation in this red alga is achieved by changes in internal concentrations of inorganic ions and mannitol acting as a compatible solute. The place where these ions are accumulated (vacuole, cell wall or elsewhere) is being investigated by X-ray microanalysis following freeze-substitution. Funds are sought for costs of sample preparation and use of STEM and Kevex analyser. Awarded $600.

Musser, Ann Marie, School of Biological Science, University of New South Wales

PROJECT: The post-cranial musculature of the Short-beaked Echidna, *Tachyglossus aculeatus*. Ms. Musser and collaborator Prof. Farish Jenkins (Harvard Univiversity.) are examining the musculoskeletal system of this echidna, which has not been studied comprehensively till now. Ms. Musser is preparing detailed pencil drawings of the anatomy and is seeking funds to travel to Boston to complete the study. Awarded $600.

Taylor-Wood, Eleni Alexandria, School of Biological Science, Univ.ersity of New South Wales

PROJECT: Structure and function of the multivesicular structure of the extracellular material of *Bostrychia tenella* subsp. *flagellifera*. Ms. Taylor-Wood is studying the morphology and function (hypothesized as transport of polsaccharides) of a multivesicular structure at the interface of the extracellular material and the plasmalemma, using freeze substitution, heavy metal staining techniques. She seeks funds for chemical costs and the use of a TEM. Awarded $600.

Trautman, Donelle Ann, Botany Department, University of Sydney

PROJECT: Physiological ecology of a symbiont-containing tropical sponge. The population dynamics, reproductive biology, growth, metabolism and nutrition of the common tropical sponge *Sigmadocia symbiotica* and its symbiont red alga *Ceratodictyon spongiosum* are being studied at One Tree Island. A grant is sought to cover part of the costs of travel, freight of equipment, bench fees, and consumables. Awarded $600.

Withers, Karen Jennifer Tyndall, School of Biological Science, University of Sydney.

PROJECT: To investigate the ecology of a hermatypic coral *(Scleractinia)* inhabiting the temperate waters of Sydney Harbour and nearby coastal areas. The distribution, abundance, growth and mortality rates, and reproduction of *Plesiastrea versipora* is being studied initially by diving at selected sites in Sydney Harbour and along the coast. A grant is sought to pay for underwater fixed thermometers, measuring tapes and photographic film. Awarded $600.

Woolcott, Geoffrey Walter, School of Biological Science, University of New South Wales.

PROJECT: Biology of Ulvaceous algae in south-eastern Australian temperate waters. Mr. Woolcott is continuing studies of the biology of the algal genera *Ulva, Enteromorpha, Ulvaria* and *Monostroma* in south-eastern Australia with the aim of clarifying useful taxonomic characters and the taxonomy of the species in these genera. A grant is sought to partly cover costs of travel to locations outside Sydney for collection of fresh material. Awarded $600.

KATANDRA BUSHLAND SANCTUARY - AN INVITATION TO STUDY

The Trust of the Katandra Bushland Sanctuary, Foleys, Hill, Mona Vale, invites scientific study of the bushland and feels it would be useful for management proceedures. The bushland is in relatively good condition. If you are interested, contact the Trust Secretary, 1 Cook Road, Lindfield 2070.

MOORLAND VEGETATION IN THE BULLI DISTRICT (NSW) AND NEW HARBOUR DISTRICT (TAS): RETRACING THE FOOTSTEPS OF CONSETT DAVIS, a lecture by Dr. David Keith, National Parks and Wildlife Service.

Consett Davis graduated in 1935, together with Ilma Pidgeon and Noel Beadle, other great names in plant Ecology. He obtained a M.Sc. in insect taxonomy in 1937 and a D. Sc. in 1943. He published 41 papers in 8 years, including some substantial monographs, and most of his papers are in the Proceedings of the Linnean Society of NSW. The late 20's to early 40's was the golden age of plant ecology.

He enlisted for war duties in 1941, was posted to New Guinea in 1944 and killed in a plane crash in December, 1944.

Dr. Keith has restudied some of his classic sites. The common theme through all his work was the moorland vegetation. The community at Bulli is very similar in structure to the button grass plains of Tasmania, and the most prominent species, *Gymnoschoenus* *sphaerocephalus* is common to both. The temperature at Darkes Forest, Bulli is 4-7° higher than that of Melaleuca Inlet, Tasmania, but the precipitation is lower, 1100-1546 mm in New South Wales compared with 2212 mm in Tasmania. New South Wales has a summer maximum and Tasmania a winter maximum precipitation. At Bulli, the moors are localised on the uplands and the swamps are confined to the valleys. The surrounding vegetation is dry sclerophyll forest. The extent of the moors is much greater in Tasmania and wet sclerophyll forest surround them. In New South Wales, the high water table is the result of inhibited drainage whereas in Tasmania it is climatic. Fires are a feature of both sites.

Many species are the same in both places, but Tasmania has a richer flora. Taxa not at both localities may be (1) endemic: (2) widespread, but their range does not extend to both localities: (3) widespread, covering both regions, but for some reason, they are not present at one or the others site: (4) taxa may be at both sites, but which are only in one moorland, e.g., *Banksia marginata* grows in the swamps in Tasmania, but in the dry sclerophyll in New South Wales: (5) taxa in adjacent communities which creep into the swamps.

The communities may be related to a particular niche in the landscape, e.g. thickets along drainage lines. In New South Wales, the wet heaths have dense sedges and open shrubs. In Tasmania, the blanket moors have dense sedges also, and less wet areas away from the drainage lines have dense restionaceous sedges.

There is almost no *Sphagnum* in New South Wales, but it is widespread and forms thick layers in Tasmania. There are few mosses in New South Wales, but they are common in Tasmania. Fires in Tasmania may be devastating if the peat burns and destroys rootsocks and seed banks. Colonisation after a peat burn is very slow. While fires are common in NSW, the devastating peat fires are rare.

Dr. Keith used the state-of-the-art computer analysis to come to the same conclusion as that of Consett Davis: that there is a striking similarity between the two regions!

Editors Note: This lecture is a good example of the "objective versus subjective" debate which was the vogue when I was a student (many long years ago). Detractors claimed that plant ecology was not a science because it was subjective, i.e. it relied on observation and description. I restudied some of J.G. Wood's classic sites, and my 'objective' study, done with punch cards and knitting needles in those days, came to essentially the same conclusions as those of J.G. Wood!

NEW SOUTH WALES ALGAL MANAGEMENT STRATEGY, a lecture by Mr. John Verhoeven, Manager, Environmental Branch, New South Wales Department of Water Resources.

We have all heard about the blue-green algae problem. Our daily news carries stories of river water becoming too toxic to drink and contact with contaminated water may cause skin rashes. The television has pictures of an emerald green river, beautiful to look at, but toxic to people and stock. During the summer of 1991-92, 1,000km of the Darling River was infested with blue green algae. The media, however, is only interested in bad news. We do not hear the good news stories of what is being done about the problem. The algal management strategy has had considerable success.

Blue green algae are part of the natural ecosystem. Two species cause all the trouble: *Anacystis cyanea* and *Anabaena circinalis*. Blooms occur when conditions are favourable. Intense blooms have 1-2 million cells per ml water. The cells have gas vacuoles which regulate their position in the water column. They may feed at the bottom of the river on the nutrients in the sediments. They may rise up to the surface to photosynthesis in the sunlight. They produce resting spores which tide them over unfavourable conditions. They produce toxins which help them keep predators at bay. The zooplankton feed on blue green algae. Fish feed on the zooplankton, but they seem unaffected by the toxins, so far.

If people eat fish that are full of toxins, however, they may be affected. Shellfish concentrate the toxins. People who live in inland areas may be dependant on river water, hence are at risk.

Many blue-green algae fix nitrogen from the air, hence can live in nitrogen poor water. Phosphorous then becomes the limiting factor in freshwater. When there is plenty of phosphorous available, the blue green algae build up to plague proportions. They cannot be eradicated, but they can be managed.

Blooms have always occurred. Charles Sturt found blue green algal blooms when he explored the Darling River. Blooms usually occur in summer and once lasted a few weeks. The problem has become steadily worse, until 1991-92 when blooms stayed for many months. They now may continue throughout the year. Blooms are found throughout the state, in the rivers, the major storage dams and water supplies and in farm dams. They occur in the far west, the highlands and on the coast. In 1991-92, the conditions were particularly favourable for blue green algae.

The concentration of available phosphorus triggers a bloom. Lack of oxygen causes the release of phosphorous from sediments. Still waters or slow-flowing water has little oxygen in it. Warmer temperatures encourage greater algal growth.

In 1991-92, the Government set up a task force to deal with the problem. The state has been divided into nine catchments and regional plans are being devised. These plans involve the communities. Strategies which help reduce the algae include:

- Increased turbidity and flow cuts down the blooms. Get as much water into the rivers and keep it there. After rains, the first part of the flood is allocated to the river, before the farmers use the water. It has a cost to the community, but it has benifits also.

- Booms with curtains around water intakes help keep out algal scums out of water being drawn off for use.

- Harvesting is not successful but alum and gypsum help keep the algae down. Copper sulphate is not used today.

- Research goes on into various control methods, including the effectiveness of barley straw, which is reputed to have benificial effects.

- Cut down the phosphorus intake. Maps of phosphorus runoff pinpoints sources, such as sewerage outfalls and piggeries, which create locally high concentrations. The bulk of the phosphorus, however, comes from agriculture. Erosion carries soil particles and the phosphorous fertiliser into the river. The remedyis to stop the high concentration outfalls and look to farm practices. Plantings of trees, or the ban on clearing of native vegetation along all waterways would cut down siltation considerably. A 10m strip is effective, but a 30m strip is better.

- A computer program of phosphorus concentrations in a catchment has proved a marvellous planning tool. It models the phosphorus runoff generated by different land uses and the community can decide on a course of aciton. Around Blayney, sediment-trap wetlands, riparian vegetation and the diversion of effluent from feed lots has been effective.

- Community involvement is the best course of action. The school children set up and tend the wetlands as their project. Not all of the community is agreeable, however, and feelings often run high. The success of any management programme must involve the community, for it is the community which produces the problem.

Remedial action is costly, but it will bring economic benifits. Can we put a price on safe drinking water and healthy rivers?

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 70 **DECEMBER 1993**

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Tues. 9.30 am-5pm

IN THIS ISSUE

Inclusions:
- Form for renewal of membership
- Notice of Annual General Meeting
- Booking slip for Society luncheon

NEW MEMBERS

We welcome
Ms. Susan E. Murray-Jones, School of Biological Science, Wollongong University.

SUBSCRIPTIONS DUE

Renewal of memberships fall due at the beginning of the year. Subscription rates remain the same as for 1993. There is a discount for memberships paid before April 1994. A form for renewal of memberships is included.

SOCIETY LUNCHEON: WEDNESDAY 16 FEBRUARY 1994.

The Society Luncheon has been relocated to the University of New South Wales in the Dining Room of the Australian Graduate School of Management. The dining room is cafeteria style and serves hot meals, sandwiches, salads, wines etc, so the cost is up to you. A full meal usually costs $7-10, sandwiches are $1.60. Please let me know if you intend to come, so that we can book tables. A booking form is included. Spouses, partners and friends are welcome.

PAPERS ACCEPTED FOR PUBLICATION

S.J. Rowland and R. Snape - Labile protogynous hermaphroditism in the black bream *Acanthopagrus butcheri* (Munro) (Sparidae).

E.J. Cother and R.L. Gilbert (communicated by B. Auld) - The endophytic mycoflora of bladder saltbush (*Atriplex vesicaria*) and its possible role in its periodic decline.

J. Gibson, G. Jordan and D. Gibson - Partially pyritised Holocene Banksia cones from Tianjara Plateau, New South Wales.

B.A. Ingram, M.A. Rimmer and S.J. Rowland - Induced spawning trials with captive Macquarie perch, *Macquaria australasica* L. and new records of *Myrmeleontini (Insecta, Neuroptera: Myrmeleontidae)* from Australia.

T.R. New - A second species of Amphientomidae (Insecta: Psocoptera) from Western Australia.

J. Chalson and H.A. Martin - The pollen morphology of some species of the family Myrtaceae and its use in the identification of dispersed grains.

J. Pemberton et al - Stratigraphy and depositional environments of the northern Capertree High.

BOTANIC GARDENS IN HAWAII

Dr. David Murray visited Hawaii in August last year as one of six Australian Scientists nominated by the Australian Systematic Botany Society and sponsored by the National Tropical Botanical Gardens, Kauai. He has written two articles, published in 'The Australian Garden Journal', Vol. 13, parts 1 and 2 respectively, due our in December. The current issue of the Journal should be available at most newsagents. The Journal is well worth a subscription - only $23 per year (5 issues) to Garden Journal, P.O. Box 588, Bowral NSW 2576.

THE REHABILITATION OF URBAN WETLANDS AND THEIR ROLE IN THE CATCHMENT, a lecture by Ms Jay Stricker

Ms. Stricker gave an account of the attempts to rehabilitate the Botany Bay Wetlands. The catchment of Botany Bay extends up to Oxford St. and includes Centennial Park, the Randwick Racecourse and University of NSW. Surface runoff comes from up to 20km away, but the ground water may come from as far as 60km. All storm water in the catchment ends up in the Botany Bay Wetlands.

Wetlands are valuable for the protection of water quality downstream. They have recreational and aesthetic value. The Eastlakes Golf course is part of the Botany Bay Wetlands. The Eastlakes were the third water supply development for Sydney, from 1853-1867. the Tank Stream was the first, the Lachlan Swamps in Centennial Park the second. After 1867, water was pumped from the Nepean River.

There are aboriginal sites and burial grounds in the catchment. The first industrial site was a woollen mill on Botany Bay. It had a dam and a water wheel to power the factory.

Wetlands are important to maintain regional biodiversity. They also have value for education and are used by schools. They have scientific value for research.

The Botany Bay Wetlands are an indicator of the success of management. Councils and state agencies are all involved and must co-operate if the wetlands are to be rehabilitated. There are still some good patches of native vegetation, but many exotics have invaded the wetlands. Native fish are present.

Degraded wetlands have poor quality water with a low oxygen content. The water is stagnant and many look dirty or green. The causes are many and any one cause may be slight, but they all add up. Gross pollutants, little reflux, infilling, the prolific growth of aliens and weeds and blue green algae all play a part. *Ludwidgia perurvlana*, originally introduced into the Botanic Gardens, has escaped and is spreading. Other weeds causing problems include Alligator weed, Salvinia, Cabomba or fan wort, exotic water lilies and water hyacinths.

Land uses are classified into nutrient export categories. A computer program models the problem and the causes so that the correct remedy may be applied. In the catchment, urban residential use accounts for 50% of the area and contributes 25% of the nutrients. The golf course is 12% of the area but contributes 60% of the nutrients because of their high and continuous use of fertilisers on the greens. Councils should sweep streets instead of washing them to minimise nutrient run-off.

Ground water is used as a resource so it must be considered as well. Astrolobe Park was once mined for sand then filled with rubbish. It now exports nutrients to the top pond in the Eastlakes system. With higher nutrients, blue green algae are a problem. Sampling over 4km of the wetlands shows that the phosphorous content is fairly constant, so the wetlands are not filtering out nutrients as they should. This may be because there is nutrient input from the ground water all along and not just in the top pond. The thick growth of *Ludwidgia* dies off each year, adding to the nutrients.

In 1869, there were only one or two ponds maintained by dams and the rest was marshy, boggy wetlands. Now, most of it is open water. In 1955, there were still stands of *Angophora* and *Banksia*, mostly on the sand dunes. Then came the sandmining and rubbish fill. By 1982, there were hardly any trees left.

Rehabilitation requires control of noxious weeds by encouraging desirable vegetation, as simple eradication would leave almost nothing. Revegetation, especially of the Banksias is required. Feral cats and foxes should be controlled so that native birds and animals can flourish.

The Environmental Management Plan will co-ordinate the actions of all who have an influence in the catchment. There will be some dredging and building up of the weir of the top pond with the aim of containing nutrients so that the rest of the wetlands benefit. The dredged sediment, however is high in nutrients and some heavy metals. The sludge will be put in a deep hole in sand with the hope that the sand will act as a filter. A curtain down to 9m may have to be put round the rubbish fill to contain the pollutants. There has been continuous community consultations in drawing up the management plan and the community supports the rehabilitation scheme.

FORM AND EVOLUTION: PROCESS AND METAPROCESS, a lecture by Dr. Alistair Hay.

The traditional way of studying plants is fragmentary. The structure of a leaf or stem is studied. Separately, photosynthesis is studied. Dr. Hay contends we should not separate and pigeon-hole function and structure. The function of the leaf is to photosynthesis and structure and function go together to make the whole. The leaf cannot be separated from the stem or roots and still function. All the parts of the plant, fragmented for the purposes of our study, go together to make the whole.

An organism cannot be separated from its environment. How a plant grows and functions depends on the environment. Organisms are integrated in their environment and studying one bit at a time overlooks this basic fact.

Heredity and evolution are usually thought to be controlled by the genes. The genes, however, are only one part, the resource handed on to the next generation. The genes cannot function outside of the organism or environment. The environment imposes selection.

Our study methods are analytical, bit by bit, fragmentary and static. A holistic method, studying the relationships of the parts in a dynamic state is needed. Dr. Hay called for a new, improved way of thinking.

In question time after the lecture, it was put to Dr. Hay that even with analytical studies of bits, they can be put together again to achieve a dynamic, functional state, and this approach is being adopted today.

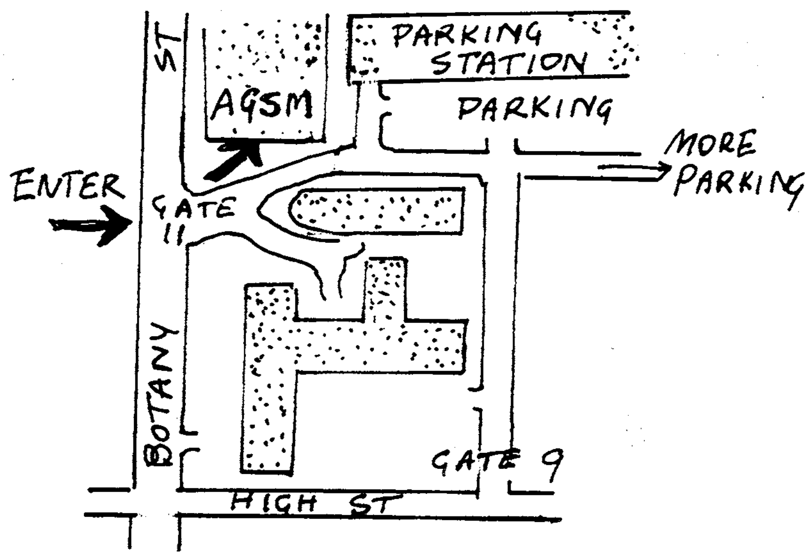
LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 16 FEBRUARY 1994, AT 12.30 pm IN THE AUSTRALIAN GRADUATE SCHOOL OF MANAGEMENT, UNIVERSITY OF NEW SOUTH WALES

The luncheon is informal and members are invited to bring spouses and friends

PARKING IS AVAILABLE



We need to know numbers for bookings, so please let us know if you are coming BY MONDAY 14 FEBRUARY

Dr Helene A Martin Phone 697-2071
School of Biological Science
University of New South Wales
P.O. Box 1
KENSINGTON NSW 2033

I wish to make bookings for .... people for the luncheonon 16 February

The cost is according to your selection

NAME:

..

ADDRESS:

..

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 71 **MAY 1994**

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IN THIS ISSUE

HONOUR TO DR. JIM PEACOCK

Dr. Peacock, Head of the Division of Plant Industry, CSIRO, was admitted as a Companion to the Order of Australia (AO) on Australia Day. Dr. Peacock has held the Linnean Macleay Fellowship and has given a Macleay Memorial Lecture to the Society. Our congratulations to Dr. Peacock.

NEW MEMBERS

We welcome:

Ms. Jennifer M. Selkirk, School of Biological Science, Macquarie University.
Ms. Kay Cotter, School of Earth Sciences, Macquarie University

MONOGRAPH COLLECTION TO THE UNIVERSITY OF NSW LIBRARY

The Society's monograph collection has been relocated to the University of NSW library and is being catalogued. The University of NSW U-Committee has generously made a donation towards the cost of cataloguing. When catalogued, the collection will be accessable to all library users.

There are some rare and valuable books in the collection. The Zoology of the Voyage of HMS Beagle, by Charles Darwin, Ichthyologie by Marc Block and personal copies of works by Sir Richard Owen (who coined the term 'dinosaur') are amongst them.

Many of the works are in need of restoration which may cost $1000 or more. The Friends of the UNSW Libraries has an Adopt-a-Book programme where sponsorship helps pay for restoration. You may select a book of special interest to adopt. Joint sponsorship is arranged for the more expensive books. Sponsorship will be fully acknowledged and all donations are tax dexuctable. If you are interested, contact Paul Wilkins on 385-3811.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $600.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

Intending applicants please note:

Please read instructions carefully.
Original plus five (5) copies are required.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible

.REGENERATION OF LANE COVE NATIONAL PARK

Weed infestations are a major problem with the regrowth of bushland after the January fires, particularly in urban areas. The National Parks and Wildlife Foundation of NSW seek help to employ trained bush regenerators who will co-ordinate teams of volunteers. If you wish to help with a donation call Alison Evans on 337 3388. All donations to the National Parks and Wildlife Foundation are tax deductible.

ASSISTANCE TO NATURE CONSERVATION COUNCIL OF NSW

The Nature Conservation Council intends to participate in the Coronial Inquiry into the recent bushfires in NSW, and request financial assistance. The NCC expect tax-deductibility status to be granted in the near future. If you wish to make a donation contact the NCC at 39 George Street, The Rocks NSW 2000, phone (02) 247 4206.

NATIONAL REGISTER OF BIOLOGISTS

The Victorian Cell Biology Society is compiling a National Register of Biologists. To be included, send your name, address, telephone and fax numbers and area of expertise to Dr. Lynne Selwood, President, Victorian Cell Biology Society, Dept. Zoology, La Trobe Unviersity, Bundoora Vic. 3083. Email Zools@room.latrobe.edu.aw

BIOLOGY SCIENCE OLYMPIADS

The Australian Biology Olympiad (ABO) program is managed by the Australian Science Olympiads and funded jointly by the Australian Federal Government and private industry. The ABO provides students with a program of accelerated learning in biology and aims to stimulate an active interest in science, both theoretical and practical; to promote and reward excellence in scientific endeavour; and to have a team of four members represent Australia at the International Biology Olympiad competition.

The program is for year 11 students. Prospective students sit a qualifying exam. About twenty selected students attend a two week summer training school. The team selected receives further preparation. The syllabus includes the cell, biological molecules, genetics, ecology, biological diversity and evolution, plants, animals, industrial biology and biotechnology. The 1993 team did remarkably well with one gold, two silver and a bronze medal. The team came second overall to China.

The Victorian Cell Biology Society plan to set up a bursary system for team members.

Send donations to the Biology Olympiads Bursary, C/- Dr. G. Flannery, Treasurer, Victorian Cell Biology Society, Dept. Genetics, Latrobe University.

INTERNATIONAL FELLOWSHIPS AND SCIENTIFIC EXCHANGES

The Australian Academy of Science has a number of scientific exchanges, fellowships and awards. Closing dates are as follows:

France, 1st June 1994
United Kingdom, 1st July 1994
Korea and Taiwan, 1st August 1994
Japan, 1st September and 1st November 1994
China, 1st October 1994

For further information, write to International Exchanges, Australian Academy of Science, G.P.O. Box 783, Canberra ACT 2601, or phone (06) 247 3966. Judith Hulbnek (9.30-1.30pm).

The French Embassy offers fellowships through the French Embassy, closing date 15th July 1994. For further information, write to the French Embassy, Scientific Section, French Government Scientific Fellowships, 6 Perth Ave. Yarralumba ACT 2600, or ring Jeanine Mordek, Scientific Section on (06) 270 5139.

BUSHFIRES IN NEW SOUTH WALES: When the smoke clears

When the flames were still blazing in January 1994, public attention was focussed on human tragedy and the herioic suppression effort. Before the ashes were cold, the scrutiny of fire management began and some flamboyant and opportunistic criticism appeared in the electronic and print media, much of it lacking a factual basis. Now that the smoke has cleared, we have the opportunity to review the scientific management of fire in natural areas for both the conservation of biodiversity as well as the protection of human life and property.

Common perceptions were that the January fires had a devastating ecological impact because of their high intensity, the extensive areas burnt and the low level of patchiness. However, such views reflect only a partial understanding of current knowledge on the ecological effects of fires. High intensity fires have both advantageous effects (e.g. in stimulating higher levels of seed germination and establishment) and detrimental effects (e.g. in higher levels of mortality in pre-fire populations of some plants and animals). Relatively little is known about the effects of the size of and patchiness of fires. It is often assumed that extensive, low-patchiness fires. It is often assumed that extensive, low-patchiness fires are especially detrimental to some animal species because of the scarcity of refuges and the dispersal long distances required for recolonisation. But there are surprisingly few data on animal mortality during and after fires, where survivors might live in burnt landscapes and their ability to disperse from adjacent unburnt areas. One study on fairy wrens showed that populations declined more in response to a series of low-intensity, patchy fires than in response to a single high intensity, low-patchiness fire over a similar period. There is also evidence that small-area, patchy fires are more detrimental to post-fire regrowth than less patchy large-area fires due to greater incidence of post-fire predation (by vertebrate and invertebrate grazers).

Surprisingly fire frequency, the aspect of fire on which there is most ecological knowledge, received little attention during the recent public debate. There is a very substantial volume of scientific evidence that regimes of frequent fire cause extinctions of species because they interrupt critical processes in the life cycle. Where the January fires contributed to a sequence of frequent fires, significant ecological changes may be expected, and indeed are now being observed. Examples include large portions of Royal and Bundjalung National Parks, where the January fires burnt through 5 year-old and 3 year-old regrowth, respectively. An extensive coverage of study sites monitored since 1988 in Royal National Park will allow us to assess and document predicted changes.

The ecological changes and losses that result from the recent fires are not irreversible, so long as large frequently burnt areas receive a respite from further fires in the coming decade.

The January bushfires have also focussed attention on the role of hazard reduction in protection of human life and property. Fire is used to fight fire by burning certain areas of bush frequently to keep fuel levels low (and also to reduce fuel in the expected path of an active wildfire - "backburning"). The extent to which fuels are reduced by such fires depends on the conditions in which they are lit. To be effective, hazard reduction fires must be intense enough to adequately reduce fuel, but not so intense as to escape out of control. The window of time when weather conditions are suitable for such fires includes only a few days of the year. During extreme conditions (high temperatures, low humidity, high wind speed), much more fuel becomes "available" to fire than under the mild conditions required for hazard reduction. This is why some recent bushfires burnt through areas that had been previously hazard-reduced only months earlier in the Royal National Park.

Hazard reduction is one component of overall fire protection, which also includes installation of fire breaks, aspects of development planning, home design and maintenance, strategic planning and a range of fire suppression techniques. One of the most important aspects of fire protection is threat assessment. The threat of fire is greatest in areas where "assets" (i.e. human life and property) are located. It follows that protective measures will be most effective when focussed on areas of greatest threat, i.e. bushland adjacent to suburban and other development. A much greater level of protection will be afforded for every 100 ha of the suburban/bushland treated with frequent hazard reduction, than for 100 ha of more remote bushland, especially if fire conditions are extreme. In Royal National Park, it appears that the January fire burnt most intensely and spread most rapidly through an area in the middle of the Park that had most recently been burnt only 5 years ago.

How much conflict is there between fire management for conservation and fire management for protection? The debate over the value of broad area hazard reduction in the protection of urban areas from wildfire will undoubtedly continue for some time, even though the ecological consequences of applying frequent fires over large areas are reasonable well understood. It is up to scientists to ensure that relevant data are gathered and communicated extensively, so that such debates will result in positive outcomes for both conservation and protection.

David Keith

PROGRAMME

☞ Joint lecture with the Deptment of Geology and Geophysics, University of Sydney.

Wednesday 29th June, 6pm in the Edgeworth David Lecture Theatre, Department of Geology and Geophysics, University of Sydney.

Dr. Hugh Torrens, Reader in Geolgy, University of Keele

Robert Townsend, Scientist and Traveller, and what happened when he came to Australia

Dr. Torrens is the S.T. Medallist of the Geological Society of London, Vice President of the International Commision for the History of the Geological Sciences and Vice President of the British Society for the History of Science. Dr. Torrens was working on the Robert Townsend project jointly with the late Prof. Tom Vallance.

☞ **Wednesday 20th July, 6pm in the J.H. Maiden Theatre, Botanic Gardens. Enter from Mrs. Macquaries Road**

Prof. Andrew J. Beattie, Research Unit for Biodiversity and Bioresources, School of Biological Sciences, Macquarie University, NSW 2109

Evolutionary Biology at the Cutting Edge

The application of evolutionary biology to the search for new biological resources is yielding an array of novel products from a variety of unexpected sources. While this application is not new, (for example, it has been the basic paradigm in the search for biological control agents), it is under-utilised and hence undervalued. Recent examples with proven or potential commercial applications include: antibiotics and termiticides from ants, high tensile fibres from spiders, venoms from mites, spiders and scorpions for pesticide development and medicine, new adhesives from barnacles and velvet worms and novel construction materials from deep sea molluscs. These and many other examples demonstrate that (i) the deductive power of evolutionary biology and its related disciplines is of commercial importance (ii) a wide variety of organisms are proving to be biological resources likely to yield many new products and services, and, therefore, (iii) in addition to the ecological and ethical reasons for conservation, economics independently highlight its importance.

Wine and chees will be served from 5.30pm

Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 72 **AUGUST 1994**

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IN THIS ISSUE

DONATION TO THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Society has received an anonymous donation of $500 to the Research Fund. Our thanks to the generous donor. All donations to the Joyce W. Vickery Scientific Research Fund are tax deductible.

NEW MEMBERS

We welcome:

Mr. J.M.C. Stratford, School of Geology and Geophysics University of Sydney
Mr. M.D. Vickers, School of Geology and Geophysics, University of Sydney
Ms. Kate List, School of Applied Geology, University of New South Wales
Ms. Sandra Caxton of Camden
Ms. N.J. Holdaway, School of Biological Sciences, University of Sydney
Ms. W.J.L. Laursen of Cronulla
Dr. C.V. Murray-Wallace, School of Geology, University of Wollongong.

PAPERS ACCEPTED FOR PUBLICATION

Morrison, D.A. - Some effects of low-intensity fires on populations of co-occurring small trees in the Sydney region.
Pannell, J.R. - Factors affecting seedling recruitment of *Allocasuarina distyla* and *A. nana* at burnt and unburnt sites.
Semple, C.P. - Studies of pathogenic *Thelohania* species (Microsporida: Nosematidae) in the Australian freshwater crayfish, *Cherax quadricarinatus* (Decapoda: Parastacidae).

IMAGERY IN GEOLOGY AND GEOPHYSICS Friday 2nd September, 1994.
A Symposium honouring the work of Harold Fletcher and Ted Raynor.

This symposium is sponsored by the Edgeworth David Society on the Seventh Annual Edgeworth David Day. The speakers and papers are as follows:

Imagery - an overview, John Huntington, CSIRO
Electron microprobe, David Cockayne, (University of Sydney)
Computer images in petrology, Geoff Clarke, (University of Sydney)
Imagery of the planets, Eric Middlemost, (University of Sydney)
2D & 3D reflection seismic colour imaging, Joop Stienstra, (Unviersity of Sydney)
Imaging airborne methods, Ted Tyne (Geoterrics)
Satellite & global groundtruth and imagery, Dietmar Müller, (University of Sydney)
Continental resource assessment, Mike Aubery (Technical & Field Surveys)
Image oriented computing, Ian Lilly (Silicon Graphics)
Exploration state of the art, Jim Cleghorn (Western Mining)

For futher information and a registration form contact: The Secretary, Edgeworth David Society, Department of Geology & Geophysics, UNIVERSITY OF SYDNEY NSW 2006

PROGRAMME OF THE ENTOMOLOGICAL SOCIETY OF AUSTRALIA

The Entomological Society of Australia holds meetings ont he first Wednesday of the month at 7.30pm usually at the Biological and Chemical Research Institute at Rydalmere. If you wish to receive their circular or participate in their meetings, contact: Mrs. Alsion W. Nicholls (Hon. Sec.) 722A, Old Northern Road, Dural NSW 2158

BOOKS FOR SALE Copies of '*The Freshwater Crayfishes of NSW*' by John Merrick at $30 plus postage and the *Polychaete Symposium Volume* at $40 plus postage are still available. Contact the Society's office if you are interested.

ROBERT TOWNSON (1762-182) AND THE PROBLEM OF PATRONAGE: FORGOTTEN POLYMATH AND AUSTRALIA'S FIRST SCIENTIST? A lecture by Dr. Hugh Torrens

Robert Townson was a talented generalist, active in botany, entomology, geology, history, linguistics and physiology. He was a mountaineer, traveller and collector.

He personally funded all his activities and was, of necessity, a scrounger. Such broad talents do not receive the recognition they deserve. It is the specialists who attract fame.

Townson's mother, Sarah Sewell, married Mr. Aldcroft, a businessman. The marriage did not go well, and in 1753, she eloped with Townson's father but they did not marry. In 1765, Aldcroft divorced his wife in a special act of parliament. His parents married four years after he was borne. Robert's father died in 1773. His brother John was a captain in the army and came to Australia in 1790. His sister Anne married John Witt and lived in Shropshire. Robert and the rest of the family went to live there, so for a while he had a patron. His formative years were influenced by some of the more liberal minds, including Archdeacon Corbertt who was fervently anti slavery.

Robert Townson started out as a mercantile apprentice, but wander lust sent him touring Europe by foot. He studied geology, chemistry and assaying with B.C. Sage in Paris. He met Pierre Brouson, the noted botanist and ichthyologist. He returned to Shropshire, well known for its walking trails and geology, and was the first to reveal order in the chaos of the rocks. Then he went to Scotland and studied anatony and surgery. He also studied chemistry and physics and was introduced to the museum. Towson became a member of the Royal Society of Edinburgh and studied the geology of Edinburgh with James Hutton, the renowned geologist. How much of Hutton's work was inspired by Townson is not known, as acknowledgement of a colleague's contribution was not common practice. He left Edinburgh without graduating and tried to get a job, but this was difficult because he did not have a patron.

Townson returned to Europe and studied Natural History at the University of Göttingen. He produced a petrographic map, the forerunner of stratigraphy. He did not graduate, became bored and travelled all over Europe by foot. He produced a new petrographic map of Hungary showing what rocks outcropped and what might be underground, the beginnings of stratigraphy. He made a map of the ethnic groups in ex-Yugoslavia and commented on ethnic tensions. In Hungary, he was arrested as a French revolutionary spy at the time of the French Revolution, because he had a French passport and the authorities were worried that the French might try to export their revolution. Townson took up mountaineering and visited mines and studied geology all around Europe. He published a book on the anatomy and physiology of amphibia that was remarkable for its time. He was also intrested in technology and knew James Watt, the inventor of the steam engine.

Townson returned to Scotland and Shropshire to write. He produced books on his travels in Hungary, mineralogy, proverbs and sayings for poor people (!) He believed in equality and did not agree with the class system that was so entrenched. He wrote on the natural history and geology of Shropshire. Publication was extremely difficult because he did not have a patron and could not find subscribers. His attempts to emigate to Canada in 1791, and to undertake a minerological survey of India in 1796 all failed because of the lack of a patron. He became disillusioned and started travelling again.

After his mother died, Townson migrated to Australia in 1806 to join his brother. He had a letter of introduction from Charles Greville, his first patron, but unfortunately, Greville died soon after. Governor Bligh would not honour promises of land grants to him or his brother, and he became caught up in the rum rebellion.

He considered the politics impossible and that Australia was a most unhappy country. He did not get along with Governor Macquarie either, but after Macquarie left, things improved. He became a very successful farmer and wine maker, the first in the country and died at the age of 65. He was not able to do any science in Australia.

John Townson was a remarkable man and all his science was achieved by his own industry and his own money. His work on amphibia remained unknown and was not confirmed for 150 years. Too often, the history of science is the history of patronage. At the other extreme, Sir Joseph Banks had patronage and money but did very little science.

EVOLUTIONARY BIOLOGY AT THE CUTTING EDGE A lecture given by Prof. Andrew Beattie, School of Biological Sciences, Macquarie University.

In the search for new commercial products, scientists are returning to natural history. Many of the problems faced by humans have been solved by other organisms, through natural selection and evolution.

Drug companies in their search for new antibiotics and drugs screen thousands of compounds, but this is not a focused approached. If we turn to evolutionary biology, we ask the question, Where in nature, would we expect antibiotics to have evolved? Where would contagious diseases be a problem? The answer is, amongst aggregations of animals, the social insects, bees, ants and wasps. If a bull ant is placed in a sterile tube, very few microorganisms are recovered from her body, far fewer than are found on our own skin. The bull ant has a gland that secretes a substance that has strong antibacterial and some antifungal properties. By regular grooming the ant spreads the secretion over her whole body.

The leaf cutting ants cut leaves into pieces and take them underground to cultivate their fungal gardens. They produce very powerful antibiotics. In general, the smaller the ant, the more powerful the antibiotic. The male ants do not produce antibiotics and if isolated from the workers, they die. They are thus totally dependant on the workers. The parasitic ants do not produced antibiotics either.

Ants are in competition with termites. There are times when they wage war, and the ants spray the termites with a substance. The ants always win. This substance has been analysed and found to have termiticide properties. It is being manufactured and used as a termiticide in Africa.

No one knows how many species of ants there are, many species have not been described. It is estimated that Australia has 3 - 8,000 species. Ants are thus a considerable bioresource. Termites also produced antibiotics as they live in very similar environments.

Where we do not expect antibiotics to be produced, for example in solitary creatures such as slaters, they are not produced. This increases confidence in evolutionary biology as a predictive tool for useful compounds. It also indicates the revelance of ecological and evolutionary theories.

Evolutionary ecology has been used for biological control for some time, and Australia is a leader in this field. As practiced today, great care is take before an organism is released to make sure that it does not become a pest itself. The study of taxonomy is important if these organisms are to be utilised. As an example, in the effort to control the salvinia water weed, a beetle known to live on it was tried, but it did not work. A beetle from apparently the same species but a different source did work.

Spider webs are being tested for their use as super strong and light weight fibres. The U.S. Army has trialed out a bullet-proof vest of spiderweb fibre and it is lighter and more shock absorbent. The U.S. Navy is looking to spider webs for a super strong net to catch planes as they land on aircraft carriers. The gene for spider web material has been taken out of the spider and put into a bacterium and vats of mushie stuff can be produced. It may be that other genes and other mechanisms in the spider are required before the fibre is spun into a thread.

Natural adhesives are found in many organisms, e.g. deep sea vent worms, spiders, velvet worms and barnacles. Some spiders and all velvet worms squirt instant glue at their prey to entrap them.

There are many other possible applications of compounds from invertebrates. Leeches produce anticoagulants. Nematodes which invade animal hosts produced anti inflamitories and immunosuppressants. Anemones and tunicates produce anti-tumour agents and a sunscreen has been developed from them.

Mites are very common in nature and may be a problem on plants. Some trees do not have mites and they are found to have mite-killers. Seed collecting ants may be a problem when attempts are made to reseed devegetated areas after mining. The ants steal all the seeds. Where may we find ant repellents? Ants will raid the nests of paper wasps and destroy them. The thin stalk attachment of the nest has an ant repellent.

Useful bio materials may be predicted also. Where will we find a strong cement-like material that is also flexible? In a deep-sea environment where the organisms must withstand the immense water pressure. A deep sea bivalve has been studied and its ultrastructure is being used as a pattern for the manufacture of some car parts.

Many more predictions may be made. The value of natural history in our technological age is proven to those who think it is old fashioned and has no relevance in modern research. The need for preservation of bio diversity is clear, even to those who think only of our own self interest.

PROGRAMME

☞ **Wednesday 21st September**, 6pm in Room 456, Biological Sciences, University of NSW (Parking is available. Enter through Gate 11, Botany Street).

Dr. Helene A. Martin, School of Biological Science, University of NSW

Tertiary Climate Evolution and the Development of Aridity in Australia.

In southeastern Australia, rainforest flourished and the climate was very wet, about 40 million years ago. Widespread rainforest disappeared from the landscape and wet sclerophyll forests became predominate when the climate became drier, about 10-14 million years ago. There was a brief return of rainforest and a wetter climate 5-6 million years ago. Forests disappeared and the vegetation became woodlands and grasslands, about 2-3 million years ago.

Pollen requires permanently wet swamps, lakes etc. for preservation. Once the climate becomes drier and their are fewer permanently wet places, the history of the vegetation becomes sketchy. The record of central Australia is compared with that of southeastern Australia. Rainforest was present in Central Australia but it was different to that of the southeast. Studies of dust particles and grass phytoliths recovered from deep sea cores are also pertinent to the development of aridity.

Desertification started in the mid Miocene, about 12 million years ago, and aridity reached its present proportions about 2-3 million years ago. There are two hypotheses about the development of aridity, one that it started in the north and extended southwards, and the other that it started in the south and extended northwards. The two may not be in as much conflict as it appears for they apply to different times.

☞ **Wednesday 19th October** at 6pm in the Edgeworth David Lecture Theatre, Department of Geology and Geophysics, University of Sydney.

Dr. David Branagan, Department of Geology and Geophysics, University of Sydney.

John Alexander Watt, Geologist to the Horn Expedition 1894

J.A. Watt made significant contributions to this expedition which carried out important scientific work in Central Australia a hundred years ago. A brilliant student, with little experience prior to the expedition, he later studies in Europe before beginning what looked to be a significant career in geology with the New South Wales Geological Survey.

He resigned in 1900 and vanished from the geological scene. What prompted this move and what did he do with his life in the following years? This talk will outline Watt's work and will discuss the problems of researching the activities and movements of scientists, such as Watt, who changed careers in midstream.

☞ EXCURSION TO MT. TOMAH BOTANIC GARDENS
Saturday 26th November.

Meet at 10.30am in the Lecture Theatre. The drive from Sydney takes 2 hr. Go via Richmond and Bell's Line Road.

LEADER:- **Prof. Carrick-Chambers**, Director, Royal Botanic Gardens

AGENDA
Meet in the Lecture Theatre, 10.30 am for Devonshire Tea
Inspect gardens on foot
Return to the Lecture Theatre for a light lunch of quiche, salad, fruit.
Tour other parts of the gardens
Leave about 3pm

Mt. Tomah specialises in cool climate plants that are not easily grown in Sydney. There are extensive rock gardens with plants from Tierra del Fuego, New Zealand, our own alpine areas, Tasmania etc. etc. There are formal gardens with herbaceous borders and large collections of the Himalayan type rhododendrons. Explorers walks through Eurasian forests and North American deciduous forests are being installed There is a new winter garden of the Ericas of the world. The walk through rainforest and sclerophyll has views back to Sydney and the restaurant and visitors centre has stunning views towards the Hunter River.

BRING: Warm, windproof and waterproof clothing and wear walking shoes. The weather at Mt. Tomah is impossible to predict from Sydney.

COST: There is a charge of $5 for car entry. Morning Tea and lunch is $ 12

We need to know numbers for catering,so please let us know if you are coming
by Tuesday 22 November

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061

Telephone: 929 0253
(Tuesdays only)

I wish to make bookings for .... people for Devonshire tea and lunch. Mt Tomah excursion, Saturday 26 November 1994

NAME: ....

ADDRESS: ....

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 73 **OCTOBER 1994**

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IN THIS ISSUE

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1994. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 6 November 1993.

PAPERS ACCEPTED FOR PUBLICATION

H.A. Martin - The stratigraphic palynology of the Murray River Valey in New South Wales.

D.A. Keith - How similar are geographically separated stands of the same vegetation formation? A moorland case study.

AWARDS FROM THE J.W. VICKERY SCIENTIFIC RESEARCH FUND

The sum requested in the applications exceeded the funds available and the Society regrets that it was unable to support the projects to the amount requested.

Brock, Glenn Anthony, Centre for Ecostratigraphy & Palaeobiology, School of Earth Sciences, Macquarie University.

PROJECT: Palaeozoic brachiopod faunas from eastern Australia: taxonomy, biostratigraphy, palaeoecology and palaeobiogeography. Brachipods are the most numerous and diverse fossils from the thick sequences of Palaeozoic marine sediments of eastern Australia. Inadequate taxonomic treatments of these faunas and the absence of well-defined biochronological control for most Palaeozoic sequences has prevented regional and global correlations and masked the biogeographic significance of many faunas. The classification and biostratigraphy of the brachiopods will be revised. Awarded $400.

Cotter, Kaye Lorraine, School of Earth Sciences, Macquarie University.

PROJECT: Palaeobiology of cherts and shales from the Neoproterozoic of the western Officer Basin.
Microfossils in the Officer Basin are being examined in detail, to provide a taxonomic and taphonomic account, as well as an interpretation of the Neoproterozoic environment at the time of deposition. Awarded $400

Crane, Ralph, Amateur orchidologist, Maleny, Queensland

PROJECT: Inventory of the orchids of the western Darling Downs, Queensland. Preliminary studies have shown that the orchid flora of this region is poorly known and poorly vouchered in herbaria. The orchid flora will be survewyed and collected. Awarded $250

Crowe, Tasman Peter, Institute of Marine Ecology, University of Sydney.

PROJECT: The distribution and diet of the mudwhelk, *Terebralia palustris*, in the mangrove forests of Darwin Harbour, Northern Territory. This project is part of base-line studies of the marine habitats in Darwin Harbour, especially the extensive areas of mangroves. Darwin is important as a centre to service our increasing trade links with South-east Asia. These ecological studies will contriubte to effective assessment and management of Darwin's mangrove habitat in the face of increasing developmental pressures. Awarded $350

Forster, Paul Irwin, Queensland Herbarium, Brisbane

PROJECT: Revision of *Dischidia* (Asclepiadaceae) in Bougainville, the Solomon Islands and Bismarck Archipelago. A revision of this group of six species is in preparation. Funding is requested for 2 plates of line illustrations. Awarded $250.

Gallahar, Nicole Kerrie, School of Biological Sciences, University of Sydney.

PROJECT: Bioturbation by the mud lobster, *Thalassina anomala*, and its influence on assemblages of amphipods in mangrove forests of Darwin Harbour. This is another study of the ecology of the mangrove habitats of Darwin Harbour (cf. Crowe above). Bioturbation resulting from the activities of burrowing animals may have profound effects on sediment characteristics and on the assemblages of other organisms, especially on amphipod crustaceans, which are sensitive environmental indicators. Awarded $350

Gillanders, Bronwyn, School of Biological Sciences, University of Sydney.

PROJECT: The importance of nursery habitats to blue groper: use of a novel method to determine movement. Juveniles of the blue groper, *Achoerodus viridis*, have been thought to be associated with estuarine seagrass beds for 3-4 months, then to migrate to deeper beds of seagrass or directly to coastal rocky reefs. However, small numbers of juvenile gropers recruit to rocky reefs. To assess whether juveniles from the two habitats can be distinguished otolith micro-chemistry will be studies. Awarded $400.

Holdaway, Nerida, School of Biological Sciences, University of Sydney.

PROJECT: The effect of electric fields on the direction of auxin (IAA) transport in corn coleoptiles. In many plants, changes in endogenous electric fields produced by the plant correlate with changes in development and morphology. It has been suggested that electric fields have a role in tropic curvature by controlling the distribution of the plant hormone IAA, which stimulates cell expansion in shoots. This study will test this, by applying transverse electric fields to coleoptile segments of *Zea mays* and then monitiroing the direction of IAA transport using 14C-IAA label. Awarded $200.

Keable, Stephen John, Australian Museum

PROJECT: Systematics, phylogeny and biogeography of *Natatolana* (Crustacea: Isopoda: Cirolanidae).
Species of *Natatolana* are significant in decomposing and recycling nutrients in Australian waters, and are also pests of many commercial fisheries. It is the most diverse genus of cirolanid isopods in Australian waters, but the taxonomy, phylogeny, distribution and biogeography of its species are inadequately known. Awarded $400.

List, Kate Helen, Applied Geology, University of NSW.

PROJECT: Continental Shelf Foraminifera of NSW.
The recent foraminiferal fauna of the surface sediments of the continental shelf of NSW is largely unstudied in terms of species occurrence and abundance. The applicant is studying 84 samples, taken from Point Danger to Cape Howe, for ecological distribution, classification and description of species. Awarded $250.

Murray-Jones, Susan Elizabeth, School of Biological Sciences, University of Wollongong

PROJECT: Genetic variation and reproduction in *Donax deltoides*.
The pipi, *Donzx deltoides* is an important commercial bivalve on the Australian east coast. There is concern that its numbers are declining, but its biology is too poorly known for effective management strategies to be formulated. A study of the reproductive biology and population genetics of the pipi will use allozyme frequencies to determine whether it is a single species, and whether there are separate breeding populations on the east coast. Awarded $400.

Stratford, James Matthew Campbell, Dept Geology & Geophysics, University of Sydney.

PROJECT: Correlations between radiolarian assemblages in the southern and northern exposures of the Gamilaroi terrane, NSW and Queensland.
A study of the radiolarian assemblages in the southern New England orogen and those at the northern end of the orogen near Rockhampton will provide a more accurate assessment of the links between these two extremes of the orogen.
Awarded $400.

Trautman, Donelle Ann, School of Biological Sciences, University of Sydney.

PROJECT: Physiological ecology of a symbiont-containing tropical sponge.
The population dynamics, growth, metabolism and nutrition of the common tropical sponge *Sigmadocia symbiotica* and its symbiont red alga *Ceratodictyon spongiosum* are being studied at One Tree Island.
Awarded $400.

van Tets, Ian Gerard, Dept. of Biological Sciences, University of Wollongong.

PROJECT: Pollen utilisation by Australian mammals.
Apart from the use of nectar as an energy source, the benefits mammals gain from flower-foraging is poorly understood. The value of pollen protein to these mammals is being studied by analysis of field-collected faeces and dietary studies of 10 captive Eastern Pigmy Possums. Awarded $400.

Withers, Karen Jennifer Tyndall, School of Biological Sciences, University of Sydney.

PROJECT: The population biology of *Plesiastrea versiporta*, a hermatypic, scleractinian coral occurring in Sydney Harbour.
The distribution, abundance, growth and mortality rates, and reproduction of *Plesiastrea versipora* is is being studied in the laboratory and by diving at selected sites in Sydney Harbour. Awarded $400.

TERTIARY CLIMATIC EVOLUTION AND THE DEVELOPMENT OF ARIDITY IN AUSTRALIA: A lecture to the Society by Dr. Helene A. Martin.

The history of the vegetation is a running commentary on the climate of the time. By using the climatic tolerances of the types of vegetation and of individual taxa, the climate is deduced. The best record of the history of the vegetation comes from bores in the Lachlan River Valley, from Hillston to Cowra, and covers about 40 million years.

From the Eocene to late Oligocene-early Miocene, i.e. from 40 - 22 million years, rainforests dominated the landscape, *Nothofagus* was common, as were the gymnosperms *Podocarpus, Dacrydium* and *Dacrycarpus*. In the wetter habitats, *Lagarostrobus*, the Huon pine was common. There was a rich diversity of plant life. The climate was very humid, probably with more than 1800mm of rainfall. From early-mid Miocene, i.e. 22-15 million years, rainforests persisted, but there was less *Nothofagus* and more Myrtaceae. The climate was not as humid, with a precipitation probably less than 1800mm, but over 1500mm.

The mid-late Miocene, about 12-10 million years, was a time of drastic change, when widespread rainforest disappeared from the landscape. Wet sclerophyll forest became dominant. There was a tall canopy of eucalypts with some rainforest in the understorey. Tree ferns were abundant and small patches of rainforest persisted in favourable habitats such as protected gullies. This period of change is especially significant because burning on a regular basis had become and intergral part of the environment. The climate had become drier, with a rainfall of 1000-1500mm and a well marked dry season.

In the late Miocene-early Pliocene, about 5-6 million years ago, there was a brief return of rainforest when the precipitation would have been more than, 1500mm. Wet sclerophyll forest was dominant through most of the Pliocene. Towards the end, in the late Pliocene-Pleistocene, the forests opened up and woodlands, shrublands/grasslands/herdfields became dominant. This time marks a second drastic change, when the rainfall was reduced to 500-800mm.

When all the sites in southeastern Australia are compared, they suggest a rainfall gradient, parallel to that of today. i.e. it was wetter on the coast and in the southeast and drier inland and to the northwest. Could the present day rainfall gradient be used as an hypothesis to predict Tertiary climate elsewhere in Australia?

A deep sea core off the northwest of Australia has casuarinaceous sclerophyll forest which decline throughout the Pliocene and are replaced by grasslands. Thus the northwest was drier than the southeast during this period. Deep sea cores off northeast Queensland show both rainforest and casuarinaceous sclerophyll forests from the late Micene through most of the Pleistocene. There was little change here, the climate remaining favourable to rainforest in this region. Northeast Queensland in the wettest part of Australia today, and it was wetter than southeast Australia during the Tertiary.

There are a few sites in central Australia where early evidence of aridity may be expected. Preservation of pollen or other plant fossils requires permanently wet environments, such as lakes, swamps and bogs. When the climate becomes dry, such sites are rare in the landscape. The evidence that exists suggests that central Australia has always been drier than the coastal regions. Thus in the late Eocene, rainforest was dominant in central Australia, just as it was in the southeast, but there was less *Nothofagus* and there were patches of sclerophyll. In the late Oligocene - mid Miocene, sclerophyll was common, with minor rainforest in central Australia whereas rainforest was the dominant in the southeast. By late Miocene-early Pliocene, all rainforest had disappeared and Casuarinaceous forests were dominant. Other than conforming to this rainfall gradient, the history of the vegetation yields little evidence about the development of aridity.

In dry weather, strong winds erode our precious top soil and blow away hundreds of tonnes in our notorious dust storms. Some of the dust reaches New Zealand but most of it settles in the ocean where it may be exhumed by deep sea drilling. A deep sea core on the Lord Howe Rise contains grass phytoliths, opaline silica bodies which were produced within the cells of the grass. When the grass plant dies and decays, the phytoliths are liberated into the soil, and may be blown away in dust storms. The phytoliths recovered from the Lord Howe Rise show a steady increase throughout the Pliocene, and the pattern is similar to that of grass pollen in the deep sea core off the north-west. Thus grasslands were developing throughout the Pliocene, in some region for which there is no palynology. In southeastern Australia the forests hung on longer, with grasslands developing only at the end of the Pliocene.

The clay minerals of the dust may be studied also. Different clay minerals require specific environments for their formation, and hence are climatic indicators. By comparison of the clay minerals in Lord Howe sites and on the Australian snowfields, the development of the present day aridity is deduced. In the early Miocene, the climate was warm and humid, with some dry periods. 13-14 million years ago, the climate changed from dominantly humid to semi-arid. About 12 million years, desertification increased. 5-6 million years ago, there was a major expansion of deserts and semi-deserts. 2-3 million years ago, the climate became dominantly arid, similar to that of today (Stein and Roberts 1986)

There is a chain of three sites on the Lord Howe Rise, and the changeover from a humid to arid climate registers at successively younger ages, from north to south. In the northern site, it is about 12 million years, whereas in the southern most site it is 5-6 million years. This has lead Stein and Roberts to propose an hypothesis that aridity started first in the north and migrated southwards.

Studies on Lake George in the highlands have yielded a climatic history. The top 2.5 million years of the core from Lake George have been palaeomagnetically dated. In the ?Miocene, the climate was humid and seasonally equable. About 5-6 million years ago, there was a change to seasonal aridity with warm wet summers. 2.5 million years ago, the climate changed to winter rainfall conditions and Lake George oscillated between lake full and lake dry conditions, just as it does today (Bowler 1982). This last stage at 2.5 million years corresponds to the final intensification of aridity at 2-3 million years from the studies on windblown dust. Lake George in a wetter climatic zone would have experienced aridification later than regions in the dry interior.

Bowler presents an hypothesis for the development of aridity. The world's arid zones experienced a dominance of the dry high pressure anticyclones. In the early Tertiary, before the development of the ice cap on Antarctica, the anticyclonic belt was weak and tracked much further south. Thedevelopment of the ice cap intensified the anticyclones and pushed them northwards. In other words, aridity developed from the south to the north. At first glance, Bowler's hypothesis appears to contradict that of Stein and Roberts, but this is not so, for the two hypotheses apply to different times.

There are other hypotheses which place the beginning of aridity in the Eocene in the northwest, because this part of Australia reached the dry anticlonic latitudes first, by continental drift. This seems unlikely, but there were probably dry spells as far back as the Eocene. We know very little about the northwest of Australia.

REFERENCES

Bowler, J.M. 1982. Aridity in the late Tertiary and Quaternary of Australis. In Barker W.R. & Greenslade P.T. Eds. *Evolution of the Flora and Fauna of arid Australia*, pp 35-45. Peacock Publications, Adelaide.

Martin, H.A. Submited for publication. Tertiary climatic evolution and the development of aridity in Australia. *Memoirs of the Queensland Museum*

Stein, R. and Robert, C., 1986. Siliclastic sediments at Sites 588, 590 and 591: Neogene and Paleogene evolution in the southwest Pacific and Australian climate. *Init. Repts. DSDP 90*, 1437-1455.

PROGRAMME

☞ **Wednesday 19th October** at 6pm in the Edgeworth David Lecture Theatre, Department of Geology and Geophysics, University of Sydney.

Dr. David Branagan, Department of Geology and Geophysics, University of Sydney.

John Alexander Watt, Geologist to the Horn Expedition 1894

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☞ EXCURSION TO MT. TOMAH BOTANIC GARDENS

P.T.O. ☞ ☞ ☞

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Saturday 26th November.

Meet at 10.30am in the Lecture Theatre. The drive from Sydney takes 2 hr. Go via Richmond and Bell's Line Road.

LEADER: **Prof. Carrick Chambers**, Director, Royal Botanic Gardens

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Inspect gardens on foot
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I wish to make bookings for .... people for Devonshire tea and lunch.
Mt Tomah excursion, Saturday 26 November 1994

NAME: ....

ADDRESS: ....

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 74 DECEMBER 1994

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IN THIS ISSUE

NEW MEMBERS

We welcome Ms. Georgina Broadsmith of Holloways Beach, Qld.

PAPERS ACCEPTED FOR PUBLICATION

T.D. Auld and M. Tozer - Patterns in emergence of *Acacia* and *Grevillea* seedlings after fire.

R.A. Bradstock - Demography of woody plants in relation to fire: *Telopea speciosissima*.

J.D. Scanlon - First records from Wellington Caves, New South Wales, of the extinct Madtsoiid snake *Wonambi naracoortensis* Smith, 1976.

J. Stratford and J. Aitchison - Lower Permian fauna from Manning facies rocks along the Peel-Manning Fault System, Glenrock Station, southern New England orogen.

BUSHFIRE SYMPOSIUM

The January 1994 bushfires around Sydney highlighted the public awareness of fire in the Australian environment. With the next bushfire season approaching, fire awareness is once more of great concern. The Society, jointly with ANZAAS NSW is sponsoring a symposium on 4th March 1995 and we have attracted a range of outstanding speakers. Papers from the symposium will be published in the Proceedings and all members of the Society will receive a copy. The same papers will be published as a special symposium volume for non-members.

The speakers and their topics are listed in the registration brochure, included in this Newsletter.

The symposium is suitable for anyone interested in the topic, non-experts as well as academics. It is suitable for senior school students interested in the environment. Could you assist in publicity and post the brochure in your public library, bring it to the attention of teachers, etc. etc. More copies are available from Dr. H. Martin on (02) 385 2071, or Fax (02) 662 2913, or School of Biological Science, University of NSW, Sydney 2052.

SYMPOSIUM ON THE QUATERNARY

This symposium is convened to bring together people from the various disciplines involved in Quaternary Studies - palaeontologists, climatologists, biologists, archaeologists, geologists and no doubt many others. Wellington Caves has been chosen as the venue because of the important role the Wellington Caves deposits have played in the history of scientific study of the Quaternay and continues to play under the auspices of the Scientific Advisory Council set up by the Wellington Shire Council. A brochure is included. Enquiries to Dr. M.L. Augee, School of Biological Science, University of N.S.W., Sydney 2052

AUSTRALIAN FLORA FOUNDATION REASERCH GRANTS

The Australian Flora Foundation has received funds from the Trustees of the Lord Mayor's Bushfire Appeal Fund 1994 Special grants are available for original research into fire and the Australian flora, for between $5,000 and $35,000. Funds may be available for up to three years. Topics may include:
Changes in flammability of the vegetation in relation to fire frequency.
The response of rainforest to fire.
The effect of fire on the fungal flora.
Role of fire-related cues in breaking seed dormancy.
Other fire-related topics will also be considered. Preliminary applictions close by 10th February 1995

Grants for scientific projects on the biology or cultivation of Australian plants are also available. Topics of particular interest are:
Propagation and cultivation of species of imprtance to ornamental horticulture, including *Ricinocarpos, Persoonia* and *Newcastelia*.
Rutaceae: propagation and cultivation.
Seed bioogy of Asteraceae, with horticultural value
Research into mycorrhiza.
Induction of flowering in *Brachychiton acerifolius*.
Preliminary applications close by 31st March 1995.

For information about applications, contact the President, Dr. Malcolm Reed, (02) 850 8155 or the Hon. Secretary, Australian Flora Foundation, GPO Box 205, Sydney NSW 2001

THE AUSTRALIAN GARDEN JOURNAL

The summer edition of the Australian Garden Journal contains an article by Assoc. Professor Robert King on *Welwitschia* and another by Dr. David Murray on the Illawarra flame tree. Both are planning further articles.

Why not subscribe? There are four issues in a year and the subscription is $25 within Australia. Write to P.O. Box 588, BOWRAL. NSW 2576

THE AGE OF FISHES MUSEUM, CANOWINDRA

A chance discovery by a roadworker in 1956 led to one of the world's great fossil discoveries when a bulldozer overturned a large rock slab with detailed impressions or natural moulds of more than 100 Late Devonian fishes, most of them complete. By the time the road was graded, the exact position of the fossil layer was lost.. In January 1993, a trial dig was carried out with the aid of a 22 tonne excavator, and in 3 hours, the fish layer was relocated. Fossil fish were abundant throughout. In July 1993, the original fish layer was excavated with the help of the Canowindra community. Results exceeded ex[ectations! The Canowindra fauna is dominated by 2 types of antiarch armoured fishes. Three or four types of air-breathing lobe-finned crossopterygian fishes were also present. These lobe-finned fishes were large, up to 1.6m long with their head regions preserved in 3-D.

360 million years ago, a large lake or river with tens of thousands of fish living in it, dried up during a severe drought. The fish, tightly concentrated in a small area, were rapidly but gently covered with sand soon after death and before their bony scales and plates fell apart. Yet another Late Devonian fossil fish site, 20 km southwest of Canowindra has been found. All new finds will remain in Canowindra where they will form the basis of the 'Age of Fishes' Museum.

Anyone wishing to participate in Canowindra's 'Age of Fishes' project can do so by joining in a regular monthly working weekend, supervised by Dr. Alex Ritchie and colleagues. For information, contact Monica Yeung, Gondwana Dreaming Earth Science Tours,, PO Box 3017, Weston ACT 2611, or tel/fax (06) 285 1872

SUBSCRIPTIONS DUE

Renewal of memberships fall due at the beginning of the year. There is a slight increase in subscription rates and a discount for memberships paid before April 1995. A form for renewal of memberships is included.

SOCIETY LUNCHEON: WEDNESDAY 15TH FEBRUARY 1995

The Society Luncheon, Wedensday 15th February, will be held in the Classroom, Royal Botanic Gardens. Please let the Secretary know if you intend to come by Tuesday 7th February. A booking form is included. Spouses, partners and friends are welcome.

JOHN ALEXANDER WATT, GEOLOGIST TO THE HORN EXPEDITION 1894. A lecture to the Society by Dr. David Branagan.

Alex Watt graduated from Sydney University with a BA, Philosophy and Latin in 1890 and MA in 1892. His father lectured at the University and curated the Nicholson Museum. Alex Watt followed his studies in the arts by a BSc in 1894 and received the prize for geology. He was also awarded the University Medal and was one of the first to receive it. Edgeworth David had become Professor of Geology in 1891 and was a great influence over Alex Watt. He had also married Alice Hall in 1890, sister to Edgar Hall, a mine manager. He became the assayist for the Lewis Ponds Mining Company in 1894, the first graduate of any Australian University to become a geologist.

William Horn was a businessman with interests in the Moonta Copper Mines in South Australia and in Broken Hill. He organised the Horn expedition to central Australia and said he was doing it just for science. There was, however, intense rivalry with Sir Thomas Elder of Adelaide who had organised an exhibition the year before, but it turned out a disaster. William Horn saw his chance to get one up on his rival, and he had his eye on a knighthood as well.

At the time, the view of central Australia was that it was all sand. The McDonald Ranges were an 'island' in the sand that may have had plants and animals not known elsewhere. Sir Ralph Tate of the Geology Department, Adelaide University also went on the expedition and included mineral collectors. Henry York Lyle Brown, a Canadian, had done the whole of the geology of central Australia. Brown was known as a fearless mine inspector who assessed mines for "puffers and duffer", those who would plant minerals to make the mine appear worth more than it was. Tate was keen to get one up on his competitor.

The expedition was also to photograph aborigines. The view of the time was that they were doomed to die out and this was a chance to record them.

There was a great deal of interest in the expedition and Horn was keen to upgrade it. He wrote to other states governments and asked them to nominate people. Edgeworth David was requested but did not go, for reasons unknown. Watt went instead, leaving Sydney hurriedly. His train tickets had not arrived, and he had some trouble on the way.

The expedition included Stirling to do the anthropology and he was keen to find diprotodons, Balwin Spencer from Victoria was the photographer and Charles Winnecke, the surveyor. Sir Ralph Tate was interested in the plants as well as geology.

They went to Oodnadatta by train and then to the Finke River by camel, travelling more than 2,000 miles and spending three months on camels.

The schedule of the expedition did not leave much time to examine the geology, but Watt managed credible accounts. He was young and energetic at the age of 26, and Tate was much older. It is said that Tate did not go on any field trip without, a keg! Nevertheless, the publications came out with Tate and Watt as authors! Watt worked at Dalhousie Springs which is fed by artesian waters. At the Finke River, Watt, Winnecke and an aboriginal tracker went off to the Newland River. Winnecke named Mt. Watt, an isolated island of Ordovician rocks with older rock underneath after Watt, who collected fossils there. They visited and described Chambers Pillar, Gills Range, Kings Canyon, Illara Rock, Urulu (Ayers Rock), the Olgas, Lake Amadeus and Palm Valley. They produced cross sections as it was not possible for geological mapping. Winnecke named Mt. Tate and Horn Valley, but because of an argument with Horn later, he renamed the valley Marini. So now there are specimens collected from Horn Valley which is not on any map. Watt made a separate trip not included in the expedition to gold, mica and ruby mines in the Altunga region, but there were no rubies, they were only garnets.

Horn expected a report almost immediately the expedition returned, as he did not appreciate the work required before writing up. When Winnecke did produced his report, Horn thought he was trying to big-note himself and rejected it. Winnecke had to publish it himself, and Horn tried to suppress it. Winnecke complained he had not been reimbursed for expenses. Horn didn't get his knighthood! Spencer finally took charge of the report, chasing people and doing the editing.

Back in Sydney, Watt worked on the fossils and reported on the economic geology of the Altunga mines. Tate urged him to beat Brown into press. Watt had been offered a scholarship to England 'for worthy colonials' in 1895. Earnest Rutherford was also awarded one off these scholarships. Watt had finished his report but took samples with him to study the thin sections. When he sent his plates to Spencer, he complained that they were not 'artistic', only scientific!

During his time spent in Imperial College, studying mines in England and in Saxony, Watt was not very well. It was suspected he had TB. He returned to Australia in 1997 and joined the Geological Survey of NSW where he worked for 2 years. He accomplished a lot, surveying the Saddle Reef goldmines and Wyalong, the Iron Mines near Goulburn and much more. His wife was not happy. He spent a lot of time in the field and the house was burgled, so he resigned. He decided to take up Medicine, went back to England and graduated in 1906. He came back to Australia and settled in Tenterfield where his wife's family lived. He lived to the age of 90.

Much of the geology Watt did has stood the test of time. There is the problem of the desert sandstone found on maps of 1870-1930, after which it vanished. It is essentially a weathering profile that silicifies rocks of different ages. Tate and Watt recognised the complications and called it 'supra Cretaceous'. He collected trilobites and ammonites. Tate recognised the Ordovician, or Lower Silurian as it was called then. They recognised shallow water graptolites and correlated them with deep water graptolites in southeastern Australia. They dispelled the idea that central Australia was all sand.

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 15 FEBRUARY 1995, AT 12.30 pm IN THE CLASSROOM, NATIONAL HERBARIUM, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

We need to know numbers for catering,so please let us know if you are coming BY TUESDAY7 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061

Telephone: 929 0253
(Tuesdays only)

I wish to make bookings for .... people at $14 per person for the luncheonon 15 February

Cheque for $ ....is enclosed

NAME: ....

ADDRESS: ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES

Council Nominations for President, Council and Auditor for 1995/6

ELECTION AT ANNUAL GENERAL MEETING, WEDNESDAY, 15th March, 1995

*The names of Members who retire (in terms of rules 15a and 15b) are marked with an asterisk.

President:-

Council:-

*A.E.J. Andrews, A.S.T.C.(Civ.Eng.) M.I.E. Aust.
*M.L. Augee, Ph.D.
J.P. Barkas, M.Sc., F.G.S., M.Aus.I.M.M.
M.R. Gray, M.Sc., Ph.D.
G.J. Harden, M.Sc.
L.A.S. Johnson, A.M., D.Sc., F.A.A. Hon. F.L.S.
D.A. Keith, Ph.D.
*R.J. King, B.Sc., Dip.Ed., Ph.D.
*H.A. Martin, M.Sc., Ph.D.
P.M. Martin, M.Sc.Agr., Ph.D., Dip.Ed., F.L.S., F.A.I.A.S.
*J.R. Merrick, M.Sc., Ph.D.
M.S. Moulds, T.Ch.
D.R. Murray, B.Sc., Ph.D., F.L.S.
*P.J. Myerscough, M.A., Phil.D.
I.G. Percival, Ph.D.
A. Ritchie, B.Sc., Ph.D.
C.N. Smithers, Ph.D.
K.L. Wilson, B.Sc.Agr., M.Sc.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- Ms Karen Wilson

Council:- (Six vacancies) - Council nominates the following and invites further nominations in accordance with rule 15e.

A.E.J. Andrews, A.S.T.C.(Civ. Eng.) M.I.E. Aust.
M.L. Augee, Ph.D.
R.J. King, B.Sc., Dip.Ed., Ph.D.
H.A. Martin, M.Sc., Ph.D.
J.R. Merrick, M.Sc., Ph.D.
P.J. Myerscough, M.A., Phil.D.

Auditors:- W. Sinclair & Co.

This notice is given under the provision of Rule 15e.
It is not a voting paper.

RULE 15e:- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

P.O. Box 457
Milsons Point
SYDNEY N.S.W. 2601
Telephone 929 0253 - Tuesdays only

For the Council

Barbara J. Stoddard
Secretary
14th December, 1994

LINNEAN SOCIETY OF NEW SOUTH WALES

RENEWAL OF MEMBERSHIP FOR 1995

The Secretary
Linnean Society of N.S.W.
PO BOX 457
Milsons Point, N.S.W. 2061

	PAID AFTER 30 APRIL	PAID BEFORE 30 APRIL	
FULL MEMBER	$50	$44	
RETIRED MEMBER	$28	$22	- retired, having reached the age of 60 years
STUDENT MEMBER	$28	$22	- full time student. Please included proof of student status
ASSOCIATE MEMBER	$8	$8	- receiving Newsletter but not Proceedings. No voting rights
LIFE MEMBER	NIL	NIL	- having been a full member of the Society for over 40 years.

PLEASE CIRCLE APPROPRIATE MEMBERSHIP

Cheque for $.................. is enclosed

NAME..

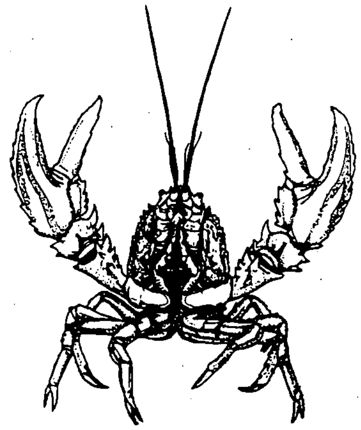
ADRESS..

If you have renewed your membership, or are a Life Member, please disregard this notice.

LINNEAN SOCIETY PUBLICATIONS 1994

FRESHWATER CRAYFISHES OF NEW SOUTH WALES

John R. Merrick



This small handbook (145 X 208 mm; 128pp) provides a comprehensive introduction to the biology and conservation of Australian representatives of this important group of aquatic invertebrates. The contents cover those species that occur in the state of New South Wales - about 25% of the Australian fauna - but many observations and recommendations have relevance for other areas.

The text is fully sourced and maintains a clear, readable style for readers without specialised knowledge of crays. Environmental management, anatomy and identification are covered, a glossary of technical terms and an index are included. Diagrams and the excellent colour plates of live crays or habitats have been placed next to the relevant text. Some plates are the first published colour photographs of rare or poorly known species.

The cover is conspicuous for easy identification and laminated for hard wear; there is no dust jacket. The tough water-repellent cover enables the book to be used in field conditions with reduced risk of damage.

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Price $30.00 + $3.00 pp

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Historical Notes of the First Fifty Years of the Linnean Society of New South Wales. Generously illustrated on art paper. $5.00 each

Transactions of the Entomological Society of New South Wales. 1862-1869. This Society was the precursor of the Linnean Society. The following parts are available at $4.00 each. Volume 1 Parts 1-5 Volume 2 Parts 1-5

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	15.	G.D. Osborne	18.	A. Musgrave
	19.	T.C. Roughley	20.	A.N. Colefax

Back issues of many volumes of the Proceedings are also available. For details please contact the Secretary: Ms. B. Stoddard, Linnena Society of New South Wales, P.O. box 457 Milsons Point NSW 2061. Phone: 929-0253 (Tuesdays only).

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 75 **APRIL 1995**

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IN THIS ISSUE

HONORARY DOCTORATE TO ISOBEL BENNETT

Our congratulations to Isobel Bennett who was awarded an Honorary Doctor of Science by the University of New South Wales. Dr. Bennett has spent a life-time working in marine natural history. Her book, *The Great Barrier Reef* is the best known and won the Whitley Memorial Award in 1982.

PAPERS ACCEPTED FOR PUBLICATION

M. Bedward - Simple models of pattern and process.

E.C. Morris - Self-thinning in *Ocimum basilicum* grown at three soil fertility levels with and without mycorrhizal inoculum.

I.M. Brewer - Isonome mapping: graphic analysis of patterns of species distribution.

J.R. Merrick - Diversity, distribution and conservation of freshwater crayfishes in the eastern highlands of New South Wales.

M. Lowman - Herbivory in Australian forests - a comparison of dry sclerophyll and rain forest canopies.

K. Cotter - Benthic foraminiferal assemblages in the Clyde River, Batemans Bay, NSW.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $600.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

Intending applicants please note:

Please read instructions carefully.
Original plus five (5) copies are required.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible

SEMINAR: Local Government and the Environment: Sydney Saturday 3rd June, 1995

This seminar examines local government issues and the new Local Government Act. For registration forms and further information, contact the Total Environment Centre, 1/88 Cumberland St, Sydney.

SEMINAR: The Literature of Australian Natural History, Canberra Friday 8th December, 1995.

The seminar will include both the writing itself - scientific, literary, popular - and the writers, from Joseph Banks to Densey Clyne. The seminar will provide a forum for writers and scientists, as well as students and amateur naturalists, to contribute and listen to modern debate on literary and historical aspects of Australian natural history writing, and just as importantly to share knowledge and interests with others.

For enquiries and proposals for papers, contact Dr. Nick Drayson, English Department, University College, Australian Defence Academy, Canberra 2600, Telephone (06) 268 8433.

REPORT ON THE SYMPOSIUM, LIVING IN A FIRE PRONE ENVIRONMENT, Saturday 4th March, 1995

The symposium was very well attended by a broad cross section of the community. As it was raining, the fire fighters were able to attend!

The papers covered historical aspects, conservation of plants and animals, management of national parks and forests and the impact of fires on the community. They are summarised below.

WILDFIRES IN PAST AGES. Dr. Helene Martin, of the School of Biological Science, University of N.S.W.

Charcoal fragments may be found together with fossil spores, pollen and leaves, hence a fire history may be reconstructed along with the history of the vegetation. When the climate was very wet and *Nothofagus* rainforests were common, fires were rare. In a bore near Hillston, an increase in charcoal particles is accompanied by a change to casuarinaceous forests. With time the forests reverted to the former *Nothofagus* rainforests.

The Latrobe Valley brown coals were formed in a vast swamp complex. *Nothofagus* rainforest was found on the surrounding hills. These swamps contained many sclerophyllous species because of the poor nutrient status. Dark coloured bands in the coal contain charcoal. Pyric and hydrologic succession in the light bands, when fire was infrequent, is different to that on the dark bands when fire was frequent. There is a charcoal layer, 5 cm thick, the result of a big burn. The podocarpaceous/proteaceous community before the fire was replaced with Casuarinaceae/mixed angiosperm forests after the fire.

About 10-12 million years ago there was a drastic climatic change and widespread rainforest was replaced by eucalypt wet sclerophyll forest. The charcoal content changes also, from its former low levels (except for specific fire events) associated with rainforest, to a high content in the eucalypt forests. The climate had become seasonal also, and burning had become a regular event.

All of these ancient fires occurred before Man arrived on the scene, and are entirely due to natural causes. Lightning would have been the main source of ignition.

ABORIGINAL USE OF FIRE IN SOUTHEASTERN AUSTRALIA. Dr. Jim Kohen,
School of Biological Sciences, Macquarie University

Did Aborigines make an impact on the vegetation with their use of fire as soon as they arrived in Australia, or did it take time to develop their fire ecology skills? From palynological studies, Singh and Kershaw claim that they altered the vegetation on arrival, but the archaeological evidence does not support them. The changes in the vegetation could be associated with climate and not aboriginal burning practices. Horton claims that Aboriginal burning made no difference to the vegetation. The truth probably lies somewhere in between these two extremes.

In the southwest of Tasmania when the climate was colder and drier, Aborigines practiced burning from 18,000 to 12,000 years ago. About 12.000 years ago, the rainfall increased and the rainforest came back and the aborigines could no longer burn. There is very little evidence of occupation in the southwest after 12,000 years. European farming in other parts of Tasmania followed open areas maintained by Aboriginal burning. Once burning stopped, "woody weeds" come back.

There is a significant change in charcoal content about 4-5,000 years ago around Sydney. Increased valley fills at this time are attributed to slope instability caused by increased burning. About this time, the dingo arrived and there was a change in types of stone tools. The aborigines started using cycads for they had the technology to process them. There is thus a change in Aboriginal culture about this time, including a change in their fire ecology.

It is not only the fire frequency but how and what time of the year that determined the type of vegetation. Arnhemland has been called an artificial wilderness maintained by fire. In the Sydney region there is a different natural fire frequency on the sandstones and on the shales. The Aborigines would have used fire to make travel easier, promote new growth and encourage edible species, for hunting, signalling, to create fire breaks around camps and to drive out snakes.

When the first settlers arrived, the eucalypt forests were park-like with very little shrub layer, and was maintained by burning. The Aborigines did not burn the rainforest or the wet sclerophyll forests. They did not burn the margins of streams because of important yam beds, hence stream margins were very scrubby. They only burnt the alluvial flats and open areas, the 'livable spaces', leaving large regions unburnt. The rugged Blue Mountains were not conducive to game hunts, hence were not burnt.

Should we reintroduce Aboriginal burning practices? The Aborigines had intensive local knowledge, but this traditional knowledge has been lost for the Sydney region. Practices in Arnhemland are not appropriate for Sydney.

REGIONAL AND HISTORICAL FIRE WEATHER PATTERNS PERTINENT TO THE JANUARY 1994 SYDNEY BUSHFIRES. Dr. Malcolm Gill and Mr. Peter H.R. Moore,
Division of Plant Industries, CSIRO

Did the bushfires occur under record-breaking extreme weather conditions? Data for temperature, humidity, wind speed and drought condition are combined to form the McArthur forest fire danger index (FFDI). The FFDI has a maximum of 100 and is 'extreme' if over 50.

Records from the Bureau of Meteorology for seven weather stations in the Sydney region (Wollongong, Sydney, Liverpool, Bankstown, Richmond and Katoomba) have been analysed. During the 1994 fire period, the maximum at 3 pm was 93 at Richmond. Record January values of FFDI were recorded at five of the seven stations, the exceptions being Katoomba and Wollongong. Only Bankstown and Liverpool equalled the highest on record.

The values of the FFDI during the 1994 fire period thus equalled the record, but they were not exceptional. What was exceptional was the maintenance of these record values for days on end. Five out of six days equalled the record.

PLANT ECOLOGY OF FIRE. Dr. David Keith, N.S.W. National Parks and Wildlife Service

Much of Australia's native vegetation is prone to recurring fires. Our desire to conserve the diversity of Australia's fire prone communities must be backed with an understanding of how various fire regimes affect processes that drive community change.

Any community has pools of propagules which will be different, depending on the type and age of the community. When any of these pools are reduced to zero, extinction flows. Resprouters, such as *Xanthorrhoea*, and *Angophora cordifolia* have transient seed banks and rely on fire to stimulate flowering. Plants have a defined life span and eventually become old and die, and if the interval between fires in longer than the life span, they may be lost to the community.

Obligate seeders store seed either in the canopy or soil and they are killed by fire, e.g. *Banksia ericifolia*. Regeneration after fire may produce thickets of individuals all the same age. These thickets exclude the understorey so that when they are burnt out, there are no resprouters and the ground remains bare until seeds germinate.

The frequency of fire, the interval between fires, intensity, season and spacial patterns of burns all influence regeneration. *Xanhorrhoea* flowers soon after a fire in summer, but will delay flowering until the summer if it is burnt in winter. Too frequent fires, before the obligate seeders have flowered will eliminate them from the community. Islands of unburnt communities may reseed the burnt areas and the size of these remnant patches are very important.

This infinite variability makes management for conservation difficult. Studies of the fire ecology hope to provide a basis for prediction so that management practices to achieve certain ends may be planned.

TO BURN OR NOT TO BURN? THAT IS THE QUESTION. Mr. Bob Conroy, N.S.W. National Parks and Wildlife Service.

In natural areas, fuel accumulates and will burn if weather conditions are right. Urban areas must be protected from fire, but prescribed burning may have undesirable consequences when conservation of the natural vegetation is also a goal. Some species are very sensitive to fire. For example, *Grevillea calyei* will disappear if burnt more frequently than every seven years.

Fires burn the edge of a rainforest, hence the practice of using a rainforest to stop fires will eventually burn it out. Weeds, e.g. whisky grass may increase with frequent burning. Pampus grass was brought in by storm water and after a fire, it out competes the natives. Animals living in trees, e.g. possums, gliders and koalas are particularly at risk in a fire. The koala colony in Ku-ring-gai Chase National Park, however, was saved in the January 1994 bushfires because of prescribed burning.

In Ku-ring-gai Chase, there are large numbers of arson fires, but they burn small areas. Power line fires burn large areas because they always occur on windy days. There are few lightening fires, but in the Blue Mountains, there are many more and they burn much larger areas than in Ku-ring-gai.

Prescribed burns within the last 18 months were effective in stopping the January 1994 fires. One prescribed burn, costing $20,000, saved 250 houses, a very cost effective protection.

ANIMALS, FIRE AND FIRE REGIMES. Prof. Rob Whelan, Department of Biological Sciences, University of Wollongong

Fire is an agent of destruction, but many animals survive. In Western Australia, 32 out of 33 bettongs survived the fire front. Many animals simply move onto just burnt ground and there are reports of kangaroos with burnt feet. Animals survive in gullies, rock outcrops and other refuges. The dense crowns of *Xanthorrhoea* provide protection for insects. There are far more insects in burnt than in unburnt *Xanthorrhoeas*. Even canopy species have been found in *Xanthorrhoea*.

Staying alive after the fire is the hardest part for animals. Many of the surviving bettongs died afterwards from predation and possibly shock. There is less cover, hence more predation and food may be scarce after a fire. Nest sites on the ground or in the trees may be altered. After the Tasmanian fires in 1967, carcasses of 59 out of the 72 species of birds were found washed up on beaches.

What is important is the survival of the population after a fire. Fires do not always have the same effect. One study of *Antichinus stewartii* showed there was a big drop in the population after a fire. In Royal National Park after the January 1994 fires, however, the population increased. *Antichinus* survived the fire in the many rock outcrops and the *Xanthorrhoea* flowers were a good food source. If the fire had occurred later in the year, the *Xanthorrhoeas* would not have flowered so soon, and the outcome would have been very different.

DISSEMINATING KNOWLEDGE OF WILDFIRE USING A GEOGRAPHIC INFORMATION SYSTEM. THREE CASE STUDIES. Mr. Mark Garvey, Victorian Country Fire Authority.

Maps of the topography, vegetation, litter, urban areas and likely fire behaviour are prepared. They may be overlaid or combined in the computer to locate high risk areas and potential fire intensity. Armed with the best information available, a rational basis for fire management and resolution of conflict is possible.

In Victoria, many groups with an interest in wildfire are beginning to see the results of information systems and to improve their understanding of wildfire processes and how it may affect them. The community may use the system to plan fire hazard reduction and the strategy in case of fire.

THE BASIS OF FIRE MANAGEMENT IN STATE FORESTS. Mr. Peter F. Moore, State Forests of N.S.W.

The objectives of fire management in State Forests revolve around timber production, as set out in their charter. State Forests manage about are fifth of the forests in N.S.W., hence there are many more forests in private hands.

Prescribed burning is necessary to reduce the fuel load. Over the last 11 years, 3% of the forests were burnt. Last year, 4% was burnt, but the planning for prescribed burns is done a year in advance. In practice, only about 60% of the area designated for a burn is actually fired. In some years it is much less because of unfavourable weather.

The planning of prescribed burns is based on many factors. The fuel load and type of fuel are taken into account. Fine fuel dries out quickly. Likely flame height and spotting distance are assessed. Priorities are assigned to different areas. Community protection is absolute to top priority. Plantations and research areas also rate highly. These regions are burnt every 1-3 years, with an average of 2 years. Second priority is given to regrowth areas, lands under native forests areas designated especially for animals or ecological regions. Each one is considered on its merits. Some areas, especially rainforest, is never burnt. In Hoop pine plantations, the understorey is usually too wet to burn. If they do burn, it means big trouble because everything else will burn. In the January 1994 fires, some hoop pine plantations were burnt.

The safety of people rates the highest, and this includes the fire fighters who must go into dangerous areas to fight fires. The strategies adopted are for forest management only and are sometimes in conflict with others, for example, National Parks and Wildlife Service.

4,000 SUTHERLAND CHILDREN AND OTHER ERECT BIPEDS: THE CASE FOR THE HUMAN CONSEQUENCES OF BUSHFIRES. Dr. Brett McDermott, Staff Specialist in Child Psychiatry, Hunter area Health Service

The effects of disasters an people are much the same, be it fire, flood, cyclone or something else. Acute symptoms may occur days or weeks after the fire. Distress manifests itself in many ways. Emotionally, it may be shock, tearfulness, unreasonable, unrealistic, or in America, "awfulization". Behaviourally, it may be restlessness, overactivity, numbness, zombie-like. There may be grief, anxiety, crying, or abnormally, denial. Distress may be expressed in many different ways by different people, but most of it goes away fairly soon. Few people suffer the chronic post traumatic stress disorder (PSD).

PSD is known by other names, shell shock, war neurosis, etc. The traumatic event is re-experienced by intrusive recollections and dreams. 15% of Vietnam veterans suffer it, 10 years after the war. In the Granville train disaster, 30-40% suffered some impairment, one year later. 100% of children on a bus taken hostage by a terrorist suffered psychic trauma. One year after a sniper attack, 93% of children were still suffering.

The effects of disasters are essentially similar for adults and children, although adults may self-medicate, with alcohol! Pre school children may regress and school children under achieve. Fears become generalised. After fires, children do not like barbecues. With a ferry disaster, the children did not want to go near water. If still distressed six months later, then they are likely to be suffering two years later. 30% of fire fighters suffer PSD and as a consequence, there is a high burn out rate.

Individual reactions are extremely variable. People with high self esteem will probably do better. The reactions of family and friends all have an influence. People who feel in some way guilty are likely to suffer more. Previous experiences have an effect. Children living at Waterfall where there is a fire almost every year suffered less than those at Como. Many people try to hide their distress, especially fire fighters.

In a screening program of 5,000 children, 10% of primary school children and 11% of infants were identified as suffering PSD and in need of treatment. An innovative book for children, 'The bushfire and me' helped parents and children talk about the trauma. Young children drew pictures.

Firefighters in particular should be screened six months later and treated if they are still suffering PSD.

BUILDING IN A FIRE PRONE ENVIRONMENT. Dr. Caird Ramsay, Division of Building, Construction and Engineering, CSIRO

In the Ash Wednesday fires of 1983 in Victoria and South Australia, there were 76 deaths and 2,463 houses lost. In the January 1994 Sydney fires, there were 4 deaths and 206 houses lost. The number of damaged houses, however, was much higher in Sydney than Victoria and South Australia. Why? A profile of houses that burnt and those that survived has been built up.

A masonary clad house that is fully enclosed, with small windows with a tile roof stands the best chance of surviving a fire. A timber house on stumps has the least chance. A house that is occupied stands a good chance, because the fire front passes in a few minutes and the burning embers left behind ignite the house. If the occupants put out these embers in the next few hours, and during the following day, the house stands a good chance of survival. Burning debri blown from the fire front lodges in the roof cladding, around windows on the combustible doormat and around the stumps.

The surrounds of a house are important too. Grass is best, overhanging trees the worst. A shrub next to a house may catch alight and damage the house.

Dr. Ramsay was Chairman of the committee which produced the Australian Standard AS3959 'Construction in Bushfire-Prone Areas' and co author of the Handbook HB36 'Building in Bushfire-prone Areas - Information and Advice'.

These papers will be published in the Proceedings and a special symposium volume will be available to non-members. The N.S.W. National Parks and Wildlife Service generously supported the symposium.

PROGRAMME

☞ **Wednesday 21st June, 6 pm in the Seminar Room, Botanic Gardens. Enter from Mrs. Macquaries Road.**

Dr. Alex Richie,
Australian Museum

THE CANOWINDRA FOSSIL FISH ANT THE AGE OF FISHES MUSEUM

The Devonian fossil fish layer was discovered by road workers in 1956. In 1993, the Caboone Shire Council lent their earth moving equipment to uncover the site. Thousands of fish have been fossilised, probably because the pond shrunk and dried up, and was covered by sand soon after or as they were dying. The new Age of Fishes Museum is located in the town and there will be a covered area with walkways and educational displays at the site. A second fish site, south of the town at Merriganowrie, a quarry, is now being worked

☞ **Wednesday 19th July, 6 pm in Room 456, Biological Science, University of NSW** (Parking is available. Enter through Gate 11, Botany Street)

Dr. Candida Briggs
School of Biological Science University of NSW

SOME OF THE FASCINATING WAYS NUTRIENTS ARE TRANSFERRED TO THE GROWING PLANT EMBRYO

A plant embryo requires nutrients for its proper growth and development. There are various strategies for solving this problem from the sublime to the exuberant! The endosperm is an important tissue in seeds of flowering plants (angiosperms) and nutrients must pass through it to reach the embryo. Consequently many strategies involve modification of the endosperm, either the outer surface, which is in contact with the surrounding maternal tissue (i.e. integuments and developing seed coat), or modification of the interior region of the endosperm. This talk will present some of these modifications.

Wine and Cheese will be served from 5.30 pm

Everyone Welcome.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 76 **JULY 1995**

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IN THIS ISSUE

NEW MEMBER
We welcome Ms. Jennifer R. Brammal of the School of Biological Science, University of New South Wales.

EMERITUS PROFESSOR ALAN H. VOISEY
It is with regret we note the death of Emeritus Professor Alan H. Voisey at the age of 84. Prof. Voisey was a life member of the Society. Most of his geological research work was concentrated in the Hunter Valley and mid-north coast of New South Wales. In 1935 and 1936, he was a geologist with the pioneering Aerial Geological and Geophysical Survey of Northern Australia. In 1939, he became a lecturer in charge of Geology and Geography at the then New England University College of the University of Sydney, and when the College became independent in 1954, he became its Foundation Professor of Geology. In 1966, he moved to the newly founded Macquarie University as Head of the School of Earth Sciences. After retirement in 1971, he became Chief Geologist with ICI Australia and worked in consultancies and directorship. His autobiography, *Sixty Years on the Rocks* was published in 1991. We extend our sympathy to Mrs. Voisey and her family in their loss.

PAPERS ACCEPTED FOR PUBLICATION
S. Fitzsimmons and K. Warburton - The effects of spatial constraints on fish shoal cohesion.

A.G. Wells - Classificatory groupings of tidal river systems in the Northern Territory and Kimberley region of Western Australia on presence/absence of mangrove species.

F. Duncan and M. Brown - Edaphics and fire: an interpretative ecology of the vegetation near Old Chum Dam, north-east Tasmania.

C.V. Murray-Wallace, S.P. Leary and R.W.L. Kimber - Amino acid racemisation dating of a last interglacial estuarine deposit at Largs, New South Wales.

P.M.A. Willis and B.S. Mackness - *Quinkana babarra*, a new species of ziphodont mekosuchine crocodile from the early Pliocene Bluff Downs Local Fauna, Northern Australia with a revision of the genus.

Q. Wang - The Australian longicorn beetle genus *Coleocoptus* Aurivillius (Coleoptera: Cerambycidae).

C.S. Findlay - Placoderm (Pisces: placodermi) remains from Lower Devonian rocks at Taemas, New South Wales.

SEMINAR ON THE COMMERCIAL EXPLOITATION OF WILDLIFE
The Nature Conservation Council of NSW will hold this seminar on Aug 19-20, 1995. If you are interested, contact the NCC at 39 George St, The Rocks or Phone (02) 247-4206/247-2228 or Fax (02) 247-5945.

AUSTRALIAN SCIENCE COMMUNICATORS (ASC)
The ASC is a national organisation and has about 500 members, including professional science communicators, journalists, scientists, teachers, museum staff and others interested in the field. The aims of the ASC are:

1. To foster professional communication of science and technology, especially through high standards in the crafts of journalism and other forms of communication.
2. To promote national awareness and understanding of science and technology.
3. To encourage discussion and debate of ethical, policy, economic and social issues related to science and technology.
4. To provide opportunities for meetings between science and technology communication professionals.

If you are further interested, contact:
Susannah Eliott Ph: (02) 330-2581/2583 e-mail: S.Eliott@uts.edu.au
Alison Leigh Ph: (02) 950-4344/4387 e-mail: sharonh@ozemail.com.au

CONSERVATION ATLAS OF PLANT COMMUNITIES IN AUSTRALIA
This Atlas is the first comprehensive overview of Australian plant communities, and evaluation of their conservation status. The Atlas is the culmination of over twenty years of research, and is a major advance on the *Conservation of Major Plant Communities in Australia and Papua New Guinea* of 1974 (the 'Specht Report'). A

total of 921 objectively (computer) defined communities are described and individually mapped to show their distribution and their presence in conservation reserves. The conservation status of each plant community is assessed. The Atlas incorporates the first botanically-based biogeographic regionalisation of Australia.

To expedite the publication of this work we are seeking indications of interest in purchase. The expected retail price of the volume is in the order of $120.00. Substantial discounts will be available for purchase of multiple copies. If you are interested, contact - Dr. Alison Specht, Centre for Coastal Management, P.O. Box 5125, East Lismore NSW 2480, Fax: (066) 212-669 or e-mail: aspecht@scu.edu.au.

FOSSIL FISH DIG WEEKENDS

For a stimulating weekend with a difference, participate in a fossil dig and assist scientists recover fossil fish, clean and cast specimens for the Canowindra Age of Fishes Museum.

With the help, support and sponsorship of individual and the business community, this ambitious project will be an attraction to visitors from Australia and overseas, and become a major centre for the study of fossil fish. $30 of the participation fee goes towards the Museum and so far, more than $10,000 has been raised from the digs. Every participant will receive a Foundation Sponsor's Certificate.

Dates for Canowindra Fossil Digs*:

August 11-13, 1995	October 6-8, 1995
September 8-10, 1995	November 10-12, 1995

** Subject to scientists' on-site work program, additional weekends may be scheduled for 1995.*

Foundation Sponsor Fossil Digs (Accommodated weekend)

Friday: We meet at Canowindra in the evening

Saturday: Learn how to uncover the fossils in the rocks, how to prepare specimens for scientific study and how to make latex casts. A lecture and slide show will introduce participants to the different species of fish found at Canowindra. The lecture will look at their evolution, the environment the fish lived in and the method by which they were preserved. Most of the day will be spent working on some of the fossiliferous rocks. Visit the site of the most recent fossil dig and enjoy a buffet lunch.

Sunday: Visit a second fossil site, south-west of Canowindra. Beautifully preserved specimens of extinct armoured fish (*phyllolepids*) and some plants have so far been found there. Help discover what other types of fish may be present in the quarry.

Foundation Sponsor weekends include: * Two nights twin-share accommodation at Canowindra. *All meals and beverages (non-alcoholic) from breakfast on Saturday until lunch on Sunday. *A personal set of photocopies showing the details of the fish you will be working on. *Free use of equipment and teaching materials. *Free lectures, slide and video presentations, professional palaeontological instruction and demonstrations. Only $265.00**

*** Group and family and social club discounts available. Please ask also about our prices for 1-day digs, camping weekends, fossil and ballooning weekends and extended weekends which include transport from your nearest capital city.*

For bookings and enquires contact: Monica Yeung, Gondwana Dreaming, P.O. Box 3017, Weston 2611 Australia, Tel/Fax: (06) 285-1872

THE CANOWINDRA FOSSIL FISH AND THE AGE OF FISHES MUSEUM
a talk by Dr. Alan Ritchie
The fossil fish found at Canowindra are Devonian in age. The Devonian, some 360-410 million years ago has been called the Age of Fishes. Fish were the dominant animal group then, but they continued to flourish through the ages to the present day, so we have never left the Age of Fishes.

The fossil fish layer was discovered in a road cutting by road workers in 1956. A large slab of rock, showing numerous fish was taken to the Australian Museum. There were numerous armoured fish which have bony head and trunk shields, about 15-30cm long. Another larger fish about 50 cm long had lobed pectoral fins with humerus ulna, radius and wrist bones - a prototype arm! The fish could gulp air as well as use its gills. It was named in honour of its home town, *Canowindra grossi*. There was another small armoured fish which intrigued Dr. Ritchie, for he had found it previously on the Antarctic plateau. At that time, it was only known from Greenland, but it has since turned out to be worldwide. Also present are antiarchs, armoured fish with paddles on its head, looking like a turtle. The antiarchs have weak jaws and probably fed on algae on the mud at the bottom of the pool. There are only fish at this site. Elsewhere in the world there were amphibians with legs and 6,7, 8 toes. This single layer of fossil fish would have formed when the pool dried up in a drought and was rapidly buried. It is thus a sample of species which were living together. It is difficult to work out how they lived, but one large fish had a small fish in its jaws.

In 1993, it was decided to work the site in earnest. Dr. Ritchie gave a talk to the Canowindra Rotary Club, and his infectious enthusiasm soon had the whole town backing him. The Caboone Shire Council lent its 20 tonne excavator to open up the site. All the material is to be kept in the town for the new Age of Fishes Museum. The huge rock slabs are currently being stored under the grandstand at the showgrounds. The townsfolk and school children helped out at the excavation and the fire tanker came along to lend its hoses to wash down the slabs of rock.

There is great hope that the new museum will put Canowindra on the tourist map. A well known architect who lives locally will design the museum. The site will be opened and made suitable for tourists as well.

While working at Canowindra, Dr. Ritchie was approached by a local who had another fossil fish which he had found under a bridge at Merriganowrie, in the road fill. It was traced to a local quarry that the Council used for road making - they had been unwittingly paving the roads with fossil fish! The quarry is now closed and fenced off and will be worked systematically. This new site has another type of armoured fish with a distinctive grooved pattern on the plates.

Yet another site exists along the sea cliffs near Eden, in the Ben Boyd National Park. The rock is much harder here and jack hammers are needed. There is a new type of lobe-finned fish here. The National Parks and Wildlife folk are not keen about Dr. Ritchie's methods of removing great slabs of rocks with 20 tonne excavators. The material will be kept in Eden and the local people will be involved. Throughout the talk, we were impressed with Dr. Ritchie as the entrepreneur. Raising money and enlisting the assistance of professionals without costs is no mean feat.

BOOK NOTICE : DENDROBIUM KINGIANUM: A Unique Australian Orchid
by Peter B. Adams & Sheryl D. Lawson
Queensland University Press
ISBN 1 875902 01 5. Pages 1-197

When we see a book on roses or some other garden flower we can accept easily the variation inherent in a single species, yet somehow a book on the varieties within a single species of the Australian flora seems quite remarkable. In 'DENDROBIUM KINGIANUM: A Unique Australian Orchid' Peter Adams and Sheryl Lawson have detailed all the accumulated knowledge on this remarkably variable plant species. They have fully researched and documented the plethora of forms and illustrated over 300 individual plants in a book which deserves a place in any orchid growers library. The book commences with general information on the history of collecting and growing *Dendrobium kingianum* and this is followed by a general account of its natural distribution and biology. Much of this is new material, the direct result of the authors' research in the field and laboratory. The section on taxonomy discusses the taxonomic consequences of the variable nature of the species, a matter taken further in the regional descriptions of the plants. In these sections there is a proper emphasis on consistent terminology so that descriptions can be comparable. The practical guide on culturing the orchid will be very useful to anyone starting a collection and there is plenty of advice for those wishing to take matters seriously. The bulk of the book however is a register of plants by colour categories and for that future workers will be forever grateful.

This book is a labour of love by two authors who have spent a great deal of time in their devotion to the species. It is however more than just a labour of love: they have brought their specialist skills to this study so that the book is botanically as well as aesthetically pleasing.

To purchase the book write direct to Central Queensland University Press,
P.O. Box 1615, Rockhampton QLD 4702, or Tel (079) 30-9777 Fax: (079) 36-1361

The cost for the book is $58.00 including postage but this offer is available only until the end of August. Purchases after August will be in normal bookshops at the R.R.P. $85.00.

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THE COLONIAL AGE

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PROGRAMME

☞ **Wednesday 23rd August 1995, 6 pm in the Seminar Room, Botanic Gardens.** Enter from Mrs. Macquaries Road.

Dr. Walter Boles,
Australian Museum

FEATHERED FOSSIL FLYERS: BIRDS OF RIVERSLEIGH AND OTHER AUSTRALIAN TERTIARY SITES

The Tertiary deposits of Riversleigh have yielded a range of interesting fossil birds, some virtually indistinguishable from modern forms, others unlike anything found in Australia today. These support (although not unambiguously) the presence of rainforest at Riversleigh at this time. The avian community has a high proportion of no-aquatic birds, in marked contrast to other Australian deposits of similar age.

Wine and Cheese will be served from 5.30 pm Everyone Welcome

☞ **Saturday 9th September, 1995 at 9.15 am**

THE COAST AND WETLANDS SOCIETY in conjunction with

ANZAAS NSW, and the LINNEAN SOCIETY OF NSW present

THE BOTANY BAY SYMPOSIUM

Biomed Lecture Theatres, University of NSW. Enter from Botany Street. Parking is available, enter through Gate 14 on Barker St.

This symposium addresses the special nature of Botany Bay, how it has changed and appropriate management regimes for the future. Speakers from Fisheries Research Institute, Australian Museum, Sydney Ports Authority, the Universities and other organisations will put their views.

Registration of $20 will include morning and afternoon teas and the proceedings of the symposium will be published in a special issue of the journal of Wetlands. Pre registration is not necessary, pay on the day. Lunch will not be provided, but food is available in shops a 5-10 min walk away, or else bring your own lunch.

☞ **Saturday 14th October, 1995,** 10 am.

EXCURSION TO THE ROCKDALE WETLANDS CORRIDOR

Meet at Eve St, Arncliffe (off West Botany Street) under the fig tree, just south of the junction with Brennan Road

Leader: **A.Prof. Paul Adam**, School of Biological Science, University of NSW

The Rockdale Wetland Corridor has been much degraded but schemes to rehabilitate and ensure survival of wetlands in urban area are in place. We will visit a series of sites in the corridor and end up at Sylvania Waters, the birth place of commercial oyster farming in Australia.

Bring: Lunch, food and drink. Binoculars for birdwatching would be a good idea.

Wear: Walking shoes

☞ MACLEAY MEMORIAL LECTURE

Wednesday 22nd November 1995, at 6 pm
in the Seminar Room, Royal Botanic Gardens

Dr. Hal Cogger, Australian Museum

ENDANGERED SPECIES: THE ROLE OF THE BIOLOGIST

The recognition of threatened species of animals and plants and the development of effective measures to conserve them is first and foremost a job for biologists and ecologists. But biologists and key biological institutions tend to be marginalised in the *realpolitik* of Australian conservation decision-making. Why is it so? What are the issues? And can we do anything about it?

Wine and Cheese will be served from 5.30 pm   Everyone Welcome

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 77 **OCTOBER 1995**

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IN THIS ISSUE

NEW MEMBERS
We welcome
Ms. Zerina M. Johanson, Australian Museum.
Mr. Steve W. Salisbury, School of Biological Science, University of New South Wales.

DONATION TO JOYCE W. VICKERY RESEARCH FUND
The Society greatly appreciates a donation of $500 from an anonymous donor. All donations to the fund are fully tax deductible.

LINNEAN MACLEAY FELLOWSHIP
Applications are invited for the Linnean Macleay Fellowship for 1996. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 6 November 1996.

PAPERS ACCEPTED FOR PUBLICATION
McAlpine, D.K. - Relationships and classification of pseudopomyzisae (Diptera: Nerioidea)

Gill, A. M. and Moore, P. H. R. - Regional and historical fire weather patterns pertinent to the January 1994 Sydney bushfires.

Garvey, M. - Disseminating knowledge of wildfire using geographic information system: three case studies.

Moore, P. and Shields, B. - The basis of fire management in State Forests.

AWARDS FROM THE J. W. VICKERY SCIENTIFIC RESEARCH FUND
The sum requested in the applications exceeded the funds available and the Society regrets that it was unable to support the projects to the amount requested.

Adlem, L.T. Dept. of Geography, Univ. Newcastle
PROJECT: Biogeography and ecology of Amphipoda and Isopoda in Barrington Tops and adjacent upland areas.
About seven species of these groups have been found in this high-altitude area, some not previously recorded and others are expected to be found since this area is under-studied. Visits are being made each season to determine the population patterns and ecological requirements. Awarded $300.

Boxshall, A.J. Dept. of Zoology, Univ. Melbourne

PROJECT: The importance of chemical cues and hydrodynamics to the settlement of *Agaricia humilis.*
These processes and cues and their interaction affect marine invertebrate larvae when they are 'choosing' a place settle and metamorphose. Previous work will be extended to another species, a Caribbean coral, in collaboration with American researchers in the same field. Awarded $400.

Brammall, J R. School of Biological Science, Univ. N.S.W..

PROJECT: Taxonomy of Quaternary and Recent populations of *Burramys.*, the Mountain Pygmy-possum living at high altitudes in the Mt. Kosciusko and Mt Hotham regions. These two small populations are vulnerable and assessing their taxonomic status is important. They have been considered conspecific with the fossil *Burramys parvus* but studies so far suggest that there may be up to three taxa involved. If there is more than one taxon, then inference of Quaternary palaeoclimates from the physiological requirements of extant taxa needs to be re-examined. The Type fossil in Edinburgh must be compared with other material to determine the correct name. Awarded $400.

Gore, D.B. Dept. of Geography, Univ. London
PROJECT: Extension of the East Antarctic ice sheet during the last glacial maximum ca 20 Ka BP. The hypothesis is that east Antarctic oases were exposed during the last glacial maximum c. 20 Ka BP and that the ice sheet was thinner and less extensive

than models have suggested. Field samples of glaciofluvial sediments are being collected for dating by Optically Stimulated Luminescence, which is expected to give more accurate results in this environment than radiocarbon-dating. Results of this and other studies will be used to reconstruct the late Pleistocene and Holocene glacial history of these areas, and to evaluate modelling techniques. Awarded $400.

Greenslade, P.J.M. Entomologist, ACT.
PROJECT: Taxonomy of Australian Collembola: keys to genera. Fieldwork in North-Western Australia is likely to reveal several genera not previously recorded. Awarded $400.

Karsten, U. School of Biological Science. University of N.S.W..
PROJECT: Biochemical investigation of 'exotic' mannitol metabolism in the mangrove red alga *Caloglossa leprieurii* . This data must tolerate wide ranges in salinity. Hypersaline stress stimulates the production of mannitol which is unknown in other red algae. Awarded $400.

Jerry, D.J. Dept of Zoology, Univ. New England
PROJECT: Population genetics of Australian bass (*Macquaria novemaculeata*) with reference to possible adverse hatchery effects. The Australian bass is probably the only native fish that has not yet been strongly affected by release of hatchery fry into the wild. Wild populations in various coastal river systems and hatchery derived stock will be sampled and allozyme electrophoresis used to assess the variation between native populations and within hatchery stock. Awarded $400.

Johanson, Z.M. School of Earth Sciences, Univ. Macquarie
PROJECT: Analysis of the single population of Late Devonian fish at Canowindra, N.S.W., including taxonomic analysis of antiarch and sarcopterygian fishes. Antiarch fossil fishes dominate the Canowindra population, with only a few taxa of sarcopterygians present. Comparison of these fossils with related fossils from other regions (mainly held in European collections and will result in a better understanding of their systematics and relationships. Awarded $400.

Kodela,P.G. School of Geography, Univ. N.S.W.
PROJECT: Pollen morphology of rainforest taxa occurring in the Illawarra Region, N.S.W.. Pollen morphological descriptions have been prepared for 66 rainforest taxa from the Illawarra region. Photographs will be used to illustrate the grains. Australia has few illustrated guides to modern and fossil pollen so this paper will be a useful tool for palynologists. Awarded $400.

Norton, M. School of Biological Science, Univ. NSW.
PROJECT: Feeding biology of juvenile red kangaroos. Wild Red kangaroo populations have very high rates of mortality, especially amongst juveniles. The effect of one of several factors, food limitation, on survival of juvenile red kangaroos is studied. Awarded $200.

Raad, M.C. School of Biological Science, Univ. N.S.W.
PROJECT: Muscle function during hopping in red kangaroos (*Macropus rufus)* . Very little is known of muscle function in kangaroos. The functional anatomy of the

hindlimb and those muscles used in hopping will be studied to gain a clearer understanding of the unique locomotion of kangaroos. Awarded $200.

Paul, D.J. Dept. of Zoology, Univ. New England
PROJECT: An examination of seasonal changes in thermoregulation, energetics and habitat use in the scincoid lizard *Egernia cunninghami.* Thermal preferences and metabolic state in terrestrial reptiles change with the seasons. Unfavourable environmental conditions may result in dormancy. However, the biology of only a few Australian species has been studied, and the relevance of laboratory-derived data to field conditions is unclear. This study will examine *Egernia cunninghami,* a native species that hibernates and may also aestivate. Awarded $400.

Salisbury, S.W. School of Biological Science, Univ. N.S.W.
PROJECT: Phylogenetic relationships of goniopholided crocodylomorphs. These primitive crocodylomorphs were widespread throughout the Northern Hemisphere, including Asia, during the Late Jurassic and early Cretaceous. Their morphology is being studied (mainly from fossils held in Europe) to determine their phylogenetic relationships. This will lead to a better understanding of the origins and phylogeny of their close relatives, the modern crocodylians. The data from this study will also contribute to a project on the broader applications of CT scanning to palaeontology (with the School of Medical Radiation Technology, Univ. of Sydney.). Awarded $400.

Selkirk, J. Graduate School of the Environment, Macquarie Univ.
PROJECT: Vegetation history on the subantarctic Macquarie Island. Hill slopes may contain accumulations of peat more than 1000 years old, underlying the present vegetation. Phytoliths (silica bodies from plant cells) and leaf fragments are being studied to assess the relative abundance of different plant species then and now. Such comparisons will indicate whether and to what extent climatic and other environmental conditions have altered over that period. Awarded $400.

Torr, G. Dept of Zoology, James Cook Univ.
PROJECT: The effect of environmental variation on the ecology of Boyd's Forest Dragon, *Hypsilurus boydii.* This lizard occurs in two fairly distinct habitats: upland and lowland rainforest in NE Qld. Temperature is much lower and more variable in upland rainforest. The influence of this and food availability on the ecology and geographic variation of the lizard is being studied. Awarded $400.

Donations to the Joyce W. Vickery Scientific Research Fund are fully tax deductible.

BIOLOGY EDUCATION REPORT AVAILABLE

In the late 1980s a world survey by the well known Australian educator Dr. G. Rex Meyer revealed that many school systems were modernising the teaching of high school biology. The trend is towards social relevance and application to everyday life. A report (750 pages) of this world survey is now available in a limited edition at a cost of $135.00 (US$95.00). The report contains many examples of teaching ideas, lesson guides, learning activities and test items. It is an invaluable resource for all educators anxious to make schooling more relevant to the modern world. Enquires: GRM Educational Consultancy, PO Box 154, Beecroft N.S.W. 2119 Australia, Fax (02) 875 3638 (International 61-2-875-3638)

NUTRIENT TRANSFER TO THE GROWING PLANT EMBRYO, A lecture by Dr. Candida Briggs.

Plant embryos developing in seeds needs to obtain nutrients from the maternal tissues, just like any other baby. Each species does this in its own way.

The immature seed or ovule has an outer covering, the integument which eventually becomes the seed coat. There is a small hole in the integument, the micropyle, through which the pollen tube grows to effect fertilisation of the egg nucleus within the embryo sac. The micropyle in the seed coat allows water to enter the seed and the root eventually grows out of it.

After fertilisation, the new plant grows a nutritive tissue, the endosperm, to provide food for the developing embryo in the seed. All the nutrients must come from the maternal plant.

In *Solanum nigrum,* the black berry nightshade, the cells at the attachment end are especially modified to assist the transfer of nutrients. The integument does not have a cuticle hence there is no barrier to the diffusion of nutrients. In *Tephrosia grandiflora,* a garden escape, the integuments are covered with a thick cuticle which prevents the transfer of nutrients. The embryo sac in both of these species have wall ingrowths that aid the transfer of nutrients and direct them to certain parts of the embryo.

In some species, the endosperm develops special outgrowths, haustoria, which break out of the embryo sac and digest the surrounding tissue. In *Avicennia officinalis,* the mangrove, the haustorial cells are very aggressive and consumes the rest of the ovule and grow into the placenta. The mangrove seed grows into a small plant while still on the tree so that when it falls off, the root anchors it in the mud and it is not swept away by the tide.

The way the haustoria develop are many and varied. They may grow from one or both ends of the embryo sac. They may be so aggressive that they grow into the flower stalk, eventually being stopped by the hard woody tissue. The integument may have a cuticle which stops the haustoria or directs it in a certain way. Special transfer tissue may develop as well.

All of these many and varied ways of seed development work to perpetuate the species. Dr. Briggs illustrated the lecture throughout with photographs of stained sections taken down the microscope, of developing seeds. The blues, reds and purples of the stains produced beautifully coloured cell detail.

FEATHERED FOSSIL FLYERS: BIRDS OF RIVERSLEIGH AND OTHER AUSTRALIAN TERTIARY SITES, A lecture by Dr. Walter Boles.

Riversleigh, on the Gregory River in Northern Australia has Miocene and some Pliocene fossils. There is a large selection of non-water birds and this is very unusual. Older Eocene birds are found at Murgon in southeastern Queensland, but the oldest Australian recorded of feathers is found in the Cretaceous deposits from Koonawarra in Victoria. Australia has a good record for frogmouths, nightjars and megapodes.

Bluff Downs in Queensland was a water bird site and would have been similar to Kakadu today. Some of the species found there are the same also. There are some unusual species as well, such as megapodes or brush turkeys. Flamingoes are present also. Australia has a good record of flamingoes with five species in Central Australia. They tend to like saline conditions.

At Riversleigh, there are dromornithids, large flightless birds like emus and the largest would have weighed 400-450 kg. There are 4-5 species of dromornithids with the smallest being about the size of a cassowary. These big birds were very prominent.

There are aboriginal legends about giant birds and some cave paintings are almost certainly not emus or cassowaries, but it is not known what they are. Open plains birds are better runners than their rainforest relatives and at Riversleigh, a small dromornithid that is half emu and half cassowary, hence is called an emuwary, would have been a good runner. Juvenile emuwaries have been found, showing that they were living there. This seems to contradict other views that Riversleigh was a rainforest environment.

The bird fauna at Riversleigh was very rich. As well as those birds already mentioned, there are birds of prey with strong feet for grabbing. Another bird was very acrobatic and could get things out of holes. One very large bird of prey could take a possum. There are rails like the native hen and the flightless moor hen of Tasmania. There are the beaks of parrots of different sizes large ones like the sulphur crested cockatoo, corella or galah size and budgie size also. There were many small birds at Riversleigh also. The ghost bats catch little birds, especially swifts, and eat the body but leave the wings and feet to accumulate on the cave floor. The songbirds make up to 60% of the species at Riversleigh. There were lyre birds and log runners also.

The Riversleigh bird fauna has challenged many of the old biogeographic ideas. It was thought that Australia's bird fauna evolved in the northern hemisphere, but it is now known that there was interchange. Songbirds, such as wrens, warblers, robins, tree creepers etc. are distinctive of the northern hemisphere and it was thought they evolved there. However, there are no songbirds in the Eocene of the northern hemisphere, whereas there are in Australia. There are distinct Australian radiations of the songbirds and many are honeyeaters.

PROGRAMME

☞ **Saturday 14th October, 1995,** 10 am.

EXCURSION TO THE ROCKDALE WETLANDS CORRIDOR

Meet at Eve St, Arncliffe (off West Botany Street) under the fig tree, just south of the junction with Brennan Road

Leader: **A.Prof. Paul Adam,** School of Biological Science, University of N.S.W.

The Rockdale Wetland Corridor has been much degraded but schemes to rehabilitate and ensure survival of wetlands in urban area are in place. We will visit a series of sites in the corridor and end up at Sylvannia Waters, the birth place of commercial oyster farming in Australia.

Bring: Lunch, food and drink. Binoculars for bird watching would be a good idea.

Wear: Walking shoes

☞ MACLEAY MEMORIAL LECTURE

Wednesday 22nd November 1995, at 6 pm
in the Seminar Room, Royal Botanic Gardens

Dr. Hal Cogger, Australian Museum

ENDANGERED SPECIES: THE ROLE OF THE BIOLOGIST

The recognition of threatened species of animals and plants and the development of effective measures to conserve them is first and foremost a job for biologists and ecologists. But biologists and key biological institutions tend to be marginalised in the *realpolitik* of Australian conservation decision-making. Why is it so? What are the issues? And can we do anything about it?

Wine and Cheese will be served from 5.30 pm

Everyone Welcome

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 78 **DECEMBER 1995**

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Tues. 9.30 am-5pm

IN THIS ISSUE

NEW MEMBER

We welcome Ms. Belinda Norton of the School of Biological Science, University of New South Wales

PAPERS ACCEPTED FOR PUBLICATION

B. McDermott. The human response to bushfire diasters.
G.C. Ramsay, N.A. McArthur and V.P. Dowling. Building in a fire-prone environment. Research on building survival in two major bushfires.
D. Keith. Fire-driven extinction of plant populations: a synthesis of theory and review of evidence from Australian vegetation.
J.L. Kohen. Aboriginal use of fire in south eastern Australia.
H.A. Martin. Wildfires in past ages.
D.K. McAlpine. Relationships and classification of the Pseudopomyzidae (Diptera: Nerioidea).
W.R. Miller and H. Heatwole. Tardigrades of the Australian Antarctic Territories: the northern Prince Charles Mountains, East Antarctica.
R. Conroy. To burn or not to burn? That is the question.
R.J. Whelan, S. Ward, P. Hogbin and J. Waley. Responses of heathland *Antichinus stuartii* to the Royal National Park wildlife of 1994.

RENEWAL OF SUBSCRIPTIONS

Renewal of memberships fall due at the beginning of the year. There is no increase in subscription rates for the coming year and there is a discount for memberships paid before April 1996. A form for renewal of memberships is included.

SOCIETY LUNCHEON: WEDNESDAY 21st FEBRUARY 1996

The Society Luncheon, Wednesday 21st February, will be held in the Classroom, Royal Botanic Gardens. Please let the Secretary know if you intend to come by Tuesday 14th February. A booking form is included. Spouses, partners and friends are welcome.

NOMINATIONS FOR THE COUNCIL

The nominations for the Council are included on a separate sheet.

COASTAL MANAGEMENT CONFERENCE, APRIL 17-21, 1996, ADELAIDE

The second national Coastal management conference has been planned by representatives from local government, community groups, indigenous people, all State governments and the Commonwealth.

The Conference aims to focus on community action through integrated coastal zone management, and capacity building for coastal managers. An innovative approach is planned for the conference, with each day being structured around on of the following components of coastal management.

Day 1 Perspectives, embracing the community, government, private enterprise, multicultural groups, and other coastal users ((what are our views?)

Day 2 Enhancing skills and improving methods and resources (how to do it)

Day 3 Implementation (doing it - case studies, best practice)

For further information, contact the Secretariat, Sapro Marketing, P.O. Box 8253, Hindley St, Adelaide SA 5000, Tel: (08) 212-7555 or Fax: (08) 212-7148.

ENTOMOLOGY IN NEW SOUTH WALES 1770-1990

The Society for Insect Studies has recently published this volume and it is available for $20.00 including postage. In addition, membership of the Society for 1996 is available for only $5 extra. If you are interested, write to Mr. W.J. Wilson, 276 President Ave, Gymea NSW 2227.

THE FLORA OF MT. ARTHUR RESERVE, by G.A. Althofer and G.J. Harden

Mt. Arthur Reserve is situated 3km west of Wellington in Central NSW, on the Catombal Range. The Reserve is largely untouched by humans except for some logging in the early days and stock grazing before 1964. It is an island of bushland in a sea of farmland, and has not been burnt out in living memory.

The vegetation is woodland and sclerophyll with cypress pine, eucalypts, Casuarina, Kurrajong the dominants.

The Flora of Mt. Arthur Reserve is available for the cost of postage only. Send $1.25 in stamps to Mr. K. Holmes, 'Noonee-Nyrang' Gulgang Rd, Wellington, NSW 2820.

BOTANY BAY SYMPOSIUM REPORT

How has Botany Bay changed since European settlement? Is it worth saving? These questions were addressed by a panel of 9 speakers covering the natural environment, "developers" such as the Sydney Ports Authority and the Federal Airports Corporation and the "regulators and managers" such as the Environment Protection Authority and the Sydney Coastal Councils. The highlights of the symposium are presented below.

Botany Bay is much changed and Captain Cook would not recognise it. It was called Stingray Bay for a few days but its botany is special.

Changes started soon after settlement. The noxious industries were put in the mangroves. The mangroves and salt marshes were harvested and used for glass manufacture, and Towra Point was the site of introduction of Buffalo grass. The sands of Botany Bay are highly mobile. Siltation is small but has probably increased with urbanisation. Major works in the Bay include excavation of material for reclamation of the airport, Cooks River diversion, and the extension of the runways into the Bay. A channel dredged for access cause deflectionof waves and erosion of Lady Robinson Beach. All such works change wave patterns and have impacts elsewhere in the Bay.

The sand moves along the shoreline but certain natural features act as groynes, causing sand to build up and starving other places. A storm event will release the buildup and a slug of sand moves along the shore. These are natural processes which have been deflected by developments. Attempts are being made to repair the beaches with funding from the relevant authorities on a percentage basis, proportional to the damage arising from different development activities.

The fisheries have been exploited by Europeans since Captain Cook's day. Stingrays were abundant then but are rare now. By 1800, there was a fishing village and lime was produced from mud oysters. By 1876, oyster burning for lime was unsustainable and it was banned. In 1880, there was a Royal Commission into over fishing. Some of the more destructive methods of netting were banned and closure of the fisheries for 2 years was recommended. The shark population declined, probably because they were caught for oil.

The recently introduced Japanese goby can be very aggressive, but it has not done a lot of damage - yet. With the various changes to the Bay, the seagrasses, hence the fish nurseries move around. The seagrasses have declined when compared with Port Hacking and Pittwater.

Towra Point has the most extensive estuarine habitats which are important fish habitats also. These areas are used by commercial and recreation fisheries and oyster farmers. Extensive fish habitats are necessary to maintain fish populations because they occupy different habitats at different stages of their life cycle.

Regulations require careful planning. A regulation prohibiting cutting down of mangroves had a loophole - they could be bulldozed. The proposed creation of Spit Island as a nesting site may be good for birds but not for fish. With so many regulatory agencies, arriving at a satisfactory solution will be difficult.

Not all changes are caused by humans. A plague of sea urchins, entirely natural, was eating out the seagrass beds until they were removed.

Bird surveys covering the last 50 years show changes over time. The diversion of the Cooks Inlet and reclamation of swamp for the airport destroyed wader habitat and wader numbers went down. Sharp tailed sand pipers are a major looser in Botany Bay but they are common elsewhere. Bar Tailed Godwits are very mobile so if they are not recorded in a survey, it is probably because they have gone elsewhere. Not all development is unfavourable to bird habitat. The third runway has created sandy shorelines favoured for eastern curlews. Pied oyster catchers have come into the area recently and increased. Thus while the surveys show change with some species down, others are up.

Effective management of Botany Bay requires integrated planning and coordinated action, with reviews to see that plans are carried out. In 1982, a management plan made 43 recommendations. Most of the easy ones have been accomplished, but some hard ones, like the stabilisation of Lady Robinson's Beach, have not been implemented. Moreover, the environment is dynamic and the plans may not be relevant now. Concepts of management have changed also.

Current changes include impact of shipping, discharge of ballast water, antifouling agents, polluting industries (the really bad pollutants have been reduced), sewage overflows - the worst of all and storm water runoff: all of which make the preservation of wetlands more difficult. Much effort is being put into identifying the problems, monitoring changes and planning, but with so many councils and authorities, all with different jurisdictions, satisfactory solutions will be complex.

Is Botany Bay worth saving? The answer was a resounding YES. Such a recreational facility in a large urban population is invaluable. Papers from the Symposium will be published in the Journal of the Coast and Wetlands Society.

EXCURSION TO THE ROCKDALE CORRIDOR WETLANDS, lead by A/Prof. Paul Adam

Many urban wetlands have survived by accident. In the case of the wetlands visited on the excursion their survival is due to occurring within the easement of the long planned, but yet to be built M6 Freeway to Wollongong.

We walked from Eve St over the top of the sewerage carrier. To the right was the old sewerage carrier which now has been heritage listed. The wetlands have been cleared of dumped rubbish and infestations of lantana, replanted with natives and restored as far as possible using funds from the Water Board's environmental levy.

They are very expensive wetlands - $400,000, but they are popular with birds and bird watchers alike. The wetlands are connected to the Cooks River and a weir was built to maintain the right water levels, but it was adjusted several times before the appropriate level was achieved. It is now an important site for ducks, stilts, small migratory birds and sharp-tailed godwits, especially now that the third runway has displaced them. Unfortunately it is now under threat from the proposed link road which will connect the F5 freeway with General Holmes Drive.

Now that it has become tidal, mangroves have become established, but they must be thinned to keep the habitat open for birds. The area is polluted from industries upstream and rubbish is swept in after heavy rain. The large plantings of *Casuarina* attract black tailed cockatoos which come in winter to eat the seeds.

The navigation lights for the East-West runway, now rarely used, stretch across the next section of wetlands. At various times there have been proposals to fill in these wetlands, but they still survive. They provide a range of habitats, including shallow seasonally hypersaline lagoons.

Chinese market gardeners occupy the next section of the wetlands we visited and have survived only because they are on the easement of the M6 transport corridor. They have a short term lease and can be evicted anytime.

Spring Creek is now a concrete canal. Nearby, in Firmstone Gardens an island in the middle of a pond is an important nesting site for birds. The surrounding wetlands are good habitat for spoonbills, herons and smaller waders. The Firmstone Gardens wetlands were, until recently, more extensive. Part was filled in during the late 1980s for construction of a golf driving range. After filling was halted the remaining wetlands were rehabilitated, with constructed walks and vantage points popular with bird watchers. The mangroves will have to be controlled or they will take over.

At the end of Eve St, there is a pile of oyster shells, covered over. This is probably the site of an old lime kiln. In the early days of Sydney, mortor was made from lime from dredged oysters, but this was unsustainable and the oyster disappeared.

Patmore Swamp off President Ave has tall reed vegetation of *Phragmites* and is probably much the same as it was before settlement. The residents regard it as a fire hazard and agitate for something to be done about it. Mullet come into the channel which is 1-1 m deep. There would have been sand dunes between this section and the shoreline, now all occupied by housing. Unfortunately, *Ludwigia peruviana* has invaded the swamp and it will take over unless checked, but it is not known how to do this.

The Hawthorn St bush is the best bushland in Rockdale and is maintained by the National Trust Bush Regenerators. It has *Eucalyptus botryoides - E robusta* (swamp mahogany) - *Angophora costata* woodland with a shrubby understorey on the high ground, *Casuarina glauca* forest on the flats and reed beds along the creek where we saw the mullet.

At Sylvania Waters, the planned M6 Freeway is the only thing that saved part of the once extensive wetlands from canal estate development. We saw the site of the first oyster farm in Australia. This was established by Thomas Holt MLC, and was a series of long shallow ponds or claires. Construction was a massive undertaking, employing 200 labourers. The attempt was not very successful, many oysters being silted over and others succumbing to heat on hot days. Nevertheless the exercise was an important stimulus to developing the continuing Botany Bay oyster industry.

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 21 FEBRUARY 1996, AT 12.30 pm IN THE CLASSROOM, NATIONAL HERBARIUM, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

We need to know numbers for catering,so please let us know if you are coming BY TUESDAY 14 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061

Telephone: 929 0253
(Tuesdays only)

I wish to make bookings for .... people at $14 per person for the luncheonon 21 February

Cheque for $ ....is enclosed

NAME: ....

ADDRESS: ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES

Council Nominations for President, Council and Auditor for 1996/97

ELECTION AT ANNUAL GENERAL MEETING, WEDNESDAY, 21st MARCH, 1996

The names of members who retire (in terms of rules 15a and 15b) are marked with an asterisk.

President:- Mrs K.L. Wilson, B.Sc.Agr., M.Sc.

Council:-
A.E.J. Andrews, A.S.T.C. (Civ.Eng.) M.I.E. Aust.
M.L. Augee, Ph.D.
J.P. Barkas, M.Sc., F.G.S., M.Aus. I.M.M.
M.R. Gray, M.Sc., Ph.D.
*G.J. Harden, M.Sc.
*L.A.S. Johnson, A.M., D.Sc., F.A.A. Hon.F.L.S.
*D.A. Keith, Ph.D.
R.J. King, B.Sc., Dip. Ed., Ph.D.
H.A. Martin, M.Sc., Ph.D.
P.M. Martin, M.Sc.Agr., Ph.D., Dip.Ed., F.L.S., F.A.I.A.S.
J.R. Merrick, M.Sc., Ph.D.
M.S. Moulds, T.Ch.
*D.R. Murray, B.Sc., Ph.D., F.L.S.
P.J. Myerscough, M.A., Phil.D.
*R.A.L. Osborne, B.Sc.(Hons), Dip. Ed., Ph.D.
*I.G. Percival, Ph.D.
A. Ritchie, B.Sc., Ph.D.
K.L. Wilson, B.Sc.Agr., M.Sc.

Auditors:- W. Sinclair & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- Dr A. Ritchie, B. Sc., Ph.D.

Council:- (Six vacancies) - Council nominates the following and invites further nominations in accordance with rule 15e.

Mrs G.J. Harden, M.Sc.
Dr L.A.S. Johnson, A.M., D.Sc., F.A.A., Hon.F.L.S.
Dr D. Keith, Ph.D.
Dr D.R. Murray, B.Sc., Ph.D., F.L.S.
Dr R.A.L. Osborne, B.Sc.(Hons), Dip.Ed., Ph.D.
Dr I.G. Percival, Ph.D.

Auditors:- W. Sinclair & Co.

This notice is given under the provision of Rule 15e.
It is not a voting paper.

Rule 15e:- Independent nominations by Ordinary Members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his willingness to accept such office.

P.O. Box 457
Milsons Point
SYDNEY N.S.W. 2061
Telephone 9929 0253 (Tuesdays)

For the Council

Barbara J. Stoddard
Secretary

14th December, 1995

LINNEAN SOCIETY OF NEW SOUTH WALES

RENEWAL OF MEMBERSHIP FOR 1996

The Secretary
Linnean Society of N.S.W.
PO BOX 457
Milsons Point, N.S.W. 2061

	PAID AFTER 30 APRIL	PAID BEFORE 30 APRIL	
FULL MEMBER	$50	$44	
RETIRED MEMBER	$28	$22	- retired, having reached the age of 60 years
STUDENT MEMBER	$28	$22	- full time student. Please included proof of student status
ASSOCIATE MEMBER	$8	$8	- receiving Newsletter but not Proceedings. No voting rights
LIFE MEMBER	NIL	NIL	- having been a full member of the Society for over 40 years.

PLEASE CIRCLE APPROPRIATE MEMBERSHIP

Cheque for $................. is enclosed

NAME..

ADRESS..

If you have renewed your membership, or are a Life Member, please disregard this notice.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 79 **APRIL 1996**

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IN THIS ISSUE

NEW MEMBERS We welcome:

Ms Maria M. Cotter, Faculty of Resource Science and Management, Southern Cross University
Mr Stephen Cotter, Faculty of Resource Science and Management, Southern Cross University
Dr Stuart Pearson, School of Geography, University of Newcastle
Dr Arland T. Hotchkiss, USA Department of Agriculture

NEW COUNCIL MEMBER

We welcome Dr Armstrong Osborne to the Council

PAPERS ACCEPTED FOR PUBLICATION

C.N. Smithers - Lepidopsocidae, Trogiidae, Myopsocidae and Psocidae (Insecta: Psocoptera) from the Mount Royal area, Hunter Valley NSW.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $600.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 30 June in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

Intending applicants please note:
Please read instructions carefully.
Original plus five (5) copies are required.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible

150TH ANNIVERSARY OF THE BIRTH OF NIKOLAI MIKLOUHO-MACLEAY

The Russian Explorer Nikolai Miklouho-Macleay was a friend and colleague of Sir William Macleay and was prominent in many early studies of Natural History. The Miklouho-Macleay Anniversary Committee is celebrating the event with functions from 21 April through to 17 July. For further information contact Wendy Paxton, 23 Pymble Ave, Pymble 2073. Tel/Fax: (02) 449 2741.

QUARTERNARY SYMPOSIUM, December 1995, at Wellington, NSW

The first session of the symposium was about the cave deposits and it was held in the Cathedral Cave, with the spectacular Cathedral formation as the backdrop to the speaker. To our left was a brass plaque, marking the site of the trench dug by Dr Mike Augee and colleagues in the mid 1980's. It was a most impressive start.

Australian Vertebrate Palaeontology started in Wellington Caves. In 1840 some bones were sent to the famous palaeontologist Jameson in Edinburgh and a list of species was eventually published, including one elephant. Further development was left to Australians. Thomas Mitchell, who trained as an engineer and Owen, a surgeon, were moved by the spirit of adventure and romanticism and between them they made a tremendous contribution to Vertebrate Palaeontology.

At this time the general public was intensely interested in caves and fossils. There was resistance to Darwin's theory of evolution and Buckland attributed all fossils to the Great Flood. He later contradicted himself and said the evidence did not support the biblical story and we had to interpret the Bible in the light of the evidence.

Mitchell explored many caves from Victoria to Queensland and the Darling Downs also. He asked many questions being asked today: about gigantism and how could there be both carnivorous and vegetarian diprotodons. He identified alternate humid and arid periods. Did the large animals live in the humid or the arid periods?

How did the bones get into the cave? Large animals probably fell in, but small animals would have been brought in by bats and owls. In Cathedral Cave there are three distinct units in the cave. The oldest unit has extinct animals but the youngest has only species living now. This is work in progress.

Mitchell worked the Bone Cave and he sent specimens all over the world, all labelled Pleistocene and none of them in any stratigraphic sequence. Dating is difficult because the deposits are beyond the range of carbon dating. All the genera found here are Pliocene and Pleistocene. The Bone Cave deposits are extremely complex. The original cave was filled with sediment, it was mostly re-excavated, filled again, this time with bone breccia, and then mined for phosphate. The palaeontologist then prospected along the mine workings, retrieving bones from both the original and the second fills.

In 1914 Australia was dependant on an imported phosphate, some of it from the German territories. Entrepreneurs realised that supply may be cut off during the war and explored caves with ammonium molybdate - if it turned blue, there was phosphate present. Of all the caves they explored, only two showed phosphate and the Bone cave was the only one worked. The deposit was worked out in two years. In the 1930's there was interest in the old phosphate mine, but it was never worked again.

The bone cave is filled with bone breccia, but the phosphate has been redeposited from bat guano, not from the bone. Ghost bats deposited a wedge shaped bed of guano in the original cave. Later, a lake formed and a crystalline layer of hydroxy apatite formed a cap on the deposit. Phosphate nodules formed on the walls and they were covered with calcite starbursts. The old mine workings are being rehabilitated for tourists and there are piles of excavated bone breccia nearby, for fossickers. Some participants spent hours on the mulloch heaps, coming away with a handful of jawbones with teeth in their sockets.

There were many papers about fossil animal species: extinct kangaroos with short fat faces, giant ringtailed possums which would have weighed 9-10kg, crocodiles - some giants, frogs, rodents and stick nest rats. A 'carnivorous/killer' kangaroo had strange dentition, very different to that of the well known carnivores today. The animal was using molars to crush and shear bone and the dentition may only be an advancement on teeth used for crushing large nuts. The tail of the kangaroo probably became modified for weight bearing while standing up browsing.

Owls may roost and nest in caves. One nest in Jenolan Caves has been used continuously from the last glacial period, 18 000 years ago. A pair of sooty owls are the current inhabitants. The bones of the animals they hunt accumulate in the pile of pellets below. They hunted a rich fauna of small mammals and the changes with time show that the late Pleistocene was colder and drier than the present, becoming warmer and wetter in the Holocene.

Not all fossil bones are found in caves. Fossiliferous sediments are found in fissures at Katherine, N.T., the only known Quarternary faunas from the Top End. A sinkhole fauna at Venus Bay, S.A. was in *Melaleuca* forest with mangrove flats nearby. Terraces at Cooma had a rich fauna and a fossilised wombat, in its fossilised burrow was found here. The lunettes bordering salt lakes in western N.S.W. yield faunal and archaeological finds.

For a long time there has been a controversy about the extinction of the megafauna - the large animals of the Pleistocene. When did they disappear? Did the Aborigines hunt them to extinction? This topic is still controversial. Now that new methods of dating are available (e.g. thermoluminescence - optically stimulated thermoluminescence), they are mainly older than the carbon dates. Many are questioning the reliability of the carbon dates. Contamination with humic acid, carried in by percolating water after the time of deposition, would produce dates too young.

There were a few papers on the history of the vegetation. Palynological studies at the Barrington Tops trace the development of the *Nothofagus* forest over the last 6000 years. A number of montane sites in the southern highlands trace the return of forest after the last glacial period. Pollen and fragments of plant material from the stick-nests of the sticknest rats show what the vegetation was like in central Australia.

Dr Robert Galloway was given a very practical task. He had to find some method of predicting the length of the ski season, using temperature and rainfall. He used this method to work out what the climate was like at the height of the last glacial period, 18 000 years ago. Temperatures were 8° colder and rainfall was about half of that today. Is there such a place on earth like this today? Yes - cold, windy, dry Patagonia.

Papers from the Symposium will be published in the Proceedings of the Linnean Society.

PROGRAMME

☞ **Wednesday 22 May, 6 pm in the Seminar Room, Botanic Gardens. Enter from Mrs. Macquaries Road.**

Dr DAVID MURRAY
University of Western Sydney at Hawkesbury

Ecological and Horticultural Implications of the Australian Native Foods Restaurant Industry

In the early 1980s the modern bush foods restaurant industry was launched with misinformation about the nutritional value and safety of some fruits and seeds, typical of advertising campaigns promoting many other consumer products. The bush food restaurant industry now looks set to undertake unprecedented growth, appealing largely to tourists from overseas. It becomes necessary to ask whether consumption of bush foods poses a threat to the survival of any indigenous species, or to the biodiversity of any habitat.

The major indigenous foods offered by restaurants and their supply companies are identified. Most plant foods have so far been collected from the wild and are the focus of this talk. The gathering of fruits involves their removal as food sources for local fauna, and the inevitable withdrawal of seeds that would otherwise be dispersed by natural vectors and contribute to the next generation of plants. Such interference in the seasonal abundance of fruits therefore has a dual impact - on the bird or animal seeking food, and on the plant's reproductive potential. For these reasons, harvesting bush foods in National Parks, native forests, water catchment areas, wildlife corridors, and other sensitive areas such as foreshores, should be prohibited more effectively.

Leaves should no longer be taken from rare rainforest trees such as *Backhousia anisata* (native aniseed). Nor should fruits be collected from the endangered magenta lilly pilly (*Syzygium paniculatum*). However, if all indigenous food consumption could be matched with deliberate farming, plantation and home garden production, this would remove adverse impacts on wild populations of the organisms in question. Indigenous food consumption might then be judged to be ecologically sustainable. In this context, the awarding of Plant Breeders' rights for 'found' plants becomes an issue. This has evidently occurred for *Kunzea pomifera* 'Rivoli Bay', *Apium prostratum* 'Southern Ocean', *Mentha diemenica* 'Kosciusko' and a sweet apple berry, *Billardiera cymosa*. No evidence of any breeding programs for these 'cultivars' has been forthcoming.

☞ **Wednesday 19 June at 6 pm in the Seminar Room, Botanic Gardens. Enter from Mrs. Macquaries Road.**

☞ Next Page

☞ **Wednesday 19 June at 6 pm in the Seminar Room, Botanic Gardens. Enter from Mrs. Macquaries Road.**

Dr NIGEL BARKER
National Herbarium, Royal Botanic Gardens

Botanic Diversity in Southern Africa

Dr Barker will present the various vegetation types in southern Africa and discuss adaptations of plants to their environment.

Wine and cheese will be served from 5.30 pm
Everyone welcome

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IN THIS ISSUE

NEW MEMBER
We welcome Mr Simon Heemstra, Department of Biological Sciences, University of Wollongong.

HONOUR TO DR HAL COGGER
Dr Cogger was awarded the Australia Medal (AM), General Division, for service to science in the field of Herpetology and as the Director of the Australian Museum for 19 years. Our congratulations to Dr Cogger.

DONATION TO JOYCE VICKERY SCIENTIFIC RESEARCH FUND
The Society has received a donation of $500 for the Research Fund. Our thanks go to the anonymous donor.

PAPERS ACCEPTED FOR PUBLICATION

G.A. Williams and P. Adam. The composition of the bee (Apoidea: Hymenoptera) fauna visiting flowering trees in lowland subtropical rainforest remnants and the possible role of bees in pollination ecology.

C.N. Smithers. Lepidopsocidae, Trogiidae, Myopsocidae and Psocidae (Insecta: Pscoptera) from Mount Royal area, NSW.

ROYAL BOTANIC GARDENS, MELBOURNE, THE 1996 COMMEMORATIVE CONFERENCE, Sunday 29th September to Saturday 5th October 1996, to be held at The University of Melbourne, Australia

The Royal Botanic Gardens, Melbourne, will host a two-part conference to celebrate the 150th anniversary of the Gardens. The first part will address the diversity and impact of nineteenth century science in *The Scientific Savant in Nineteenth Century Australia: A Celebration of the Life, Times and Legacy of Ferdinand von Muller,* and consider the future of systematic research in *Australia Beyond Floras.* A number of events will be held in conjunction with the **1996 Commemorative Conference**, including Proteaceae and Mycology.

If you are interested, contact The Conference Organisers. Royal Botanic Gardens, Birdwood Avenue South Yarra, Victoria 3141. Telephone 03 9344 4490, Fax 03 9344 6122.

ECOLOGICAL AND HORTICULTURAL IMPLICATIONS OF THE AUSTRALIAN NATIVE FOODS RESTAURANT INDUSTRY

A lecture by David Murray

The Restaurant Industry combines bush tucker with standard food. For example, the Red Ochre Grill menu has 'Warrigal spinach spaghetti tossed with roast garlic, roma tomatoes, basil and parmesan cheese' and 'kangaroo fillet with couscous and harisea spiced riberry jus'. For desert we could have 'baked orange and wild lime tart with guava coulis' or 'black sapotte and macadamia pudding - native aniseed anglaise'. We could also have Acacia sprinkles on ice ccream and wattlechino instead of coffee.

Most bush tucker supplies come from the wild and collecting and packaging are major activities. Table 1 lists the species involved. Collecting from the wild is not sustainable. The native aniseed, *Backhousia anisata* is rare and conserved, not necessarily adequately. Davidson's plum and the majenta lilly pilly are also collected from the wild. The riberry lilly pilly, *Syzygium leuhmanii* is the most popular and is easily grown so there is no reason to harvest from the wild. Harvesting witchetty grubs involves harvesting roots and sometimes the whole plant and is very destructive. While the witchetty grub is highly prized, there are a number of other species that look like it.

Some species are grown for commercial use and the Macadamia nut is the best known. The plantation macadamias have been selected for toxin-free forms that lack cyanide found in other macadamias. There are toxins associated with the Hicksbeachia nut also. *Backhousia citrodora* is grown in plantations for oils as well as the bush tucker trade. Australian Natural Products have large scale nurseries and plantations. They decline to export because of the limited suply and are very responsible.

Acacia seeds are eaten by aborigines and animals and being a legume, they are regarded as nutritious and high in protein. Analysis shows, however, that the seed coat accounts for up to 40% of the seed. For comparison, telephone peas have a seed coat of 8% and chick peas 4%. The seed coat is not palatable. The function of the seed coat is to protect the seed and such a thick coat is impermiable to water and oxygen and requires heat treatment - boiling water for 2 mins or water at 70-80°C for 10 mins (50° is not enough) - before the coat will split open. The seeds are long-lived, thanks to the thick seed coat and in nature,

Table 1: Species of plants used for bush tucker

Leaves	
Lemon aspen	*Acronychia acidula*
Lemon myrtle	*Backhousia citriodora*
Mountain pepper	*Tasmannia lanceolata*
Warrigal spinach	*Tetragonia tretragonioides*
Fruits	
Bush tomatoes	*Solanum* species (*aviculare, centrale, stelligerum*)
Davidson plum	*Davidsonia pruriens*
Kakadu plum	*Terminalia ferdinandiana*
Quandong	*Santalum acuminatum*
Riberry	*Syzygium luehmannii*
Lilly Pilly	*Acmena smithii, Syzygium* spp.
Wild lime	*Microcitrus australe, australasica*
Muntari	*Kunzea pomifera*
Mountain pepper	*Tasmannia lanceolata*
Burdekin plum	*Pleiogynium timorense*
Illawarra plum	*Podocarpus elatus*
Native figs	*Ficus* species
Seeds	
Wattle seed	*Acacia* species (*aneura, murrayana, victoriae*)
Bunya nuts	*Araucaria bidwillii*
Macadamia	*Macadamia integrifolia/ternifolia*
Red boppel nut	*Hicksbeachia pinnataifolia*
Peanut tree	*Sterculia quadrifida*
Kurrajongs	*Brachychiton* species
Flowerbuds	
Rosella	*Hibiscus heterophyllus*

fire splits the coat. The record for longevity goes to *Acacia pycnantha*. Ten seeds from a packet dated 1888 were planted and six of them grew.

The protein content of Acacia seeds ranges from 5-15%. For comparison, peas have 16-25% protein. *Acacia victoriae* from central Australia has the lowest - 5%, but it is eaten by aborigines and emus. However, Acacias may be a crop suitable for desert regions where nothing else will grow. Experimental work on the Acacias is being done at Hawkesbury branch of the University of Western Sydney. Acacias are not without risk. Some species are toxic.

The Illawarra flame tree, *Brachychiton* has seeds with protein comparable to the common crop pea. The seeds, however, are locked with prickles and must be scraped out into hot ashes to remove the prickles. They are roasted at the same time.

There is concern about the application of plant breeders' rights to bush tucker. To register a variety, it must be shown that there has been a breeding programme to produce the variety being patented. Requests for information about the breeding programmes have been ignored and these registered varieties may well have been found in the wild.

Bush tucker supplements our regular food supplies and may be an alternative to some of them, but it is not likely to supply any mainstream item. Cultivation of bush tucker should be encouraged, particularly as some of the species can grow in regions unsuitable for conventional agriculture.

BOTANIC DIVERSITY IN SOUTHERN AFRICA, A lecture by Dr Nigel Barker

Dr Barker illustrated his talk with slides of magnificent vistas and innumerable colourful flowers. This report cannot do the slides justice.

Several authors have classified the vegetation of southern Africa, south of latitude 10°, using different methods, but each method produces roughly the same subdivisions. There are about seven major botanical provinces. Endemism is high throughout southern Africa.

The forest biome is very patchy, for much of it has been cleared. The forest was home to a prized Encephalatus which has almost disappeared from over-collecting.

The Karoo scrub covers large areas of arid regions. A grey coloured prickly Euphorbia tree and large Aloes are common here. This habitat is uninviting and the home of many snakes.

The savannah biome or Zambesian province has open, grassy plains. In places, the grasses grow to 6m tall. There are patches of woodlands throughout and Bauhina and Acacia are common trees. There are many herbaceous plants and geophytes which flower spectacularly after rain. The savannah supports huge numbers of large animals.

In certain regions of the Savannah there are large swamps and the Okavango is the best known. The huge swampy complex is flooded annually with water that comes from snow-covered mountains in Angolia, but the water takes six months to reach the swamps. The swamps flood in the driest part of the year and support lush vegetation. Animals and people flock there. Unfortunately, there are plans to pump water from the Okavango to urban areas.

Grasslands with patches of woody shrubs are found in the mountains. The flora is very rich and there are many herbs and geophytes which flower profusely at the right time of the year. Seeps have a cover of miniature plants with tiny leaves and flowers. If overgrazed, the seeps erode badly and the local water supplies which rely on the seeps, suffer. At very high altitudes the conditions are harsh and the ground is stoney and gravelly with cushion plants and tufted grasses.

The Afro-montane biome is found on granite hills. The bare granite rocks are heavily encrusted with lichens, some of which are endemic. In depressions, there are stunted woodlands where Euphorias and Aloes are common. Podocarp-Widdringtonia forests are found in places. Widdringtonia is prized for its cedar timber and is heavily logged. In damp depressions an Impatiens 3 m tall may be found.

The Fyrnbos has many Proteaceae, Restionaceae and Ericaceae. Large shrubs of Proteas are dominant. The Afro-montane forest is probably climax to the fyrnbos, for Podocarp seedlings come up under the Proteas. The Fyrnbos revolves around fire. After burning, the Proteas are killed and grasses and geophytes such as Gladiolus and Watsonia are stimulated by fire. For two or three years after a fire, the fyrnbos is very colourful. What comes up after a fire is unpredictable and may bear no relation to what was there before. There are many endemics here.

In the arid regions, there are many Mesembrianthums and other succulents. Many plants are spiky and there are weird triffid-shaped forms. Asteraceae are also common. After rains, there are mass flowerings which attract tourists, and mushrooms come up. In extreme aridity, the land is desolate and active dunes bury the river courses and what vegetation there is. Near the coast, daily fog is an important source of moisture. Some animals live here, including feral horses that rely on a few permanent water sources.

PROGRAMME

☞ **Wednesday 24th July, 6pm in the Seminar Room, Royal Botanic Gardens. Enter from Mrs Macquaries Rd.**

Mr GUY KNOX
Manager, Randwick City Council Community Nursery

Community Gardening, Tree Planting and Ecological Restoration

Mr Knox will show slides and talk about his study tour of Canada, USA, and Great Britain while on a Churchill Fellowship. Highlights include community gardens in San Francisco, reclaimed garbage strewn lots in the Bronx, New York, Central Park, New York and huge wildflower areas in industrial vacant lots, Liverpool, England.

☞ **Wednesday 21st August at 6pm in the Seminar Room, Royal Botanic Gardens. Enter from Mrs Macquaries Rd.**

Dr BRONWYN HOULDEN
Conservation Biologist, Taronga Zoo

The Role of Zoos in Conservation

Dr Houlden will discuss specific conservation programs undertaken by the Zoological Parks Board of NSW. These will include the Przewalski Horse, the Green and Golden Bell Frog, Red Panda, Black Rhino and Penguin rehabilitation. Dr Houlden has done genetic research on the Chimpanzee and Koala which has relevance to conservation.

☞ **EXCURSION, Saturday 12th October**
LEADER , Mr. Phillip Kodela, Royal Botanic Gardens

Discover or re-discover the rainforests and wetlands of the Southern Highlands, exploring the ecology and history of these communities.

We will visit:

- Robertson Nature Reserve - a remnant of mixed cool temperate/warm temperate rainforest of the Yarrawa Brush, that once covered most of the Robertson Basalt.

- Wingecarribee Swamp - the largest montane peatland of its type in mainland Australia. While debate continues on peat mining and the management of this outstanding wetland, it supports a high diversity of over 100 native plant species, including two endangered herbs *Gentiana wingecarribiensis* and *Prasophyllum uroglossum*. Wingecarribee Swamp has many ecological, hydrological, scientific and social values which will be discussed, along with the results of recent sediment studies and palynological investigations.

- Hanging Rock Swamp - one of the complex of sandstone swamps in the Penrose area. These upper catchment wetlands serve important hydrological functions within their catchments and the Hawkesbury-Nepean Basin, ultimately draining into the Warragamba Dam. Hanging Rock Swamp is the only other known site providing habitat for the rare Gentian. We may be fortunate to see this elusive annual flowering!

- Other possible sites if time permits include Butlers Swamp, Cecil Hoskins Nature Reserve, Stingray Swamp...

We will find a nice spot for a BYO picnic lunch.
More details will be provided in next newsletter and on the field day.

Meeting place: 10am, car parking area at Robertson Nature Reserve, just south of Robertson township, over the rail line (see map).

What to bring: hat, sunscreen, walking shoes, gum boots (optional), food and drink, good cheer.

If you would like to come and need transport, contact the Secretary at the Society's Office.

☞ **Wednesday 23rd October, 6pm in the Seminar Room, Royal Botanic Gardens Enter from Mrs Macquarie's Rd.**

Dr GLEN BROCK
School of Earth Sciences, Macquarie University

Bizarre Beasts From the Cambrian of Eastern Gondwana and the Reconstruction of an Ancient island Arc System

Cambrian carbonate rocks from South Australia yield a diverse suite of shelly taxa including trilobites, brachiopods, moluscs, conodontomorphs and echinoderms. They also produce a wide range of bizarre scales and shelly fossils whose biological affinities are problematic. There were possibly colonial honeycomb-like organisms, early worms and coral-like forms.

Cambrian faunas from northeastern NSW show strong biogeographical affinities with those from western NSW and northern Australia. They are broadly similar to faunas in southern NSW, central Victoria, northwest Tasmania, Nelson, NZ, and northern Victoria land, Antarctica, suggesting a now dismembered or eroded island arc system situated off the Pacific margin of East Gondwana. These faunas have some affinities with those elsewhere in the world. The problems associated with Cambrian palaeogeography will also be discussed.

Wine and cheese will be served at the lectures, from 5.30pm

EVERYONE WELCOME.

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IN THIS ISSUE

NEW MEMBERS

We welcome
Dr. Paul Willis, Consultant Vertebrate Palaeontologist of Berowra Heights.
Ms Sarah L. Brecknock, School of Biological Sciences, University of Sydney.

PAPERS ACCEPTED FOR PUBLICATION

S.T. Ahyong and S.F. Norrington. The stomatopod crustacea of the Macleay Museum, University of Sydney: a taxonomic and historical review.
J.A. McNamara. Some smaller macropd fossils of South Australia.
R.L. Jones and J.R. Dodson. A Holocene vegetation record from Wright's Creek Valley, New South Wales.
R.A.L. Osborne. Rehabilitation of the Wellington Caves Phosphate Mine: implications for the Late Cainozoic of Australia.

CHANGE TO CLOSING DATE FOR JOYCE VICKERY RESEARCH GRANT APPLICATIONS.

The closing date for submissions of applications for a Joyce Vickery Research Grant will be the 31st of March and applications would be invited in the December Newsletter. The Grants will be awarded in April-May.

REVIEW OFJOYCE VICKERY RESEARCH GRANT AWARDS

A review of the Research Fund and its operation is included on a separate sheet. There have been some 190 successful applicants. The projects cover a broad range of subjects. All donations to the Joyce Vickery Research Fund are deductible for taxation

AWARDS FROM THE JOYCE VICKERY RESEARCH GRANT

Margaret Anne Anderson, Earth Sciences, Macquarie University
PROJECT: Conodont faunas from the Lookdown Limestone, near Bungonia, with special emphasis on studies of the genus *Belodella*. The applicant aims to review the classification of *Belodella* and to describe the conodont faunas from Bungonia. Awarded $400

Kathryn Elizabeth Arnold, Dept of Zoology, University of Queensland
PROJECT: Biased sex ratios in the cooperatively breeding Noisy Miner. Cooperative breeding is known in only 3% of the world's birds, many of these being found in the SE Qld-NE NSW region (25% of species found there are cooperative breeders). The unique form of cooperative breeding found in Noisy Miners is being investigated. Awarded $600

Sarah Louise Brecknock, School of Biological Sciences, University of Sydney
PROJECT: The three-dimensional structure of plasmodesmata. Viruses produce a protein that opens plasmodesmata, allowing the virus to move freely between plant cells. The structure and composition of plasmodesmata is being studied as a first step in understanding the details of how viruses open plasmodesmata. Awarded $600

Candida Lea Briggs, School of Biological Science, UNSW
PROJECT: Contribution to the pollen tube-derived carbohydrates to the developing embryo and endosperm: identification of the carbohydrates through fluorescent microscopy. The aim is to study *Solanum nigrum* and Petunia *hybrida*, to confirm a possible post-fertilization role of the male gametophyte in early embryo and endosperm nutrition. Awarded $600

Robert Condon, Zoology Department, University of Melbourne
PROJECT: Live observation, photography and collection of the jellyfish, genus *Cyanea* and related genera, from the Port Lincoln region, South Australia. Jellyfish are major marine predators. The classification of *Cyanea* is not resolved, and further study of nematocyst morphology, life cycle and DNA analysis is needed. This study aims to collect and study more specimens and make live observations near Port Lincoln, and study specimens in the South Australian Museum, for comparison with data from eastern Australia. Awarded $600

Alison Margaret De Pomeroy, Earth Sciences, Macquarie University
PROJECT: Microvertebrate biostratigraphy of the Early Devonian of Southeastern Australia. The current international definition of stages of the Devonian is based on conodont microfossils. These are found only in marine sediments. Associated microvertebrate materials are being studied, to see whether their use can extend stratigraphic alignments from the marine to brackish and non-marine environments Awarded $598

Joanne Clare Holloway, Zoology Department, University of New England
PROJECT: Seasonal changes in energetics, thermal physiology and reproduction in the sugar glider, *Petaurs breviceps* (Marsupialia). CAT scans are being used to determine seasonal differences in fat content and distribution and any other morphological changes. This 'live' technique has not been used on this species before; it will provide new data that can be related to the thermal and reproductive physiology of the glider. Awarded $600

Margaret Anne Humphrey, Dept of Crop Sciences, University of Sydney
PROJECT: Systematics and biology of genus *Corasoides* (Aranae-Amaurobiidae). *Corasoides*, a spider, has been considered to consist of one species widespread in Australia. However, studies suggest that this includes several new species and even a new genus. In addition there are two new species in New Guinea, which appear to be more closely related to SW Australian species than to other Australian species. Fresh specimens from PNG are sought for electrophoresis and chromosome studies. Awarded $426

John Stanislaw Klyza, Earth Sciences, Macquarie University
PROJECT: The Tamworth Belt in the Tamworth-Attunga area: stratigraphy, structure, biochronologic and environmental analysis. Study of the undifferentiated Devonian and pre-Devonian carbonates and volcaniclastic rocks of the Tamworth Belt has been limited, especially

the limestone outcrops near Attunga and their surrounding sediments. Now their chronology, sedimentology, lilthostratigraphy and relationships are being studied in detail. This study has found the first reported Late Silurian-Early Devonian conodont fauna from an in situ limestone. Awarded $600

Maxwell Sydney Moulds, Australian Museum
PROJECT: Review of the generic and higher classification of Australian cicadas. The higher level classification of cicadas has not been reviewed since 1906. This study is reviewing generic characters for the Australian taxa, and relating them to the neighbouring New Guinean and western Pacific faunas. Fresh material from PNG is sought for dissection of the reproductive systems, for phylogenetic analysis of these groups. Awarded $426

MILKLOUHO-MACLAY'S MARINE BIOLOGICAL STATION

Nikolai Milklouho-Maclay came to Australia in 1875 after malaria had forced him to stop his anthropological studies on the Papuans. He was a close friend of Sir William Macleay and became an honorary member of the Linnean Society. He established a marine biological station at Watsons Bay in 1881. It operated for only three and a half years before the Army resumed it. The Milklouho-Maclay Anniversary Committee wished to have the historic house and site dedicated as a reserve and memorial to Milklouho-Maclay. The Commonwealth Government is the current owner.

A book, *Nikolai and Australian Connections: A brief history of the life and achievements of Nikolai Milklouho-Maclay*, by Wendy Paton and published by the Woollahra Municipal Library, 1996, is available from the Library, 548 New South Head Road, Double Bay N.S.W. 2028, cost $20 per copy including postage and packing, or $15 directly from the library. For enquiries, ring Ms Christine DeMenzes, (02) 391 7100.

DRAFT N.S.W. BIODIVERSITY STRATEGY
A draft of the N.S.W. Biodiversity Strategy will be publicly exhibited for thirty days. The Strategy is a requirement of the N.S.W. Threatened Species Conservation Act (1995). If you wish to see the Strategy, contact Lynn Webber, Community Relations Division, National Parks and Wildlife Service, PO Box 1967, Hurstville, 2220. Lynn can be contacted on (02) 585-6450.

SCIENTIFIC ILLUSTRATOR
Ms Christine Payne, Designer and Botanical Artist is available for scientific illustrations. Ms Payne may be contacted at 63 Owen Dixon Drive, Evatt ACT 2617 or (06) 258-4620.

COMMUNITY GARDENING, TREE PLANTING AND ECOLOGICAL RESTORATION, a talk by Mr GUY KNOX, Randwick City Council Community Nursery.

Mr. Knox describes the Randwick City Council Nursery as a 'typical council nursery' specialising in indigenous flora. They collect seed from the native vegetation in the area. A large tract of almost pristine coastal heath on what was the old Malabar Rifle Range is a good source. The seeds are cleaned and other treatments may be necessary. Banksia capsules must be opened and roasting on a barbeque is a good substitute for a bushfire in nature. Documentation is important and is easily done, using a computer. Growing the seed, however, requires a considerable experimentation, for this information cannot be found in books

Many of the plantings are experimental. *Ceratopetalum gummiferum*, the Christmas bush is being trialed as a street tree around Randwick. Community participation is encouraged and residents plant 'their' trees and care for them.

Cities tend to be homogenous in their concepts of parks and gardens. Plane trees are favourites for they are very practical and they are planted as street trees around the world. Mr Knox has a strong feeling for the natural landscape and is an advocate for sympathetic urban parks and gardens. Examples may be found everywhere of rigid, formal gardens, with trimmed box hedges, topiary and totally exotic plantings which are out of place with the landscape. A slide of one example showed a Monterey pine, with its characteristic fan-shaped branching and flat top, at at truck stop in southern California, giving it the sense of place.

Community gardens where residents have plots of land are features of some cities. SLUG (San Francisco League of Urban Gardeners) organises plots for anyone who wants to garden, and there are about 400 community gardens in San Francisco. In comparison, there are about 2 functional community gardens in Sydney. People are trying to establish oaks on the bare, grassy slopes around San Francisco. At the right time of the year, these open slopes support fields of wildflowers.

There are about 1600 community gardens in New York. The Green Guerillas, started in 1974, make use of any available space for gardening. All the work and maintenance is done by volunteers for New York City spends very little on its parks and gardens. Other organisations as well as the Green Guerillas have sprung up and developers now fence their sites to keep out the gardeners.

In England, walks in woods and parks are well sign-posted with explanations of the natural habitat and ecology. Lawns are an English invention and became fashionable with the invention of the lawn mower, but now the trend is not to mow so that grasslands with wildflowers develop. They mow along the edges of the paths so that people can see that not mowing is not the result of neglect. Wildflower fields are more actively encouraged. In Liverpool, old terrace housing and factories were bulldozed. A trial planting of wildflowers proved very popular with the residents and they were expanded. these wildflower gardens are not natural, for the seed is planted, and at the end of the season, the seed is harvested and sold, thus making it a commercial venture. At one site, the soil was too fertile for the ox-eye daisy which does best on impoverished soils, so the topsoil was sold and the seed planted on the poorer sub-soil.

Although not natural, these wildflower gardens are an improvement on the original state of the abandoned industrial sites. Our urban bushland is not able to maintain itself either and must be managed if it is to survive.

THE ROLE OF ZOOS IN CONSERVATION, A LECTURE BY Dr BRONWYN HOULDEN Conservation Biologist, Taronga Zoo.

Modern zoos may be regarded as living museums rather than cages for animals. The exhibitions of animals should include their habitat and they aim to educate and conserve. Zoos strive for an holistic and more ecological approach. Philosophically, the right of zoos to exist depends on their contribution to conservation. Unfortunately, capital works programmes lag behind philosophy.

The first preference in conservation is to maintain a viable population in the wild. For some large animals, for example, tigers, there is not enough habitat left to do this. Captive breeding may be the only way to keep the species going. Zoos are very good at captive breeding, but they do not regard it as a panacea. If a captive breeding programme is successful, then the species may be released back into the wild. This has been done with Prezwalski horse, the national symbol of Mongolia. It became extinct in the wild in 1946, the result of predation and competition with other horses and goats. The Western Plains Zoo in New South Wales and the Monarto Zoo in South Australia both donated individuals from their populations to be taken to the edge of the Gobi Desert. They overwintered successfully, which delighted everyone as they had never experienced such conditions before. It looks as if the release will succeed, but it remains to be seen if the line will remain pure or they will interbreed with other wild horses.

Captive breeding and release back into the wild are not restricted to large animals. The green and gold bell frog, an endangered species found at Homebush Bay on the site of developments for the Olympic Games is being bred at Taronga Zoo. They were successful up to the tadpole stage when a keeper accidentally knocked the float out of the tank and they all went down the drain, highlighting some of the problems of captive breeding - accidents and human error. The second attempt was more successful and 2,000 froglets have been release in Sir Joseph Banks Reserve.

In collaboration with other zoos and agencies around the world, the white rhino is been bred at Dubbo. There is a global master plan for the breeding of red pandas, where 540 individuals are required to keep a viable population and Austalasia has been allotted 50 of these. there have been 30 births since the plan started. Thorough documentation is necessary to maintain genetic variation. The zoo population of red pandas is founded on 23 animals and it will not be augmented with captures from the wild. The red panda habitat is used for cattle grazing and the cattle dogs hunt them. They are also susceptible to distemper. The human population and habitat degradation also threaten them. It is planned to reintroduce them into the wild in India where zoo directors have connections with forestry. Species such as these would not continue to exist without assistance. The Taronga Zoo is also involved in reafforestation and education in India.

Zoos have skills that may be needed in the community. They are experienced at catching, handling and transporting animals for relocation. They have excellent veterinary and nursing care skills for rehabilitation and release. Following the oil spill from the Iron Baron in Bass Strait, Taronga Zoo was called upon to provide the expertise to rehabilitate the affected penguins. With all the best intentions, the hard-working volunteers did not even know what sized fish to feed the penguins. Over 2,000 birds were treated and less that 1% died. They were tagged before release and are now breeding, a very good result.

Genetic research works out the family tree and is necessary to prevent inbreeding. The genetics may also be needed to work out species and subspecies. The parentage of individuals may not be what it seems. With the Chimpanzees in Taronga Zoo, the dominant male is Snowy, an orphan who was gradually introduced over a period of 6 years. It is generally assumed that the dominant male sires all the offspring, but in the wild, it may be anything from 50% to 100%. The female Sheba had a male baby, Shabana, and genetic testing shows that he was fathered by a lesser male, Monte. Genetic testing shows that the pedigree of Sheba is not the same as that recorded in the stud book.

There are three subspecies of koalas, each population conveniently coinciding with the state boundaries of Queensland, New South Wales and Victoria. The Qld and N.S.W. subspecies look the same but the Victorian subspecies is larger, has more white on it and has thicker fur. Zoos try to keep the subspecies apart, but are they really different? This problem has legal ramifications. Genetic testing should answer this question.

Zoos play a valuable role in the education of the thousands of visitors that come each year. With the continued degradation of the environment, it may be the only places we will find some species.

PROGRAMME

☞ EXCURSION, Saturday 12th October

LEADER , Mr. Phillip Kodela, Royal Botanic Gardens

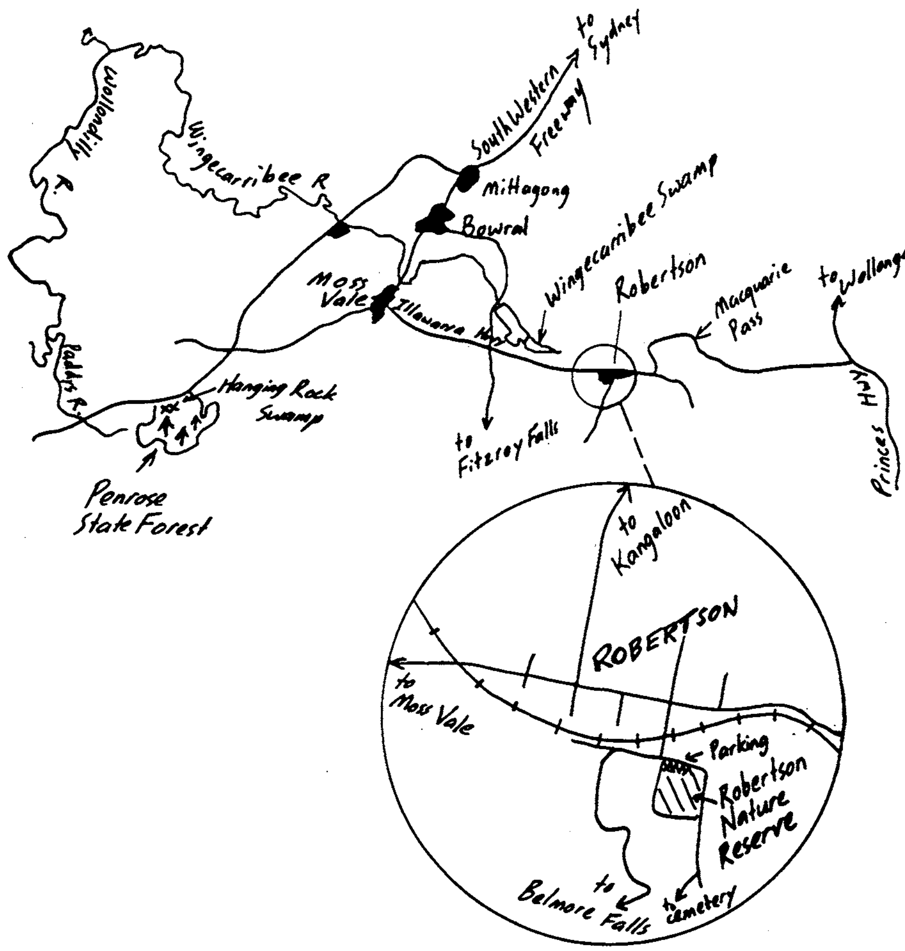
Discover or re-discover the rainforests and wetlands of the Southern Highlands, exploring the ecology and history of these communities.

We will visit:

- Robertson Nature Reserve - a remnant of mixed cool temperate/warm temperate rainforest of the Yarrawa Brush, that once covered most of the Robertson Basalt.

- Wingecarribee Swamp - the largest montane peatland of its type in mainland Australia. While debate continues on peat mining and the management of this outstanding wetland, it supports a high diversity of over 100 native plant species, including two endangered herbs *Gentiana wingecarribiensis* and *Prasophyllum uroglossum.* Wingecarribee Swamp has many ecological, hydrological, scientific and social values which will be discussed, along with the results of recent sediment studies and palynological investigations.

- Hanging Rock Swamp - one of the complex of sandstone swamps in the Penrose area. These upper catchment wetlands serve important hydrological functions within their catchments and the Hawkesbury-Nepean Basin, ultimately draining into the Warragamba Dam. Hanging Rock Swamp is the only other known site providing habitat for the rare



Gentian. We may be fortunate to see this elusive annual flowering!

- Other possible sites if time permits include Butlers Swamp, Cecil Hoskins Nature Reserve, Stingray Swamp...

We will find a nice spot for a BYO picnic lunch.
More details will be provided in next newsletter and on the field day.

Meeting place: 10 am, car parking area at Robertson Nature Reserve, just south of Robertson township, over the rail line (see map). We will finish about 4 pm, but you may leave at anytime you wish.

What to bring: hat, sunscreen, walking shoes, gum boots (optional), food and drink, good cheer.

If you would like to come and need transport, contact the Secretary at the Society's Office.

☞ **Wednesday 23rd October, 6 pm in the Seminar Room, Royal Botanic Gardens Enter from Mrs Macquarie's Rd.**

Dr GLEN BROCK

School of Earth Sciences, Macquarie University

Bizarre Beasts From the Cambrian of Eastern Gondwana and the Reconstruction of an Ancient island Arc System

Cambrian carbonate rocks from South Australia yield a diverse suite of shelly taxa including trilobites, brachiopods, molluscs, conodontomorphs and echinoderms. They also produce a wide range of bizarre scales and shelly fossils whose biological affinities are problematic. There were possibly colonial honeycomb-like organisms, early worms and coral-like forms.

Cambrian faunas from northeastern NSW show strong biogeographical affinities with those from western NSW and northern Australia. They are broadly similar to faunas in southern NSW, central Victoria, northwest Tasmania, Nelson, NZ, and northern Victoria land, Antarctica, suggesting a now dismembered or eroded island arc system situated off the Pacific margin of East Gondwana. These faunas have some affinities with those elsewhere in the world. The problems associated with Cambrian palaeogeography will also be discussed.

Wine and cheese will be served at the lectures, from 5.30 pm

EVERYONE WELCOME.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 82 DECEMBER 1996

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Tues 9.30 am-5 pm

IN THIS ISSUE

AWARDS TO DR. ALEX RITCHIE AND DR. TIM FLANNERY.

Dr.Alex Richie has been awarded the ABC Eureka Prize for the Promotion of Science and raising public awareness of the amazing world of ancient fishes. Dr. Ritchie has been instrumental in setting up the Age of Fishes Museum in Canowindra and establishing dig-your-own fossil holidays for the lay palaeontologist.

Dr. Tim Flannery has been awarded the POL Prize for Environmental Research for 'contributing to public debate and increased understanding of environmental and social issues through quality research, intellectual analysis and outstanding writing skills'.

Our congratulations to Dr. Ritchie and Dr. Flannery.

DONATION TO THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

We thank Dr. B.V. Timms for his generous donation to the Joyce W. Vickery Scientific Research Fund. All donations to the Joyce W. Vickery Scientific Research Fund are fully tax deductible

NEW MEMBER

We welcome Mr Shane Ahyong to the membership of the Society.

RENEWAL OF SUBSCRIPTIONS

Renewal of memberships fall due at the beginning of the year. There is no increase in subscription rates for the coming year and there is a discount for memberships paid before April 1996. A form for renewal of memberships is included.

SOCIETY LUNCHEON: WEDNESDAY 19th FEBRUARY 1997

The Society Luncheon, Wednesday 19th February, will be held in the Classroom, Royal Botanic Gardens. Please let the Secretary know if you intend to come by Tuesday 11th February. A booking form is included. Spouses, partners and friends are welcome.

NOMINATIONS FOR THE COUNCIL

The nominations for the Council are included on a separate sheet.

PAPERS ACCEPTED FOR PUBLICATION

D. Morris, M.L. Augee, D. Gilleson and J. Head. Analysis of a Late Quaternary deposit and small mammal fauna from Nettle Cave, Jenolan, New South Wales.

J. Muirhead, L. Dawson, M. Archer and K. Aplin. *Perameles bowensis*, a new species of bandicoot (Peramelemorphia, Marsupialia) from the Pliocene faunas of Bow and Wellington Caves, New South Wales.

G.J. Prideaux and R.T. Wells. New *Sthenurus* species from Wellington Caves and Bingara, New South Wales.

M. Archer, K.Black and K. Nettle. Giant ringtail possums (Marsupialia, Pseudocheiridae) and giant koalas (Phascolarctidae) from the Late Cainozoic of Australia.

N. Bishop. Functional anatomy of the macropodid pes.

L. Dawson and M.L. Augee. The Late Quaternary sediments and fossil vertebrate fauna from Cathedral Cave, Wellington Caves, New South Wales.

M.C. McDowell. Taphonomy and paleoenvironmental interpretation of a late Holocene deposit from Black's Point Sinkhole, Venus Bay, South Australia.

R.E. Molnar and C. Kurz. The distribution of Pleistocene vertebrates on the eastern Darling Downs, based on the Queensland Museum collections.

S. Sweller and H.A. Martin. History of the vegetation at Burraga Swamp, Barrington Tops National Park, Upper Hunter River Region, New South Wales.

P.Willis and R.E. Molnar. A review of the Plio-Pleistocene crocodilian genus *Pallimarchus*.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1996. Applicants must be Members of the Linnean Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project, but may hold a Post Graduate Award and may undertake limited casual tutoring/demonstrating, with the permission of the Council.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 1st February, 1997.

RESEARCH SUPPORT GRANTS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $700.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Application forms can be obtained from the Secretary.

Intending applicants please note:
Please read instructions carefully.
Original plus five (5) copies are required.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible

DRAFT MANAGEMENT PLAN, HAWKESBURY NEPEAN CATCHMENT

Draft Aquatic Ecosystems Conservation and Management Principles: a Discussion Paper has been recently published by the Hawkesbury Nepean Catchment Management Trust. The document is on display until 31st December 1996 and other copies are available from the Hawkesbury Nepean Catchment Management Trust, 68 Mileham St (PO Box 556), Windsor, Tel: (045) 77 4243 or Fax: (045) 77 4236.

ANIMAL CATCHING CAGES

P. Beaumont of Grafton manufactures heavy duty animal cages which are successful alternatives to baiting and the illegal jaw traps. These cages have proved effective in reducing feral cats, dogs, foxes etc. They are also effective in catching native fauna for relocation, e.g. possums. Squeeze cages for the easy immobilisation of captured animals are also available. Direct all enquiries to P. Beaumont, P.O. Box 1347, Grafton N.S.W 2460, Tel (066) 473 204, Mobile 017-920-930

BIZARRE BEASTS FROM THE CAMBRIAN OF EASTERN GONDWANA AND THE RECONSTRUCTION OF AN ANCIENT ISLAND ARC SYSTEM, a lecture by Dr GLEN BROCK, School of Earth Sciences, Macquarie University

In the Cambrian, Australia was a very different place when compared with today. The western third to half was land and there was a large, shallow inland sea, covering the Northern Territory, South Australia and extending down to Antarctica. The eastern one third was deep water with chains of volcanic island arcs extending from New England down to Antarctica. At this time, Australia was joined to Antarctica.

The limestones deposited on the shallow platforms of the inland sea and now found around Lake Frome, the Flinders Ranges and Yorke Peninsula contain many molluscs, both articulate and inarticulate, brachiopods and archaeocyatheans, an extinct group somewhat like corals and sponges. Sponges have also been found in the Northern Territory. There are sclerites or scales from an armoured worm, the palaeoscoleodinian, an annelid type worm. There are conical structures covered in scales, sclerites from some armoured animal, but what it was like is unknown. It must have looked fearsome, an animal covered in scaly humps. There are a few trilobites, but they are poor in the shallow inland seas. there are many unknown fossil animals amongst these faunas. On Kangaroo Island, the soft parts of animals have been preserved, like in the Burgess Shale in Canada, but the fauna is not as diverse or abundant. It is also slightly older, Early Cambrian, whereas the Burgess Shale is Middle Cambrian. The Burgess Shale is exceptional rich with over 10,000 specimens. There are myriads of arthropods, but many types are bizarre and may be disjointed.

The faunas in the volcanic island arc province lived on the fringing reef surrounding the islands. From time to time, the reefs would collapse and the animals would be deposited in deep water, along with the deep water animals. These island arcs were a region of convergent plates that have conveniently uplifted the sea floor so that it is now accessible. Some of the islands acreted to New Zealand as well as to Australia. The faunas were different to those of the inland seas. There were lots of strange brachiopods and brachiopod-like forms and other problematic shelly forms. Sponge spicules are found here also. There were lots of trilobites and many of the species are found elsewhere in the world. These island arcs appear to have been a mixing zone for Gondwanian and Laurasian forms and the faunas show particular affinities with New Zealand and the west coast of Laurentia, now North America. The faunas suggest that the west coast of North America was close to Australia in the Cambrian.

Dr. Brock and his colleagues continue their work, piecing together a picture of what Australia was like in the Cambrian period, some 550-600 million years ago.

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 19 FEBRUARY 1997, AT 12.30 pm IN THE CLASSROOM, ANDERSON BUILDING, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

We need to know numbers for catering,so please let us know if you are coming BY TUESDAY 11 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061
Telephone: 9929 0253

(Tuesdays only)

I wish to make bookings for .... people at $14 per person for the luncheon 19 February

Cheque for $ ....is enclosed

NAME: ....

ADDRESS: ....

THE LINNEAN SOCIETY OF NEW SOUTH WALES

Council Nominations for President, Council and Auditor for 1997-98

ELECTION AT ANNUAL GENERAL MEETING, WEDNESDAY, 19th MARCH, 1997

The names of members who retire (in terms of rules 15a and 15b) are marked with an asterisk.

President:- A. Ritchie, B.Sc., Ph.D.

Council:-
A.E.J. Andrews, A.S.T.C.(Civ. Eng.), F.R.A.H.S.
M.L. Augee, Ph.D.
*J.P. Barkas, M.Sc., F.G.S., M.Aus.I.M.M.
*M.R. Gray, M.Sc., Ph.D.
G.J. Harden, M.Sc.
L.A.S. Johnson, A.M., D.Sc., F.A.A., Hon.F.L.S.
D.A. Keith, Ph.D.
R.J. King, B.Sc., Dip. Ed., Ph.D.
H.A. Martin, M.Sc., Ph.D.
*P.M. Martin, M.Sc.Agr., Ph.D., Dip. Ed., F.L.S., F.A.I.A.S.
J.R. Merrick, M.Sc., Ph.D.
*M.S. Moulds, M.Sc., T.Ch.
D.R. Murray, B.Sc., Ph.D., F.L.S.
P.J. Myerscough, M.A., Phil.D.
R.A.L. Osborne, B.Sc.(Hons), Dip.Ed., Ph.D.
I.G. Percival, Ph.D.
*A. Ritchie, B.Sc., Ph.D.
*K.L. Wilson, B.Sc.Agr., M.Sc.

Auditors:- Phil Williams & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- A. Ritchie, B.Sc., Ph.D.

Council:- (Six vacancies) - Council nominates the following and invites further nominations in accordance with rule 15e.

J. P. Barkas, M.Sc., F.G.S., M.Aus. I.M.M.
M.R. Gray M.Sc., Ph.D.
P.M. Martin M.Sc.Agr., Ph.D., Dip.Ed., F.L.S., F.A.I.A.S.
M.S. Moulds T.Ch., M.Sc.
A. Ritchie B.Sc., Ph.D.
K.L. Wilson B.Sc.Agr. M.Sc.

Auditors:- Phil Williams & Co.

This notice is given under the provision of Rule 15e
It is not a voting paper.

Rule 15e:- Independent nominations by ordinary members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his/her willingness to accept such office.

P.O. Box 457
Milsons Point
SYDNEY 2061
Telephone 9929 0253

For the Council

Barbara J. Stoddard
Secretary
10th December, 1996

LINNEAN SOCIETY OF NEW SOUTH WALES

RENEWAL OF MEMBERSHIP FOR 1997

The Secretary
Linnean Society of N.S.W.
PO BOX 457
Milsons Point, N.S.W. 2061

	PAID AFTER 30 APRIL	PAID BEFORE 30 APRIL	
FULL MEMBER	$50	$44	
RETIRED MEMBER	$28	$22	- retired, having reached the age of 60 years
STUDENT MEMBER	$28	$22	- full time student. Please included proof of student status
ASSOCIATE MEMBER	$8	$8	- receiving Newsletter but not Proceedings. No voting rights
LIFE MEMBER	NIL	NIL	- having been a full member of the Society for over 40 years.

PLEASE CIRCLE APPROPRIATE MEMBERSHIP

Cheque for $.................. is enclosed

NAME...

ADDRESS...

If you have renewed your membership, or are a Life Member, please disregard this notice.

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 83 **APRIL 1997**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members to the Society:

Mr Nigel Andrew, Macquarie University
Dr Mark Downton, Dept of Biology, Wollongong University
Ms Susan Hobley, University of Technology, Sydney
Prof W.D.L. Ride, Canberra

PAPERS ACCEPTED FOR PUBLICATION

Martin, H.A. The Stratigraphic palynology of the Darling River, downstream from Bourke.

Metcalfe, I., Atchison, J.C. and Stratford, M.C. Lower Devonian (Emsian) microfauna from the Camilaroi terrane at Glenrock in the Southern New England orogen, New South Wales.

DONATIONS TO THE JOYCE VICKERY RESEARCH FUND

We thank Mrs Joan Beattie and Dr Roger Carolyn for their generous donations to the Joyce Vickery Research Fund.

Donations to the Joyce W. Vickery Scientific Research Fund are tax deductible

REPORT OF THE AFFAIRS OF THE SOCIETY

The report of the affairs of the Society and financial statements, presented to the Annual General Meeting, are included with this Newsletter.

SUBSCRIPTION TO NATURE AUSTRALIA AT A DISCOUNT

Members of Associate Societies may obtain a subscription to NatureAustralia at a discount. Nature Australia then makes a donation to the Society and promotes it in their Society Page. The Linnean Society is due to be featured in the June 1997 issue. If you wish to take up a subscription and obtain the discount, contact the Secretary of the Society to obtain a brochure.

EXCURSION TO THE SOUTHERN HIGHLANDS
Leader, Mr Philip Kodela

On a fine day we travelled to Robertson via the Macquarie Pass Road. Although slower and longer, the views as we climbed the escarpment were truly magnificent. At Robertson we were blasted by a relentless wind as soon as we stepped out of the car.

Our first stop was the Robertson Nature Reserve where a remnant of the once extensive Yarrawa Brush is preserved. The main canopy trees are sassafras (*Doryphera sassafras*), coachwood (*Ceratophyllum apetalum*) and possumwood (*Quintinia sieberi*). Beneath the tall trees there is a secondary layer of shade tolerant trees, shrubs and tree ferns, with an abundance of ground ferns, epiphytic ferns and bryophytes. The shelter of the rainforest gave us a welcomed respite from the relentless wind.

The high rainfall and fertile soils that are good for rainforest are attractive to farmers, and the major clearance of the Yarrawa Brush occurred in the 1860s. There are a number of small remnant rainforest patches as well as the Robertson Nature Reserve. The rainforest in these remnants are fairly similar in composition, but on the hilltop and exposed ridges there are fewer species and a simpler structure. Where there is disturbance, species that regenerate from suckers fare better than the ones that must regenerate from seed. *Polyosma cunninghamii* (featherwood) is one of the latter and it is not found in most of the remnant patches. If left undisturbed, rainforest species start coming back in 10-15 years and rainforest will expand.

The Robertson Protection Society is very active in preserving the rainforest and is working to establish a patch of rainforest at Wingecarribee Swamp.

Wingecarribee Swamp is the largest of the montane peatlands in NSW and in this open expanse we felt the full force of the wind.

There is a range of habitat conditions from open water aquatic conditions to damp swamp margins. The range of mineral nutrition is also wide, from eutrophic vegetation such as *Phragmites* and *Typha* to oligotrophic *Sphagnum*. Wetland communities include aquatic herbfields, *Carex, Eleocharis* and *Typha* sedgelands, *Phragmites* reedland, *Sphagnum* mossland, Tea-tree shrubland Poa Tussock grassland, 'wet' meadows (grasses and other herbs) and swamp gum (*Eucalyptus ovata*) woodland. The mosaic of plant communities reflects variation in the degree of waterlogging and inundation, mineral nutrition, fire regime and human disturbance, as well as natural plant succession. Exotic species are mainly restricted to the swamp margins and slopes.

We saw *Gentiana wingecarribiensis* (gentian), an endangered species, at the swamp margin. It is a small, inconspicuous plant when not flowering. There are very small populations and attempts to grow it at Mt Annan Botanic Garden have been unsuccessful.

Mr Kodela has used pollen analysis to study the history of the vegetation of the Robertson Plateau. About 10 000 years ago there was no rainforest on the plateau and eucalypt forest with a fern understorey was widespread. About 2-3000 years ago rainforest expanded into the area and peat formation accelerated, for the climate had become wetter. In parts of the swamp up to 3m of peat have formed in the last 2-3000 years.

Peat extraction for horticultural use has been going on for about 20 years but peat mining is not sustainable and has negative impacts on the environment. Mining creates open water habitat and the loss of vegetation and sediment reduces the swamp's ability to help maintain water quality. Peat extraction can also cause hydrological changes such as alterations in water table levels. Sydney Water is interested in these problems as Wingecarribee Swamp is within the catchment of the Warragamba Dam. There are alternatives to peat for horticultural purposes, such as coconut fibre, sewerage sludge and various compost mixes that have been used successfully both on the open ground and as potting media.

Wingecarribee Swamp is listed on the *Register of the National Trust of Australia* (New South Wales), the *National Estate Register* (Australian Heritage Commission) and the *Directory of Important Wetlands in Australia* (Australian Nature Conservation Agency), recognising the conservation values of the swamp. Peatland is important for helping maintain water quality and filtering out potential pollutants. The swamp vegetation is efficient in absorbing accumulating nitrogen and other nutrients. As well as absorbing rainwater, the swamp receives groundwater from springs which helps maintain the wetlands and reservoir water supply during drought. The swamp sediments provide information on long-term environmental changes and processes, such as a project to evaluate flood and river history. These studies are important when considering catchment management of the water supply. There are several archaeological sites around the perimeter of the swamp also.

Management plans need to consider changes in the hydrological regime, including impacts on water levels that peat mining would cause at Wingecarribee Reservoir. The reservoir water levels are closely connected to the watertable of the remaining Wingecarribee Swamp. Activities on the swamp and in the catchment can also affect water quality. It would be preferable if peat mining were discouraged and grazing practices carefully regulated.

In 1992 there was a contract to export sedge peat from Wingecarribee Swamp to southern China for a golf course, and there were other potential overseas markets. Production rose from 19 248 cubic metres in 1990/91 to 25 271 cubic metres in 1991/92. Peat mining is not compatible with the heritage values and it degrades the environment.

UPDATE ON MINING AT WINGECARRIBEE SWAMP.

Renewal of the mining lease came before the Mining Warden's Court at the Moss Vale Court House on the 24th February. The Mining Warden investigates the proposal to resume mining and makes recommendations to the Minister. Environmental interests were well represented and they objected to any further mining. Some Government authorities, viz. Sydney Water, Environmental Protection Authority, National Parks and Wildlife Service and the Heritage Commission were also opposing mining. The case has been ajourned to the 28th April.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

☞ **Wednesday 18th June, 6pm in the Classroom, Royal Botanic Gardens. Enter through the gate to the carpark for the Herbarium on Mrs Macquaries Rd.**

Dr. MIKE MELVILLE

School of Geography, University of New South Wales.

The issue of acid sulfate soils for coastal land use in Australia

The acid soil problem is extremely important for land use and development in coastal regions. Dr. Melville will discuss the cause(s) of the problem and possible management strategies.

Wine and cheese will be served at the lectures, from 5.30 pm

EVERYONE WELCOME

☞ **Wednesday 23rd July, 6pm in the Classroom, Royal Botanic Gardens. Enter through the gate to the carpark for the Herbarium on Mrs Macquaries Rd.**

Dr. PATRICK CONAGHAN

School of Earth Sciences, Macquarie University

Confirmation of a shipwreck identity in for north Queensland, using Geoarchaeology

A nineteenth century shipwreck on Cockburn Reef, northeastern Queensland could have been any of nine ships reported lost in the region. Investigations suggested a British/European-built vessel of 350 to 450 tons sailing 'in ballast' and that narrowed the contenders down to two: the brig Druid, wrecked on a voyage from Hobart to Singapore, or the barque Lady Sale, wrecked on a voyage from Sydney to Ceylon. The petrographic characteristics of a block of the ballast rock showed it to be Hawkesbury Sandstone from Sydney, thus confirming the wreck to be that of the Lady Sale. Historical evidence suggests the ballast originating from Hobart would probably have been basalt. Dr. Conaghan will detail the detective work necessary to confirm the identification.

Wine and cheese will be served at the lectures, from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 84 **JULY 1997**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members to the Society:
Dr. G.A Brock, School of Earth Sciences, Macquarie University
Mr. Michael Engelbretsen, School of Earth Sciences, Macquarie University

HONOURS TO Dr.HAL COGGER

Our congratulations to Dr. Hal Cogger who was awarded an honorary degree of Doctor of Science from Sydney University. Dr. Cogger is one of Australia's pre-eminent experts on reptiles and amphibians.

DEATH OF DOROTHY HILL

Emeritus Professor Dorothy Hill, A.C., C.B.E.,D.Sc., LL.D., F.R.S., F.A.A., F.G.S. and a Life Member of the Linnean Society of N.S.W., died aged 89. Professor Hill graduated from Queensland University in 1928 and completed a Master of Science in 1930. She went to Cambridge University and graduated with a Ph.D. in 1932, returning to the Queensland University in 1937 as a research fellow and graduating as a Doctor of Science in 1942. During the was years, she served in the Women's Royal Naval Service and in 1947, rejoined the Queensland University as a Lecturer in Geology. She was appointed Reaearch Professor in Geology in 1959. She was also a pioneer at a time when few women went to university and fewer still continued to make a career in research or university administration. She has been rated as one of the two most distinguished graduates, the other being the Nobel Laureate Peter Doherty

Professor Hill was a pioneer in Palaeontology achieving excellence in her research on Palaeozoic corals and Cambrian Archaeocyatha. She is the sole author of three and a half volumes of the definitive work,*Treatise on Invertebrate Paleontology*, a truly outstanding achievement. She built up a fine Earth Sciences library at the University of Queensland and accepted high administrative posts within the University. She was actively involved in the regional mapping and resource development of Queensland and has supported endeavour in scientific societies. She was the first woman elected to the Australian Acadamy of Science.

Her many students are indebted for their early training and encouragement in excellence which she taught more by example than by direction. Before it became normal practice, she encouraged parents to send their daughters as well as their sons to university. She also encouraged women to consider careers in Earth Sciences and thought that the best way women could confront disadvantage was through excellence in performance.

DEATH OF Dr. A.A. RACEK

It is with regret that we record the death of Dr. A.A. (John) Racek, who became a Member of the Linnean Society of N.S.W. in 1960 and was elected a 'Corresponding Member' in 1975 in recognition of his long and worthy efforts on behalf of the Society. Dr. Racek was 86. He was a man of many accomplishments and was held in high regard by the numerous colleagues and students with whom he interacted during his zoological career in Australia..

Born in Czechoslovakia. Dr. Racek graduated from Charles University with a particular interest in aquatic biology. His life and that of his family were much disrupted by the events of the Second World War and its aftermath, but eventually Dr. Racek and his wife Ann were enabled to come to Australia as migrants in the days when the first two years had to be spent 'working as directed'. Lorry driving and process working were a major part of this initial experience, which they both absorbed successfully and remembered afterwords in a fund of good humoured stories. Subsequently, John obtained a post with the New South Wales Fisheries and carried out a major study on the biology and ecology of commercial prawn stocks. He then joined the biology staff of the University of Sydney as a a lecturer and remained in his post until retirement as a Senior Lecturer in 1975. He lectured widely on invertebrate and aquatic biology, providing many opportunities for research students to investigate questions about marine and freshwater crustaceans and freshwater sponges and carried out definitive research on the taxonomy of Australian prawns and a world-wide revision of the taxonomy of freshwater sponges.

Dr. Racek was an extraordinarily knowledgable zoologist, a widely cultured man, a notable musician and a fine wit and raconteur. After his retirement, he and his wife settled on the New South Wales Coast, where he resumed an earlier interest as a consultant in prawn fisheries. He will be remembered with affection by all who knew him.

D.T. Anderson

PAPERS ACCEPTED FOR PUBLICATION

Turvey, P and Merrick, J.R. Reproductive biology of the freshwater crayfish, *Euastacus spinifer* (Decapoda: Parastacidae), from the Sydney region, Australia

Turvey, P and Merrick, J.R. Population structure of the freshwater crayfish, *Euastacus spinifer* (Decapoda: Parastacidae), from the Sydney region, Australia

Turvey, P and Merrick, J.R. Diet and feeding in the freshwater crayfish, *Euastacus spinifer* (Decapoda: Parastacidae), from the Sydney region, Australia

Turvey, P and Merrick, J.R. Moult increments and frequency in the freshwater crayfish, *Euastacus spinifer* (Decapoda: Parastacidae), from the Sydney region, Australia

Turvey, P and Merrick, J.R. Growth with age in the freshwater crayfish, *Euastacus spinifer*

(Decapoda: Parastacidae), from the Sydney region, Australia

Merrick, J.R. Conservation and field management in the Freshwater crayfish, *Euastacus spinifer*

DONATION TO THE JOYCE W. VICKERY RESEARCH FUND

Our thanks to an anonymous donor for $500 to the Joyce W. Vickery Research Fund. All donations to the Fund are fully tax deductible.

AWARDS FROM THE JOYCE W. VICKERY RESEARCH FUND

The total amount requested by the successful applicants exceeded the funds available. The Council considered that all worthy projects should be funded and the amount awarded was reduced slightly to accommodate the shortfall.

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested or why the project is important and how it would add to knowledge in that particular discipline. The proposed budget must be fully justified also. Students should seek help from their supervisor or someone versed in the art of grant applications if they are doing this for the first time.

Mr Shane Timothy Ahyong, School of Biological Science, UNSW

PROJECT: Systematics and radiation of the stomatopod Crustacea.
The Stomatopoda are a predatory crustacean group that has been little studied in Australia, despite being diverse. They appear to be useful bio-indicators of coral reef health and are increasingly fished commercially. The group is being revised, using morphological and molecular techniques. Awarded $440

Dr Glenn Anthony Brock, Centre for Ecostratigraphy and Palaeobiology,
Macquarie University

PROJECT: A review of the Cambrian articulate brachiopods from Australia.
Calcearious 'articulate' brachiopods were the dominant faunal component in Ordovician-Permian marine environments, in terms of diversity and abundance, and are therefore of vital significance in palaeontological research. Despite this, their taxonomy and phylogenetic relationships are poorly known, and are currently undergoing critical revision. Improved extraction techniques have led to a much greater diversity becoming known, especially in Australia, and have provided substantial extra material for study. Awarded $532

Ms Sonia Carmel Claus, School of Science, University of Western Sydney, Hawkesbury

PROJECT: The ecological and genetic variability of *Hexaminius foliorum*. The barnacle *Hexaminius foliorum* is an ephemeral species that lives on the underside of leaves of the mangrove *Avicennia marina* in temperate Australia. The species' distribution will be studied in Botany Bay, both spatially and temporally. Allozyme analysis will be used to determine the genetic variation between sites. Awarded $560

Mr Matthew Samuel Crowther, School of Biological Sciences, University of Sydney

PROJECT: The evolution, systematics and ecology of the *Antechinus stuartii* - *A. flavipes* species complex. Despite being much studied, there is still confusion about species' limits in this species complex. The study will particularly look at the taxa in SE and NE Queensland. Morphological and molecular techniques will be used to assess the status of these taxa. Awarded $520

Dr Mark Dowton, Dept of Biology, University of Wollongong

PROJECT: Rearrangement of the tRNA genes for aspartate and lysine during the evolution of the Braconidae (Hymenoptera). This is one of the largest families of wasp parasitoids (35 subfamilies and more than 20,000 species). Host specificity is high at the subfamilial level. Study of morphology has not successfully elucidated relationships, so mitochondrial RNA is being analysed to provide a framework for further assessment of relationships. Awarded $480

Mr Michael James Engelbretsen, School of Earth Sciences, Macquarie

PROJECT: Taxonomy and biostratigraphy of early Palaeozoic inarticulate brachiopod faunas from eastern Australia. The brachiopod faunas from an area of Cambrian limestones in central Victoria and from Ordovician carbonate debris flows in central Queensland are being studied. A monograph will be produced. In addition, a comprehensive biostratigraphic scheme for that period will be built up. Awarded $558

Mr John Raymond Farrell, School of Earth Sciences, Macquarie University

PROJECT: Late Ordovician, Late Silurian and Early Devonian conodont faunas from the Molong/Wellington region, central western NSW. These conodont faunas are being documented, described and correlations between different areas assessed. This will enable more precise correlation with conodont faunas in other parts of the world. Awarded $100

Mr Ross Alan Parkes, Centre for Ecostratigraphy and Palaeobiology, Macquarie University

PROJECT: Palaeoecology of the Quidong Limestone and Delegate River Mudstone. No accurate date has been established previously for these formations. Conodonts are being studied to do so. This involves re-assessment of the taxonomy of the conodonts found in these areas. Awarded $560

Dr Bettye Jeanette Rees, School of Biological Science, University of NSW

PROJECT: A taxonomic study of the genus *Gymnopilus* in Australia. The basidiomycete genus *Gymnopilus* (family Cortinariaceae) includes at least 150 species, and seems to be readily adaptable to extreme ecological conditions. Species are saprophytic, and some may be useful in whitening paper pulp without significant destruction of the substrate. This is the first comprehensive treatment to be attempted since 1892. Spore incompatibility studies are being used to try to resolve some difficult species complexes. Awarded $560

Mr Anthony Francis Robbie, School of Biological Science, University of NSW

PROJECT: The palynology and vegetation history of Mountain Lagoon, Blue Mountains, NSW Radio carbon dates from Mountain Lagoon indicate that it formed 18,000 BP, at the peak of the last glacial period, when the vegetation was much more open and patchy. Few sites in the Eastern Highlands of Australia are as old, or have as good and continuous a pollen record. The current vegetation of the site will be surveyed and compared with pollen from cores taken from the lagoon. Awarded $313

Ms Susan Sweller, School of Biological Science, University of NSW

PROJECT: Palynology and vegetation history of Burraga Swamp at Barrington Tops National Park, NSW. No accurate date has yet been determined for the sediments in this swamp. The generally slower rate of accumulation of basal clays at other Barrington Tops swamps suggest that this swamp could be at least 12,000 years old, equalling or exceeding the age of most other swamps in SE Australia. There appears to have been a major change in vegetation at about 6,500 years BP, as well as currently undated earlier changes. Awarded $560

THE ISSUE OF ACID SULFATE SOILS FOR COASTAL LAND USE IN AUSTRALIA, a lecture given by Dr. Mike Melville.

Acid sulfate soils or potentially acid sulfate soils contain pyrite which on exposure to air, oxidises to produce sulphuric acid. When there is more acid produced than the soil can neutralise, the soil becomes acid and a pH 3.5 is common, but it may fall to 1.5-1.8. Clay and shells are the natural neutralisers of the acid. Acid sulfate soils are part of the natural sulphur cycle and extreme acid events, where acid is washed from the soil into the rivers causing fish kills, occurred before Captain Cook discovered Australia.

Pyrite production requires three things:
1) A supply of iron - readily available in soils and sediments
2) Enough sulphur, present in sea water. Sulphur may be limiting in fresh water
3) Organic matter in a waterlogged, anaerobic environment. Bacteria live on the organic matter and produce the pyrite.

Mangrove swamps, with their black, sticky, smelly mud are good places for pyrite production, but pyrite is also formed in salt marshes and the bottom of tidal lakes, e.g. Tuggerah Lake.

Most of the pyritic sediments were deposited when the sea level rose after the last glacial period and flooded the lowlying estuaries and flood plains, from about 10,000 years ago to the present, and they are still being formed. The present day distribution of mangroves is a guide to where acid soils may be found, but it is not totally reliable. There are not many mangroves fringing the Kakadu region, but mangrove wood is found almost anywhere beneath the flood plain which once supported extensive mangroves. The first rains of the wet season may wash out the acid produced during the dry season and cause fish kills. Dr. Melville showed us a slide of a pristine Kakadu billabong, with waterlillies flowering - and dead fish floating around.

The pyrite oxidises in two stages:
1) To half the acid plus ferrous iron which is soluble and may be washed out of the sediments, thus transporting the remaining acid to somewhere else.
2) The second half of the acid plus ferric iron precipitate which produces yellow, red and brown colours.

When ferrous iron is transported out of the system to cause 'acid at a distance' the ferrric iron is often precipitated out further downstream, causing rusty stains in drains and in estuaries.

The potential zone for acid sulfate soils occurs around about three quarters of the Australian coastline. The zone extends around the northern half of the west coast, all the north coast, most of the east coast and stretches of coastline near Melbourne, Adelaide, Perth and Sharkes Bay. In New South Wales, the most affected soils are found on the North Coast. The Department of Land and Water Resources has produced Acid Soils Risk Maps to assist land owners/users identify where the problems are likely to be found. The problem is global, however, and is found in parts of Asia and the Far East, Africa, and Latin America

Dr. Melville has done most of his research in the Tweed River region and here, a typical acid sulfate soil has an unoxidised sulfidic layer below 1.5 m, where the clays are soft, dark grey or bluey green to black, with a pH of 7-8, i.e. neutral to slightly alkaline, and they contain the pyrite. There is a narrow transition zone above the sulfidic layer, then the sulfuric layer of pH less than 4, where some of the pyrite has been oxidised. This zone has pale yellow encrustations from the first stage in iron precipitation. Finally, there is a layer of top soil or peat and alluvium, with a pH greater than 4, at the top. The depth of the sulfidic layer is crucial, for the closer it is to the surface, the more severe the acid problems.

Acid water draining from these soils looks beautifully clear or milky-bluish but it is very corrosive to metal and concrete. Ferrous water weeds may flourish and there are iron stains and deposits. Severe acid events kill fish, and less acid waters encourage the fish disease red spot. The acid causes leisions on the fish and allow the disease fungus to take hold. The acid waters also leach biotoxic aluminium out of the soil.

In the Pearl River Delta of China, the people have been living with and managing acid sulfate soils for a thousand years. The Delta has built up considerably in the last thousand years. Macau was once an offshore island, but the buildup of the delta sediments have connected it to the mainland. When the seas became shallow enough, the people built up polders or embankments to reclaim the land and keep out the sea. The polders keep out the sea water, the source of sulfur, and the high discharge of fresh water from the Pearl River flushes out the sediments. This method of land reclaimation, at the rate of 100 m p.a, relied on a high fresh water flushing and worked well in the days of pick and shovel, but modern ways and developments are increasing the acid problem.

In Australia, we do not have a high enough rainfall to flush the sediments out to sea so they lodge in the flood plains and estuaries. The moderate tidal range brings in the seawater and the sulfur supply, hence there is active pyrite production. At the other extreme, the Sepik River in New Guinea carries a very high discharge and there is practically no pyrite deposition.

Where do we find acid soils or potentially acid soils? Look for Holocene sediments (less than 10,000 years old), estuarine sediments below 5 m and sediments deposited from tidal lakes. Suspect soils are found below the 10 m contour level along the coast. The pyrite containing sediments may be overlain by freshwater fluvial sediments, hence burying the pyrite and there are no problems until disturbed. Under natural conditions, the pyrite would stay in the soil until the sea level fell when it would be oxidised and the sulfur leached out, thus completing the sulfur cycle.

The canefields in the Tweed River region on the low-lying land require drainage and have an network of drains that have flaps to allow drainage water out into the river but keep out the sea water when the tide comes in. Unfortunately, the drains cut into the lower layers of the soil, thus allowing oxidation of the pyrite. The sugar cane grows well on these soils if the unoxidised pyrite is kept locked up. There is no problem at times of high rainfall which keeps the soils wet and continually removes the acid. Dry spells allow acid to build up so that when it does rain, there are high concentrations. Some cane farmers line their drains with lime that neutralise the acid. A number of drains have been filled in, thus reducing the exposure of the pyrite. The key appears to be the management of the hydrology and the farmers are still learning. Government departments and CSIRO have set up the Acid Sulfate Soils Management Advisory Committee (ASSMAC) and the Acid Sulfate Soils Management and Technical Information Committee (ASSMATIC) for education and setting guidelines and best practice management to at least stop the problem getting worse. Guidelines for rehabilitation of acid degraded land are being worked out.

The North Coast has a rapidly growing population problem. Round Ballina, land zoned for urban development is on the acid sulfate soils. Some of it is also below the 100 year flood frequency level, not a desirable place to live, if the problems are known, and there are conflicts between different sections of the community. Some of the worst practices involve brackish water aquaculture. Prawn farms have a life of about 5 years and when the land is abandoned, it is in a worse state than originally. A lot of work has been done on education, but there is still a lot of ignorance. There are some cases going to court where developers have persisted, even though the Council had refused permission.

There is still much to be done in both fundamental research and working out urgent management practices. If the Chinese can live with the acid sulfate soils problem, then there is hope that we will too, but there is no quick-fix. The most important thing to do is not to drain or disturb any of the acid soils that are still in their natural state. The acid sulfate soils problem is just as great in extent as the dryland salinity problem.

Reference

White, I , Melville, M.D. et al., 1996. 'Acid Sulfate Soils, facing the challenges'. Earth Foundation Monograph 1. (Earth Foundation Australia, Sydney).

LINNEAN SOCIETY OF NEW SOUTH WALES

P R O G R A M M E

☞ Wednesday 23rd July, 6pm in the Classroom, Royal Botanic Gardens. Enter through the gate to the carpark for the Herbarium on Mrs Macquaries Rd.

Dr. PATRICK CONAGHAN

School of Earth Sciences, Macquarie University

Confirmation of a shipwreck identity in far north Queensland, using Geoarchaeology

A nineteenth century shipwreck on Cockburn Reef, northeastern Queensland could have been any of nine ships reported lost in the region. Investigations suggested a British/European-built vessel of 350 to 450 tons sailing 'in ballast' and that narrowed the contenders down to two: the brig <u>Druid</u>, wrecked on a voyage from Hobart to Singapore, or the barque <u>Lady Sale</u>, wrecked on a voyage from Sydney to Ceylon. The petrographic characteristics of a block of the ballast rock showed it to be Hawkesbury Sandstone from Sydney, thus confirming the wreck to be that of the <u>Lady Sale</u>. Historical evidence suggests the ballast originating from Hobart would probably have been basalt. Dr. Conaghan will detail the detective work necessary to confirm the identification.

Wine and cheese will be served before the lectures, from 5.30 pm

EVERYONE WELCOME

☞ Wednesday 20th August, 6pm in the Seminar Room, Rm 456, School of Biological Science, University of N.S.W. Enter through Gate 11, Botany St. for carparking.

Dr. ROSS McMURTRIE

School of Biological Science, University of New South Wales.

MODELLING FOR SUSTAINABLE FORESTRY

Sustainable forest use has been adopted by Australia's National Forest Policy, hence there is a need for ecologically based measures of sustainability. The removal of nutrients through forest harvesting and fire is one process that may affect ecosystem sustainability. This talk presents a model-based analysis of the combined consequences of harvesting and fire management practices for the nitrogen and phosphorus budgets of managed forest ecosystems. The model has been applied to stands of karri in south-western Australia and alpine ash in New South Wales

Wine and cheese will be served before the lectures, from 5.30 pm

EVERYONE WELCOME

P.T.O ☞

Saturday 18th October

☞ EXCURSION to JIBBON, ROYAL NATIONAL PARK

Leader, Mr. MARK TOZER
National Parks and Wildlife Service.

DYNAMICS OF HEATHLAND COMMUNITIES

The dynamics and composition of heathland communities at Gibbon have been studied over the last 50 years. The *Banksia* thickets come and go and the understorey varies in response to the overstorey. Mr. Tozer will show us the study plots and explain the dynamics.

MEET at 10 am in the park at Bundeena, opposite the shops, near the wharf (NOT the park opposite the service station).

We will have morning tea before we depart. It takes about 20 mins to walk to the first study site, then about 20 mins to walk between each site (a total of 4 sites). The walking is all very flat.

BRING lunch, food and drink in a pack for carrying

WEAR good walking shoes, hat, sunscreen, and be prepared for wind the heathlands to be windy.

If you do not have transport and would like to come, ring the Secretary at the Society's office for arrangements.

☞ Wednesday 22nd October, 6pm in the Seminar Room, Royal Botanic Gardens. Enter from Mrs Macquaries Rd.

Prof PETER MARTIN
Department of Crop Sciences, University of Sydney.

Evidence is accumulating to suggest that the long contunued use of heavy applications of animal manures, characteristic of intensive horticultural production on the alluvial soils of the Hawkesbury River flats around Richmond and Windsor, is mobilising phosphorus down the soil profile. Under local conditions we have had movement to greater depths in 20 years than have been recorded in England in 150 years.

Since 1993, my group has produced clear evidence of phosphorus enrichment on commercial farms to depths of 2 metres under poulty manuring in just twenty years. Since the process seems to be progressive, and in many parts of the areas studied the water table is only 4-6 metres from the surface and the soils are relatively undifferentiated, the prospect is that within another twenty to forty years we could have direct leakage of phosphorus into the ground water and hence into the river.

The phenomenon appears to be associated with the use pf phosphorus bearing manures of animal origin, so not only does it call into question the continued disposal of poultry manure in this way, but also raises queations about the proposed use of large quantities of Sydney sewage sludge ("biosolids") on the intensively farmed alluvial flats of the rivers near Sydney. It seems likely that in solving one urban problem, we may be creating another of far reaching significance and a most intractable nature.

Wine and cheese will be served before the lectures, from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 85 **OCTOBER 1997**

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IN THIS ISSUE

VALE DR LAWRIE JOHNSON

We were saddened to hear of the death of Dr. Lawrie Johnson on the 1st August 1997. Dr. Johnson had been a member of the Society for 50 years and a Council Member from 1965 until the time of his death. He was President in 1967 and 1971. He attended the Society's lectures regularly and all the excursions, up to the time of his illness.

Dr. Johnson was Botanist at the Royal Botanic Gardens from 1947 to 1972 and Director from 1972-1985. On his retirement, he became Honorary Research Associate and continued his research until he died. He and his colleagues were responsible for a major review of Australia's largest and most characteristic tree group, the eucalypts, distinguishing many new species, revising groups and developing a system of classification. He also worked, with colleagues, on Proteaceae and Myrtaceae, producing worldwide classifications and accounts of their evolution. He has collaborated on studies of Casuarinaceae and Juncaceae, and the work on Restionaceae is unfinished.

His term as Director of the Royal Botanic Gardens resulted in very significant developments in the scientific programs and the collections, as well as the development of the satellite gardens at Mt. Tomah and Mt. Annan. His colleagues has celebrated his 70th birthday with a festschrift issue of the Gardens' scientific journal, Teleopea, with many international contributions. The University of Sydney included him among the notable graduates featured on its home page on the World Wide Web.

He is survived by his wife Merle, who was always such a strong support to him, sons Chris, Nicholas, Quentin and Sandy, daughter Sylvia and eight grandchildren.

NEW MEMBERS

We Welcome Mr Peter Cockle, School of Earth Sciences, Macquarie University.
Mr. John Lower of Neutral Bay.

NEW COUNCIL MEMBER

We welcome Mr. Stefan Rose, our new Council Member. The Society is indebted to Mr. Rose for setting up our home page.

THE SOCIETY IS ON THE WEB

Use the Linnean Society of N.S.W. Home Page to find out about the Society, coming events, the Journal (Proceedings), research grants, publications available and membership. Forms for applications for research grants and membership are available from the home page also.
The home page is

http://bioscience.babs.unsw.edu.au/linnsoc/welcome.htm

PAPERS ACCEPTED FOR PUBLICATION

M.J. Tyler, A.C. Davis and C.R. Williams - Pleistocene frogs from near Cooma, New South Wales.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for 1998. Applicants must be Members of the Society, reside in New South Wales and have a degree in Science or Agricultural Science from Sydney University. Applications require an outline of the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 4th November.

NEW RESEARCH FUND

The Society has had the good fortune to receive funds from the now defunct Earth Exchange Museum Society, originally left to it in the will of Betty Mayne. The funds are being used for a new research fund to be known as the Betty Mayne Research Fund for Earth Sciences. The workings and the rules of the Fund are similar to those of the Joyce Vickery Research Fund except that the Betty Mayne Research Fund is restricted to Earth Sciences.

BETTY FLORENCE MAYNE

Betty Mayne was born in Young, NSW, on 13/4/1930. She was educated at the Presbyterian Ladies College, Pymble, prior to joining the nursing profession in which she served for some years.

In 1982, Betty retired from nursing and undertook extensive overseas travel. On returning to Sydney she became interested in the study of earth science and soon became a very keen and knowledgeable amateur mineralogist. She joined what was then the Friends of the Geological and Mining Museum (FOGAMM) Inc, serving as Vice President and in other executive positions. Betty was also a member of the Mineralogical Society of NSW Inc; she became its President in 1990, and organised the very successful Annual Seminar for the Mineralogical Societies from the rest of Australia.

Betty was a keen collector of minerals from worldwide locations, as well as gathering fossils and petrological specimens from around Australia. She was actively adding to her extensive collection until her untimely death in July 1991.

Betty's will stipulated that her collection was to be sold at auction, with the proceeds to be evenly divided between the 2 societies so closely associated with her earth science interests. The Mineralogical Society of NSW has used its share of these funds to purchase mineral specimens for the Australian Museum collections.

The Friends of the Geological and Mining Museum, more recently The Earth Exchange Museum Society (TEEMS), also purchased specimens for the collection of the latter museum. However, with closure of the Earth Exchange in September 1995, TEEMS invested its share of the Betty Mayne bequest pending winding up of the society. After consideration of various options, the TEEMS council decided that donation of the accumulated capital to the Linnean Society of NSW to establish "The Betty Mayne Scientific Research Fund", the purpose of which is to assist students of the earth sciences, would be a fitting memorial to perpetuate the memory of their fellow geologist.

The Betty Mayne Scientific Research Fund commenced with a donation of $36,216.05 from TEEMS, which the Linnean Society of NSW has supplemented with an additional $35, 000 from reorganisation of its own funds. These amounts have been invested, with the intention of 50% of interest earned to be disbursed in the form of research grants to be first awarded in 1998.

RULES GOVERNING AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences has been established to provide financial assistance to support short term original research projects in all aspects of geology, including (but not necessarily restricted to) the fields of regional geology, tectonics, structural geology, stratigraphy, sedimentology, geomorphology, palaeontology, biostratigraphy, igneous and metamorphic petrology, geochemistry, mineralogy, economic geology, and meteoritics.

2. Applications will be accepted from postgraduate students at recognised Australian Universities who are undertaking full-time or part-time higher degree studies with a geological emphasis. Students enrolled in Honours degree courses at recognised Australian Universities, whether full- or part-time, may also be considered for an award. Applications are also encouraged from amateur or professional geologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Earth Sciences, for example through a record of publications on the subject.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. The total amount of Fund money available for awards in any year will depend on interest income received by the Fund over the preceding year. Not more than 50% of this income will be distributed as grants; the remainder will be capitalised to increase the Fund. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $700, subject to Council review). Money awarded must be used for research purposes, which may include the purchase of equipment, laboratory, photographic or other consumables, and fieldwork or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences, obtainable from the Secretary of the Society by telephoning (02) 9929-0253 on Tuesdays 9.30 am - 5 pm (answering machine for messages at other times), or by writing to the address below. The form may be accompanied by no more than three (3) typed pages of additional information, plus references and a list of the applicant's relevant publications over the previous five years. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

CONFIRMATION OF A SHIPWRECK IDENTITY FOR NORTH QUEENSLAND, USING GEOARCHAEOLOGY, a lecture by Dr. Patrick Conaghan, School of Earth Sciences, Macquarie University

Dr. Conaghan began his lecture with a story about Linnaeus and his travels. Travelling in the wild places he visited was best done by boat along the rivers. On one journey, the boat had been wrecked, so Dr. Conaghan thought it fitting that the Linnean Society should have a lecture about a shipwreck.

Nineteenth century sailing ships travelling along the northern part of the east Australian coastline could take the shallow water route, but they had to anchor each night because they could not see the reefs. The outside route avoided anchoring at night, but they had to negotiate the outer barrier and a maze of reefs to pass through Torres Strait. They would start this hazardous route early in the morning with the sun behind them so that they could see the reefs better. They would get through Cockburn Reef before noon, anchor at Bird Island overnight before going on to Torres Strait.

One wreck on the Cockburn Reef, could have been any of nine ships reported lost in the region. The site had been mapped in 1989 and excavated to show the starboard timbers and ballast blocks. A line of copper bolts showed where the keelson had been bolted to the deadwood. The pattern of debris and anchors suggested that the ship had been driven from the east and had broken into two pieces. Samples from the floor timbers showed it to be elm or white oak and hence was built in Europe . Analysis of the nineteenth century sailing calenders narrowed the field down to two: the brig *Druid*, wrecked on a voyage from Hobart to Singapore, or the barque *Lady Sale*, wrecked on a voyage from Sydney to Ceylon.

The *Lady Sale* had left Sydney on Monday 17th May, 1852, sailing to Ceylon with ballast. Hawkesbury Sandstone is the only rock outcropping around Sydney Harbour that could be used for ballast, if ballast was not being recycled. A ballast broker would supply the ballast, both local and pre-used. Stream worn stones were preferred over quarried rock because they would not scratch the hull, but there was an industry quarrying sandstone for ballast at Pyrmont. Ballast Point was a source of sandstone blocks and a real estate advertisement in 1842 promoted Ballast point for the ballast trade as well as harbour views. If the ballast had come from Hobart, it would probably be a basalt.

The Hawkesbury Sandstone has two distinct units: a lower cross bedded unit truncated by an erosional surface and a flat bedded unit above. With exposure, the edges and corners of blocks of the first unit become sub-rounded because the bedding cracks and grooves etch out where exposed. This type is moderately friable and would not stand much rough treatment. The upper flat-bedded unit is relatively unstructured, more resistant and massive

The ballast from the wreck was sandstone and it was sub-rounded, showing it had not been quarried. It was ochre stained with weathering alteration throughout, suggesting it had been exposed in a low energy environment such as on the foreshore of a sheltered inlet, for some time. Microscopic examination of thin sections showed grain size, pore space, bedding and particularly graphite, which is not common in sandstone, were similar in both the ballast block and sandstone from Ballast Point.

The *Lady Sale* was 334 tons and knowing the tonnage, the dimensions of the hull and proportion of ballast it would carry can be calculated. There is a pile of exposed ballast blocks on the reef, and some of them would have been covered by coral. Calculations of the amount of ballast on the reef is close to the possible ballast the *Lady Sale* would have carried. The *Lady Sale* left the Philippines on January 27th 1852, stayed 4 months in Port Jackson, left on 17th May and was wrecked on the 4th June, 1852. The *Druid* landed in Hobart 18th July 1843, left on 28th August and was wrecked on 21st September, 1853. There are no indications it came into Port Jackson or whether it was carrying cargo or ballast in the records. The Shipping Gazette of the 9th January 1984, however, said the *Druid* had a consignment of horses that could not be saved. If it had carried ballast, it would probably have been basalt. The basalt in a dump in Hobart, used by the ballast trade, comes from Victoria.

EXPLAINING HOW ECOSYSTEMS FUNCTION USING THEORETICAL MODELS: a lecture by A/Prof. Ross McMurtrie, School of Biological Science , University of N.S.W.

Dr. McMurtrie has been working for many years on models of forest ecophysiology. He began his lecture by quoting John Monteith on the differences between physicists and biologists involved in crop modelling:

PHYSICISTS, when young, are taught that matter and energy obey simple general laws throughout the universe. Because crops are components of the universe, they try to construct crop models from simple algorithms that embody these laws. When this somewhat naive view is challenged by biologists, physicists tend to take refuge in Occam's razor - "do not multiply hypotheses".

BIOLOGISTS are brought up to believe that everything in our world is different until proved the same - the philosophical basis of taxonomy. When this philosophy is applied to crop modelling, every leaf in a canopy becomes a discrete organism and parameters proliferate. (Monteith, J.L., 1994. The quest for balance in crop modelling).

Dr. McMurtrie and his team (Drs. Roddy Dewar and Belinda Medlyn, and Ph.D students Dana Munty and Mark Jeffreys) have had to work somewhere between these two extreme views. They have aimed to develop models which are complex enough to capture the behaviour of natural plant ecosystems but simple enough to obtain general insights into ecosystem function.

Modelling to show the effect of rising carbon dioxide on plant productivity is one example. In the model, photosynthesis depends on the amount of leaf protein. Some of the products of photosynthesis are allocated to protein synthesis but there is a construction cost in the form of respiration, and newly synthesised protein degrades within a few days. The products also go to sugar and starch pools. One conclusion from the model is that plant growth rate is proportional to absorbed light. This result is consistent with experiments which show that net primary production or growth rate is proportional to the intercepted solar radiation or light absorbed. This relationship seems contrary to the principle of limiting factors that are taught to all young botanists, but it emerges from the model because simulated leaf protein levels are higher in well lit leaves. At high carbon dioxide levels, the model predicts that protein synthesis declines. Simulations at 350 ppm of carbon dioxide show most rapid growth when 40% of photosynthate is allocated to protein, whereas at 700 ppm of carbon dioxide, growth is fastest when 30% is allocated to protein. At high carbon dioxide levels more of the photosynthate goes to sugars and starches.

The above responses to increased carbon dioxide concentrations are all seen in the short term. Long term responses must take into account nutrient cycling processes. If nutrients are limiting, then the response to increased carbon dioxide is less. On the other hand, if water is limiting, the response is greater because the stomates tend to close under conditions of higher concentrations of carbon dioxide, which means that water is used more efficiently.

Dr. McMurtrie also discussed the issue of sustainable forest productivity. Sustainable forest use has been adopted by Australia's National Forest Policy, but how to achieve sustainability is a matter for debate and controversy between the managers, users and other groups involved in forestry. The model combining the consequences of harvesting and fire management practices, however, has been applied to stands of karri in south-western Australia and alpine ash in New South Wales.

Forest management practices affect sustainable productivity The input of nitrogen to the ecosystem comes from deposition and fixation, and in Australia, many forest communities are high nitrogen fixers. Loss of nitrogen from the ecosystem is due to wildfire (fire volatilises nitrogen), leaching, harvesting and slash/burn. For regrowth karri forest in Western Australia, a 7-9 year cycle of prescribed burning is practised. Modelling shows the likely effect on the nitrogen status of burning and harvesting. With prescribed burning at 6 and 9 year intervals, nitrogen is lost from the ecosystem with both low and high intensity fires. Only a 12 year cycle of low intensity fire allows nitrogen levels to increase. These conclusions depend on the assumed rates of nitrogen inputs, which are poorly understood.

Forest productivity is high in young forests, but after canopy closure, productivity declines gradually by as much as 50%. This effect of aging on productivity is well known but the reasons for it are not clear. Several mechanisms have been proposed. Larger trees have increased maintenance respiration, largely because they have more living tissue. Stomatal conductance declines in older trees because the pathway that water must travel is longer, particularly out to the branches. Nutrients are locked up in the stand and tree litter, hence available nutrients for growth may be limiting.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Saturday 18th October

EXCURSION TO JIBBON, ROYAL NATIONAL PARK

Leader, **Mr. MARK TOZER**
National Parks and Wildlife service.

DYNAMICS OF HEATHLAND COMMUNITIES

The dynamics and composition of heathland communities at Jibbon have been studied over the last 50 years. the *Banksia* thickets come and go and the understorey varies in response to the overstorey. Mr Tozer will show us the study plots and explain the dynamics.

MEET at 10 am in the park at Bundeena, opposite the shops near the wharf (NOT the park opposite the service station)

We will have morning tea before we depart. It takes about 20 mins. to walk to the first study site then about 20 mins to walk between each site (a total of 4 sites). The walking is all very flat.

BRING lunch, food and drink in a pack for carrying.

WEAR good walking shoes, hat, sunscreen, and be prepared for the heathlands to be windy.

If you do not have transport and would like to come, ring the Secretary at the Society's office for arrangements.

Wednesday 22nd October, 6 pm in the Seminar Room, Royal Botanic Gardens. Enter from Mrs Macquaries Rd.

Prof PETER MARTIN
Department of Crop Sciences, University of Sydney

ENHANCED PHOSPHOROUS MOVEMENT THROUGH SOIL

Evidence is accumulating to suggest that the long continued use of heavy applications of animal manures, characteristic of intensive horticultural production on the alluvial soils of the Hawkesbury River flats around Richmond and Windsor, are mobilising phosphorus down the soil profile. Under local conditions we have had movement to greater depths in 20 years than have been recorded in England in 150 years.

Since 1993, my group has produced clear evidence of phosphorus enrichment on commercial farms to depths of 2 metres under poultry manuring in just twenty years. Because the process seems to be progressive, and in many parts of the areas studied the water table is only 4-6 metres from the surface and the soils are relatively undifferentiated, the prospect is that within another twenty to forty years, we could have direct leakage of phosphorus into the ground water and hence into the river.

The phenomenon appears to be associated with the use of phosphorus bearing manures of animal origin, so not only does it call into question the continued disposal of poultry manure in this way, but also raises questions about the proposed use of large quantities of Sydney sewage sludge ('biosolids') on the intensively farmed alluvial flats of the rivers near Sydney. It seems likely that in solving one urban problem, we may be creating another of far reaching significance and a most intractable nature

Wednesday 22nd October, 6 pm in the Seminar Room, Rm 456, School of Biological Science, University of N.S.W.
Enter through Gate 11, Botany St. for carparking

LINNEAN MACLEAY MEMORIAL LECTURE

PROF. IAN PLIMER
School of Earth Sciences, University of Melbourne.

TITLE TO BE ANNOUNCED.

Wine and cheese will be served at all lectures

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO. 86 **DECEMBER 1997**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE

1. The nominations for President and Council - the white sheet.
2. The form for renewal of subscriptions - pink sheet. The subscriptions remain the same as last year.

LINNEAN MACLEAY MEMORIAL LECTURE

Prof Ian Plimer of the School of Earth Sciences, University of Melbourne will give the Linnean Macleay Memorial Lecture on the 20th May, 1998. The title and further details will be announced in the next Newsletter.

NEW MEMBER

We welcome Mr. G.Z Földvary of Matraville.

PAPERS ACCEPTED FOR PUBLICATION

P.J. Gullan and C.J. Hodson. A new genus of Australian soft scale insect (Hemiptera: Coccidae) with species on *Capparis* (Capparaceae) and *Doryphora* (Monimiaceae) from New South Wales.

S.D. Hetherington, B.A. Auld and H.E. Smith. A possible bioherbicide for Avena fatua L. (Wild oats): isolate collection and host range testing.

J.A. Honan. Egg and juveniles development of the freshwater crayfish *Euastacus bispinosus* Clark (Decapoda: Parastacidae).

H.A. Martin. Tertiary climatic evolution and the development of aridity in Australia

K.B. Sewell and L.R.G. Cannon. New Temnocephalans from the branchial chamber of Australian *Euastacus* and *Cherax* crayfish hosts.

T.V. van de Martel and W.A. Buttemer. Avoidance of ultraviolet-B radiation in frogs and tadpoles of the species *Litoria aurea*, *L. dentata* and *L. peronii.*

APPLICATIONS FOR THE RESEARCH FUNDS.

1. THE BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences has been established to provide financial assistance to support short term original research projects in all aspects of geology, including (but not necessarily restricted to) the fields of regional geology, tectonics, structural geology, stratigraphy, sedimentology, geomorphology, palaeontology, biostratigraphy, igneous and metamorphic petrology, geochemistry, mineralogy, economic geology, and meteoritics.

2. Applications will be accepted from postgraduate students at recognised Australian Universities who are undertaking full-time or part-time higher degree studies with a geological emphasis. Students enrolled in Honours degree courses at recognised Australian Universities, whether full- or part-time, may also be considered for an award. Applications are also encouraged from amateur or professional geologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Earth Sciences, for example through a record of publications on the subject.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. The total amount of Fund money available for awards in any year will depend on interest income received by the Fund over the preceding year. Not more than 50% of this income will be distributed as grants; the remainder will be capitalised to increase the Fund. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $700, subject to Council review). Money awarded must be used for research purposes, which may include the purchase of equipment, laboratory, photographic or other consumables, and fieldwork or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences, obtainable from the Secretary of the Society by telephoning (02) 9929-0253 on Tuesdays 9.30 am - 5 pm (answering machine for messages at other times), or by writing to the address below. The

form may be accompanied by no more than three (3) typed pages of additional information, plus references and a list of the applicant's relevant publications over the previous five years. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1st February 1998**

2. THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of New South Wales announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $700.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgment to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **31st March 1998**

Application forms for both Research Funds may be obtained from the Secretary or the Home Page **http://bioscience.babs.unsw.edu.au/linnsoc/welcome.htm**

Intending applicants please note:

Please read instructions carefully.
Original plus five (5) copies are required.

Donations to the Joyce W. Vickery and the Betty Mayne Scientific Research Funds are tax deductible

ADVICE TO APPLICANTS

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested or why the project is important and how it would add to knowledge in that particular discipline. The proposed budget must be fully justified also. Students should seek the help from their supervisor or someone versed in the art of writing grant applications if they are doing this for the first time.

The projects are assessed on merit, but when funds are insufficient to cover all suitable applications and all other things being equal, Members of the Society may be given preference

The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only make grants for research. This means we cannot fund theses preparation or attendances at conferences.

NEW BOOK: CARBON DIOXIDE AND PLANT RESPONSES, by David Murray

This book describes how carbon dioxide has affected all life on earth since the earliest times and explores the response of plants, particularly food plants, to the ever increasing levels of CO_2 in the air. It explains why the im pact of elevated CO_2 on food production will not be the panacea that some have predicted. Important features of the book include:

The effects of CO_2 on many plants

Identifies the adverse greenhouse effects associated with rising CO_2 levels which could make life on earth extremely difficult

Provides wide, up-to-date coverage of scientific literature in the field.

Proposes that, for ecologically sustainable development, there is an urgent need to slow the present rate of increase in levels of atmospheric CO_2

The book is published by Research Studies Press, Belvedere Road, Taunton, Somerset TAI IDH. UK or ring 0 86380 213 3. Price, £52

DYNAMICS OF HEATHLAND COMMUNITIES. An excursion to Jibbon, Royal National Park. Leader, Mr. Mark Tozer, National Parks and Wildlife Service.

We met at Bundeena and set off into National Park on a beautiful sunny day. The eucalypts, up to 3 m tall, were green and bushy, just like we would expect to find in National Park, but they had all been burnt in the January 1994 fires and were all regrowths. Only an extra metre of so of burnt stem, sticking above the greenery, betrayed the fire of some three and a half years earlier. The area immediately around Bundeena has had a long history of disturbance, and we passed the rubbish dump, not being used now, and an old gun emplacement.

We set out to see some of the experimental plots being studied by Mr. Tozer and his colleagues. These plots are being monitored to provide the information necessary to formulate management plans for the Park, and fire is the principal environmental factor requiring management. Fire can be extremely variable in frequency, extent and intensity of burning, all of which have an impact on the plant species. These experiments concentrate on the plants, for ultimately, the animals depend on the plants.

Species may resprout from root stocks after fire, eg. *Banksia serrata*. Other species are killed by fire and must regenerate from seed and the time it takes for the young plants to flower and produce seed is critical for long term survival. For example, *Casuarina distyla* is killed by fire and it is 4-5 years before it produces seed. If fire frequency is less than 4 years, it will be eliminated from the community and the seed bank will have to be replenished from outside the area. There are about 500 species in the park and their response to fire can be placed into these two groups, the resprouters and the seed germinaters.

Population studies, where one species is studied intensively, are the basis of the present fire prescription. These studies, however, are based on selected species, eg. *Banksia serrata*, and fire prescriptions for them may not be appropriate for other species. The present studies focus on other species. *Xanthorrhoea resinifera* has been studied since 1988. It is very long lived and slow growing, making it difficult to study because changes are hard to detect.

The 1994 fire, following so soon after the 1988 fire, provided a good chance to test out previous predictions. The distributions of *Banksia serrata* and *Casuarina distyla* have been reduced considerably and many of the small shrubs that were overshadowed by the tall thickets have increased. It is this small shrub understorey that contains most of the diversity. If tall thickets are left unburnt for about 20 years, most of the small shrubs will disappear.

Current fire management guidelines give priority to protecting housing and people and burning to reduce the fuel is necessary. For the management of the vegetation, if an area has been burnt within the last 2 years, fire is excluded. If burnt five years ago, fire is suppressed. If not burnt for 15 years, the possibility of introducing fire is considered. These plans are under scrutiny and may be revised.

Xanthorrhoea resprouts readily after fire. It may also flower heavily after fire, but some flowering goes on even when there is no fire. Seeds germinate in huge numbers after fire also, but most of the seedlings do not survive and they are probably eaten. Growth rate in the field is very slow. We were shown 8 year old seedlings, with 3 leaves, 25 cm. long! Had Mr Tozer not pointed them out, we would have missed them completely. The leaf number increases by one half in five years! A good sized plant is 50-70 years old before it flowers. *Xanthorrhoea* does not always grow so slowly, for in experiments in the glasshouse, they grow much faster.

On the damp swales before the 1994 fire, *Banksia ericifolia*, which is killed by fire and must regenerate from seed, formed dense thickets. These thickets had grown up after the 1988 fire, but the plants had not flowered. These swales have been opened up and there are few young *B. ericifolia* plants there now. Recruitment of *Xanthorrhoea* has been good here and there will be a complete change of dominants as a result of the 1994 fire. These damp swales are the best habitat for *Xanthorrhoea*.

On the drier slopes of the dunes, where there is a complex of *Xanthorrhoea resinifera* and *Xanthorrhoea media* and intermediates, some of the plants are arborescent with a stem, the 'blackboy', and others lack the stem. All of the plants growing in the damp swales lack an above ground stem. Only the arborescent forms flower in this habitat. The growth of the stem is very slow and hardly detectable in these experiments. There is a high mortality, about 20%, in this habitat and we saw the dead stumps of many blackboys. The cause of this mortality is not known, but the habitat may be marginal. This loss of blackboys is worrying because the seed grows as soon as it becomes wet and it is not long-lived, hence if the adults die out, there will be no seed bank in the soil. We are not sure of the reason for the two forms of the plant. *Xanthorrhoea* has contractile roots which pull the plant down, if necessary, and it may be that they can function well in the damper, core habitat but not in the drier, marginal habitats.

The structure of the community before the fire may have an influence on what happens afterwards. *Xanthorrhoea* plants that were under a *Banksia* thicket before the fire have suffered the highest mortality. A thicket overstorey shades the small shrub layer below it and many species will disappear, especially in the drier habitats. Some species, however, do well under a canopy, eg. epacrids and Restionaceae, and if the overstorey is removed, they will suffer.

The complexity of the dynamics of the heathland communities was impressive. The plant cover quickly regenerates after a fire which may be the impulse for change in the communities. There is no doubt that fire maintains the rich diversity of the heathlands.

LINNEAN SOCIETY OF NEW SOUTH WALES

LUNCHEON

WEDNESDAY 18 FEBRUARY 1998, AT 12.30 pm IN THE CLASSROOM, ANDERSON BUILDING, ROYAL BOTANIC GARDENS

ENTER FROM MRS MACQUARIE'S ROAD

COST PER HEAD, $14

The luncheon is informal and members are invited to bring spouses and friends

We need to know numbers for catering, so please let us know if you are coming BY TUESDAY 10 FEBRUARY

The secretary
Linnean Society of N.S.W.
PO Box 457
Milsons Point N.S.W. 2061 Telephone:
9929 0253

(Tuesdays only)

I wish to make bookings for .... people at $14 per person for the luncheon 19 February

Cheque for $ ....is enclosed

NAME: ....

ADDRESS: ....

LINNEAN SOCIETY OF NEW SOUTH WALES

RENEWAL OF MEMBERSHIP FOR 1998

The Secretary
Linnean Society of N.S.W.
PO BOX 457
Milsons Point, N.S.W. 2061

	PAID AFTER 30 APRIL	PAID BEFORE 30 APRIL	
FULL MEMBER	$50	$44	
RETIRED MEMBER	$28	$22	- retired, having reached the age of 60 years
STUDENT MEMBER	$28	$22	- full time student. Please included proof of student status
ASSOCIATE MEMBER	$8	$8	- receiving Newsletter but not Proceedings. No voting rights
LIFE MEMBER	NIL	NIL	- having been a full member of the Society for over 40 years.

PLEASE CIRCLE APPROPRIATE MEMBERSHIP

Cheque for $.................. is enclosed

NAME..

ADDRESS...

If you have renewed your membership, or are a Life Member, please disregard this notice.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

Council Nominations for President, Council and Auditor for 1998-99

ELECTION AT ANNUAL GENERAL MEETING, WEDNESDAY, 18th MARCH, 1998

The names of members who retire (in terms of rules 15a and 15b) are marked with an asterisk.

President:- A. Ritchie, B.Sc., Ph.D.

Council:-
*A.E.J. Andrews, A.S.T.C.(Civ. Eng.), F.R.A.H.S.
*M.L. Augee, Ph.D.
J.P. Barkas, M.Sc., F.G.S., M.Aus.I.M.M.
M.R. Gray, M.Sc., Ph.D.
G.J. Harden, M.Sc.
D.A. Keith, Ph.D.
*R.J. King, B.Sc., Dip. Ed., Ph.D.
*H.A. Martin, M.Sc., Ph.D.
P.M. Martin, M.Sc.Agr., Ph.D., Dip. Ed., F.L.S., F.A.I.A.S.
*J.R. Merrick, M.Sc., Ph.D.
M.S. Moulds, T.Ch.
D.R. Murray, B.Sc., Ph.D., F.L.S.
P.J. Myerscough, M.A., Phil.D.
R.A.L. Osborne, B.Sc.(Hons), Dip.Ed., Ph.D.
I.G. Percival, Ph.D.
A. Ritchie, B.Sc., Ph.D.
*S.Rose, B.Sc., M.Sc.
K.L. Wilson, B.Sc.Agr., M.Sc.

Auditors:- Phil Williams & Co.

RECOMMENDATION BY COUNCIL FOR ELECTION AS:-

President:- R.A.L. Osborne, B.Sc.(Hons), Dip. Ed., Ph.D.

Council:- (Six vacancies) - Council nominates the following and invites further nominations in accordance with rule 15e.

S. Rose, B.Sc., M.Sc.
M.L. Augee, Ph.D.
H.A. Martin, M.Sc., Ph.D.
A.E.J. Andrews, A.S.T.C.(Civ. Eng.),F.R.A.H.S.
R.J. King, B.Sc., Dip. Ed., Ph.D.
J.R. Merrick, M.Sc., Ph.D.

Auditors:- Phil Williams & Co.

This notice is givem under the provision of Rule 15e.
It is not a voting paper.

Rule 15e:- Independent nominations by ordinary members of the Society to vacancies on the Council or for the office of President or Auditor, if received by the Secretary on or before the last day of January, shall be accepted as valid nominations to those offices, provided that each nomination paper is signed by not less than two Ordinary Members of the Society and countersigned by the nominee in token of his/herwillingness to accept such office.

P.O.Box 457
Milsons Point
SYDNEY 2061
Telephone 9929 0253

For the Council

Barbara J. Stoddard
Secretary

16th December, 1997

LINNEAN SOCIETY OF NEW SOUTH WALES
LINN S'O'C' NEWS

NEWSLETTER NO: 87 **APRIL 1998**

NEWSLETTER EDITOR:
Dr Helene A Martin
School of Biological Science
University of New South Wales
SYDNEY NSW 2052

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IN THIS ISSUE

HONOURS TO PROF. CARRICK CHAMBERS

Congratulations to Prof. Carrick Chambers who became a Member of the General Division, Order of Australia (AM) for 'Services to the Science of Botany and its application to Horticulture, as Director of the Royal Botanic Gardens, Sydney, and as a teacher and researcher on conservation issues and botanical concepts'.

NEW MEMBER

We welcome Ms. Sharon Downes, School of Biological Sciences, University of Sydney

LINNEAN MACLEAY MEMORIAL LECTURE

Prof Ian Plimer of the School of Earth Sciences, University of Melbourne will give the Linnean Macleay Memorial Lecture on the 20th May, 1998. The title of his address is 'Science and the law: the Noah's Ark trial. Venue and other details are in the Programme.

PEAT MINING AT WINGECARRIBEE STOPPED

The Minister for Urban Affairs and Planning has issued an Interim Conservation Order under the Heritage Act, and peat mining at Wingecarribee has stopped. This order is valid for one year, but the Minister is able subsequently to make a Permanent Conservation Order.

DEATH OF CLARICE KENNEDY

Clarice Kennedy, a Member of the Society, died at the age of 89. She was a sportswoman and held many titles and records in track and field events and swimming. She also played hockey, basketball, vigoro and tennis. At school, she shone in literary activities, writing poems and plays and entering competitions. She became a teacher at Shirley Ladies College, and as well as teaching, played the piano and the organ.

Ms. Kennedy was determined to go to university, and at the age of 59, was the oldest student at the then newly opened Macquarie University. When asked why she started higher education so late, she replied that she had been too busy earning a living. She completed an arts degree, a Master of Science and a Ph. D with a thesis on the microscopic pseudoscorpions. She also completed a diploma in theology and had completed the first year of a Bachelor of Divinity.

MEMORIAL SERVICE TO MARK 200th ANNIVERSARY OF BIRTH OF W.B. CLARKE

The Memorial Service will be held on 2nd June at 2.30 pm in St. Andrews Cathedral, George St. Sydney. Descendants of the William Clarke family and students from Kings College and the William Clarke College will attend. Interested members of the public are invited to join them.

William Clarke was born in England on the 2nd of June in 1789 and became a curate and a schoolmaster. He was advised to seek a warmer climate for health reasons, so migrated to Australia, arriving in Sydney in May 1839. He was appointed to the Parish of Castle Hill and Dural, and combined his clerical duties with headmastership of The King's School, Parramatta. He resigned from the School at the end of 1840 but continued his clerical duties. His chief interest, though, was science, in particular geology, and he is best known for his discovery of gold in the Colony. He worked on many geological projects and received the Murchison Medal of the London Geological Society for his work on the New South Wales coalfields. He was involved in the scientific societies and died in Sydney in June 1878.

For further information, contact Ms Barbara Davies of the Historical Society on 02 9908 2024.

NORTH SHORE GROUP OF THE AUSTRALIAN PLANTS SOCIETY: PROGRAM

The North Shore group of the Australian Plants Society has an active program of talks and walks, garden visits and excursions. For further information, contact Julia Robertson on (02) 9498 4547.

ENHANCED PHOSPHOROUS MOVEMENT THROUGH SOIL. A lecture by Prof Peter Martin, Department of Crop Sciences, University of Sydney.

There is intensive horticultural activity on the alluvial flats of the Hawkesbury, Shoalhaven and Wyong Rivers, where vegetables, cut flowers and turf are the main crops. The turf farming is particularly profitable, worth $100 million a year, more than the apple crop in N.S.W. Intensive horticulture requires high levels of nutrients and in practice, poultry manure is used. This seems like a good thing in that the poultry farmers have a means of disposing of the manure. Wyong Shire Council was worried that runoff after heavy rain might pollute the Wyong River which is the water supply for Wyong. They called in Prof. Martin and his team to put their minds at rest.

The question as to whether runoff from the farms was polluting the river was easily answered. The Wyong River has levee banks, built up from overbank flooding, which prevents runoff from draining into the river. There are a number of cutoff oxbows in the river flats and drainage from the farms ends up in them. There was another equally important question to be answered. Were the farms polluting the groundwater? If they were, this would be just as disastrous for the Wyong water supply, because the river flows the year round, fed by groundwater. Excess nutrients encourage algal blooms and some of them are toxic. The blue green algae problem in the Murray Darling River and elsewhere is a good example.

If excess nitrogen is the pollutant, then this problem could be fixed easily. Stop putting on the manure and the polluting nitrogen will be leached out of the soil in 5-10 years. If excess phosphorous is the pollutant, then the problem is not fixed easily because the soil phosphorous soil chemistry is very complex. Prof. Martin and his team started a series of studies to find out if excess phosphorous could be a problem.

Poultry manure is used chiefly for its nitrogen content, but it has a high phosphorous content, excessive to the plant's needs. Some of the phosphorous is taken up by plants, some may be lost in runoff after rain and some may contribute to the pool of phosphorous in the soil. Conventional wisdom has it that phosphorous does not leach from the soil, hence it should not find its way into the deep drainage, but measurements show that it does.

The classic experiments of Rothamstead, where plots of land have been given different farm treatments for 150 years do not show any movement of phosphorous through the soil. If application is not too high, then it may be that the export of phosphorous in the farm product balances the input in the fertiliser. There is one plot, however, which had been given excessively heavy dressings of farmyard manure, 25 tonnes/ha/year for 115 years, where the soil has become enriched with phosphorous down to a depth of 55 cm. On the farm treatment plots where dressings were not as heavy and inorganic superphosphate was used, phosphorous did not move down the profile. Turf farms apply 15-25 tonnes/ha/year of manure but they have been going for only about 20 years. The levels of phosphorous enrichment of the soil achieved in these 20 years took 115 years in the trials at Rothamstead.

Prof. Martin and his team have been studying the soils of the turf farms and natural, unmanured soils in an attempt to find out what is going on. They have taken many cores, up to 2 m deep (most soil studies stop at 25-30 cm), sampled them every 10 cm and analysed them for phosphorous. The phosphorous may be inorganic, derived mainly from the original rock materials, or organic, from humus or manures. The unmanured soils have high concentrations of total phosphorous at the surface, the concentration decreasing to 40-50 cm, then remaining at this lower concentration below this depth. On the heavily manured soils, however, the top 0-3 cm has 3.5 times the concentration of phosphorous over the unmanured and there are higher levels of phosphorous all the way down the profile. Available phosphorous, the fraction that can be used by plants is 25 ppm at the surface, decreasing down the profile, whereas it is 350 ppm in manured soils, and although it decreases down the profile also, it remains higher than unmanured soils.

In all, Prof. Martin and his team analysed the soil for 14 different properties about phosphorous. One worrying feature is the behaviour of the absorption capacity that immobilises phosphorous in the soil. In unmanured soils, the absorption capacity is fairly uniform all the way down the profile. In manured soils, the surface has a negative absorption capacity, decreasing to 50 cm and the remaining much the same as that for the unmanured soils. This means that phosphorous moves around the absorption mechanism in the surface, to deeper levels of the soil. This has all happened in 20 years whereas it took 100 years in England to get to this stage. With the water table at 4-6 m, if intensive horticulture continues, it will be only a matter of time before the phosphorous reaches the water table.

What is the solution to this impending problem? The obvious answer seems to be to cut down on the use of the poultry manure, but this would curtail economic activity of the region and the authorities are reluctant to do that. The prospects of future groundwater pollution will hang over the region.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

LINNEAN MACLEAY MEMORIAL LECTURE

☞ **Wednesday 20th May 1998 at 6 pm in Bio-Medical Lecture Theatre D, University of N.S.W.**

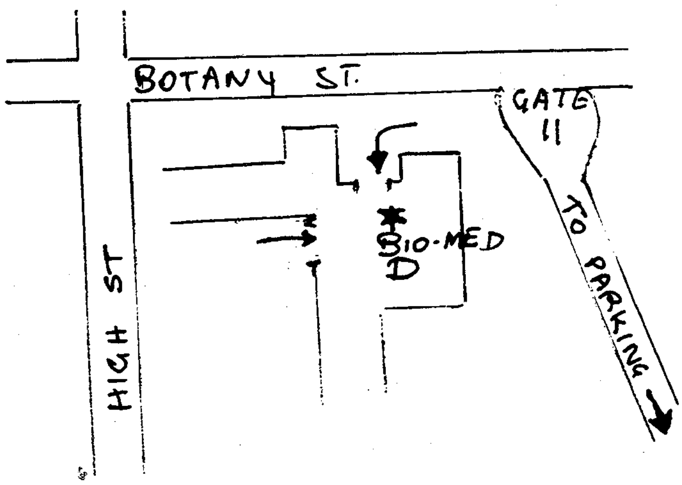
For parking, enter from Gate 11, Botany St. (see map). Note - Parking will cost you $2.

Speaker **Prof IAN PLIMER**

School of earth Sciences, University of Melbourne

Title **"SCIENCE AND THE LAW: THE NOAH'S ARK TRIAL"**

Wine and cheese will be served from 5.30 pm



☞ **Wednesday 22nd July, 6 pm in the Seminar Room, Royal Botanic Gardens.**
Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Dr. DAVID MURRAY

School of Horticulture, University of Western Sydney (Hawkesbury)

CARBON DIOXIDE AND PLANT RESPONSES

The fact that the concentration of carbon dioxide in the atmosphere is continuing to increase is a cause for deep concern worldwide. This talk describes how carbon dioxide has affected all life on earth since the earliest times and explores the responses of plants, particularly food plants, to the ever-increasing levels of carbon dioxide in the air. It explains why the impact of elevated carbon dioxide on food production will not be the panacea that some have predicted.

Dr. Murray identifies three distinct adverse 'greenhouse' effects associated with rising carbon dioxide levels which could make life on earth extremely difficult: warming enhancement brought about by the carbon dioxide itself; warming of vegetation by restriction of transpiration; and nutritional erosion. He finally proposes that, for ecologically sustainable development, there is an urgent need to slow the present rate of increase in levels of atmospheric carbon dioxide. Ways of achieving this are considered.

Wine and cheese will be served from 5.30 pm

☞ **Wednesday 17th June, 6 pm in the Seminar Room, Royal Botanic Gardens.**
Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Dr. BRETT SUMMERELL

Plant Disease and Diagnostic Unit, Royal Botanic Gardens

PLANT PATHOLOGY: DIAGNOSTICS AND RESEARCH AT THE ROYAL BOTANIC GARDENS SYDNEY

In this talk, I will summarise the diagnostic and research programmes of the Plant Pathology section of the Royal Botanic Gardens Sydney and discuss how it is important for a commercially based diagnostic unit to be supported by an extensive programme of scientific research on pests and diseases.

Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 88 **JULY 1998**

NEWSLETTER EDITOR:
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IN THIS ISSUE

NEW SECRETARY

Mrs. Barbara Stoddard is retiring and the Society's new secretary is Ms Claudia Ford. We thank Mrs Stoddard for her many years of service to the Society and wish her well in her retirement.

NEW MEMBER

We welcome Mr. Christopher D. Nancarrow, School of Biology, University of Wollongong

PAPERS ACCEPTED FOR PUBLICATION

Golding, R. Between a rock and a hard place: conservation of the endangered broad-headed snake in Australia's oldest national park.

Meek, P.D. Food items brought home by domestic cats *Felis catus* (L) living in a national park, New South Wales.

DONATION TO THE JOYCE W. VICKERY RESEARCH FUND

Our thanks to an anonymous donor for $500 to the Joyce W. Vickery Fund. All donations to the Fund are fully tax deductible.

INAUGURAL AWARD FROM THE BETTY MAYNE RESEARCH FUND

Cockle, P.D., School of Earth Sciences, Macquarie University.
Project. Time, space and environmental relationships in the Silurian succession of the Boree Creek area, NSW.
Chronologic relationships between the various units of the Silurian succession have yet to be examined in detail. The Boree Creek area may have more than local significance because it embraces the Global Extinction Event (and perhaps the mid-Ludlow Pentamerid Event), and might be expected to show some impress of regional sedimentary-tectonic events. Specifically, this project aims to map and sample the Borenore/Rosyth (Boree Creek) carbonate succession for conodonts to delimit the time span and nature of boundaries for this succession. Awarded $700.

AWARDS FROM THE JOYCE W. VICKERY RESEARCH FUND

The total amount requested was slightly above funds available. All applications were of a high standard, and the Council decreased the amount awarded slightly to cover the shortfall in funds.

Clarke Smith, K.L., School of Botany, University of New England.
Project. Systematic studies in Abildgaardieae (Cyperaceae).
This tribe of sedges has a wide range of members in Australia. This study aims to assess systematic limits (tribal down to specific in some cases) and monophyly of the tribe, limits that have been variously interpreted in the past. Awarded $650.

Cook, S. P., School of Zoology, James Cook University.
Project. Changes in colour of a skink due to differing predation regimes.
The rainforest edge skink *Carlia rubrigularis* differs in its dorsal stripes, stripes prominent in parts of its range that the species has recolonised by crossing more open habitats, and stripes are absent in areas thought to be continuously inhabited by the lizard. Painted models will be used to assess avian predation pressure in different habitats. Awarded $246.

Crane, R., Maleny, Qld.
Project. Photography of the orchids of southern Queensland.
Over 200 species of orchids, 30 of them as yet unnamed have been collected for the Queensland Herbarium and for researchers in Canberra. Now the flowers of all these species will be photographed. Some of the species grow only in the wild. Awarded $500.

Crowther, M. S., Dept. of Zoology, University of Sydney.
Project. Evolution, systematics and ecology of the *Antechinus stuartii- A. flavipes* species complex.
The aim is to determine how many species there are in this complex and what their distributions are, using a combined morphological, biochemical and reproductive approach. Two new species have been recognised and several more are being investigated through fieldwork in northeast NSW. Given that *A. stuartii sens. lat.* has been the most studied marsupial in eastern Australia, this research will lead to the need to reasses exactly which species was the subject of previous studies. Awarded $650

Curley, B., Dept. of Zoology, University of Sydney.
Project. Ecological justification for the size of marine protected areas for reef fish in NSW
The distribution, abundance and movement of temperate reef fish in different habitats and at different spatial scales are being examined to provide quantitative descriptions as criteria for selection and size of marine protected areas. Awarded $650.

Downes, S.J., Dept. of Zoology, University of Sydney.
Project. Investigation of the mechanics of predator-prey coevolution in reptiles.
Broadheaded snakes, smalleyed snakes, and velvet geckos are small nocturnal reptiles that occur on rock outcrops along the east coast of Australia. Broadheaded snakes prey heavily on velvet geckos, whereas smalleyed snakes refuse to eat them. Geckos living in the same area with broadheaded snakes detect and respond strongly to the scents of this predator, but those from a different area, and not living with the predator do not respond. Additionally, geckos living in the

same area with smalleyed snakes, detect their scent but do not modify their behaviours, while those from a different area do not perceive these cues. These behaviours support theoretical models of predator-prey coevolution. Whether the ability to detect snake odours is inherited or learned, and whether behavioural variation among populations parallels geographic variation in genetic markers will be investigated. Awarded $650.

Möller, L.M., School of Environmental Studies, Macquarie University.
Project. Social structure and dynamics of bottlenose dolphins, *Tursiops truncatus*, in Jervis Bay and Port Stephens.
Group living is usually a balance between benefits and costs such as increased competition and disease transmission. Female spatial distribution and social relationships often appear to be more adapted to ecological pressures, while the behaviour of males is generally adapted to maximise mating success. Social structure and dynamics will be studied using photo-identification techniques, behavioural observation and genetic analysis. Awarded $650.

Mott, B., School of Zoology, James Cook University.
Project. Do cyclone-induced changes in habitat affect lizard assemblages in exotic plantation pine?
As ectotherms, small diurnal lizards are highly likely to be affected by disturbance events. The effect of cyclone damage on the structure of heliothermic lizard assemblages in plantation pine will be compared to those living in native habitats adjacent to the pines. Data previously collected suggest that the thermal environment imposed by plantation pine may be limiting to many small lizards. However, preliminary observations after Cyclone Julian (March 1997) suggest that cyclone-damaged areas within plantations may have more lizard species than do undisturbed plantations. This may have implications for management of tropical lizard diversity in such areas. Awarded $518.

Nancarrow, C.D., School of Biological Sciences, University of Wollongong.
Project. Reproductive character displacement in three sympatric *Persoonia* species: *P. levis, P. myrtilloides* and *P. chamaepitys.*
Species in the genus *Persoonia* are attractive to both native bees and the introduced honey bee, and the aim is to investigate the influence of these pollinators on the reproduction of these three species in two localities. The first two species hybridise extensively, but the third is not known to hybridise, so they provide an interesting contrast to study. Awarded $650.

Rankin, T.A., School of Zoology, University of Sydney.
Project. Dietary selection by platypus: individual and seasonal variation in selectivity.
Platypus are vigorous opportunistic carnivores, known to consume large volumes of a wide variety of benthic macro-invertebrate taxa, yet little is known about their foraging behaviour and their effects on stream invertebrate communities and ecosystem functioning. Cheek pouch contents of tagged individuals will be examined to study patterns of selectivity. Awarded $650.

Rymer, P.D., University of Western Sydney, Hawkesbury.
Project. Reproductive biology and population genetics of the rare and threatened *Dillwynia tenuifolia* (Fabaceae).
This low spreading shrub is found in sclerophyll woodland in 17 locations on the Cumberland Plain and lower Blue Mountains. Its breeding system will be studied by examining flower production, pollination, fruit set and seed production, viability, dormancy and germination. Allozyme electrophoresis will be used to assess the genetic variation and distance within and between populations. These studies will be applied to its management as a threatened species. Awarded $650.

Zuccarello, G., School of Biological Sciences, University of N.S.W.
Project. Population biology of *Bostrychia moritziana* on the eastern Australian coast.
Red algae such as *Bostrychia* commonly cover the pneumatophores and trunks of mangroves. These macroalgae are a major source of primary energy in these coastal forests. Studies of the reproductive modes of this species so far suggest that some populations are clonal, others are genetically very variable, while other populations vary within themselves. There appears to be a geographic trend from sexual reproduction in Victorian populations to asexual reproduction in northern N.S.W. and southern Queensland. Studies will also be made in northern Queensland to assess the status of populations there. Awarded $650.

SCIENCE AND THE LAW: THE NOAH'S ARK TRIAL The Linnean Macleay Lecture presented by Prof. Ian Plimer, School of Earth Sciences, University of Melbourne.

Scientists work on evidence. Science is married to evidence and is dynamic and always evolving as new evidence comes to hand. Ask creationists to provide the evidence - they don't. Creationism is anti-science. The scientific history of the earth is exciting, and punctuated with extraordinary events, far better than the earth being created fully formed 6,000 years ago. Plimer takes offence at creationism.

Creationism has nothing to do with religion. It is about promulgation of one American fundamentalist cult with the aim of forcing their ideas on the education system. It is undesirable in multicultural Australia.

In 1992, Dr. Allen Roberts toured Australia lecturing about finding Noah's Ark on Mt. Ararat in Turkey. Plimer attended the lecture and noted that everyone paid an entrance fee. Roberts recounted the Bible story, then the geology. There were many slides, but they were photographs of photographs, all slightly out of focus. There were photographs of the timbers of the Ark, said to have been found by metal detectors finding nails. The Ark was located by sonar, but sonar is only ever used under water. Logic was not a strong point.

Then the penny dropped for Plimer - it was a scam. Roberts DCE, Doctor of Christian Education must have taken a calculated $5,000 at the door. At half time, you could by books, videos etc. Plimer handed over his card and said he wanted to ask questions. Roberts went catatonic and said that only written questions submitted in advance would be considered. Then Plimer and friends were ejected. The next day, Plimer went on air, saying he thought the public was being conned. A letter from a lawyer arrived in an attempt to silence him. Plimer decided to investigate Roberts.

Roberts had obtained his doctorate from Freedom University (FU), but all attempts to trace FU failed. It was not even in the book "The Degree Mill", which lists the undesirable universities in the U.S.A. Roberts claimed to work with the Noah's Ark Research Foundation. A check of the Corporate Affairs records showed no such foundation was registered. Then Plimer formed his own company and registered the name Noah's Ark Research Services, freezing the name so that Roberts could not use it.

"A Current Affair" (ACA) took PPlimer to Hobart to attend one of Robert's lectures - he was ejected again - and ACA duly aired it all. After such adverse publicity, Plimer thought Roberts would give up, but he kept going. For his Sydney lecture, Dr. Alex Richie organised a party of scientists. The meeting was packed and supervised by rented security guards. Richie asked a simple geological question - What was the difference between a syncline and a geosyncline - for which he was thrown out. Plimer received a writ for defamation from a firm of solicitors named Church and Grace. The stakes had been raised and there were only two choices, cave in and apologise or defend it and fight back. Plimer felt he was being nobbled to profess his science in public.

Meantime, Dr. Peter Pockley had been reporting the proceedings and had managed to track down Freedom University in Orlando, Florida, better known for Disneyland. FU is feral, changing location every few years, and consisted of one letter box, and as a photograph showed, leaning to the right. Robert's thesis was really a business plan to bring FU to Australia, grant degrees and get creationism into schools. His degree was granted in just 14 days. A search of the books about Noah's Ark revealed one by Mr David Fasold that stood out. Much of the argument and photos had come from Fasold's book. Pockley had been reporting the events and his article was published in Los Angeles where Fasold saw it and realised that his work had been stolen. He was angry and wanted to sue.

Plimer and Fasold joined forces to sue under the Trade Practices Act for breach of copyright and unfair trading. Roberts admitted it, but said it was all in the name of the Lord, and once he had heard about the it, he transferred all his assets to his wife for $1. By the end of 1992, Plimer had served a writ on Roberts. In 1993, Roberts offered to settle, but Plimer continued with the writ.

Plimer's problems were only starting when he engaged lawyers. When asked for a list of costs, the lawyers refused Affidavits arrived late and after $72,000, there were only 2 affidavits. When asked to justify the budget, the lawyers refused again, so Plimer took all the files and sued the lawyers, successfully. He engaged another set of lawyers, better known and trusted, he thought. A day before going to court, Plimer's insider in the creationist movement tipped him off - his case would be thrown out. After contacting his lawyer, he found that he had not opened his mail for 3 months, and there had been 4 orders to appear in court in that time. The lawyer made amends and the case was back in court, with only 10 days to go, a seemingly impossible task. Plimer found lawyer No. 3, sued lawyer No. 2. successfully and received $42,000, but the lawyer only had to pay $5,000 and his insurance paid the rest.

Meantime, Plimer and Fasold had become friends and had visited Turkey to check out the Noah's Ark location. Mt. Ararat is in a highly restricted zone and it is extremely difficult to visit, hence you can make almost any claim you like because is most unlikely that anyone will check it out. They found nothing and Fasold admitted he had made a mistake. On his first trip, Fasold was accompanied by two creationists who told him what he had found. This story was aired 2 days before the court case, but it was ruled irrelevant.

The Q.C. who had worked for two and a half years on the case was offered a position of a judge, the chance of a lifetime. He took the position and dropped the case. Another Q.C. had to be found and he had to absorb the case in a short time. The system does not take the client's interests into account.

A court of law interprets legislation, it is not a court of justice. Scientists use all the evidence available, look at the whole picture and come up with a decision. The law looks at the evidence, and rules out this bit because they do not like the way it is presented, and rules out that bit....etc. etc. All the evidence to show it was a scam was ruled out. The witness who came from the U.S.A was ruled inadmissible. Fortunately, the barrister for the other side asked questions about science, so Plimer could bring back quite a bit of the evidence ruled out. The reason for this became apparent. Plimer's counsel and the judge did not want to hear about science because they could not handle it.

Plimer was pleased with the results. The journalists' reporting was fair and well balanced. The case for breach of copyright was won and Fasold was awarded $2,500 (in the U.S.A he won $40,000). The case for misleading claims was upheld, but they could not prove Roberts was engaging in trade and commerce. The decision was appealed but lost. Three appeal judges plus the trial judge could not agree about what constituted trade and commerce. Plimer ended up with massive court costs. On the 19th of June this year, the case goes before one judge of the High Court to see if he could appeal on the judgement about trade and commerce. (Update - the judge ruled an appeal was inadmissible).

The trial highlights the differences between science and the law. Science searches for the truth using evidence. The law seeks only to prove untruths, using precedence. To succeed in science, work is required, but to succeed in law, money is required. How will the legal system cope with cases about genetic engineering?

Some explanation for the creationist phenomenon may be found in the church system. Anyone can set themselves up as a church. Gather a few friends to act as minister, deacon, etc. Establish a trust fund for the faithful to put their money into. All necessities, accommodation, a car, business, travel etc for the officers of the church are paid out of the trust fund, and churches do not pay taxes. There are no fringe benifit taxes on a luxury car, should the Archdeacon need one to carry out his duties. We, the taxpayers, subsidise them. Most fundamentalist churches work this way. Fundamentalist churches flourish because of uncertainty in society.

A question was asked: How can scientists reassure people about society? Plimer. admitted that was a hard one, considering we cannot guarantee clean air, water or jobs. Insecure people grab onto a lifeline and agree with a litany of ills. Fundamentalists capitalise on this fear.

It is popularly believed that science and technology are the cause of the world's ills but people do not realise the immense benefits of science and technology. We have good science journalists, but sub-editors have a lot to answer for. Science communication to the public is a worry. Plimer then gave his recipe on how any scientist may communicate his science to the public. Choose a quiet weekend - no football finals, no test cricket matches, no riots in Indonesia. Compose a press release - and there is an art in press releases - never use jargon - and fax it off to 'The Australian' on Sunday morning when the journalists are wondering what they are going to put in the paper on Monday. If the story is taken up, be available 24 hours a day for talkback radio. If you are lucky, you will make it all the way to the 'Midday Show' with Kerrie-Anne, and you will do your discipline an immense amount of good.

How can science be brought into the law when the bench does not have any knowledge of science? With complicated fraud charges, there are arguments for specialist judges and juries. This approach is needed for science, for there will be massive cases on copyright of genes. The courts are not about justice, they are about winners and lawyers.

Plimer has written two books on his experiences, 'Telling lies for God - Reason vs. Creationism', Random House (1997) and 'Telling lies for God - Sinking the Ark', Random House (in press). The latter contains the scientific evidence disallowed by the court.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 22nd July, 6 pm in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Dr. DAVID MURRAY

School of Horticulture, University of Western Sydney (Hawkesbury)

CARBON DIOXIDE AND PLANT RESPONSES

The fact that the concentration of carbon dioxide in the atmosphere is continuing to increase is a cause for deep concern worldwide. This talk describes how carbon dioxide has affected all life on earth since the earliest times and explores the responses of plants, particularly food plants, to the ever-increasing levels of carbon dioxide in the air. It explains why the impact of elevated carbon dioxide on food production will not be the panacea that some have predicted.

Dr. Murray identifies three distinct adverse 'greenhouse' effects associated with rising carbon dioxide levels which could make life on earth extremely difficult: warming enhancement brought about by the carbon dioxide itself; warming of vegetation by restriction of transpiration; and nutritional erosion. He finally proposes that, for ecologically sustainable development, there is an urgent need to slow the present rate of increase in levels of atmospheric carbon dioxide. Ways of achieving this are considered.

JOINT MEETING WITH THE ROYAL SOCIETY OF N.S.W.

Wednesday 5th August, 5.30 pm for 6 pm, in the Edgeworth David Lecture Theatre, Geology Dept., Sydney University.

REMEMBERING REV. W.B. CLARKE (1798-1859), NOT FORGETTING SAMUEL STUTCHBURY (1798-1859) AND WILLIAM KEENE (1798-1892).

Speakers: Prof. K.J. Cable. Clarke the Cleric
Mr. M. Organ. What did Clarke actually do?
Dr. D.F. Branagan. Not forgetting Stutchbury and Keene.

Refreshments will be served from 5.30 pm

Wednesday 23rd September, 6 pm in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Dr ANDREW R. PARKER

Australian Museum

STRUCTURAL COLOUR IN ANIMALS, LIVING AND EXTINCT

The brilliant metallic colours displayed in nature, sometimes appearing as a rainbow of hues, are being studied in living animals at the Australian Museum in collaboration with an international physics group. Against expectations, this research has extended to reveal colour structures in ancient, extinct animals known only from fossils. These include the famous Burgess Shale fossils, 515 million years old, which gives rise to a new theory on the most dramatic event in the history of life on Earth, the Big Bang in animal evolution. In addition, nature has anticipated problems of anti-reflection: the microscopic surface discovered on the eye of a 45 million year old fly preserved in amber is now being tested as a suitable surface for solar cells. The range of so-called structural colours in animals will be demonstrated and the behavioural and evolutionary implications revealed.

Saturday 3rd October

EXCURSION to MT WILSON

Leader, Mr. PETER HIND
Royal Botanic Gardens

A WALK THROUGH TEMPERATE RAINFOREST

The circular walk at Mt. Wilson goes through temperate rainforest dominated by coachwood and sassafras. There are lots of ferns: filmy ferns on the trunks of tree ferns, epiphytic ferns and many more.

MEET at 10 am in the car park/picnic area. Take the road to Mt Wilson, go through the village of Mt Wilson to the T junction about 1 km further on, turn **right** and go on to the car park. Note: a left turn will take you to the Cathederal of Ferns, but we won't be there.

We will have morning tea then take the circular walk, returning to the cars and picnic area for lunch. There are a number of things to do after lunch and we will decide over lunch, depending on the interests of the people present.

BRING lunch, all food and drink, and hot water for hot drinks. There are barbeque facilities available. There are no shops at Mt Wilson.

WEAR good walking shoes and warm clothing.

Wednesday 21st October, 6 pm in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs Macquaries Rd.

DR. ANDY RYLAND and DR. MATTHEW PARKER

Hawkesbury Integrated Pest Management Service

IPM - INTELLIGENT PEST MANAGEMENT

The growing awareness of the limitations and side effects of synthetic pesticides, plus a realisation that insect pests were developing widespread resistance to chemical insecticides, has led to the development of new control measures that minimise or eliminate the use of chemicals in pest control. Integrated Pest Management (IPM) is a system where emphasis is placed on the maintenance of pest populations at levels below those causing economic damage. Populations of naturally-occurring beneficial insects are encouraged by reduced pesticide use and major pests can be targeted for biological control. There are significant cost savings for commercial growers in this approach.

Wine and cheese will be served from 5.30 pm before each lecture.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 89 **OCTOBER 1998**

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IN THIS ISSUE

Dinner in honour of Mrs. Barbara Stoddard, see separate pink sheet.

AWARD TO DR. BARBARA BRIGGS

Congratulations to Dr. Barbara Briggs who was awarded the Public Service Medal in the Queen's Birthday honours.

DINNER IN HONOUR OF MRS. BARBARA STODDARD

Mrs. Barbara Stoddard was Secretary of the Society for 21 years, and has recently retired. Members, their partners and friends are invited to a dinner in her honour, on Friday, 20 November, 1998. Cost is $27 per head, drinks not included. For further details and bookings, see pink slip included with this newsletter. Bookings are essential. Please make them by Tuesday, 10 November, 1998.

NEW MEMBER

We welcome Ms Katarzyna Anna Hempel, Division of Botany, ANU.

PAPERS ACCEPTED FOR PUBLICATION

Richardson, D.L. Descriptions of the juvenile colour patterns of anemone fishes (Pommacentridae: Amphiprion) from New South Wales and Lord Howe Island

Smithers, C.N. New species and new records of Psocoptera (Insecta) from South Australia.

CARBON DIOXIDE AND PLANT RESPONSES. A talk given by Dr. David Murray on 22 July 1998.

It is beyond question that the concentration of CO_2 in the atmosphere has been increasing progressively this century. From a pre-industrial level of 280-290 ppm it rose to 330 ppm by the mid-1900s. An accelerating increase in recent years has seen the level reach approximately 360 ppm at present. The annual rate of increase presently varies between 1-2 ppm. Should this trend continue we could be looking at levels as high as 600-700 ppm next century. CO_2 is often cast as a villain in many predicted phenomena such as global warming, raised sea levels and extreme weather events. But what are the implications for our ultimate source of food: plants? Will they cope?

Before life evolved on earth, atmospheric CO_2 levels were much higher than at present but gradually decreased in the last 500 million years because of the organisms that accumulated it. First prokaryotic organisms evolved, then eukaryotic organisms appeared, some of which were photosynthetic. Thus we see a transition from an oxygen-free to an oxygen-rich atmosphere, although increases in atmospheric oxygen pre-dated the appearance of eukaryotic cells by one million years. Oxygen is now at super-abundance in the atmosphere at 21%. Most eukaryotes have taken advantage of the oxygen-rich environment – any organism choosing to remain anaerobic when oxygen increases is at a significant disadvantage.

Flowering plants evolved in the Cretaceous when CO_2 levels were around 200 ppm (significantly lower than pre-industrial levels). Levels fluctuated after that time between 200 and 300 ppm. Temperature differences between the poles and the equator were less in the Eocene than at present, and the CO_2 level fell until the appearance of ice caps. In recent prehistoric times however, CO_2 concentration has increased gradually. The typical rate of increase was 1 ppm per 100 years, compared with the present rate of up to 1 ppm every 6 months. From the early 1800s the CO_2 concentration began to increase exponentially.

We can predict with some confidence the likely responses of different categories of plants to projected future CO_2 levels on the basis of findings from experimental manipulation, or from other observations and measurements. Research has focused on particular responses in broad areas as follows:

(1) Growth. Compared with 350 ppm, significantly greater growth has been demonstrated at 900 ppm in *Tricanthium* (a plant with the C_3 pathway of photosynthesis). Hugo Thomas found in 1980 that soy bean (also C_3) exhibited enhanced root systems and advanced leaf development at 700 ppm. Maize (a plant with the C_4 pathway of photosynthesis) showed a doubling of biomass at 910 ppm, dispelling the popular textbook myth that C_4 plants do not respond to elevated CO_2 levels. Observations from a basin in Italy in which CO_2 levels are naturally elevated to 600-1200 ppm indicate that stem lengths of plants are affected. Some species exhibit increases in height, others decrease, while others show no change.

One of the implications of increased growth for crops is that weedy grasses such as Barnyard grass *Echinochloa cruss-galli* (C_4) and a grass in the *Panicum* group exhibit more vigorous growth under elevated CO_2 levels than rice (C_3). Therefore it is possible many weeds could outcompete C_3 crops.

(2) Leaf morphology and anatomy. In general, leaf area and leaf thickness can increase with elevated CO_2 levels. Either one or the other or both can increase depending on the species. For example tomatoes show an increase of 30% in leaf area with elevated CO_2.

(3) Flowering. Many species will flower earlier with elevated CO_2 levels, for example flowering is brought forward by some 15 days in African Violet. This is probably due to morphological effects and morphogenetic interactions.

(4) Chemical composition of leaves. Nitrogen concentration in leaves is greatest under lowest CO_2 concentration – a doubling of CO_2 from 330 to 660 ppm will decrease nitrogen content by approximately 50% in rice, thus making less nitrogen available to distribute to the seed. So the popular interpretations in the press by journalists that CO_2 is basically a plant "fertilizer" are oversimple and distorted. Another point to consider is whether any potential biological control agents will cope with the changed nutritional composition of leaves.

Work by Claudia Tipping demonstrated that increasing the CO_2 level from ambient to 900 ppm resulted in an increase of the starch content of *Panicum* (a suitable forage crop) from 5% dry matter to 30-35% dry matter. It was originally thought that increased starch in leaves may inhibit photosynthesis due to physical blocking of incident radiation. It is now believed that this may not happen, because other factors compensate such as glucose production. However, the question is still open to debate.

(5) Photosynthetic productivity C_3 plants respond to increased CO_2 levels partly through minimising wasteful splitting of ribulose biphosphate in the Calvin cycle. In addition a number of biochemical changes involving enzymes and amino acids occur in organelles such as peroxisomes and chloroplasts. C_4 plants also show increased photosynthetic productivity with elevated CO_2 levels. In *Urochloa panicoides*, productivity doubles if CO_2 is increased from 100 to 400 ppm. This provides further evidence that C_4 plants can indeed respond to elevated CO_2.

Under elevated CO_2, seed protein increases by up to 23% dry matter in peas, 12.8% in *Acacia* and 29% in *Phaseolus vulgaris* (bean). As CO_2 levels increase, the relative increases in the amount of starch and protein appear to be correlated with the shape of the seed. In addition, the supply of phosphorus influences the level of nitrogen in grain: if the supply of phosphorus is high, nitrogen content in grain drops by one third compared with low phosphorus supply.

So what are the implications for food production of all these changes? In general, we may conclude that while food crops such as cereals and legumes will exhibit an increase in biomass, in many cases it could be of lower quality nutritionally owing to the compositional changes described. Legumes, though, are likely to adapt well. For example soy bean will cope at double the present CO_2 levels (up to 660 ppm), but when this concentration triples, then we are in trouble.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

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Royal Botanic Gardens
Enter through the gate to the Herbarium on Mrs Macquaries Rd.**

DR. ANDY RYLAND and DR. MATTHEW PARKER

Hawkesbury Integrated Pest Management Service

IPM - INTELLIGENT PEST MANAGEMENT

The growing awareness of the limitations and side effects of synthetic pesticides, plus a realisation that insect pests were developing widespread resistance to chemical insecticides, has led to the development of new control measures that minimise or eliminate the use of chemicals in pest control. Integrated Pest Management (IPM) is a system where emphasis is placed on the maintenance of pest populations at levels below those causing economic damage. Populations of naturally-occurring beneficial insects are encouraged by reduced pesticide use and major pests can be targeted for biological control. There are significant cost savings for commercial growers in this approach.

Wine and cheese will be served from 5.30 pm before each lecture.

EVERYONE WELCOME

DINNER IN HONOUR OF BARBARA STODDARD

Friday, 20 November, 1998, 6.30 for 7.00 pm

See pink sheet included with this newsletter

LINNEAN SOCIETY OF NEW SOUTH WALES

DINNER IN HONOUR OF BARBARA STODDARD

Friday, 20 November, 1998, 6.30 for 7.00 pm

at the

GENGHIS KHAN IMPERIAL MONGOLIAN B.B.Q. RESTAURANT
77 Archer St. Chatswood.

Cost - $27 per head.

Drinks not included.

Please make bookings by Tuesday, 10 November, 1998

Partners and friends welcome.

The Secretary,
Linnean Society of N.S.W.
PO Box 457
Milsons Point NSW 1565

I wish to make bookings for ....people at $27 each for the

DINNER IN HONOUR OF BARBARA STODDARD
Friday, 20 November, 1998

A cheque for $.................is included.

NAME...

ADDRESS..

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 90 DECEMBER 1998

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members:
Ms Giselle Walker, School of Geological Sciences, University of Sydney
Mr Gary Dargan, NSW Dept. of Mineral Resources

SUBSCRIPTIONS FOR 1999

Subscriptions for 1999 are due in January. A renewal form (lemon-coloured) is included with this newsletter. Subscriptions remain the same as for 1998.

NOMINATIONS FOR PRESIDENT AND COUNCIL

A white sheet with the nominations for President and Council is included with this newsletter.

THE DEATH OF EMERITUS PROFESSOR NOEL BEADLE

Professor Noel Beadle died on 13 October, 1998, after a long career in plant sciences. He studied Botany at Sydney University, and field trips were important occasions for him. After an honours year and Master of Science degree spent on the respiration and carbohydrate content of tomatoes, he became a demonstrator in the Department of Botany. He was particularly excited when, invited to join a Linnean Society of NSW collecting trip to Broken Hill and northern NSW, he collected over 600 plant specimens. In 1939, he was appointed to the position of Research Officer and Botanist in western NSW for the newly formed Soil Conservation Service. His work was published in 1948 as *The Vegetation and Pastures of Western New South Wales with special reference to Soil Erosion*, a work still used today.

In 1946, he became a Lecturer, and later Senior Lecturer, in Botany at the University of Sydney, developing courses in ecology. In 1954, he was appointed the Foundation Professor of Botany at the newly independent University of New England. As an adjunct to teaching, he developed keys for the identification of plants, and eventually floras. His *Handbook of vascular plants of the Sydney District and Blue Mountains* (1962) was followed by *Flora of the Sydney District* (1972) and then *Students' Flora of North-Eastern New South Wales.* All of these floras were in use until the recently published *The Flora of New South Wales.*

Prof. Beadle is remembered for his generosity and the use of his own funds to promote his science, even going so far as to finance some of his publications himself. He endowed prizes for top students, and funded scholarships for postgraduate students. The full extent of his generosity to charities will probably never be known. He gave a large block of land to the Armidale City Council which has since developed it as a park featuring native plants of the region, and named it 'Beadle Grove'.

PAPERS ACCEPTED FOR PUBLICATION

BRIERLEY, G. AND CUNIAL, S. Vegetation distribution on a gravel point bar on the Wilson River, NSW, a fluvial disturbance model.

GROWNS, I. AND MARSDEN, T. Distribution and pollution tolerance of two freshwater crays (*Euastacus*: Family Parastacidae) in coastal flowing streams of the Blue Mountains.

KOBAYASHI, T., GIBBS, P. AND SHIEL, R.J. Daytime vertical distribution of microzooplankton in the Hawkesbury-Nepean River.

LOCKETT, M.M. AND SUTHERS, I.M. Ontogenetic diet shift and feeding activity in a temperate reef fish, *Cheilodactylus fucus*.

MEEK, P.D. AND TRIGGS, B. The food of foxes, dogs and cats on two peninsulas in Jervis Bay, New South Wales.

MÖLLER, L.M. AND HARCOURT, R.G. Social dynamics and activity patterns of bottlenose dolphins, *Tursiops truncatus*, in Jervis Bay, southeastern Australia.

OWEN, J.F. AND MERRICK, J.R. Re-interpretation of snapper (*Pagrus oratus*) from the Holocene middens at Bass Point and Currawong, New South Wales.

ROWLAND, S. J. Age and growth of the Australian freshwater fish Murray cod, *Maccullochella peelii peelii*.

ROWLAND, S. J. Aspects of the reproductive biology of Murray cod, *Maccullochella peelii peelii*.

WILLIAMS, G.A. AND ADAM, P. Pollen loads collected from large insects in Australian subtropical rainforests.

APPLICATIONS FOR RESEARCH FUNDS

Applications are currently invited for research grants from the Society's two Research Funds (detailed below).

Forms for both Research Funds may be obtained from the Secretary or the Home Page: http://bioscience.babs.unsw.edu.au/linnsoc/welcome.htm

CLOSING DATE

for applications to both
the Betty Mayne Scientific Research Fund for Earth Sciences and
the Joyce W. Vickery Scientific Research Fund is

31 MARCH 1999

Intending applicants please note: Read instructions carefully, and
Original plus five(5) copies are required.

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term, original research projects in all aspects of geology.

Applications are accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society assesses: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members are given preference.

Individual grants do not normally exceed $700. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council takes into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources does not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Joyce W. Vickery Scientific Research Fund supports worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Applicants need not be graduates. The criteria the Society use in making grants includes the quality of the project, the applicant's ability to carry it out, realistic costing, timetable and probability of ultimate publication.

Individual grants will not normally exceed $700, with the awarded grant normally being used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members, but other things being equal, members of the Society are given preference.

The deadline for applications is 31 March in any year, however, in exceptional circumstances, applications for emergency support are received at any time.

Grantees are required to make a report at the end of the project and to justify their expenditure. Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund must include an acknowledgment to that effect. Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Donations to the Joyce W. Vickery and Betty Mayne Scientific Research Funds are tax deductible.

ADVICE TO APPLICANTS

Intending applicants are strongly urged to ensure that their application contains adequate explanation of what hypothesis is being tested, or why the project is important, and how it would add to knowledge in that particular discipline, and that the proposed budget is fully justified. If applicants are submitting an application for the first time they are advised to seek assistance from their supervisor or an appropriate colleague with experience in writing grant applications. The application should be reviewed before submission.

(The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only be used for research. This means we cannot fund theses' preparation or attendances at conferences.)

WHO WAS JOYCE W. VICKERY?

Dr. Joyce Vickery died almost 20 years ago, and it was a generous bequest from her will that set up the Joyce W. Vickery Research Grant. Who was she?

Dr. Vickery was born in 1908 into a family with extensive business interests and grew up on one of the family's rural properties. She shared a keen interest in botany and ecology with her father. At University, she studied Botany and graduated in 1931, then became a Demonstrator and Research Student in the Botany School. Her research during this period resulted in publications on insectivorous plants, and with Lilian Frazer, the ecology of the Barrington Tops. After 5 years, she gained her MSc.

In 1936, Joyce Vickery was appointed Assistant Botanist at the National Herbarium, then part of the Department of Agriculture. In this period, the Herbarium's function was primarily to identify weeds and poisonous plants, but she found time to develop taxonomic research. After about a year at the Herbarium, she applied for leave to work for a year in the Herbarium of the Royal Botanic Gardens at Kew, regarded as the source of all taxonomic wisdom. Her experience established world standards in taxonomic research at the Herbarium, and was the first of regular changes between the herbaria at Kew and Sydney. She started the specialist publication for taxonomic botany, *Contributions from the New South Wales National Herbarium*. Later, there followed a start on a new Flora of New South Wales. Her main work, though, was in grass taxonomy, and culminated in a DSc. in 1959.

Dr. Vickery was closely involved in the campaign to set up the then Kosciusko State Park, the Elouera Bushland Reserve, and the Muogamarra Sanctuary. Some forensic work, where she identified grass and soil found on a blanket wrapped around the body of a child that ultimately led to the conviction of the murderer, was later recognised with the award of an M.B.E.

Dr. Vickery had been a member or the Linnean Society since her student days. On her retirement, she became Honorary Treasurer of the Society, and found ways of improving the investment income of the Society, which was seriously disadvantaged by the conditions of its Founder's will, set out about a hundred years ago. She also set up a tax-deductible Research Fund, later named in her honour, which has benefited some 210 people to date.

LINNEAN MACLEAY FELLOWSHIPS

The Society is currently inviting applications for Linnean Macleay Fellowships, having extended the deadline for submissions to 31 March 1999, to coincide with that for the Research Grant Funds.

The Fellowships, funded from a bequest of the Society's first President, Sir William Macleay, aim 'to encourage and advance research in Natural Science by enabling those who wish to continue their studies at the University [of Sydney] or elsewhere after having completed the regular curriculum and taken a Science degree to do so'.

Every candidate must be a member of the Society, must reside in New South Wales, and must hold a degree in Science or Agricultural Science from the University of Sydney.

The Fellowships are tenable for one to five years with an annual emolument of between $800 and $3200.

Each Fellow is allowed a period of four weeks' leave during his/her year of tenure, but is not permitted to undertake any paid employment during that year without special sanction of the Council.

Fellowships may be held for research in any of the following branches of Science:

- Animal or Plant Physiology
- Animal or Plant Pathology
- Biochemistry
- Botany
- Comparative Anatomy and Embryology
- General Biology, including Ecology
- Physical Geography
- Geology
- Palaeontology
- Physical Anthropology
- Zoology

Further details are available from the Society's Home Page:

http://bioscience.babs.unsw.edu.au/linnsoc/welcome.htm

or by contacting the Secretary at the address at the beginning of this newsletter.

STRUCTURAL COLOUR IN ANIMALS, LIVING AND EXTINCT

A lecture given by Dr Andrew Parker of the Australian Museum
on Wednesday, September 23, 1998.

Colour in animals may be produced in any of several different ways. Chemical pigments absorb some wavelengths of light and reflect others. The colour produced this way is dilute, because the light is reflected in all directions. The colour may be in chromatophores, branched structures that expand, and become coloured, or contract, and become colourless.

Luminescence is produced when luciferin and luciferase, react together. With some dinoflagellates, the two chemicals are excreted into the water where they react to produce phosphorescence. With many organisms, the reaction is contained within the cell. Some ostracods have reflectors to beam the light out. The males of fireflies have specific flashes to attract the female of the species. The Japanese are reputed to have read documents by the light of fluorescence, during the war.

Structural colours are produced when a structure, such as a prism, splits up white light. With thin layers, light is reflected off the top and bottom of the layer, and if the difference is half the wavelength of light, there is interference and colours are produced, for example, soap bubbles, oil on water. Animals employ thin layers to produce iridescence, for example, butterfly wings and peacock feathers. A single thin layer reflects about 8% of the light, but with multiple layers, close to 100% may be reflected. The thin layers are found in the epidermal cells or the cuticle.

Only blue light penetrates to depths of 200m in the sea. Crabs at these depths reflect blue light and can send signals to their own species without predators seeing them. Sapphire copepods are about 4mm long, and the ones that live at shallow depths reflect all wavelengths of light, but those at greater depths only reflect blue light.

Many animals can see ultraviolet light. We cannot see UV, but a camera can be set up to photograph UV. In white light, these animals look camouflaged to predators that cannot see UV, but they are visible to members of their own species.

Colour in birds' feathers is produced by interference from multilayers and reflectors. Crab shells are built up of layers and are iridescent, but as this would attract predators, the crab secretes an opaque layer on the outside. Some multilayers are finely tuned and result in the recombination of reflections to give white light. In bright light, silvery fish act as mirrors and the predator sees reflections of something else, hence the fish seems to disappear. Silvery shoals of fish work this way.

Some animals have reflectors in their eyes which reflect light onto the retina, a very good strategy in dim light. Some amphipods have a large silver dish on their antenna and a bioluminescent organ on their head. The silver dishes reflect light in a precise beam, and it is used to attract prey. Some fish have bioluminescent organs on their lower side, and light detectors on their upper side. The output of light on the lower side matches the background light on the upper side, hence predators looking up see the same light intensity.

Fine particles in the atmosphere scatter the blue wavelength of light (Tyndall scattering), producing a blue sky against the black of space. The red part of the spectrum is transmitted to the earth, and we only see it at sunset and sunrise. The blue of a blue-ringed octopus and a 'blue' frog is produced in this way. The frog is only blue when in the 'pickle' jar, in life, it is green. Frogs cannot produce green pigment so they have a yellow pigment and the fine particles to scatter blue light - 'pickling' dissolves the yellow pigment.

Diffraction, where light bends around an obstacle, is used by some animals. Some shells appear white because light is scattered in all directions. Blue butterfly wings have diffraction gratings spaced about the wavelength of light, and the ridges break up white light. Polychaete worms, copepods, seed shrimps and many more, use diffraction gratings to produce iridescence for some purpose or other. Some of these gratings are very complex. A polychaete worm has a series of hollow rods, looking like cigarettes, but of variable width, and it is taking a physicist and two PhD students to work out what it does.

All smooth surfaces reflect light to some degree, thus we see our reflection in glass. Moths' eyes have antireflectors, like a beaded surface. Since moths fly at night, they need all the light they can get, and cannot afford to lose any to reflection from the surface of the eye. Physicists are very interested in antireflectors, for they would make solar panels more efficient, just to mention one application.

When fossils are examined, surfaces show striations and structures are multilayered, similar to those of today, hence the colours they would have been when alive may be worked out. A 3D model of one particular fossil revealed its rainbow hues.

In the Cambrian period, there was an evolutionary explosion, and three more phyla of animals appeared, including the chordates, to which all vertebrates, including ourselves, belong. No new phyla have appeared since the Cambrian. Scientists have often wondered what caused the evolutionary 'big bang' in the Cambrian. Studies on the animals of the Burgess Shale, which was laid down at the end of the evolutionary 'big bang', have revealed many of them were colourful. Eyes first evolved in the Cambrian, and there are many organisms with compound eyes. Without eyes, colour does not matter. Once eyes evolved, a predator could actively seek out prey, in contrast to before the big bang, when predators like jellyfish had to wait for the currents to deliver food. With eyes, colour and camouflage became very important to prey so that they could evade predators.

Animals have been using light in the most sophisticated way for millions and millions of years, and they make our holograms look crude. Physicists are very interested in Dr. Parker's work, and there will be important applications from it.

Season's greetings to all our members

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 91 **APRIL 1999**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members
Richard Cooper, Graduate School of Environmental Studies, Macquarie University
Paul D. Meek, State Forests of NSW.
Claire L. Brown, Flora and Fauna Research Centre, Wollongong University.

IPM - INTELLIGENT PEST MANAGEMENT, a lecture by Andy Ryland, Hawkesbury Integrated Pest Management Service, University of Western Sydney.

Management of insect pests in agriculture and horticulture changed after the second world war when synthetic chemicals were increasingly used to control pests in crops. At first promising to increase the world's food production amazingly, the spraying of crops with pesticides, sometimes simply according to dates in the calendar, soon showed that it was not without problems. These included damage to the health of those using sprays, promotion of some organisms to pest status that previously posed no threat to crop production, damage to non-target species, and accumulation of residues. Perhaps the most well known example of such problems is in the use of DDT. Rachel Carson and others issued warnings, and, during the 1960's, use of chemical sprays increasingly came to be seen as a last resort in controlling pests in crops, to be undertaken only after "action thresholds" had been reached in populations of clearly identified species of pests, and certainly not just according to the date on the calendar.

In short, to control insect pests in crops intelligently, the identity of insects and other arthropods in the crop has to be known, at least to the extent of recognising those that are potential pests and those that may function as predators of pests. Also, it is advisable to know something of how cultural practices, such as fallow and rotation of crops, may affect potential pests. This meant attitudinal change in some growers and educating them to make the observations necessary during growth of their crops. It is no longer sufficient simply to observe crops from the edges, but searches have to made in them.

Increasingly, biological control is being used as an alternative, or, in some cases, an adjunct, to chemical spraying in managing pests in crops. Agents introduced into crops for biological control include various species of arthropods that operate as predators of pest species, and various species of fungi, bacteria and viruses that operate as pathogens of pest species. Genetic engineering also offers the possibility of splicing into crop genotypes genes for resistance to specific pests.

Biological control is usually a better option to using chemical sprays for a number of reasons. Selection for resistance to control in pests in not as rapid as it has proved to be in the case of some synthetic pesticides. It is usually much more specific, especially compared to broad-spectrum pesticides such as pyrethrum. Biological control is almost entirely without hazard to human health, and is generally much less hazardous than chemical sprays to environments in the neighbourhood of the crop. The economic advantages of successful biological control can be considerable, with savings in the costs of sprays, equipment and fuel for tractors or aircraft. Spraying, however, remains the only viable option in some circumstance; fortunately, many new pesticides and weedicides are often much more specific in their action than early ones.

some cropping systems now use a high degree of biological control for managing pests, as, for instance, does the Australian *Citrus* industry. Some large buyers of produce, for example supermarket chains in Europe, seek as part of their contracts with growers, to encourage intelligent pest management with high degrees of biological control rather than use of pesticides. In Sweden, there is government legislation insisting on a 75% reduction in use of synthetic chemicals in control of pest in crops, while in Australia, the federal government is seeking to reduce use of pesticides in cotton growing. There are systems or registration of agents used in biological control, and it is now very difficult to introduce species to use as agents in biological control in Australia.

In Australia, many species offered commercially as agents in biological control are native species. Andy Ryland kindly left with the Secretary of the Society a number of copies of leaflets giving sources offering such species to growers and home gardeners. Any member interested in having copies of the leaflets should telephone the Society's Office.

THE ORIGIN OF JENOLAN CAVES: ELEMENTS OF A NEW SYNTHESIS AND FRAMEWORK CHRONOLOGY. The Presidential Address given by Dr. Armstrong Osborne, School of Professional Studies, University of Sydney.

Jenolan Caves have been well known for a long time, but little work has been done on their origin. They are situated on the edge of the Sydney Basin, and there are a number of features which have caused difficulty of confusion.

There are seemingly contradictory evidence for the age of the landscape. For example, there are some Permian caves, eg. Dreamtime Cave, on the hill slope. In a saddle nearby, Permian gravels are exposed, but, in the same saddle, there is also a deposit with vertebrate fossils, probably Pleistocene in age.

There are parallel surface and underground drainage systems. Why not one or the other? In places, the stream has cut through deposits with vertebrate fossils, suggesting a very recent incision.

The drainage is deranged. Cavers expect one underground river connecting up the caves, but this is not the case at Jenolan. There are deep sumps and bits of disjointed rivers.

There are exposures of palaeokarsts in caves, and this is very unusual. Palaeokarst may be seen at the surface, in drill holes and road cuttings, but rarely in caves, ie. modern caves do not intersect ancient caves. There is good reason for this.. Once a cave fills up with sediment, the hydrology is changed and future caves are carved out elsewhere.

There are cupolas, large dome-shaped cavities, eg Temple of Bahl, Orient Cave. Bell holes in the limestone roof suggest swirling water carved them out. These caves have formed in clusters. Halls are very tall passageways without any apparent reason for their formation, connecting sumps.

Conduits with niches are passages with flat tops, rounding down to the sides which have patches of sediment along the walls, forming the niches and at the base, narrow slots. The sediments are fine grained, suggesting they were deposited from slow moving water, and dip towards the centre of the passage.

There is secondary alteration of bedrock and palaeokarst, Dolomitic pendants hang from the ceiling. A variety of minerals have developed since the caves formed, and some of them are magnesium rich, but there is almost no magnesium in the caves themselves.

A number of processes help to explain the complexity of the caves.

The caves have formed over a long period of time by multiple processes. There are six distinct phases of development, beginning in the Carboniferous.

Hydrothermal waters or rising artesian waters form caves from the bottom upwards. The waters do not need to be very hot. Where palaeokarsts are found in caves, there is always evidence of hydrothermal waters. The cupolas have all formed where hydrothermal or artesian waters have been trapped. A river system is not needed for cave formation in this way. The source of the hydrothermal waters is not known

The classic keyhole cave is formed in horizontal strata, but the strata at Jenolan is almost vertical. In these strata, tall narrow caves are formed. When the flow path of the water is blocked, the cave fills with sediment, the water comes to the surface, and cuts down the valley. At some later date, water gets in under the sediment and cuts it out. This happens when there is no defined path for the water through the limestone. The sediment is mostly not limestone, because the catchment contains a variety of rock types and the limestone is confined to a narrow band.

The best decorated caves occur near sediments deposited by hydrothermal waters. These sediments are rich in minerals and are really low grade ore bodies. While below water, the sediments remain stable, but if the water table falls and they are exposed, they oxidise and become unstable. Eventually, the cave is exhumed.

The first set of caves were probably formed in the Late Carboniferous and have been filled with marine sediments. Fossil crinoids are found in the sediments. Example, Olympic Steps. There are Permian caves as well, eg. Dreamtime Cave.

Then followed the hydrothermal phase, when the cupolas were formed, and the alteration of bedrock and mineralisation occurred. The limestone was probably buried under the Sydney Basin at this time. This phase is probably Mesozoic to Tertiary in age. The overlying Sydney Basin sediments were stripped off.

The modern phase, where caves are formed from the top down, under the influence of rainwater, probably started in the Tertiary. The pyrite in the mineralised sediments is readily oxidised, and the rusty, rotten sediments are eroded out, blocking and filling caves. Veins of sediment in the walls and roof oxidised and make them unstable and subject to collapse, when oxidised. The filled caves may be exhumed. This stage has probably been repeated a number of times, and the exhibition chamber is the latest event.

The field work needed to unravel this story is very time consuming. Many samples are required, not just one, as has been the practice in the past. This work has important implications for management. Most management practices of caves are concerned with protecting the catchment and the water going into the caves. Here, the water and processes associated with it are all in situ. The history of the caves has important implications for cave exploration which usually assumes that the cave river connects up all the caves, but this theory does not apply at Jenolan.

This story is not the end, for there are many more puzzles for Dr. Osborne to solve. The Presidential Address will be published in the Proceedings

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

THE ANZAAS AND FRIENDS OF GALARINGI

Invite you to a walk and exhibition

CORRIDOR THROUGH TIME

starting from Eric Mobbs Lookout, Marsden Rd., Carlingford

at 12.30 pm

May 2, 1999

Leader: Dr. DAVID BRANAGAN

Wear sturdy shoes and bring a hat.

The walk is under 2 km and will commence from the Eric Mobbs Lookout at 12.30 pm, and will follow the creek to the Old Dundas Quarry site. Insights into the vegetation, geology and history of early settlement will be obtained along the way. The Exhibition and talk will be held in the Sir Thomas Mitchell Reserve. The exhibition includes old photos, diagrams of quarry operations, aerial photos and lots of rocks.

For further information, contact the Honorary Secretary of Friends of Galaringi, Mrs E. Boesel, 74 Honiton Avenue Carlingford NSW 2118, Phone (02) 9872 3122

Wednesday 19 May, at 6 pm in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Mr. ALAN ANDREWS

Author, Mona Vale.

EARLIEST BURRAGORANG AND MONARO

Mr. Alan Andrews has been addicted to the Snowy Mountains and Monaro for more than half a century, and has written on the discovery and exploration of both the high and low country. The early stockmen and settlers moved past the Burragorang to take their herds first into Argyle, a county that stretched from Wingicarribee to Lake George. They were then lured on to the Mologo (Canberra and Queanbeyan), and to the Upper Murrumbidgee Monaro, and then to the Snowy Monaro. The Burragorang was first explored by the surgeon Bass, of Bass and Flinders fame, but he told us very little about it. Barrallier was sent by Gov. King to cross the Blue Mountains, and in the effort to do so, he fully explored the Burragorang Valley.

Wednesday 23 June, at 6 pm in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Dr. LIN SUTHERLAND

Australian Museum

JURASSIC PARK, AUSTRALIAN VOLCANIC VISTAS

New South Wales and eastern Australia show ample evidence of past volcanic landscapes. New studies highlight a volcanic 'Jurassic Park' extending from the Tasman margin to the Western Plains and down along eastern Gondwana. The scene studded, with landmark volcanoes, would differ markedly from present terrains. It would resemble the East African and German Rhineland volcanic fields to the north and an Icelandic like terrain to the south, where Tasmania and Antarctica approached a 'hell' scape.

Some of the inland volcanoes remain remarkably preserved, but the Tasman margin is now deeply incised, revealing extensive volcanic plumbing systems. What turned eastern Australia into a vast volcanic vista? Novel answers are needed.

Wednesday 21 July, at 6 pm in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs Macquaries Rd.

Dr. ARTHUR WHITE

Associate, Australian Museum and School of Biological Science, University of NSW.

AUSTRALIAN FROG WONDERS

This talk will cover the range of Australian frogs, including many lesser known species, some with quite bizarre reproductive habits. The talk will be well illustrated with slides. Australia has lost some frog species as part of the global decline of frogs. Some theories about the causes of the decline will be discussed.

EVERYONE WELCOME

WINE AND CHEESE WILL BE SERVED FROM 5.30 PM

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 92 **JULY 1999**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new memebers
Mr. T. M. Celebreeze. Australia Flora and Fauna Research Centre, Wollongong University
Dr. R. B. Coles, Dept Physiology, Sydney
Ms. R.M.B. Harris, Key Centre for Biodiversity and Bioresources, Macquarie University
Ms. M.E.Montgomerey, School of Biological Science, University NSW.
Ms S. L. Radford, Southern Cross University and State Forests of NSW.

DONATION TO THE J.W. VICKERY SCIENTIFIC RESEARCH FUND

The Society is most grateful for an anonymous donation to the Joyce Vickery Scientific Research Fund. All donations to the Scientific Research Funds are fully tax deductible.

AWARDS FROM THE SCIENTIFIC RESEARCH FUNDS

There were a total of 36 applications for grants from the research funds, a record number. Requests far exceeded the money available, and we were unable to give any of the applicants the full amount requested. The amount awarded was based on merit of the project and the application itself.
Applicants should remember that the members of the Committee assessing the applications may not be familiar with your particular speciality. You should explain technical terms and concepts so that readers outside of your discipline can understand your application.

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

Stephen COTTER, CRCLEME, Faculty of Applied Science, University of Canberra
PROJECT - Palaeogeography and characterisation of the basal Cambrian sedimentary units within the Georgina Basin, north west Queensland.
Funding was sought to commence a study of carbon and oxygen isotope variations in sediments from significant stratigraphic units in the basal Cambrian section of the Georgina Basin. Suitable material for analysis has been obtained from drillcore provided by exploration companies. The pattern of the light isotope variations will permit direct comparison with records from other sedimentary basins, and may also provide indirect sea-surface temperature and eustacy data for the Early Cambrian. Awarded $350.

James DANIELL, MUCEP, Department of Earth & Planetary Sciences, Macquarie University.
PROJECT - Conodont biostratigraphy and sedimentology of limestone debris flows and olistoliths of the Dosey Limestone, Broken River area, north Queensland
Fieldwork in the area was undertaken in July 1998, with collection of 48 samples of limestone, from which approximately 300 conodonts (together with other microfossils) have been extracted by dissolution of these rocks in acid. Approximately half the conodonts have been photographed by SEM to date. Ages derived from study of the conodonts will be used to constrain the age of the debris flows. This may lead to recognition of a marine transgressive/regressive episode during which the olistoliths formed. Awarded $350

Ian David LINDLEY, Department of Geology, Australian National University
PROJECT - Fish studies in the Early Devonian limestones of Taemas and Wee Jasper
Extraction of complete hard parts of Early Devonian fish by acid dissolution of limestones has resulted in considerable advances in understanding of the evolutionary relationships of these animals at a time during which placoderms (armoured fish), lobefinned fish, and rayfinned fish were all rapidly developing. The limestones of the Burrinjuck area have yielded well-preserved three-dimensional material, which can be precisely placed in a stratigraphic context already known in considerable detail. Awarded $350.

Ross PARKES, MUCEP, Department of Earth & Planetary Sciences, Macquarie University.
PROJECT - Facies analysis of the Quidong Limestone
The Quidong Basin, located 20 km WSW of Bombala, NSW, contains a petrologically diverse Silurian limestone (Quidong Limestone) between 90 and 140 m thick. Four detailed sections have been measured through this unit, enabling detailed logging of facies variations in order to understand the depositional environments of the limestone. Seventy-three samples have been collected for thin-sectioning and microscopic examination, as part of this logging procedure, prior to interpretation of facies associations. Awarded $350.

Jason ROBERTS, Department of Geology, University of Newcastle
PROJECT - Structural history of the Taylor Arm Fault System and origin of fault-related antimony mineralisation, Nambucca Block NSW
The Taylor Arm Fault System is one of the major faults of the Nambucca Block, and hosts antimony (Sb) deposits which have been the focus of recent exploration. Despite this, little is known about the kinematic history or structural control, age, and origin of the mineralisation. This mapping and laboratory project aims to address these topics. Awarded $270.

Mark TAYLOR, School of Geography, University of Oxford (U.K.)
PROJECT - Quaternary travertines of the Barkly Karst, Northwest Queensland
The aim of the project is to determine the relationship between fossil travertine deposits in the Barkly Karst, regional river behaviour, and climate change during the late Quaternary. The work will be done in collaboration with Dr R. Drysdale (University of Newcastle, NSW). The applicant had secured the cost of his airfare to Australia from a scientific research fund in Britain. Awarded $300.

Yongyi ZHEN, MUCEP, Department of Earth & Planetary Sciences, Macquarie University.
PROJECT - Late Darriwilian to early Gisbornian conodonts from limestones in the Fairbridge Volcanics and Oakdale Formation of central NSW
A diverse, well-preserved conodont fauna consisting of 15-20 species has been recovered from an interval about the Middle to Late Ordovician boundary from which no conodonts have previously been described from NSW. As such, the documentation of this fauna is crucial to refining the biostratigraphy of formations of this age in the Lachlan Fold Belt, and will also provide data to establish biogeographical links with contemporaneous Tasmanian, Chinese, and North American faunas. Description of the conodonts has commenced, but requires SEM photography of the specimens. Awarded $350.

AWARDS FROM THE J.W. VICKERY SCIENTIFIC RESEARCH FUND

Andrew H. BAIRD, James Cook University.
PROJECT: The length of the larval phase in corals: new insights into patterns of reef connectivity.
The extent of dispersal and the factors controlling length of the larval phase of marine invertebrates is poorly known. It is not clear, for example, whether corals can disperse long-distance, and whether coral larvae stay in the reef of origin or disperse to other reefs. These issues are of fundamental importance in managing reef ecosystems. Quantifying dispersal patterns of marine organisms is essential for effective design and management of marine reserves and the prediction of recovery rates following dispersal. This study aims to quantify the number of larvae settling locally through time from single cohorts; and to study changes in the biochemistry and morphology of coral larvae. Awarded $300.

Claire L. BROWN, Australian Flora and Fauna Research Centre, University of Wollongong
PROJECT: Threatened flora species in science and law
Threatened Species conservation legislation often demands action by land managers despite inadequate scientific knowledge. This study will look at the interactions between legislation, policy and science using two threatened plant species as case studies: *Tetratheca glandulosa* and *Darwinia biflora*. One aspect of this study (for which funding is being requested here) is to compare the ecology of the two species in urban versus natural sites. Awarded $300

Emma L. BURNS, School of Biological Science, UNSW
PROJECT: Conservation genetics of the Green and Golden Bell Frog *Litoria aurea*
This threatened species consists of relatively small, isolated populations from the far North Coast of NSW to East Gippsland, Victoria. Genetic viability of the species is thought to have been undermined by general decrease in size and increase in isolation. Genetic variation will be studied (using microsatellite markers) over the range of the species in NSW with more detailed analysis of populations near Sydney. Results will be compared with samples taken from a Victorian population and from an introduced population in New Zealand. Awarded $300

Thomas M. CELEBREZZE, School of Biological Sciences, University of Wollongong
PROJECT: Gene flow and inbreeding effects of European honeybees (*Apis mellifera)* in some Australian shrub species: comparative exclusion experiments in bird- and insect-pollination syndrome species in three plant families (Myrtaceae, Proteaceae and Epacridaceae).
The effect of honeybees on the population genetics and pollination ecology of several Australian species will be studied, to investigate whether honeybees alter the rate of fruit set, and move pollen shorter distances than vertebrate pollinators, thereby leading to inbreeding in bird-pollinated species such as the endangered *Grevillea rivularis*. Awarded $300

Michelle T. CHRISTY, School of Biological Sciences, University of Sydney
PROJECT: Movement patterns and home range in a population of Green and Golden Bell Frog *(Litoria aurea)*
This study will investigate whether the endangered Bell Frog can move long distances, thereby increasing the chance of colonisation and re-establishment of colonies and decreasing the risk of local or regional extinction. A population at Kurnell will be monitored using radio-transmitters to compare long- and short-term movements in relation to weather conditions and habitat requirements. Awarded $ 150.

Roger B. COLES, School of Physiology, Universiy of Sydney.
PROJECT: Ecology and conservation status of the vulnerable Large-eared Pied Bat *Chalinolobus dwyeri.*
This species is listed as vulnerable, but reasons for its apparently sparse distribution are not clear (perhaps a shortage of suitable roosting sites in sandstone caves and mines). The roosting and foraging ecology and distribution of this species will be studied by a field survey in the NE quarter of NSW. Awarded $300

Maria M. COTTER, School of Resource Science and Management, Southern Cross University
PROJECT: The Quaternary palaeoenvironment of Deepwater National Park, Curtis Coast, central Queensland
Coastal swamp and associated dunal sediments within the Deepwater National Park, central Qld, will be analysed, to develop a detailed terrestrial chronostratigraphy for the area. Holocene vegetational and climatic records will be analysed, and an explanatory model developed for the evolution of the present coastal landscape. This evolution will be related to observed patterns of prehistoric human occupation of the area. The central Qld coastal region has not been so analysed before. Awarded $500

Sharon J. DOWNES, School of Zoology, University of Sydney
PROJECT: Geographic variation in lizard antipredator behaviours: fixed traits or learning to avoid a specialist predator?
Velvet geckos are nocturnal and inhabit rock outcrops along the east coast of Australia. In parts of their range they share the same habitat with broadheaded snakes and smalleyed snakes. The former snakes prey heavily on the geckos, the latter refuse to eat the geckos. Data gathered so far in this study show that there are three geographically distinct genetic subgroups of the gecko, and further study is needed to relate this to behaviour patterns. Awarded $500

Rachael A. EVANS, Australian Museum
PROJECT: Studies on the systematics, ecology and biogeography of ampithoid amphipods (Crustacea): the Australian fauna [sic]
Ampithoid amphipods are among the most abundant and diverse amphipod crustaceans inhabiting marine algae in coastal Australia. Ampithoids appear to be keystone species in the communities of the brown alga *Sargassum* that dominate shallow water communities here. These communities are under threat because of coastal development. The systematics of the ampithoids is being elucidated to assist in understanding these communities. Awarded $300

Susan GILES, School of Biological Sciences, University of Sydney
PROJECT: The role of a native rodent, *Rattus fuscipes,* in structuring assemblages of forest leaf litter invertebrates
Conservation and management strategies often focus on rare species. However, abundant species may play significant roles in structuring their environments through predation, competitive interactions or mutualisms, such that their removal from a system may cause dramatic changes in biodiversity and production. Despite being a common species, widespread in SE Australia, the life history and ecology of the native bushrat are relatively little known. The impact of this rat on leaf litter invertebrates will be examined in Barrington Tops National Park. Awarded $200

Adrienne J. GRANT, School of Biological Sciences, University of Sydney
PROJECT: Metabolite transfer between the symbionts of a sponge/macroalga association

The marine sponge *Haliclona cymiformis* lives symbiotically with the macroscopic red alga *Ceratodictyon spongiosum* in tropical waters. They are common in the Great Barrier Reef. Culture experiments suggest that the sponge modifies the alga in the wild. Biochemical and physiological interactions of the symbionts are being studied to determine the role of each partner in this obligate association. Awarded $200

Rebecca M.B. HARRIS, School of Biological Sciences, Macquarie University
PROJECT: Cattle grazing and burning in public forests: the response of ground-dwelling forest spider assemblages
The impacts of long-term grazing and burning on different species of ground-dwelling spiders are being assessed in NE NSW. This study will identify those habitat variables that most influence forest spider assemblages, and will suggest ways to minimise impact on these species. Awarded $300

James INDSTO, Research biologist (cancer genetics)
PROJECT: Mimicry and the pollination of *Diuris* orchids
Many *Diuris* species have flowers that resemble those of unrelated plant species growing in the same locality (e.g. pea flowers). This phenomen is called Batesian mimicry when insect pollinators are deceived into effecting pollination. It is proposed to investigate whether this is so with *Diuris* species through field observations of plants and their pollinators. Ultra-violet reflectance patterns of flowers will be compared (many insects can see ultraviolet). Awarded $200

Michael KRUETZEN, School of Biological Science, UNSW
PROJECT: Kinship and alliance formation in male bottlenose dolphins in Shark Bay, WA
Alliances are widespread in the animal world, but those between males of a species are rare. Male bottlenose dolphins in Shark Bay form two levels of alliance, apparently aimed at controlling reproductively active females. Almost all males have been found to stay in first-order alliances of two or three individuals. These alliances cooperate with each other. This extraordinary behaviour is possibly explained by genetic relatedness /kinship. A novel skin biopsy system has been developed to study this. Awarded $150

Charles LITTNAN, School of Environmental studies, Macquarie University
PROJECT: Foraging ecology of the Australian fur seal
This protected species will be studied in Bass Strait to determine spatial, seasonal and annual variation in diet. Knowledge of the diet will help in the development of management plans for this species, and will have particular relevance to the fishing industry. Awarded $150.

Margaret E. MONTGOMERY, School of Biological Science, UNSW
PROJECT: Inbreeding depression in the koala (*Phascolarctos cinereus*)
Koala populations have built up without active human intervention in Qld and NSW, whereas Victorian populations have been intensively managed. A rare series of populations has resulted, which can be used to study the genetic consequences of bottlenecks and the effect of loss of genetic diversity on fitness. It is hypothesised that inbreeding depression in wild populations may mean that some of these populations are at greater risk of extinction than previously thought. Awarded $300

Christopher D. NANCARROW, School of Biological Sciences, University of Wollongong
PROJECT: Reproductive character displacement and hybridisation in three sympatric *Persoonia* species: *P. levis*, *P. myrtilloides* and *P. chamaepitys*.
Species in the genus *Persoonia* are attractive to both native bees and the introduced honey-bee, and this study is investigating the influence of these pollinators on the reproduction of these three species in two localities. The first two species hybridise extensively, but the third is not known to hybridise, so they provide an interesting contrast. Awarded $300

Sally RADFORD, Southern Cross University
PROJECT: The ecology and reproductive success of the koala, *Phascolarctos cinereus*, in Pine Creek State Forest
This study addresses the issues of predation, impact of logging and *Chlamydia* on the local koala population, currently estimated at 400. The only previous study of this population was a brief

survey before the Pine Creek State Forest Koala Management Plan was drawn up. This study is needed to provide detailed data to verify the principles of that plan and to successfully implement it. Awarded $200

REGINA, Biostructural and Biomolecular Research Unit, UWS Hawkesbury
PROJECT: The evolution of semiochemicals in Australian marsupials
Semiochemicals are compounds that mediate interactions between organisms. One known source of these chemicals in mammals is the sternal (chest) gland; the chest secretions are associated with territorial marking and attracting members of the opposite sex. Analysis of the actual chemical compounds involved (in Australian marsupials) has only started in the last decade, with studies so far on the common brushtail possum and koala. This study is looking at the chest secretions of a wide range of marsupials (and at intraspecific variation), analysing the compounds and potential production pathways and considering the evolution of chemical signalling mechanism in marsupials. Awarded $300

Anthony F. ROBBIE School of Biological Science, UNSW
PROJECT: The history of the vegetation from the palynology of Mountain Lagoon, Blue Mountains, NSW
Initial radiocarbon dating of a core from Mountain Lagoon indicated that the sediments cover a range of ages from about 9,000 to 18,000 years BP. AMS dating of the clay fraction of a subsequent core gives dates of about 19,000 years, which does not fit with the basal date of about 30,000 years estimated by extrapolation from the original core. The AMS dates suggest an unusually rapid accumulation of sediments in the basal 40 cm of the lake. A further core is needed to check agreement (at particular depths) with the dates from the original core. Awarded $200

Elizabeth M. TASKER, School of Biological Sciences, University of Sydney
PROJECT: The impacts of cattle grazing and associated burning regimes on the biodiversity of Tableland eucalypt forests, NSW
The impact of such activities has been studied in grasslands, rangelands and alpine areas, but little has been done on Australian forests. This study will look at whether a regime of frequent low-intensity spring fires immediately followed by grazing reduces structural complexity of the forest understorey and consequently reduces faunal diversity on the Northern Tablelands of NSW. There is anecdotal evidence that this is so. Awarded $300

Xiufu ZHANG, University of New England
PROJECT: Systematic studies in Schoeneae (Cyperaceae): phylogeny and biogeography of *Carpha* and relatives
The group of sedge genera around *Carpha* is of interest in several ways: generic limits are unclear; species limits within *Carpha* need further study; and spikelet morphology is argued by some to be contrary to that usually found in Cyperaceae. These areas will be investigated. The group of genera has a generally Gondwanan distribution; biogeography will be farther assessed once generic limits have been investigated. Awarded $150

PUBLICATIONS FOR SALE

Australian Quaternary Vertebrates, arising from a symposium held by the Society at Wellington Caves NSW, December 1995. This volume contains a selection of papers dealing with vertebrates or vertebrate fossil sites. Price $35 (including postage within Australia).

Living in a Fire Prone Environment. The January 1994 bushfires highlighted the public awareness of fire in the Australian Environment, but much of the public comment was ill informed. This Symposium, held at the University of NSW in March 1994, attempted to address some important aspects of fire and its management. Price $35 (including postage within Australia).

Freshwater Crayfishes of New South Wales. This handbook provides a comprehensive introduction to the biology and conservation of the crays. fully sourced but written in a clear, readable style, it is suitable for those without specialized knowledge of crays. Price $30 (plus $3 postage and handling).

EARLIEST BURRAGORANG AND MONARO, A talk given by Mr. Alan Andrews.

This talk is covered in Mr. Andrew's latest book, *Earliest monaro and Burragorang 1790 to 1840.*
Burragorang is the valley of the Wollondilly River in the area between the Coxs/Warragamba junction and Bullio on the Wombeyan Caves road. It was the scene of two of the earliest attempts at the turn of the 18th century to cross the mountains to the west. These days it is partly covered by the waters of Warragamba Dam.

If the early colonists found themselves to be hemmed in, it was mostly a problem of their own making. The easiest way of expansion lay to the southwest, but they themselves cut off this option. This happened because of the escape of 6 of their 7-strong herd of cattle they had brought from the Cape of Good Hope. It was a full seven years later that these were found, and by then, seventy strong.

Govenor John Hunter went out to 'the Cowpastures' to investigate in 1796 and was so impressed with the cattle's potential worth (a value never to be realized, unfortunately) that he forbade the colonists to proceed across the Nepean in this area. That situation remained for almost twenty years. The grasping John Macarthur, of course, managed to circumvent the decree. The way to the southwest, though, was blocked.

While there, Hunter climbed the Razorback for the best view. And so did Surgeon George Bass, who set off to the west 'in an attempt to round the mountains to the westward'. Bass has told us nothing of this attempt, but the naturalist Francois Péron tells of Bass's party using climbing irons on their feet and letting themselves down with ropes, and so forth...Bass was out fifteen days - 'of fatigue and unparalleled danger' - and may have reached Scotts Main Range above the Kowmung River. Whether he attempted the Burragorang walls or proceeded much as Barrallier did eight years later we have no chance of finding out. There is no doubt, though, that he proceeded into the Burragorang

The productive exploration into Burragorang was that of Ensign Francis Barrallier in 1802. He too was trying to cross the mountains to the west. Unfortunately, because of his gross exaggerations of distances, many people have suggested that he did cross to the west. Barrallier's own record, though, clearly shows that he never escaped from the Warragamba's catchment, Barrallier indicating yhat he was stopped by waterfalls.

Barrallier's route has been a puzzle, but the talk displayed the proof that Barrallier travelled west up the Tonalli River through Byrnes Gap, even showing the cave where the party briefly sheltered. Matthew Flinders' chart is a part of that proof, despite that Barrallier's record was not its source. How did Flinders obtain the information for his chart?

The information came from the natural history collector George Caley. Caley had persuaded Governor King in 1806 to let him repeat Barrallier's journey. When he did so, he announed that Caley had gone west less than half the distance he claimed. Caley drew a map of the journey and a comparison with Barrallier's map.

Unfortunately, no one has found Caley's map of this journey. The talk told, however, of how the evidence of it has survived in another form, and has let us analyse the detail of Barrallier's map.

The question was raised of how Caley was able to follow Barallier's route after a gap of three and a half years. The answer was that John Warby, who had become the keeper of the wild cattle, had been on both expeditions. It was Warby, too, who guided Govenor Maquarie into the Nattai River (a part of Burragorang) in 1820.

A few years prior to that, Charles Throsby, with some help from Hamilton Hume and Joseph Wild, had made some incursions past the land of the wild herds. The country was reasonably straightforward, with nothing of the problems of the Blue Mountains or the country north of the Hawkesbury. Indeed an exploration had been made in 1798, only two years after Hunter had stood on Razorback.

That 1798 exploration was by the convict John Wilson who reached the Wollondilly (near the Wombeyan Caves Road) and afterwards from Mt Jellore walked to Gingenbullen Mtn and on to Towrang, not far from the site of Goulbourn. He also discovered, for the first time, it is said, the Lyrebird. (Ten years to find a lyrebird?)

In 1927, the wild herds were some 500 strong, and their preservation seemed not so important. Macquarie decided on expansion to the southwest. The way to Argyle was opened exploration proceeded apace. And so by 1825, even Molonglo (Canberra) was settled. The Monaro. invitingly lay ahead. Currie and Evans (with Joseph Wild) had found this downs country in 1823.

By 1827, all the grazing land as far as the Twins at Michelago - the limits of location - had been taken up. Beyond the limits, squatting had started well into Monaro. From then on, the graziers, the merchants, the younger sons, settlers, freed convicts, all tried for a spot in Monaro.

1834 saw Dr. John Lhotsky make his journey to the Australian Alps. He climbed int othe Snowy Mountains nearly as far as the site of Thredbo. And he ventured to the lower Snowy River beyond Delegate. The graziers were with him or hard on his heels. Eventually the Government, getting fed up with being unable to collect the rent from this land ousside the limits of settlement, decided to lease it. This next phase - of the huge Maneroo Squatting District - its administration and recording by Crown Land Commissioner John Lambie; and its first survey and mapping by Stewart Ryrie, was touched upon to conclude the talk.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 21 July, at 6 pm, in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Dr. ARTHUR WHITE
Associate, Australian Museum and School of Biological Science, University of NSW.

AUSTRALIAN FROG WONDERS

This talk will cover the range of Australian frogs, including many lesser known species, some with quite bizarre reproductive habits. The talk will be well illustrated with slides. Australia has lost some frog species as part of the global decline of frogs. Some theories aabout the causes of the decline will be discussed.

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JOINT MEETING WITH THE GEOLOGICAL SOCIETY OF AUSTRALIA (NSW DIVISION)

Wednesday 11 August 5.30 pm for drinks, to start at 6 pm, in the Rugby Club, St. Leonards, Christie St. St Leonards.

Parking is available in the street nearby, and it is a few minutes walk from St. Leonards train station

Dr. MARY WHITE
Author

HOW THE GEOLOGICAL PAST PREDETERMINES THE ENVIRONMENTAL PROBLEMS FACED TODAY

The talk will focus on geological history and how it impacts on the present and future on Australia. Dr. White has recently published a book on this topic, "Listen, Our Land is Crying", which has been short-listed for the Eureka Prize. Books will be available at the meeting.

People may join for dinner locally afterwards

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**Wednesday 22 September, at 6 pm, in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs. Macquaries Rd.**

Dr. IAIN SUTHERS
School of Biological Science, University of N.S.W.

HOT DAYS BUT COLD SWIMS; FISHERIES OCEANOGRAPHY OFF SYDNEY

Why is it that on a blistering hot day, the ocean seems so bitterly cold? And why does Australia have the 3rd largest fishing zone and the 55th largest fishery? There is good oceanographic reason for both these questions, which sets the scene for explaining our coast's nutrient budget. The story begins with the birth of the East Australian Current, in the Coral Sea. The EAC then departs the coast north of Sydney, but leaves behind an eddy field and upwelling, and Sydney's chronic sewage discharge. Dr. Suthers will review the outcomes of some recent research cruises off NSW, looking at the changing zooplankton, and where fish spawn, and where Sydney's red tides progably come from. We will look at some examples of environmental concerns in estuaries and the fishes of rocky reefs, and how some naturally occuring stable isotopes provide a new management tool.

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Wednesday 20 October, at 6 pm, in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Prof. RUSSELL BLONG

Natural Hazards Research Centre, Division of Environmental and Life Sciences, Macquarie University

NATURAL HAZARDS AND RISKS IN AUSTRALIA - PLACE YOUR BETS

Which natural hazards in Australia are the most important?
Which natural hazards will be the most important in 50 years time?
How frequently do billion dollar hailstorms, earthquakes, floods occur?
Can we or should we do anything about them?

****

Wednesday 17 November, at 6 pm, in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Dr. IAN PERCIVAL

Geological survey of New South Wales

THE GREAT ORDIVICIAN BIODIVERSIFICATION EVENT

The Ordivician Period (490-440 million years ago) was a time during which the greatest explosion in biodiversity in Earth's history took place. An equally dramatic global extinction event co-incided with the end of the Ordovician. Apart from the vast increase in invertebrates at all levels of the taxonomic hierarchy during the Period, the first representatives of fish became widespread, and first evidence of land plants is recognised. Global study of the reasons for this biodiversification (and subsequent mass extinction), and documentation and quantification of the biota involved, is the subject of an International Geologiocal Correlation Program project spanning 1997-2001. Co-leader of this IGCP project is Dr Barry Webby (a past President of the Linnean Society of NSW); Ian Percival is part of the regional team coodinating the assembly of biotic data for Australasia. Case studies to be discussed in this talk will include a comparison of the distribution and abundance of invertebrates between two contrasting regions of easten Australia in the Late Ordovician (the central NSW volcanic island belt, and the platform margin through Tasmania), and illustrations of the applicability of the Benthic Assemblage concept to the study of depth-related marine biotas of the Ordovician.

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 93 SEPTEMBER 1999

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IN THIS ISSUE

RELOCATION OF SOCIETY OFFICE

The new owner of the office at Milsons Point increased the rent by 117%, so the Council decided it was time to move. The new address, phone and fax number are given above.

THE SOCIETY IS CONNECTED

The Society now has e-mail, and the address is given above.

NEW MEMBERS

We welcome our new member Dr. Robert C. Cashner, Graduate School, University of New Orleans.

DONATION TO THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

The Society is most grateful for a donation from Mrs Joan Beattie to the Betty Mayne Scientific Research Fund. All donations to the Scientific Research Funds are fully tax deductible.

PAPERS ACCEPTED FOR PUBLICATION

Booth, D.T. Incubation temperature and growth of the Brisbane River Turtle (*Emydura signata*)
Booth, D.T. Size, water and energy content of eggs of the freshwater turtles *Emydura signata* and *Chelodina expansa.*
Ekert, P.A. and Bucher, D.J. Winter use of large-leafed priviet *Ligustrum lucidum* by avifauna in suburban Lismore, New South Wales.
Furey-Greig, T. Late Ordovician Scolecodonts from the Wisemans Arm Formation, northern New South Wales.
Ingram, B.A. and Philbey, A.W. Occurrence of the parasite *Ergasilus intermedius* (Copepoda: Ergasilidae) on the gills of the Macquarie Perch, *Macquarieaustralasica* (Percichthyidae)

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2000. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carriied out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 10th November.

OBITUARY: KNOWLES MAIR

Knowles Mair, Botanist, died in August aged 90. He was elected to the Society in 1931, and was a life member at the time of his death.

Knowles graduated from Sydney University with first class Honours in Botany. He was first appointed to the CSIR (now the CSIRO) as assistant agronomist in pasture research in 1931. In 1936, he became the first resident botanist in Darwin, at a time when the Northern Territory was only vaguely known to most people. He establish a herbarium there and acted in many positions. In World War II, he enlisted in the Army, where he held the rank of Captain, and used his botanical expertise on wartime agriculture and forestry projects in New Guinea and Borneo.

On his discharge from the Army in 1946, Knowles started with the Botanic Gardens as a Botanist. He became Senior Botanist in 1948, and Director and Chief Botanist in 1964. He retired in 1970. During his time as Director, the Brunet family donated the Mt. Tomah Garden to the Botanic Gardens, but it took time and patience for its development, for resources were scarce. His initiatives included the start of ecological research at the Gardens and the planning of the Pyramid Glasshouse.

Knowles was first and foremost a botanist, and his special love was for the native orchids. A colleage once told him of a racehorse named Cymbidium (an orchid), and he bet on it, winning at 8/1. His garden was crammed full of plants, and when living near the sea at Coogee, he had great interest in seeing which plants could withstand the salt spray.

JURASSIC PARK: AUSTRALIAN VOLCANIC VISTAS, a talk by Dr. Lin Sutherland of the Australian Museum

Dr. Sutherland and his team have been studying Jurassic, some 200-150 million years (m.y) ago volcanism in New South Wales. Around Dubbo, lava flows rest on the Jurassic land surface, and it is remarkable that the land surface has survived to today. The Jurassic landscape of the Hunter valley was covered with volcanics. Evidence of volcanism may be found up and down the coast, and in the Sydney region. There was fissure eruption near Darling Harbour. There is evidence of explosive eruptions in water. Near Bowral, explosive volcanoes produced deadly incandescent clouds, and there were volcanoes with viscous lava. In quieter interludes between all this volcanic violence, there were thermal springs and other hydrothermal activity.

The age of volcanics shown on geological maps is usually derived by correlation from a very few potassium argon (K/Ar) dates. In rocks, potassium decays to argon, and the ratio of the two give an indication of age. Fresh rocks that have the argon locked in the crystals are necessary, but most rocks are weathered. Alternatively, resistant rock types that do not break down could be used. Zircon, which may be retrieved by panning, is one such mineral, and it usually contains some uranium as well. Uranium breaks down to thorium, and releases an electron which leaves a fission track in the crystal. The number of fission tracks depends on the amount of uranium and the time since the rock solidified, hence may be used for dating also. Chemical 'fingerprints' help to trace similar rock types that would have come from the same molten source.

The geological map for Dubbo shows extensive Tertiary (65-2 m.y.) volcanics, from only one K/Ar date of 4 million years just north of Dubbo. With many more dates, Dr. sutherland has shown that most of the volcanics are 180-190 m.y., or Jurassic in age, hence the landscape is far more ancient than thought.

The volcanic rocks record the history of volcanism. Near Dubbo, Turtle Rock has one large hump with banding of the trachyte showing that the lava flowed out and filled the valley 160-170 m.y ago. Another hump has upright 'fingers' of rock showing that the lava was coming up. Yet another rock was once a feeder pipe. Rhyolite sheets would have been formed from the incandescent cloud eruption that would have shot out the side of the volcano. There is an almost complete volcano here.

Further east, the Sugar Loaf is a volcanic plug, and there is no trace of the Jurassic land surface. Near Geurie, there is a big intrusion, 230 m.y old (Triassic) which would have formed deep in the earth. There is another intrusion, 180 m.y and 140 m.y. at Mt Bodangora. There is no trace of the ancient land surface here, as there has been considerable erosion to expose the deep intrusions. At Garrawilla, north of Dubbo, Jurassic lava flows are preserved. There was also hot spring activity, where secondary minerals such as zeolite and the chocolate coloured heulandite, a collector's item, were formed.

Around Sydney, just off the cliff of the Bondi golf course, there is a volcanic pipe standing in the sea. Next to the pipe on the cliff, the sandstone is baked and cooked. The pipe would have been buried deep, and the ancient land surface has been eroded away. At the Minchinbury Quarry, a volcanic pipe punched its way through the sandstone, deforming it. In the Blue Mountains, some pipes are associated with sediment containing preserved plants. While the Jurassic land surface has been preserved around Dubbo, there are only deep pipes around Sydney.

In the New England District, Rooty Hill is a pipe with broken up rock fragments, rather like the pipes around Sydney. The middle one of the Brothers, north of Taree, is a granite intrusive of Triassic age. The south Brother has a huge dyke of fine-grained volcanic rock, of unknown age. There was a lot of stripping of the land to reveal these deep chambers.

In the Jurassic, 160 m.y. ago, Australia, Tasmania and Antarctica were joined, and part of Gondwana. There were giant floods of lava in Antarctica and Tasmania. In comparison, the volcanic activity in New South Wales was relatively sporadic. There are similar lava flows in the Karroo of South Africa, which was also part of Gondwana. In Namibia, there are sill sheets. All of this makes up a huge volcanic province, over 3,000 km in length, with eruptions coming from the one molten lava source.

There is no ready explanation for volcanism on this scale. Floods of lava are unknown today. Tertiary volcanism along the east coast of Australia has been explained by hot spots. The Australian plate passed over a hot spot which caused the eruptions. This idea will require updating with the large numbers of new dates. There is still much more to do, and many more dates are required.

AUSTRALIAN FROG WONDERS, a talk given by Dr. Arthur White

The talk was accompanied by many beautiful slides, and the reader will have to imagine them. There are five families of frogs in Australia, and four of them are natives, with one exotic, the cane toads. Tree frogs and ground frogs are Gondwanan in origin, with distributions in Australia, South America and South Africa. The other two families are not Gondwanan in origin.

The hylid or tree frogs have lost the tip of one finger that allows the digit a 360° rotation, and a better grasp of the branch. The male inflates his throat to make the mating call. The female can only make a distress scream and a "release me" call when she has finished laying eggs. The common tree frog, the one that gets into toilets, etc., is long lived, up to 25 years, and can grow to a large size. The big ones may eat mice, or steal from birds' nests, or pick off bats as they fly out from their roosts. Very few tree frogs are green. Pearson's tree frog is grey or dark brown, and the colour is extremely variable. The frogs are active at night, but they have to survive the daylight hours, hence the need for camouflage colouring. One tree frog looked as if it had lichens growing on its back, good camouflage for spending the day on a lichen encrusted tree trunk.

Ground frogs cannot climb trees, and are lousy hoppers. They have a fat, rounded shape, and short legs that are good for digging burrows, where they hibernate during unfavourable times. Along the east coast, the burrows are shallow, and the frogs only spend a few months in them, but in the desert, they dig much deeper burrows and form a chamber at the end, and can survive there for up to 7 years. There are 5 species in the Simpsons Desert. They store water in two sacs, like jerrycans, one on each side of the body, and the stored water may be up to 2/3 of their body weight. The Aboriginies would dig up the frog and use its water supply for a drink.

When rains come, and there is sufficient water to breed, which may be only every 3-5 years, the frogs emerge, dehydrated and looking like prunes. They rehydrate, eat everything in sight for 24 hours (insects flourish at these times), mate, then burrow down again. Inside the burrow, the frog sheds the outer skin that becomes impervious and like a plastic bubble, maintaining a high humidity inside. One of the burrowing frogs, the turtle frog of southwest Western Australia, is a pale fawn-beige in colour and hunts termites under ground. The crucufix frog, looking as if encrusted with precious jewels, sits in the middle of an ant heap, eating the ants. The ant bites do not bother it, unless they attack its eyes.

The gastric breeding frog, now extinct, was only discovered a few years ago. The female swallows the eggs containing prostaglandin, which causes the stomach lining to degenerate, and the tadpoles live in her stomach. She goes down to the creek every day, the tadpoles jump out and feed, then back into her mouth afterwards, and this goes on until they metamorphose. Drug companies became very interested in the prostaglandin, and these frogs probably became extinct from over collecting. New species of frogs are still being collected. The sunset frog was discovered 6 years ago in peat amongst granite domes, and there are 2 other new species in the same area.

One species of ranid frog, the type common in Europe, arrived in the Pleistocene. Microtoads, an Asian group, are very small, and have been here since the Pliocene. There are up to 40 species of the microtoads in north Australia and New Guinea. Cane toads have been here since 1934, and have poison glands on their shoulders and back, to poison predators.

At mating time, the male calls are species specific and calling is a serious business. The female must select a mate by call alone, and the puddle will have many frogs of different species. There is lots of acoustic rivalry. The receptive female, ready to lay eggs, can filter frequencies and listen to only one species. She selects a mate on vigour, carries him piggy-back to the egg laying site of her choice which may be some 100m away. She releases eggs, he releases sperm and fertilisation is external. Most Austalian frogs lay small egg masses, each egg with a large amount of yolk, then the parents desert the eggs. Development of tadpoles and frogs is rapid, for the puddle may dry up. At metamorphosis, the gills become lungs, and the circulatory system changes so that frogs can absorb oxygen through the skin. The whole digestive system changes as well. Tadpoles are herbivores but the frogs are carnivores.

There seems to be endless adaptations to the breeding process to ensure survival. Where water may be scarce, large eggs with big yolks may be buried amongst plant roots, where they are less likely to dry out. The female of the hip pocket frog carries her eggs in splits in the skin on her flanks which become brood pouches, until metamorphosis. The male is toxic, and the bird eating spider is the only predator. The tusk frog develops two fangs on the lower jaw in the breeding season, and these are used for fighting. Given the chance, he will kill and eat a rival. The giant burrowing frog develops claws on his hind toes, also for fighting. They growl at each other in a Mexican stand off for an hour or two, jockeying for position, then one will jump on the other, bring up his hind feet to rip open the belly of the rival.

There have been extinctions and contractions of ranges. Bathurst is the type locality of the green and gold bell frog. A long time resident had old photos of a spotted bell frog, now extinct, which had been fed to snakes, kept by a reptile fancier! New South Wales has 42 species of frogs, and 24 are endangered or threatened. Australia wide, there are 214 species, and 8 have not been seen in recent years, and hence are presumed extinct. It is estimated that 11 species will be lost in 10 years. It appears that the current rate of extinctions started some time after 1960. At a world conference in 1979, it was realised that there was a world wide decline of frogs. An international task force was set up and data pooled. The task force still exists and collects data, and the best data come from Australia.

The decline of the green and gold bell frog illustrates the problem. It first disappeared from Jindabyne, the highest altitude of its distribution. It was then lost from Cooma and everywhere above 800 m altitude. In the next few years, it disappeared from all localities above 500 m. Now, the highest elevation where the the green and gold bell frog may be found is 150 m. This pattern is repeated all over the world. Populations from the highest altitudes are lost first. The problem is, Why?

It is suggested that elevated ultraviolet light at high altitudes, together with the increase in UV because of the hole in the ozone layer, is responsible. It is known that high levels of UVB sterilizes eggs and causes malformations, but there is no proof. Frogs are taken to high altitudes and put in UV protected and nonprotected enclosures, and each do equally well. It is then suggested that the UVB causes an imbalance to the bacteria, and the frogs then succumb when stressed, but there is still no proof. The decline with altitude is still happening, but it has slowed down.

Frogs are essentially night creatures, so any effect of UV must be indirect. Ground frogs have not declined to the same extent. Fungal disease may sweep frog populations, but it is probably not the cause, rather the consequence of stress.

LINNEAN SOCIETY OF NEW SOUTH WALES

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Prof. RUSSELL BLONG

Natural Hazards Research Centre, Division of Environmental and Life Sciences, Macquarie University

NATURAL HAZARDS AND RISKS IN AUSTRALIA - PLACE YOUR BETS

Which natural hazards in Australia are the most important?
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Saturday 6 November, 1999

THE PRESIDENT'S FIELD TRIP TO JENOLAN CAVES

Dr Armstrong Osborne will show us the evidence for new ideas about how Australia's best known caves were formed.

The trip includes a guided walk around the surface and a special tour of the caves, to places not normally open to tourists.

Meet at 11.30 am, at Carlotta Car Park (near old school), Jenolan Caves. Drive through the Grand Arch, past Caves House, round bend, and up the Oberon Hill.

Bring your lunch, unless you wish to line up with the tourists.

Wear good walking shoes. Some places in the caves may be muddy.

Program Meet 11.30 am
11.30 - 1 pm: Introduction and walk around the landscape
1-2 pm: Lunch - bring your own, or line up with the tourists
2-4 pm: Tour of the caves

Cost - $12 per person

REMEMBER: On November 6th, voting in the referendum for a republic is compulsory. You may call in at any polling booth along the way and cast a vote.

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Page 7 follows

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Dr. IAN PERCIVAL
Geological Survey of New South Wales

THE GREAT ORDIVICIAN BIODIVERSIFICATION EVENT

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EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 94 **DECEMBER 1999**

NEWSLETTER EDITOR:
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HOME PAGE: http://www.acay.com.au/~linnsoc/welcome.html

IN THIS ISSUE

NEW HOME PAGE

The Society now has a new home page and the address is:
http://www.acay.com.au/~linnsoc/welcome.html

SUBSCRIPTIONS FOR 2000

Subscriptions for 2000 fall due in January. Before deciding the subscription rate, the Society has had to consider the GST and how it applies to us.

The Society's turnover does not exceed the level above which charities and non profit organisations must register. The Society had the option of registering voluntarily for the GST, but Council chose not to as this would entail a vast increase in paperwork, with associated increased secretarial costs. This means we will have to pay the GST on all of our goods and services, and we do not have to charge GST on membership.

The membership rate has remained the same for at least 5 years and is due for an increase, especially as we will have increased costs because of the GST. The new rates are shown on the separate renewal notice. Please note, this increase is not the GST.

Please note that the deadline for the deduction for early payment has been changed to the end of March. It was previously the end of April.

The Council also decided to obtain an Australian Business Number (ABN) to preserve the tax deductibility of donations to the Research Funds.

NOMINATIONS FOR PRESIDENT AND COUNCIL

A white sheet with the nominations for President and Council is included with this newsletter.

PAPERS ACCEPTED FOR PUBLICATION

Augee, M.L. and Ford, D. Radio-tracking studies of grey-headed flying-foxes, *Pteropus poliocephalus*, from the Gordon colony, Sydney.

Booth, D.J. and Schultz, D.L. Seasonal ecology, condition and reproductive patterns of the smooth toadfish *Tetractenos glaber* (Freminville) in the Hawkesbury estuarine system, Australia.

Cashner, R.C., Hawkes, G.P., Gartside, D.F. and Marsh-Matthews, E. The fishes of the Nymboida-Mann and Orara River Systems (Clarence River drainage) New South Wales, Australia.

Clague, C.I., Coles, R.B., Whybird, O.J., Spencer, H.J. and Flemons, P. The occurrence and distribution of the tube-nosed insectivorous bat (*Murina florium*) in Australia.

Lundelius, E.L. Jr. and Turnbull, W.D. *Leporillus* (Rodentia: Muridae) from Madura Cave, W.A.

Martin, H.A. The stratigraphic palynology of the Macquarie River Valley, western New South Wales.

McAlpine, D.K. Australian signal flies of the genus *Rhytidoratalis* (Diptera: Platystomatidae).

Meek, P.D. and Triggs, B. A record of Hastings River mouse (*Pseudomys oralis*) in a European red fox (*Vulpes vulpes*) scat, New South Wales.

Smithers, C.N. The Psocoptera (Insecta) of Norfolk and Philip Islands – occurrence, status and zoogeography.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please note:
Please read instructions carefully.
Original plus five(5) copies required.

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $700, subject to Council review). Money awarded must be used for research puposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applictions must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending aplicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies

supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **31st March, 2000.**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of N.SW. announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $700.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **31 March 2000**

ADVICE TO APPLICANTS

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested, or why the project is important, and how it would add to knowledge in that particular discipline. The proposed budget must also be fully justified. Students should seek help from their supervisor, or someone versed in the art of writing grant applications, if they are doing this for the first time.

The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only be used for research. This means we cannot fund theses preparation or attendances at conferences.

DONATIONS TO RESEARCH FUNDS ARE TAX DEDUCTIBLE

All donations to both research funds are fully tax deductible. Give yourself a tax break and help a struggling research student, as most of the funds go to students.

NATURAL HAZARDS AND RISKS IN AUSTRALIA - PLACE YOUR BETS, a talk by Prof. Russell Blong, Natural Hazards Research Centre, Division of Environmental and Life Sciences, Macquarie University.

Prof. Blong asked us what we thought were the most important natural hazards, then we could check our bets with his assessment.

Earthquake risk for most of Australia is very low. There is most activity off northeast Tasmania. The Newcastle earthquake in 1989 was exceptional. Australia is in the centre of the tectonic plate, and there is most activity around the edges of the plates. Volcanic activity, steep slopes and their risk of landslides, and the orogenic effect of uplifted mountains are also controlled mainly by tectonic plates, and are associated with a greater earthquake risk.

Tropical cyclones are a hazard across the north of Australia. There are two hotspots, one in the Coral Sea and the other off the northwest of Australia, and they each generate about 9% of the world's cyclones. Cyclone Tracey that flattened Darwin in 1974 was rated category 4, and Australia's worst. Cyclones affect the coastal regions.

The El Nino effect may be rated a natural hazard through its influence on other events. In El Nino years, tropical cyclones track close to the coastline, but with La Nina, they track further out to sea, and are less severe. The correlation between El Nino and bad bushfires is strong. El Nino was in advance for the devastating bushfires of 1939, and for Ash Wednesday in 1983. This correlation allows prediction of bad bushfire years.

The most important hazard for deaths is heatwaves. Heatwaves killed 4,287 people,1803-1992, mostly old people, and especially men. Some deaths may have been recorded as heart attacks and not attributed to a heatwave, hence the deaths probably should be higher. The heatwave preceding the 1939 bushfires, the worst ever, killed over 400 people.

Tropical cyclones killed 1,863-2,312, for the period 1827-1989. The uncertainty about the precise number is because flooding usually accompanies a tropical cyclone, and deaths attributed to floods may be included here. Cause of deaths recorded as floods are 2,125 for 1803-1994. All other cause of deaths from natural hazards are relatively minor. Bushfires account for 678 deaths (1827-1991).

Lightning strikes killed 650 (1803-1992). Deaths from lightning peaked in the early part of the century, probably because we were more rural, and there were more people out on horseback. Today, with our urban lifestyle, we spend more time indoors. People playing golf and fishing from an aluminium dinghy are most at risk from lightning. Landslides accounted for 32 deaths, (1803-1994), and earthquakes, 14 deaths.

To put these natural hazards into perspective, biological hazards, i.e. disease, kill many more people. The pandemic flu of 1918 killed 12,000 people in Australia. Motor vehicles probably kill even more.

There are no known deaths in Australia from tsunami. There is an excellent warning system for tsunami, and the police would have time to evacuate everyone in the danger zone. However, based on what happens in other countries, when the warning for tsunami goes out, many people go down watch! Big volcanoes in the sea, e.g. Hawaii, tend to become unstable, and big chunks break off the side, setting off a tsunami. The Reunion Islands, 4,000 km off the Western Australian coastline, and close to Madagascar, could behave the same way. Aborigines in the southwest of Western Australia have legends about big waves.

With all of the hazards, the risk is greater for young men, with the exception of heatwaves, probably because they are the ones doing things, perhaps not always wisely, e.g. crossing rivers in flood.

The high risk area for thunderstorms and hailstorms covers about one third of Australia, and includes Perth, Brisbane and Sydney. Storms may be widespread, but hail is usually restricted to a relatively small area. The largest hailstone is about 10 cm, but size is often exaggerated. Storms with hailstones of 10cm occur relatively frequently, once every 50 years. A cricket ball sized hailstone (8.5 cm diameter) from the 1999 hailstorm was sectioned and the structure examined. The crystals were larger in the centre, showing that it was formed under relatively warm temperatures. The core was surrounded by a zone of smaller crystals, which were formed under colder temperatures, and an outer zone of larger crystals, indicating warmer temperatures. This hailstone was buffeted up and down during its formation in the storm. Damage to housing depends on the type of house and the nature of the storm. In the March 1990 hailstorm, fibro houses suffered proportionately greater damage, but in the January 1991 windstorm, brick houses suffered the greatest damage. Windstorms bring down trees, and almost all of the houses were brick. When the 1999 storm if fully analysed, the patterns will be different again. Hailstorms are probably the most important natural hazard, from the insurance industry's point of view, with tropical cyclones a close second. However, it could be argued that drought is the greatest hazard, but we cannot insure against drought.

If we consider a damage index of 9, where 500 or more buildings were destroyed/damaged, then there have been 4 tropical cyclones, 4 bushfires, 4 hail/wind storms and 4 floods. There is thus no one hazard that rates above the others, with damage to buildings.

What of the future? Over the last 70 years, the frequency of tropical cyclones in the southwest Pacific has not varied, except for a slight increase when satellite observation came in. In Australia, the statistics show a dramatic increase since 1985, but there are many more recording stations now. The higher population along the coastline means that more people are affected by tropical cyclones - and more insurance claims.

Most companies do not insure against flood damage to houses, except in Queensland, but cars are usually covered. The industry is looking at what it would mean to insure against floods. For the Hawkesbury Nepean region, a 1 in 20 year event would mean 1,000 houses would be flooded; a 1 in 50 year event, over 2,000 houses; and a 1 in 1,000 year event, 12,000 houses would be flooded.

In 1984, the then Premier, Neville Wran, cancelled flood plain mapping due to political pressure, and replaced it by flood maps which are quite incomprehensible. The Flood Plain Management plan defines a flood plain as that below a Probable Maximum Flood (PMF). The Hawksbury Nepean system would probably be the worst affected. The difference between a 1 in 100 year flood and a PMF is about 5-6 m, and timber houses would float off their stumps. On the other hand, the difference between a PMF and a 1 in 100 year flood in the Lachlan R., at about Forbes, would only be 20-30 cm, because of the very wide flood plain. The coastal rivers have a problem here. These are some of the factors the insurance industry is considering before taking on flood insurance.

Calculating the risk of a natural hazard happening is one thing, but interpreting this risk is another thing. Some people think that if we have a 1 in 50 year flood, then it will be 50 years before we have another one like it. This is not so. After a 1 in 50 year flood, the risk is still 1 in 50. With earthquakes, however, stresses build up along fault lines which then moves at fairly regular intervals. But there are still problems associated with interpretation of the risk. For example, the Meckaring fault, east of Perth, moved vertically about 50 cm in 1968, disrupting roads, the railway, and the Perth to Kalgoorlie pipeline. With vertical movement, organic matter may fall into the fault line, and by digging down and dating the organic matter, it has been shown that the fault line moves about every 100,000 years. But this is the only fault we know about. There may be others, but we cannot detect them until they move.

HOT DAYS BUT COLD SWIMS: FISHERIES OCEANOGRAPHY OFF SYDNEY. A talk by Dr Iain Suthers, School of Biological Science, University of NSW.

Fish in Australia account for a 5th of Australian primary produce, but in world terms, Australia is 55th in tonnage, even though we have the 3rd largest fisheries area. Our clear water and clean beaches are a problem for fisheries.

Fisheries are being hard pressed the world over, Australia has the dubious distinction of having the first extinction, both commercial and biological of a fish – the eastern gemfish. Now that fishing has stopped, the gemfish is not coming back, unlike the eastern American cod which is coming back. Gemfish would swim up to Coffs Harbour to the 400 m isobath to spawn. The tiny fish drift back to the adult feeding grounds around Tasmania. Egg and larval drift are the nub of survival. As another example, juvenile prawns are swept out to sea from the spawning grounds in the river estuaries. They drift to the feeding grounds where they complete their development. Variable numbers of larvae arrive at the feeding grounds each year, accounting for a variable fish catch.

Three factors affect the drift and the numbers of larvae that arrive at the feeding grounds: first, food and nutrients: second, currents, and unusual currents may take the larvae somewhere else, and third, predation, especially by jellyfish.

The East Australian Current (EAC) is the major current down the east coast of Australia. It come across the Pacific as the Equatorial Current, then is deflected south down the coast. It takes about 2 years to cross the Pacific, and is stripped of nutrients to make the water nice and clear – but it is sterile. It branches off from the coast at about Laurieton, south of Port

Macquarie, but eddies form and travel further down the coast. When the current is at the edge of the shelf, it is pushed to the left by the Coriolis force, and colder water with more nutrients is pushed up from the depths. Thus the water temperature off Sydney beaches depends upon just what the EAC, the eddies and the upwelling are doing.

The only other natural source of nutrients is from runoff from the land. Off Cape Banks, at the entrance to Botany Bay, the frontal zone between runoff and the EAC may be seen, and it moves with the tide. This frontal zone influences larval fish distribution. The sterile waters of EAC have more light for phytoplankton, while the runoff has more nutrients, hence the frontal zone has the best of both worlds.

The sewerage outfalls, 3 km out to sea, are meant to put the sewage where it is trapped beneath the sterile water. Dr. Suthers is studying the effect of this additional nutrient source.

Diatoms and dinoflagellates are usually abundant in the phytoplankton, but there are many other types. High levels of nutrients may induce blooms of some of the phytoplankton. At times, Jervis Bay may turn milky white, because unusual eddies drive nutrients into the bay and keep them there. Under these conditions, there may be a bloom of coccolithophores, which have white, chalky plates (the White Cliffs of Dover are made of them). Around Sydney, a bloom of a blue green alga that looks like paint or sawdust, and the ‘red tide’ caused by a naked dinoflagellate bloom, are probably the result of additional nutrients coming from sewerage. *Noctiluca* is a large, bioluminescent dinoflagellate which captures and eats diatoms (as well as other particles). Thus even though it is a single celled "plant" it has no photosynthetic pigments - it's an obligate heterotroph. The greenish bioluminescence is released by bacteria-like organelles inside, similar to many other animals in the ocean that are also bioluminescent.

The water is sampled at discrete depths, and instruments measure salinity, temperature and depth. The plankton from different depths is studied. There are many different species in the plankton, and as well as the ones mentioned above, copepods and larvae of many species contribute substantially to the plankton. The standard way of studying plankton has been to identify all these species, but this is very time consuming, and it requires a level of expertise. The new approach is to use an optical plankton counter that counts and classifies according to size. All the species of a certain size group have much the same characteristics, e.g. how long they live, etc. Once classified, the chief objective of the study, the effect of nutrients on the plankton, can proceed. It is thought that excessive nutrients from runoff are the greatest danger.

The Franklin research vessel samples 2 transects. Near Smokey Cape, north of Port Macquarie, the current speeds up, as it is trapped between the coast and the open ocean. This is a good sampling place for warm water. Near Diamond Head, south of Laurieton, where the current has veered off from the coast, there is upwelling and this is a good cold water sampling place. A maximum of chlorophyll is found at depths off Smokey Cape, but the maximum is at the surface at Diamond Head.

The study of the response of the plankton to nutrients, and the effect on the fisheries is ongoing and will take many years. There are components of the plankton, such as the bacteria and viruses, about which very little is known, and Dr Suthers will be kept busy for many years to come.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 95 **APRIL 2000**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members:
Ms Margaret A. Humphrey, School of Biological Sciences, University of Sydney
Ms Shauna Murray, School of Biological Sciences, University of Sydney
Ms Helen M. Smith, School of Biological Sciences, University of Sydney.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS ARE TAX DEDUCTIBLE

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is on a separate sheet.

THE GREAT ORDOVICIAN BIODIVERSIFICATION EVENT: a talk given by Dr. Ian Percival.

The base of the Ordovician period is 490 million years old and the top is 443 million years. During the Ordovician period there was a great explosion of life, or biodiversification, with a rapid emergence of families, genera and species. At the end of the period, there was a catastrophic extinction of many of the life forms.

The International Geological Correlation Project 410 aims to study the Great Ordovician Biodiversification Event (GOBE) and has a five year timetable. We are half way through the programme, and Australia is one of the 7 major study areas.

The Ordovician world was a very different place. There was one large continent, Gondwana. North China, South China and Taiwan were separate blocks to the north, and Kazakstan was an island arc further west of the China blocks. To the west of Gondwana was Laurentia or North America. All of these land masses were fairly close together, and the rest of the world was sea.

Almost all life in the Ordovician was marine, and the project will study the reasons for biodiversity at different depths. It will also study realms and provinces, and whether organisms were cosmopolitan, provincial or endemic. The Ordovian was a time of much provincialism. Climate was one factor controlling distributions. Australia, China and Kazakstan were temperate to tropical

Conodonts are the fossilized mouth parts of an extinct group of chordates, rather like the hagfish, and are provincial. The conodonts, graptolites and brachiopods all live at particular water depths, hence the shelf edge, shelf and deep water environments support different species.

In the mid Ordovician, Australia had a shallow seaway across the centre. The eastern one third of Australia was deep water with offshore volcanic islands. Thus in inland New South Wales, there are two formations of Ordovician rocks outcropping, one a shelf formation stretching from South Australia to Broken Hill, and the other a deep water, volcanic and turbidite formation. Tasmania has a platform formation similar to the Flinders Range in South Australia and western New South Wales.

Lord Howe Island is thought to be a good analogy of Ordovician environments. There is a shallow lagoon with limestone reefs, and reefs fringe the island. The steep sides drop off rapidly to deep water, where the shales and turbidites are formed. Islands are special environments, and they are rare in the geological record. They are relatively small in area, may be isolated and are frequently subjected to storms. They may be refuges or may form stepping stones for migration. There may be upwelling along the side of oceanic islands, and slumping of unstable oozes down steep slopes.

Shallow platform assemblages are distinctive, with corals reefs, algae, and shell banks of gastropods and brachiopods. Shells have a heavy end and stand upright, except after storms. There may be hundreds of species in the community. Up to 10 m depth, there may be 30-40 species of corals in habitats such as sheltered lagoons. To 50 m depth, there may be over 80 species of brachiopods, stromatoporids, corals, gastropods, conodonts and trilobites.

In New South Wales, the steep slopes have communities that would have lived on site, and displaced organisms that probably fell down the slope as a result of earthquakes. There are up to 131 species of siliceous sponges, conodonts and lingulid brachiopds. Some of the latter were very small, only a few millimeters, and are easily overlooked. Tasmanian communities in similar habitats lack the sponges and the lingulid brachiopds that live on them.

The deepest habitats are dominated by trilobites, and there may be up to 20 species. Pelagic graptolite, nautiloids, benthic lingulids and large sponges are found here also. The bottom gradient is important for the habitat. These deepest communities have greater biodiversity because at these depths, climate has no influence, hence they are not provincial.

At the end of the Ordovician period, there was an ice age which devastated the temperate-subtropical world. At this time the south pole was in the middle of the Sahara. The ice cap would have drained the shallow shelves, thus devastation the shallow water communities.

WILSONIA BACKHOUSEI: A SALTMARSH PLANT WITH A PAST Helene A. Martin

Wilsonia backhousei is a small, inconspicuous plant growing in saltmarshes. It is so inconspicuous that it does not have a common name. I tramped over it many times without being aware of its existence, until it flowered, and then the saltmarsh was a carpet of tiny white flowers. It is a member of the morning glory family (Convolvulaceae), but you would not think so just by looking at it. When I examined its pollen under the microscope, I recognized a fossil pollen type that had been named *Tricolpites trioblatus*.

T. trioblatus Mildenhall and Pocknall had been described from Miocene sediments from the Otago district, South Island New Zealand and attributed to the *Hebe* complex (family Scrophulariaceae). This attribution was decided by comparison with pollen types found in the New Zealand flora, and the comparison was 'fair enough'. When compared with *W. backhousei*, which is not native to New Zealand, the match was much better. Pollen of *Wilsonia rotundifolia* is very similar, and *Cressa cretica* is like *T. trioblatus* also, but the match is not as good. Both of these latter species are found in saltmarsh also. If *T. trioblatus* had come from *Wilsonia*, and not one of the *Hebe* complex, then it would solve an ecological problem in Australia.

Species of the *Hebe* complex are common in alpine and subalpine regions of New Zealand, and may form shrublands on rocky scree slopes. There are a few species of the *Hebe* complex in Australia, mainly in Tasmania and the Snowy Mountains. *T. trioblatus* is found in Miocene sediments in central Australia, near Lake Eyre and Lake Frome, at a time when there were large, shallow lakes with wide swampy margins. The waters were fresh or brackish, becoming saline at times. Both forests and open vegetation were present, and there were periodic dry spells. The region supported an abundant fauna, and fossils of fish, crocodiles, mammals and water birds, including two species of flamingoes, have been found. Thus saltmarsh habitats would have been present, but alpine/subalpine habitats were most unlikely.

Re-examining the New Zealand *T. trioblatus*, it is found in lake sediments which were distinctly alkaline, and where there were stromatolites. Salt tolerant plants are adapted to harsh conditions and would be at home in an alkaline environment. This alkaline lake was destroyed by mountain uplift. The central Australian and New Zealand records are thus in accord with regards to the habitat of *T. trioblatus*, supporting its identification with *Wilsonia*.

The fossil is also found in the Murray Basin in the late Eocene, pre-dating the central Australian record. The shallow Murray Basin was subjected to extensive flooding at times of high sea level, and the deepest channels were probably always marine, even at times of low sea level. There were probably always some salt affected environments, somewhere in the basin. Such an environment, and a frequently changing (in geological terms) environment would have been conducive to selection for salt tolerance and the evolution of saltmarsh species. This record from the Murray Basin is the oldest of the fossil known.

There is another record of the fossil from the Lemonthyme in the highlands of Tasmania, where a marine influence was most unlikely. The lake sediments overly a tillite with clasts of an alkaline basalt, hence an alkaline environment is possible. Thus all of the fossils occur where a saline or alkaline environment is possible, and it is likely that *Wilsonia* was a saltmarsh/alkaline habitat plant for the whole of the time since the late Eocene, or some 30 million years.

It is not surprising that *Wilsonia* is found in the fossil record of New Zealand, for Australia and New Zealand shared many taxa that may not be native to either country now. Today, on the rare occasions when the dry salt lakes in inland Australia fill with water, they support prolific populations of opportunistic waterfowl. When the lakes dry up, the waterfowl rapidly disperse to coastal regions of Australia, New Zealand, Christmas Island, Indonesia and Macquarie Island. Birds would be ideal transport for seeds, either in the gut or stuck to feathers or feet. *Wilsonia* did not persist in New Zealand because its habitat was destroyed.

Reference

Martin, H.A. (submitted for publication). Re-assignment of the affinities of the fossil pollen type *Tricolpites trioblatus* Mildenhall and Pocknall to *Wilsonia* (Convolvulaceae) and a re-assessment of the ecological interpretations. Review of Palaeobotany and Palynology.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 24 May, at 6 pm, in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Dr PAUL HESSE

Department of Physical Geography, Macquarie University

PROFITING FROM LOESS: CONSTRAINING QUATERNARY CLIMATE CHANGE IN AUSTRALIA FROM AEOLIAN DUST RECORDS.

Aeolian dust is a uniquely valuable proxy of past climates of arid Australia. The amount and frequency of dust raising (wind erosion) is determined by environmental conditions in the arid and semi-arid inland at both short and long time-scales. Most important are the availability of strong winds, the moisture level of the soil in holding particles together and the protection offered to the soil surface by plant cover. The variability of these factors determines the amount of dust raised and transported in the atmosphere. Over the late Quaternary, variations in the amount of dust transported from inland Australia to the oceans record continental climatic variations with the added benefit of continuous, (relatively) high resolution sedimentation and continuous age control unequaled on land. This proxy is ambiguous, however, as it may be influence by source area moisture status (aridity) and wind strength. Particle size analysis of dust in deep-sea sediments has recently shown that during the Last Glacial Maximum (20 000 y. B.P.) winds over southern Australia were no stronger than those of the Holocene (the last 10 000 years) contrary to the widely held expectation. This finding has widespread implications; the record of dust accumulation can be read as one of changing aridity over the glacial cycles and the progressive 'aridification' of inland SE Australia in the late Quaternary. Secondly, the desert dune fields covering much of Australia and the marginal continental dunes of the southeast must also be explained by increased aridity rather than stronger winds. Physiological aridity, influenced by atmospheric carbon dioxide levels, must be modeled to account both for the Glacial aeolian activity and the well-known vegetation changes in southern Australia.

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Wednesday 21 June, at 6 pm, in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Dr. STEPHEN SKINNER

Royal Botanic Gardens, Sydney.

BLUE-GREEN AND OTHER MORE VISIBLE ALGAE FROM THE SYDNEY SANDSTONE

There are many algae on the rocks and in the waterways of the Sydney basin. Snot (*Nostoc* commune), a resurrection plant, commonly appears in lawns, golf courses and waste land after rain, as a rubbery khaki gel. The edges of the natural gardens in sandstone country have purple-brown *Stigonema* and *Scytonema* among the mosses. *Scytonema* and its friend *Dichothrix* are real city slickers, living happily around the fountains of the city and in the dripways of cuttings and stone walls. The strange thick walled green alga *Cylindrocapsa* and occasionally the tufted red alga *Audouinella* turn up in seepages, waterfalls and in gully creeks. Have you ever seen strange pale green or clear lumps of jelly along bush tracks? It's probably been a colony of a minuscule and rather weird green called *Coccomyxa*! And there are plenty more. Specimens and illustrations will accompany the talk.

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Wednesday 19 July, at 6 pm, in the Seminar Room, Royal Botanic Gardens.
Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Dr. SCOTT MOONEY

School of Geography, University of NSW

UNRAVELLING ENVIRONMENTAL CHANGE IN THE LAST 2,000 YEARS IN SOUTHEASTERN AUSTRALIA

Several Australian research groups have recently turned their attention to environmental change within the late Holocene (the last 2,000 years), for example, investigating climatic variability or environmental change associated with the European occupation of Australia. While these studies use similar techniques, they represent a departure from more traditional palaeoenvironmental studies. In particular, the analysis of the recent past using sediment-based palaeoenvironmental records allows a 'quasi-experimental procedure' whereby known perturbations can be used to test palaeoenvironmental records. Using such 'tests' sensitive indices of change can then be developed. Of note, such research is also potentially relevant to the modern management of landscapes (for example the recent history of fire, erosion and lacustrine productivity). This talk will seek to introduce such uses of palaeoenvironmental research, and in particular, will illustrate the topic using the recent fire history of Royal National Park as an example.

EVERYONE WELCOME

Wine and cheese will be served from 5.30 pm

Before each talk.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 96 **JULY 2000**

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IN THIS ISSUE

NEW MEMBERS

We welcome the new members to the Society:
Ms Tanya Llorens, Departmant of Biological Sciences, University of Wollongong
Ms Jessica Stapley, Division of Botany and Zoology, Australian National University
Ms Elizabeth Tasker, School of Biological Sciences, University of Sydney
Ms Emma Turner, Graduate School of the Environment, Macquarie University
Mr. Bob Wong, Division of Botany and Zoology, Australian National University

LINNAEN MACLEAY MEMEORIAL LECTURE

We are pleased to invite Prof. Paul Adam to present the Linnaen MacLeay Memorial Lecture on the prospects of biodiversity conservation. See Programme for details.

Vale MARY MACLEAN HINDMARSH

Mary Hindmarsh, botanist and university lecturer died in Sydney after a long history of chronic health problems. She will be remembered kindly by many of her students and colleagues, some of whom kept in touch right up to her death.

Born in 1921 into an old Lismore family, Mary was the eldest of four girls. After their mother died, they were cared for by a very progressive grandmother. Educated at local schools, she had always shown an interest in and an aptitude for Botany, and so was encouraged by her grandmother to continue on to university. In 1939 she was enrolled in only the second intake of students into the Faculty of Science at the New England University College in Armidale. At this time in its infancy, the college was a bit like a large family.

Mary graduated with a BSc in 1943 majoring in Botany and Geology. She taught briefly in a Sydney private girls' school and then undertook part-time demonstrating in Botany at Sydney University, eventually becoming a full-time demonstrator and tutor to ex-servicemen and women studying under the Commonwealth Reconstruction Training Scheme.

In 1949 she won a Linnean Macleay Fellowship, which allowed her three years to do research and was awarded a Ph.D in 1953. The next two years were spent at the Chester Beatty Research Institute at the Royal Cancer Hospital in London. She returned to Australia in 1954, and was appointed as one of the only two female lectures, she in Botany and the late Dr. Par Stephenson in Zoology, to the NSW University of Technology in Ultimo, which later became the University of NSW at Kensington. She remained at UNSW retiring in 1978 as an Associate Professor.

She joined the Linnean Society of NSW in 1943, later becoming a Life Member, and served on the Council in 1970-1974. She was a very generous anonymous donor to the Joyce Vickery Research Fund, and a Foundation Member of the Friends of the Royal Botanic Gardens.

In the latter part of her career, she spent some years working with the late John Waterhouse, compiling a key to the identification of rainforest species south of the Macleay River watershed. Unfortunately, due to the sudden death of Mr. Waterhouse in 1983, and her inability to complete the field work alone, this work was never completed.

In her early retirement she became an enthusiastic wood carver and cabinetmaker, and she played croquet, becoming a qualified coach and referee. She was honoured with a Life Membership of the Mosman Croquet Club.

Her achievements were the most remarkable because, for the last 45 years of her life, she suffered from Systemic Lupus Erythematosis which necessitated many adjustments to her lifestyle and complicated any outdoor activities. In the last two years she also developed Motor Neurone Disease which finally claimed her life. She bore the increasing disability with admirable courage and further adapted her lifestyle as her physical condition deteriorated. When she could no longer use her woodworking tools or hold a croquet mallet, she learned to play bridge and enjoyed it. When she was no longer able to write, she bought a computer and learned to communicate through e-mail.

A positive and independent person, she loved music and enjoyed the ballet and opera. She had a great interest in and affection for her family and was a very loyal and supportive friend and colleague. She is survived by her three sisters.

She will be remembered as a pioneering botanist and academic, a conscientious and caring teacher, a fair and just administrator, and someone who made a contribution to women in Science especially at the University of New South Wales.

BETTY MAYNE SCIENTIFIC RESEARCH FUND AWARDS FOR 2000

The Committee's report. Ten application were received with requests far exceeding money available. The Committee expressed concern that only one applicant was a member of the Society. While this is not a requirement of application for funding, it was disappointing that some academics of long-standing did not consider membership was warranted, and that none of the postgraduate student applicants availed themselves of the benefits of Society membership. Awards were made on the basis of merit and need, with well-constructed grant proposals rating most highly. We regret being unable to fund all proposals and grant successful candidates all they sought.

GOLAB, Alexandra, (Ph.D. student, School of Geosciences, University of Wollongong)
Project: Impact of igneous intrusions on coal mining and the alienation of coal reserves.

The main objective is to develop a method which uses groundwater and gas chemistry to detect and locate these intrusions in 3-D, using analyses performed at the earliest stages of exploration. A water probe is needed which will be used to analyse groundwater samples at the time of collection for pH, eH, temperature and conductivity – all of which change with time. The chemistry of the groundwater and rock samples in the mine workings can be statistically compared and mapped on a GIS, in order to determine the contributions made by igneous intrusions to the groundwater chemistry. Awarded $400 towards the purchase of a Horida Field water probe

MUNDELL, Andrew (B.Sc. Hons student, Geology Dept, University of New England)
Project: Geochemistry of arsenic and antimony mobilisation in the Macleay River tributaries and wetlands of the Kempsey Shire associated with acid sulphate soils.

There are 3 main aims of the project: (a) to identify the source of arsenic affecting the Stuarts Point water supply and surrounding wetland area; (b) to document the source of high antimony levels in the Macleay River; and (c) to study the extent of acid sulphate soils in Kempsey Shire. Analysis of water and sediment samples will assist determination of potential sources of contamination, and will help to understand and predict the likely toxicological effects on the environment and marine organisms such as oysters. Awarded $240 towards analyses.

TRUE, James, Ph.D. student, School of Marine Biology & Aquaculture, James Cook University
Project: Tracing stress events recorded in coral skeletons: the reliability of stable isotope analysis used to reconstruct periods of stress.

The tissue layer of massive scleractinian corals, such as *Porites*, is present as a thin band at the outer edge of colonies. Tissue thickness normally follows a seasonal cycle, influenced closely by sea surface temperature, and is responsive to environmental conditions. The project aims to establish patterns of variation in stable isotope ratios of carbon and oxygen resulting from stress episodes in the life of the corals. Experiments will investigate if stable isotope analysis may be used as a proxy environmental monitors. Preliminary investigations show promise. Awarded $240 for coring gear.

WILSON, George, p/t Ph.D. student, Dept of Earth & Planetary Sciences, Macquarie University
Project: Community dynamics of Early Devonian silicified faunas of central-western NSW.

Outcrops of the Garra Limestone near Wellington, NSW, yield rich shelly faunas. This enables the complete fossilised community to be extracted and studied. Brachiopods are the main component, while associated conodonts give a precise age to the faunas. This is important because a global extinction event has been recorded elsewhere in the Pragian stage of the Early Devonian, and it is known that the Garra Limestone spans the Lochkovian/Pragian boundary.

Documentation will use both SEM (conodonts) and conventional photography (macrofossils). Awarded $500.

WRIGHT, Anthony, Senior Honorary Fellow, School of Geosciences, Wollongong University.
Project: Taxonomic and biostratigraphic studies of Silurian graptolite faunas from the Four Mile Creek area, south of Orange, NSW.

This area includes is arguably the most important Lower Silurian sequence in Australia (yielding a crucial fauna in global terms), but none of the 50+ graptolite species so far listed from the succession have so far been described. Much of the fauna has been collected, and is being described, but additional fieldwork is needed to complete a detailed map of the area, and to confirm the stratigraphic succession of the old collections. The enhanced precision in Early Silurian biostratigraphy of the Lachlan Fold Belt will enable determination of the interplay between tectonic phases and sea-level changes on stratigraphy of this region. Awarded $600.

J.W. VICKERY SCIENTIFIC RESEARCH FUND AWARDS FOR 2000
The Committee's report. There were 34 applications with requests far exceeding the money available. Only 13 of the 34 applicants were members of the Society, and although it is not compulsory to be a member to receive a grant, it was decided that with so many applications and with limited money available, members would be given precedence in deciding grants, all else being equal. The Committee regrets that it could not fund more projects, or support those granted with the amounts they requested.

ANDREW, Nigel R., PhD student, Department of Biological Sciences, Macquarie University
Project: The potential effects of climate change on insect herbivory

The project aims to understand how herbivorous insects may respond to climate change by assessing how current species distribution is limited by climate, distribution of host plants, and the interaction of these two factors. Very little is known about what determines the distribution of herbivorous insects. This project will initially measure the turnover of herbivorous insects on *Acacia falcata* with a broad latitudinal range, from Atherton to Batemans Bay. Awarded: $250.

BROWN, Claire L., Ph.D student, Australian Flora and Fauna Research Centre, University of Wollongong.
Project: Threatened flora species in science and law

Threatened Species conservation legislation often demands action by land managers despite inadequate scientific knowledge. This study will look at the interactions between legislation, policy and science using two threatened plant species as case studies: *Tetratheca glandulosa* and *Darwinia biflora*. The former species is clonal, which could have important ramifications for its conservation. Awarded: $300.

BROWNE Carol L., PhD student, Centre for Integrated Catchment Management, University of Western Sydney, Hawksbury
Project: The impact of urbanisation on the Eastern Longneck Turtle

This turtle, *Chelidonia longicollis*, has a patchy distribution in higher-density Sydney, and few juveniles have been found in most of these populations. There are few studies of pollution effects on reptiles. The effects of pollutants on this species will be studied through blood and parasite laboratory studies and field monitoring. Awarded $250.

CELEBREZZE, Thomas M., PhD student, Australian Flora and Fauna Research Centre, University of Wollongong.

Project: Gene flow and inbreeding effects of European honeybees (*Apis mellifera)* in some Australian shrub species: comparative exclusion experiments in bird- and insect-adapted species in three plant families (Myrtaceae, Proteaceae and Epacridaceae).

The effect of honeybees on the population genetics and pollination ecology of several Australian species will be studied, to investigate whether honeybees alter the rate of fruit set, and move pollen shorter distances than vertebrate pollinators, thereby leading to inbreeding in bird-pollinated species. Last year's J.W. Vickery grant was used for a pilot study of the variability of genetic markers in the only population of the endangered species *Grevillea rivularis*. Further funding is sought to extend this study to assess the likely magnitude and rate of inbreeding. Awarded: $300.

CLAUS, Sonia, PhD student, School of Biological Sciences, University of Western Sydney Hawkesbury

Project: The effect of urbanisation on the distribution, abundance and accumulation of heavy metals in the mussel (*Xenostrobus securis*).

Bivalve molluscs are good sentinel/indicator organisms, to indicate the presence of pollutants such as heavy metals in estuaries. Stormwater is believed to be a major source of pollutants in urban areas, as well as putting large amounts of fresh water into mangrove habitats. The mussel *Xenostrobus securis* is not well studied, but is known to be tolerant to a wide range of salinity levels, unlike other commonly used bioindicators (Sydney rock oyster, blood cockle and blue mussel), so it may be a useful indicator species. Awarded $250.

COX, Michelle P., PhD student, School of Biological Sciences, University of Sydney
Project: The effects of warm-temperate rainforest fragmentation on non-flying mammals in the Dorrigo region, NSW

Habitat fragmentation is a worldwide problem, leading to various consequences including loss of species and changes in species composition. The effects of clearing and fragmentation have been studied in Australia's tropical rainforests but surprisingly little is known about other rainforest types. Mammal diversity will be examined in a range of 30 warm-temperate rainforest remnants near Dorrigo, and the importance of various parameters (time since logging, grazing, fire, etc.) determined. Awarded $200.

DEBUS, Stephen J.S., PhD student, Division of Zoology, University of New England
Project: The impact of habitat fragmentation on woodland birds

Many bird species are declining in NSW woodlands, but the relative importance of inferred causes is unclear. Focal species (mainly small, open-nesting, ground-foraging passerines) will be studied to test whether lack of dispersal to habitat remnants and nest predation are causing loss of local populations in some remnants. Awarded $250.

GARCIA, Adriana, Visiting Fellow, University of Wollongong
Project: Systematics and biological cycle of the charophyte *Lamprothamnium* (Algae) from coastal lakes of NSW

Charophytes are non-marine green algae, living in fresh to hyper-saline water bodies. They are important primary producers, providing a substrate for epiphytic growth and food for water birds. They play a significant role in maintenance and improvement of water quality, including salinity. *Lamprothamnium* is the only genus that can tolerate 'fringe' environments, being adapted to changing salinity. Two of the 5 or 6 species are known to occur in Australia: one in inland saline lakes, the other in coastal lakes. The coastal species will be investigated for distribution, habitat and life cycle. Awarded $250.

GAYLER, Lucyna M., Honours student, Department of Geography and Environmental Science, University of Newcastle
Project: Vegetation history and its implications for reconstruction of past climatic conditions in the Paroo area, NW NSW

Pollen from palaeo-lake sediments and geomorphological features related to the lake will be used to reconstruct vegetation history and climatic changes over the last few thousand years in this ecologically interesting area. Growing interest in further agricultural development of this region has increased the importance of water regulation issues. Awarded $200.

GIBB, Heloise, PhD student, School of Biological Sciences, University of Sydney
Project: The effect of a 'dominant' ant, *Iridiomyrmex purpureus*, on the ant community of Hawkesbury sandstone outcrops

The Australian meat ant is abundant, active and aggressive. It seems to affect other species by interfering with their foraging workers. This study, the first longer-term experimental study of a dominant species, will examine its effect on species richness and on abundance, activity levels, habitat use, foraging success and nesting behaviour of other ant species. Ant-attended homopterans and predatory spiders will also be studied. Most other ant studies have been in the arid zone, so this will add to knowledge of temperate species and their behaviour. Awarded $200.

JOHANSON, Zerina M., Postdoctorate Fellow, Australian Museum
Project: Phylogenetic relationships of the Dipnoi (lungfishes)

Lungfish are the living sister group of the Tetrapoda (land vertebrates), the two groups are not only closely related but have strikingly similar early histories (fossils go back 400 million years to the Devonian). However, their more recent histories have been very different, with the Tetrapoda moving onto land and undergoing an explosive radiation, but the lungfish remaining aquatic and declining. The reasons for these very different outcomes are not clear, and this study of fossil lungfish aims to elucidate them. Dr. Per Ahlberg, the acknowledged expert on lungfish, plans to visit Australia and collaborate on the project. Awarded $550 (for accommodation of visiting collaborator) and $250 (supplementation from the Betty Mayne Fund).

KEITH, David A., Senior Research Scientist, NSW National Parks and Wildlife Service
Project: Demographic census of *Epacris stuartii* Stapf

This native heath species is only known from one population, in Tasmania. The population was first examined in 1995, and 400 plants were tagged for re-examination annually. This study aims to document population trends and understand factors that control its population dynamics by quantifying annual variation in survival, growth and reproduction in relation to the occurrence of fires and storms. It is the only such demographic study on *Epacris* and one of the few Australian studies of plant population dynamics extending beyond 5 years. It is the first population viability model that addresses two independent disturbance regimes (fires and storms). Awarded $ 250

LENTIC, Michael I., PhD student, Institute of Wildlife Research, University of Sydney
Project: Landscape ecology: fire, rainfall and lizard diversity in Central Australia

Australia's spinifex deserts harbour the world's greatest diversity of lizards. The Simpson Desert in Queensland supports 50 species, but species assemblages can change dramatically over a few years. This study aims to disentangle the effects of climate, fire and niche-partitioning in the Simpson Desert, leading to models that can explain and predict lizard diversity in other arid areas. Awarded $200.

LITTNAN, Charles, PhD student, Graduate School of the Environment, Macquarie University.
Project: Methods for accurately estimating fur seal numbers at the Skerries Island group, Bass Strait

This protected species is being studied in Bass Strait to assess the extent of competition between seals and commercial fisheries. Diet and foraging behaviour are being studied, but there is a need also to assess the size and dynamics of seal populations. The relative accuracy of different methods for estimating seal numbers in the different conditions found in Bass Strait colonies is being determined. Awarded $250

McDONALD, Paul G., PhD student, Division of Botany and Zoology, Australian National University
Project: Parental investment and mate choice in a declining woodland raptor, the Brown Falcon *Falco berigora*

The Brown Falcon is a common woodland raptor that is declining in some areas. This study will follow up on the only comprehensive study of this species, at Werribee, focussing on the effect of land-use changes and on parental investment and mate choice. Awarded $250

MONTGOMERY, Margaret E., PhD student, School of Biological Science, University of NSW.
Project: Inbreeding depression in the koala (*Phascolarctos cinereus*)

Questions about loss of genetic variation and loss of reproductive ability in isolated populations in the Pilliga, French Island, Kangaroo Island and Eyre Peninsula are being addressed. Awarded $300

MURRAY, Shauna A., PhD student, School of Biological Sciences, University of Sydney
Project: Taxonomy, toxicity and ecology of benthic dinoflagellates of the Sydney region

Dinoflagellates are unicellular organisms inhabiting sediments and the water column in both fresh and salt water. Recent years have seen renewed interest in benthic dinoflagellates, mainly due to the potent toxins found in many species, which can cause poisoning but may also have chemotherapeutic properties. This is the first taxonomic study of benthic dinoflagellates in temperate Australia. Awarded $300

PATTERSON, Heather, PhD student, School of Biological Sciences, University of Sydney
Project: Isotopes, early life history, and potential self-recruitment of coral reef fishes

If a reef-associated iostopic signature can be detected in the otoliths (ear bones) of fish, it will provide information on the early life history of coral reef fish (i.e. water conditions they have experienced), as well as potentially indicating connectivity between reefs and the extent to which these populations are recruiting to the reefs from which they were spawned. Awarded $200

PFEIL, Bernard E., PhD student, CSIRO Plant Industry Canberra
Project: Systematics of Hibisceae (Malvaceae)

Understanding the tribe Hibisceae is central to understanding the relationship between two very closely related and often intertwined families, Malvaceae and Bombacaceae. Preliminary work has shown that this largely Gondwanan tribe is polyphyletic, while its largest genus, *Hibiscus*, is paraphyletic. The main centre of diversity in the tribe is in Madagascar, and samples are needed to complement the material obtained from other researchers in the Americas and India. Awarded $200

PRITCHARD, Janet C., PhD student, Division of Botany and Zoology, Australian National University
Project: Evolution of Golden Perch life histories over the last 25,000 years of climate change (Percichthyidae, *Macquaria ambigua*)

Comparing characteristics of otoliths in modern and fossil populations of Golden Perch will enable tracking of life history variation over 25,000 years of climate change. Fossil otoliths are to be collected from the Lake Eyre region to compare with fossils from the Willandra Lakes and modern otoliths from the Murray-Darling Basin. Awarded $300.

SEARSON, Matthew J., Honours student, Dept. of Geography and Environmental Science, University of Newcastle
Project: The dendroclimatological potential of *Callitris glaucophylla* in the Paroo
The potential of tree rings for the reconstruction of climate history will be investigated. Awarded $200

SHEPARD, Jill M., PhD student, Australian School of Environmental Studies, Griffith University
Project: Conservation priorities for the White Bellied Sea Eagle (*Haliaeetus leucogaster*) as determined by genetic analysis and habitat modelling

Declining numbers of White Bellied Sea Eagles have been linked with habitat clearance and other human interference. The genetic variation in the eagle is being studied over major biogeographical regions of Australia. Modelling historical distribution records against habitat using a GIS, and adding genetic data as a final layer in the GIS, will allow better identification of areas of particular conservation significance. A field-based sexing tool will be produced, based on genetic and morphometric data. Awarded $200

STRKALJ, Veronica J. A., Honours student, Division of Botany and Zoology, Australian National University
Project: Molecular phylogeny of Australian coral snakes (Elapidae: *Simoselaps*) and the evolution of egg-eating

Classification of this widespread group has not been clear. Molecular data from 3 mitochondrial genes, cytochrome *b*, ND4 and 12S, will be gathered to elucidate relationships, and draw inferences about the evolution of egg-eating in the group. Awarded $200

TASKER, Elizabeth M., PhD student, School of Biological Sciences, University of Sydney
Project: The impacts of cattle grazing and associated burning regimes on the biodiversity of Tableland eucalypt forests, NSW

The impact of such activities has been studied in grasslands, rangelands and alpine areas, but little has been done on Australian forests. This study is looking at whether a regime of frequent low-intensity spring fires immediately followed by grazing reduces structural complexity of the forest understorey and consequently reduces faunal diversity on the Northern Tablelands of NSW. Funding is needed for the final field trip to complete a comparison of small mammals, epigaeic and trunk invertebrates and vegetation in forest that is either grazed and burnt OR ungrazed and unburnt. Awarded $300

TURNER, Emma K., MSc (Honours) student, Graduate School of the Environment, Macquarie University
Project: Effects of human activity on the behavioural and hormonal stress response of Little Penguins at Phillip Island and Weddell Seals in McMurdo Sound, Antarctica

These two species are exposed to frequent research and visitation, as are many other species. Previous studies have looked at long-term consequences for disturbed species but not so often at the consequences for individual animals. This study aims to use small-scale parameters such as stress hormone levels, vigilance and defensive/aggressive behaviour to assess the acute stress response (i.e. temporary changes in behaviour and physiology in response to a short, intense disturbance) of these two species (not previously so studied) and to determine whether they differ in their vulnerability to disturbance. Awarded $200.

WONG, Bob B.M., PhD student, , Division of Botany and Zoology, Australian National University
Project: Reproductive ecology of the Spotted Pipefish, *Stigmatopora argus* (family Syngnathidae)

The Spotted Pipefish offers an ideal opportunity to test our understanding of the evolution of sex differences because of its uniquely specialised parental care. Like other Syngnathids, the males carry and care for the developing embryos in specialised brood pouches. Sex role reversal is likely in such species, with females competing more intensely for access for mates and usually being more modified by sexual selection. This study will determine whether this species is in fact sex role reversed, through field and laboratory experiments. This will also result in a better understanding of the evolution of the Syngnathidae in general. Awarded $200.

PROFITING FROM LOESS: CONSTRAINING QUATERNARY CLIMATE CHANGE IN AUSTRALIA FROM AEOLEAN DUST RECORDS, a talk by Dr. Paul Hesse, Department of Physical Geography, Macquarie University

The profit from loess, an indicator of past climates, is all intellectual. Dr. Hesse showed us a scene of the thick loess deposits in China. A steep gully cut through the thick pale yellowish sediments which are the accumulation of windblown dust. Several greyish bands showed where the dust stopped blowing long enough for soil formation and a vegetation cover to develop. Australia does not have significant deposits of loess, for the dust is blown out to sea.

Dust events are correlated with the failure of winter rains in southern Australia, when the vegetation cover is reduced (mainly the failure of the wheat crop). Strong westerly winds then whip up the dust. Severe dust storms today may reduce visibility to almost zero, and the dust may end up in New Zealand. Most of the dust originates from the Murray Darling flood plains in southern New South Wales and Victoria.

Cores from ocean drilling show deposits of dust. A picture of a core showed the mid grey colour of the sediments - with occasional redish grey bands, the red colour coming from dust. The dust may be recovered from the sediments and studied. Dust is essentially particles of quartz (sand) and clay. Dr. Hesse selected his cores from the Lord Howe Rise, away from strong currents that may redistribute sediments carried out to sea by runoff from the land, and away from volcanic activity that would also be a source of dust. The Lord Howe Rise deposits almost entirely carbonates, and any dust must have been transported in by wind.

Deep sea cores are excellent for study, for deposition is almost continuous. They contain foraminifera, and the oxygen isotopes studies on them give a very good dating record. In comparison, terrestrial deposits are usually discontinuous and hard to date.

The particle size of the dust is correlated with wind strength. The further the distance from source, the smaller the particle size. Larger particles settle out under gravity, but the smaller particles are washed out by rain. A change in particle size at any one site (the Lord Howe Rise in this case) would indicate a change in wind speed.

The record for Lord Howe Rise goes back about 1 million years. The graph for dust shows a low and consistent level of dust, without much variation, from 1 million years to 350,000 years, then a considerable rise at the time of a glacial period. After that glacial period was over, the dust level fell, but not to the former low levels. At each subsequent glacial period, the dust levels increased to higher levels than the previous one, and afterwards fell, but to a higher level than the previous one. There have been four cycles of elevated dust activity.

In the Murray Darling area, there have been four cycles of dune mobility also. Today, dunes only become mobile when the vegetation has been disturbed, either from clearing or from rabbits on some other cause. Vegetation stabilises them, and also prevents wind erosion of the soil, i.e. the duststorms. There are even marginal sand dunes in the Blue Mountains. At Newnes, there is a dune 8 m high, 200 m wide and a kilometer long. It is now covered with low trees, which would not have been there in the last glacial period. These marginal dunes outside the Murray Darling floodplain indicate the great area affected by the aridity during the last glacial period.

The glacial periods were more arid, with an estimated 40% less rainfall. They were also colder, with mean annual temperatures about 9° lower than that of today. There was more shrubby and herbaceous vegetation and fewer trees in glacial times. It has usually been thought that during the glacial periods, winds were stronger than the present, but Dr. Hesse questions this, for his dust particle size does not change from glacial to non-glacial periods. This means the greater quantities of dust in the glacial period must have been the result of greater disruption of the vegetation.

The amount by which the rainfall was lowered is now being questioned also. Carbon dioxide (CO^2) levels were 40% lower than those of today. This has been determined from ice cores of the ice caps. Ice accumulates each year and there are very long, continuous records in Greenland and Antarctic. There are air bubbles in the ice, and the air from glacial times has 40% less CO^2. No one knows where the CO^2 went, but is assumed it was absorbed by the oceans. The Japanese make use of the trapped air bubbles in ice. They like to take chunks of ice-berg and put it in their scotch - it fizzes! Lower levels during the glacial periods would have been stressful for plants, stunting growth. Smaller plants, the shrubs and herbs, that could grow and reproduce on less resources would have had an advantage. Thus the lower levels of CO^2 would have been to enhance apparent aridity.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 19 July, at 6 pm, in the Seminar Room, Royal Botanic Gardens. Enter through the gate to the Herbarium on Mrs. Macquaries Rd.

Dr. SCOTT MOONEY

School of Geography, University of NSW

UNRAVELLING ENVIRONMENTAL CHANGE IN THE LAST 2,000 YEARS IN SOUTHEASTERN AUSTRALIA

Several Australian research groups have recently turned their attention to environmental change within the late Holocene (the last 2,000 years), for example, investigating climatic variability or environmental change associated with the European occupation of Australia. While these studies use similar techniques, they represent a departure from more traditional palaeoenvironmental studies. In particular, the analysis of the recent past using sediment-based palaeoenvironmental records allows a 'quasi-experimental procedure' whereby known perturbations can be used to test palaeoenvironmental records. Using such 'tests', sensitive indices of change can then be developed. Of note, such research is also potentially relevant to the modern management of landscapes (for example the recent history of fire, erosion and lacustrine productivity). This talk will seek to introduce such uses of palaeoenvironmental research, and in particular, will illustrate the topic using the recent fire history of Royal National Park as an example.

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Wednesday 23 August, at 6 pm, in the Education Classroom, Royal Botanic Gardens. Enter through the gate to the car park, next to the Herbarium on Mrs. Macquaries Rd.

Dr. GEOFF HYDE

School of Biological Science, University of NSW

IS THAT ALL? QUESTIONING THE GENETIC HEGEMONY

One of most entrenched assumptions of modern biology is that we will understand how humans (and other organisms) develop and function once we have sequenced their genome. The speaker will argue that this is a serious misconception, not because of "nature versus nurture" considerations, but because this "genetic hegemony" ignores the single most important driving force of biological development and evolution: the ability of the components of an organism to self-organize.

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LINNEAN MACLEAY MEMORIAL LECTURE

Wednesday 18 October, at 6 pm, in the Education Classroom, Royal Botanic Gardens.
Enter through the gate to the car park, next to the Herbarium on Mrs. Macquaries Rd.

Dr. PAUL ADAM

School of Biological Science, University of NSW

"....NOTHING LESS THAN CULPABLE CARELESSNESS". PROSPECTS FOR BIODIVERSITY CONSEVATION IN A CHANGING WORLD

Biodiversity conservation has recently become the objective of global conservation policies. Adoption of the biodiversity paradigm creates considerable challenges for society. Despite the recent invention of the term 'biodiversity', the concept and challenges were more clearly identified by Macleay and his contemporaries. How far have we advanced in the last century? What do our past failures tell us about our chances of doing better in the future?

****

Sunday 22 October

EXCURSION TO ROYAL NATIONAL PARK

Dr. David Keith will lead us on a tour of the heathlands and swamps to see the spring flora, and the changes in the vegetation since the last fire in 1994

MEET at the Marley car park on the Bundeena Road, about 1-2 km past the Maianbar Rd. turnoff

TIME 10 am

BRING lunch, food and drink

WEAR good walking shoes, a hat, sunscreen and be prepared for the heathlands to be windy.

If you do not have transport and would like to come, ring the Secretary at the Society's office (phone number on the first page) for arrangements.

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EVERYONE WELCOME

Wine and cheese will be served from 5.30 pm before each talk at the Botanic Gardens

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 97 **OCTOBER 2000**

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IN THIS ISSUE

CHANGE OF ADDRESS

The Society has been obliged to move its office. The new address is 4/2 Gardeners Rd, Kingsford and the new phone number is (02) 9662 6196. The fax number is the same as the phone number. The postal address remains the same box number at Matraville and the e-mail address and web site remain the same.

DONATIONS TO THE RESEARCH FUNDS.

The Society has received one donation to the Betty Mayne Scientific Research Fund and five donations to the Joyce Vickery Scientific Research Fund. Our heartfelt thanks to these generous donors. Most of the grants from the research funds go to struggling students. All donations are fully tax deductible.

PAPERS ACCEPTED FOR PUBLICATION

Hancock, M.A., Timms, B.V., Morton, J.K. and Renshaw, B.A. The structure of the littoral invertebrate

communities of the Kosciuszko region.
Holmes, W.B.K. The middle Triassic megafossil flora of the Basin creek Formation , Nymboida Coal Measures, NSW, Australia. Part 1. Bryophyta, Sphenophyta.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2001. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 1st December 2000.

NEW BOOKS

Dr. David Murray has written two gardening books with an emphasis on ecological sustainability. "Successful Organic Gardening" has just appeared, a sequel to "Growing Peas and Beans" published last year. Both are available direct from David for $22 each, including postage within Australia. Address: 7 Acacia Avenue, Gwynneville, 2500.

Jocelyn Howell and Doug Benson's new book, "Sydneys's Bushland: More than meets the eye" is an update of "Taken for Granted: The bushland of Sydney and its Suburbs", and there is much to update. The overview is more positive, now that many councils recognize the value of bushland and have protective management plans. Much more is known about survival tactics of native plants and the discovery of the Wollemi pine is a remarkable good news story. Published by the Royal Botanic Gardens, the book is available at the Royal Botanic Gardens Shop or other good bookshops and retails for $27.95

BLUE-GREEN AND OTHER MORE VISIBLE ALGAE FROM THE SYDNEY SANDSTONE: a talk given by Dr Stephen Skinner

Blue-green algae are ubiquitous - we probably see them or come into contact with them every day without being aware of them. The steps that are slippery when wet, the slime on the lawn or rocks, the black gunk in the sink are mainly due to blue green algae. They are an important part of the ecosystem but they do not fire up the imagination, so are mostly unknown. Dr. Skinner is studying the blue-greens and other more visible algae from the Sydney sandstone for the biodiversity inventory.

Growing on sandstone is a challenge, for sandstone is very porous. After rain it becomes wet, but rapidly dries out and a day or two later, it can be bone dry. Algae need water to function, so if they grow on sandstone, they must be able to withstand the dry periods. There are some unusual habitats favoured by the algae. Just over the edge of a cliff top, where the water drips, it remains wet because the gelatinous algae hold water. The top of the sandstone has a very diverse plant life, and the algae are diverse too.

Not all of the algae on the sandstone are blue-greens, but they are very widespread with about 10 genera and 40 species. There are about 13 genera with 50 species of green algae. The red algae are represented by about 5 genera with 10 species, the stoneworts (*Chara*) by 3 genera and the golden greens by 2 genera with 3 species.

Nostoc is known as 'snot'. Linnaeus credits Paracelsus with naming it about 1520. Paracelsus called it "Nostoch ... pollution of some plethoricall and wanton star or rather excrement blown from the nostrils of some rheumatick planet". Paracelsus may have had a poor opinion of *Nostoc*, but in some parts of the world it is used for food and medicine. *Nostoc* is a soil alga and in summer it dries out and forms a layer over the soil and leaf litter. In winter it grows, forming balls, and tiny bits break off and get blown away in the wind, washed away by the rain or otherwise moved around.

Stigonema looks like black, uncarded wool, and grows in the edges of gardens amongst the mosses. It starts off as a filament, then grows a thick cortex and starts branching, characteristics that are more like the higher plants. The long filaments become tangled together. Little packets of cells become motile by means of streaming mucilage (all blue-greens do this). They have the tiny cells typical of blue-greens and heterocycts that fix nitrogen. There are probably 4 species in the Sydney region.

Some blue-greens do very well in cities. *Oscillatoria* causes slippery steps and the black gunk in sinks. It will grow anywhere there is water and light, and it can make do with very little light. Blooms produce untidy black masses that turn red when parted, the "red tide". The description of Moses striking the Nile and turning it to blood is the first description of a blue-green algal bloom. *Scytonema* grows as a patina on buildings and rocks, and the black stuff amongst moss. The filaments go in all directions, producing a felted mass that is hard to clean off. *Dichothrix* has pointed filaments and grows in fountains and waterfalls.

Some of the red algae may be pests in streams. *Audouinella* grows as tufts in fast flowing water. There is one endemic species in waterways on the sandstone. Other species of red algae may looks like miniature pine trees a few millimeters high.

The macrophyte green algae may appear as slimes when nutrient levels are high. *Cladophora* (blanket weed) feels rough and can be a pest. *Stigeoclonium* filaments form small slightly gelatinous tufts and prefer clear, clean water. *Bulbachaete* looks like tiny trees and also prefers clear water. *Spirogyra* and its relatives (silk weed) grows in shallow flowing water. *Zygogonium*, another relative of *Spirogyra,* is found as a purpley, gluey mat around soaks in sandy soils. *Gloeocapsa* forms gluey masses on the surface of soils along creek banks and seepage lines.

The resurrection plants, such as the desmid *Cylindrocystis,* have masses of jelly that take about two weeks to dry out to a very thin sheet. When water becomes available, they "wet up" in a few minutes.

These are just some of the rich algal flora that is all around us and has an important place in the ecosystem. The sludge in a wheel rut after rain was studied and found to have 51 species in it!

FUTURE DIRECTIONS FOR THE PUBLICATION OF THE PROCEEDINGS

Times are changing with new technology offering alternative ways for publishing. Each method for publishing has advantages and disadvantages. Costs are an ever important consideration, and they just keep going up, especially at a time of low interest rates which mean a low income for the Society. The Council is currently grappling with these issues and some of the Council Members views are presented below.

We invite Members to make their views known. The next issue of the Newsletter will continue this debate with your comments and it is intended to include a questionnaire about future directions for publishing and the activities of the Society.

The case for electronic publication, by Dr. M.L. Augee, Editor

Non-profit publishers, such as scientific societies, provide a valuable service by distributing research results. Ideally this is done as quickly and widely as possible.

A second service, equally important but less recognised, is the provision of quality control. This is achieved by the peer review process, and scientific societies are seen to guarantee the integrity of the quality control process.

Today it is clear that rapid and wide distribution of research results can be achieved far better by electronic means than by the traditional printed journal format. Electronic distribution is also a great deal cheaper, and it can be argued that the cost of traditional printing and posting is in fact an impediment to distribution of information. This is clearly the case in regard to several commercial publishers of scientific journals, whose prices are notorious for stripping library budgets.

Distribution by way of the worldwide web is easy and cheap. The Linnean Society already possesses the basic hard- and software required, and for about one quarter of the cost of printing one issue the society could acquire the capability to put onto the web papers with illustrations (including photos) equal to if not better than those we now produce on the printed page of the Proceedings.

Although information placed on the web is instantly available to millions of people, including the vast majority of scientists, it can be argued that it is not available to everyone for two reasons:

1). There are some people who are not connected to the web and do not have access to computers that are connected. With every passing day the percentage of people in this position decreases, but it is necessary, particularly in regard to the members of the Linnean Society, to provide for this group of likely consumers in the near future. In fact this is easy to achieve - material on the web can be printed out. The

Linnean Society possesses a laser printer quite capable of printing at a quality level equal to current journal publication. Printed copies can be provided to members as requested. Indeed, printed copies can be provided to anyone who wishes specific articles or whole issues printed out but does not have a suitable printer of their own. In the case of non-members this service can be provided at a charge that covers costs or even includes a profit to the society. Of course such printed versions will be on A4 paper and will not have the fancy (and expensive) cover that currently comes with a journal issue, but this has nothing to do with the distribution of research information.

2). It will be extremely difficult to find papers published by the Linnean Society (or any scientific publisher) using searches with standard browsers (Explorer and Netscape). This is a fundamental problem with the worldwide web: separating the useful information from a mass of garbage. How does a user determine quality? How are unfounded personal opinions separated from peer-reviewed scientific reports? How can a search be directed towards such peer-reviewed literature? *An example*: to find out about recent research into crayfish, a student does a search on 'crayfish'. That student will find thousands of "hits" mostly recipes. An even worse example would be a search on "sex determination in crayfish". Anything with the word "sex" or terms even remotely related to sex (don't even think about a search for "breast cancer research") will result in a plethora of porn sites.

The solution to the problem of quality control and directed searches is the same. There needs to be a centre where such material is stored (i.e. papers that have been published in refereed journals). Such a centre exists for physics - hosted and maintained by the Los Alamos Laboratories in the USA. I believe this archive includes papers from all over the world and this archive is already widely used by physicists. At present most of their material is submitted by authors - i.e. they want to put on electronic file papers already published in print journals. However as more and more journals go completely electronic, such centres will come to house complete journals as well. Another type of electronic archiving centre is the university library. A number of American and European libraries are already doing this on behalf of staff members. In the long run this will probably not be the answer, since it still requires the searching of many sites (for each university) to find material.

In Australia the likely organizations to take on electronic archiving of scientific literature are CSIRO and the National Library. Given that they are already involved in electronic publishing and that their primary mission is science publishing, I feel that CSIRO is the correct organization. I propose that the Linnean Society make representations to CSIRO urging their immediate assumption of such a role.

Another point often raised in regard to electronic publishing is the question of preservation. There is a perception that material stored electronically, or the equipment used to store and retrieve such material, is ephemeral. While I feel the view that material on a hard disc or CD is less durable than print material is demonstrably incorrect, the question of changing technology is serious. Here again the solution is the central archiving authority. They must not only archive the material but also be able to supply it as requested. Therefore the pressure on these institutions (and institutions they must be, with the same stability as libraries and universities) to continually update systems as required to maintain accessibility will be immense and I believe successful. Most academics are familiar with the pressure required to keep university librarians from discarding material as recent as the 1950s and 60s. It must be noted here that the motivation to dispose of or "bury" older print material arises out of the cost and effort to archive such bulky material. That bulk is of course ever-increasing. But electronic storage immediately resolves that problem. There is no practical limit on the amount of material that can be archived

A few other problems have been raised in regard to electronic publishing. Some of these are:

1). Difficulty in citation of references in the traditional form.

2). Failure of institutions to recognize such publications for purposes of promotion and grants.

3). Failure of nomenclature bodies to recognize such publications for matters such as priority.

All of this problems are basically of an administrative nature. Reference citation can include electronic addresses for example. Administrative bodies by their very nature will never lead and will far too often actually impede any sort of logical progression. I do not believe that obvious advantages in distribution of research results and scientific information should be held back until administrative units finally move into the new century. They will inevitably follow, albeit begrudgingly.

Considerations specific to the Linnean Society:

1). Member benefits. Why bother to be a member if the journal is available free to anyone?

This is an important consideration. If the society goes to electronic publication, the societies functions will become:

i. Provision of research grants through the two granting programs. ii. Acting as a quality control in the preparation of peer reviewed papers for lodging with an archiving centre.

iii. Public forum and excursion activities.

Careful consideration must be given to whether these activities offer sufficient value to maintain a viable membership or whether other activities will need to be added.

2). Finances. Printed journal publication costs the society between 15 and 20,000 dollars a year.

If electronic publishing is accepted, most of this money can be used for the grant funds. In these days of ever diminishing government support for research, this is an extremely valuable activity of the Linnean Society. At present the grants are too small to be of great significance.

Conclusion

Electronic publication of the Proceedings of the Linnean Society offers such dramatic advantages in distribution and cost that it should be adopted by the society following the current volume (122). The transition should be complete - publication by both print and electronic means is no solution. The cost barrier would remain.

Until an Australian or worldwide life/earth science archiving centre is established, the Proceedings can be archived through www.eprints.org or www.openarchives.org and also on our own server. Anyone wishing to learn more about the state of play in electronic publishing should check either of the above www sites. Of particular interest is the "Santa Fe Convention" which can be accessed through those sites. This is a protocol arising out of a conference at Santa Fe which will probably become the operational basis for electronic archiving with universal access. *Universal, free access is what it is all about.*

Electronic Publishing: a taxonomist's viewpoint from Max Moulds

The *Proceedings of the Linnean Society of NSW* have been an important outlet for the publication on new names and other aspects of systematics since the first issue in 1876. Publication of the journal has continued uninterrupted to the present day. As a taxonomist I find the proposal now before Council, to discontinue publication as print on paper, a major concern.

Although the *International Code of Zoological Nomenclature* now permits publication 'by a method that does not employ printing on paper' on the proviso 'that copies (in the form in which it is published) have been deposited in at least five major publicly accessible libraries' (Article 8.6) it also states that 'authors and publishers are strongly urged to ensure that a new scientific name or nomenclatural act is first published in a work printed on paper' (Recommendation 8B). Likewise, the *International Code of Botanical Nomenclature* excludes electronic publishing for nomenclature purposes.

All taxonomic papers, and those dealing with other aspects of systematics, are intended for permanent record; rapid publication is rarely a priority of the author. Here lies a major concern.

Permanency of electronic publishing

Permanency of electronic publication depends upon two factors:

a) The durability of the media; the fashion at present is to use CD's. The life of CDs is limited by the life of the plastic of which they are made and this is clearly limited. Also, by a rapidly changing technology whereby we can expect CDs as we know them today will be unreadable by computers of the future (see Bennett, 1997, Studies on the preservation of electronic materials, *British Library Research and Innovations Report* 50, for a detailed account). The argument that libraries will continually transfer old technology to new clearly has financial and compatibility constraints.

b) The permanency of web sites. First I must emphasize that the *Zoological Code* specifically **excludes** from being published 'text or illustrations distributed by means of electronic signals (e.g. by means of the World Wide Web)'. This matter aside, data posted on the WWW are dependent upon the maintenance of individual web sites; data can be deleted in part at the will of the maintainer of the site, or the entire site terminated (maintenance of large web sites is expensive).

Permanency of print on paper

Print on paper has served the world efficiently for over 300 years. In fact the world knowledge base is almost exclusively archived in this way. The permanency of print on paper has proven itself and remains the best known means of indefinite storage, despite advances in electronic retrieval systems, archiving and publishing. This system is unlikely to diminish for many years to some.

Conclusion

Our Editor has provided an excellent overview of electronic publishing and its potential effects as they relate to the Society's *Proceedings*. Members should read this overview carefully. I must strongly disagree on one point; that the Society should immediately proceed to electronic publication of the *Proceedings* and simultaneously dispense with print on paper. Our Society should not be leading the way to electronic publication (exclusive of print on paper) in the natural sciences for the reasons I have given above plus additional uncertainties that have been raised by the Editor. In particular, my concerns lie in the uncertainties relating to permanency for back issues of the journal; in the potential loss of our library subscription base, which currently sustains the journal and which is unlikely to be regained should we revert to print on paper; and I worry that our authors, especially systematics, may not actually want to publish solely in an electronic medium.

The advantages of electronic publication as a cost savings measure, and as a means of rapid distribution, may not be as great as first appears. I am concerned that the effective distribution profile of the journal may actually decline if a significant number of library subscriptions terminate; our journal will only become accessible via web searches or accessing out web site. If we lose our library subscription base then we also lose income supporting approximately half the cost of printing. If we also lost members then the saving may only be one quarter the cost of printing.

Comment from Stefan Rose

Basically I support the general thrust of the proposal and concur with the arguments about the significant benefits to the society that electronic publishing offers. My view is that, on balance, the benefits of electronic publishing clearly outweigh the disadvantages. That is not to say, however, that the disadvantages are necessarily insignificant, and I would like to see an attempt to address them in some way.

The major disadvantage I can see is the sudden lack of a set of bound volumes on library shelves in institutions that one can simply go to and 'browse' through. How often have we had the experience of browsing through some issues of a favourite journal in the library, when one just happens to stumble upon an article that is completely relevant to the line of investigation that one is pursuing. Its uncanny, but it happens.

Could a compromise (at least in the interim) be to print out a certain number of 'hard copies' of the proceedings ourselves, and perhaps arrange for them to be bound in a cheaper (but respectable) cover to place in libraries? The cheaper, nastier (unbound) versions could be given /sold to people who request it. The number of copies required would need to be determined by survey, trial and error etc., but would be most likely to decrease as time progresses. And as Mike points out, this will cease to be an issue when a reliable system of 'archiving' is established. Until such a facility is established with an efficient subject, topic or keyword searching function, traditional 'browsing' of electronic material may be very difficult.

Also, I don't know if Mike is making it clear enough that the provision of the journal material on the web will be free for everyone who wishes to access it. Could there be an issue of equity here? Is it fair that the proceedings should be free to those who do and don't pay a Linnsoc subscription fee alike? I certainly don't think the cost should be prohibitive to those who are not members, but perhaps we should consider charging a fee for access by non-members - via a username and password (which members would get free of charge).

An example of a major publisher that has gone electronic is CSIRO publishing with 'Wildlife Research' and 'Aust. J of Botany' etc. CSIRO still offers a choice of electronic or hard-copy subscription to their journals or both. However, electronic subscription appears to only be available to libraries and institutions, for reasons I don't quite understand. To see how the CSIRO online system works, have a look at: http://www.publish.csiro.au/

Opinion concerning discontinuing publication of *Proceedings of the Linnean Society of New South Wales* - Alan Andrews

The first volume of the *Proceedings of the Linnean Society of New South Wales* was published in 1877 to cover the proceedings of the Society and papers read in 1875 and 1876. One may pull the volume off the shelf of any first class library or even shelves of may private individuals interested in Natural History.

In it one may read of the ichthyology, shells, mollusca, zoology, ornithology, entomology and more of the Chervert Expedition to New Guinea; of a new bat discovered by Ralph Hargrave (Lawrence's brother?) at Stanwell Park; of a new plover; a new kangaroo...and so it goes on.

The volumes go on, uninterrupted, covering the work of the Society's members and others up to the present day – 122 volumes (some huge, some limited) over 125 years.

Since those heady days of natural history of the nineteenth century much has changed. There were only 125 members then, but membership and the *Proceedings'* authority grew. There was hardly an Australian discovery in Natural History that did not find its record in the published volumes. These days, with the spread of the sciences, its coverage is necessarily less, but the work is still being published in the *Proceedings* is equally important. The Society has extended its services to providing funds for scientific researchers (more often than not to students), but the publication of papers has been and still is the Society's main function.

It needs to be considered very carefully, therefore, if the function of recording this work and dispersing the record should be relegated solely to electronic process and an 'electronic archive', as is being suggested.

There can be no doubt that the computerized filing storing, and indexing of data electronically should be a great step forward. And the Society must go forward into this area. Nevertheless to abandon the printed word and hurl ourselves solely into this forum would be most unwise.

There is an opinion that books – the printed word – will no longer be read; this, despite that there is not the slightest diminution in publication – rather an explosion in such. The electronic advantages presented possibly are particularly attractive to those working on the 'discovery edge' in their specific fields – where information back a few years might be considered 'old hat' or even misleading. The loss of historic material in such cases might not be viewed with dismay. When, however, it is considered that any work in the field over previous years might add to the better analysis of continuing and current research, considerable caution should be applied before the process of the printed record is summarily dispensed with.

Technology moves so swiftly. It will move ever swifter in the years ahead, and the swifter it moves the greater the danger to that archival information dependent upon it. It is driven by greed and the 'bottom line'. If a process is not making a corporation money it will be abandoned come what may.

Until such processes are tightly controlled there are enormous dangers in selecting technology, hoping that it will survive the movement of the years. Tapes and tape recorders: Who has got an 8 inch tape they cannot now play? Or 78rpm records? Or Beta video tapes they cannot play? Or sheets and sheets of microfiche they cannot read? At present computer technology is being driven by the profit market. It is not concerned with the small areas where access to archival material is uppermost.

On the other hand book publishing has proved itself over hundreds of years. Information published is there to stay and can be easily accessed through the years. It will be quite some years before electronic storage can claim this. It may never be able to, unless there is a change from the 'profit' thinking and unless worldwide legislation and demand can make it so. The Society should, by all means work towards having its *Proceedings* available for internet use, but to cut the bridge to the published word under present circumstances would be foolishness in the extreme.

Book publishing (as well as electronic presentation) is becoming technically easier and cheaper, although still expensive compared to presenting the same material on the internet. Of course it would be cheaper to dispense with publication and merely present the material elecronically. But then it would be even cheaper for the Society to dispense with production of the *Proceedings* altogether. Without question, though, publication of scientific papers will always be recognized as being our obligation -the very reason for our existence. We can overcome any needs to reduce expenditure without destroying the object of the Society's continuity -without throwing out the baby with the bathwater.

It must be remembered too that the Linnean Society is a society of members of various occupations and interests. Not all are part of Universities or scientific authorities, constantly immersed in computer and internet activity. Many may not have the personal equipment to access an electronic journal -nor may they have any reason to have that equipment, nor wish to obtain it just for the purpose of reading the *Proceedings*. It has to be questioned as to whether the majority of present members or even members of the future would wish to read the results of the Society's members' and contributor's research from a web site and the computer screen. There is no indication that people are prepared to read from the screen anything but concise and specific material. To be forced to have no other option but a web site to read the contents of the *Proceedings* is not appealing, and should not be recommended.

Presentation of the Society's *Proceedings* electronically is an object that would seem to have certain advantages, and one that should be supported. Abandoning the publication of the *Proceedings* in favour of presenting it solely electronically is fraught with danger and should be resisted.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 98 DECEMBER 2000

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IN THIS ISSUE

SUBSCRIPTIONS FOR 2001

Subscriptions fall due in January, see separate pink sheet. We have been able to keep the subscription rate to the current level. Please note that you get a deduction if you pay before 31 March.

NOMINATIONS FOR PRESIDENT AND COUNCIL

The nominations for President and Council are included in this newsletter, on a separate white sheet.

PAPERS ACCEPTED FOR PUBLICATION

Adlem, L.T. and Timms, B.V. *Biogeography of the freshwater Peracardia (Crustacea) from Barrington Tops, NSW*

Armand, L., Ride, W.D.L. and Taylor, G. *The stratigraphy and paleontology of Teapot Creek, MacLaughlin River , NSW*

Beard, L.A. and Grigg, G.C *Reproduction in the short-beaked echidna,* Tachyglossus aculeatus*: field observations at an elevated site in south-east Queensland*

Douglas, J.W. and Brown, P. *Notes on the successful spawning and recruitment of a stocked population of the endangered Australian freshwater fish, trout cod,* Maccullochella macquariensis *(Cuvier) (Percichthyidae)*

Karsten, U. *Occurrence of photoprotective mycosporine-like amino acid compounds (MAAs) in marine red macroalgae from temperate Australian waters*

Kobayashi, T., Williams, S. and Kotlash, A. *Autotrophic picoplankton in a regulated coastal river in New South Wales*

Osborne, A. *Presidential address: Geodiversity: "green' geology in action*

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please note:
Please read instructions carefully.
Original plus five(5) copies required.

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $700, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for

subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **31st March, 2001.**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of N.SW. announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $700.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **31 March 2001**

ADVICE TO APPLICANTS

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested, or why the project is important, and how it would add to knowledge in that particular discipline. The proposed budget must also be fully justified. Students should seek help from their supervisor, or someone versed in the art of writing grant applications, if they are doing this for the first time.

The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only be used for research. This means we cannot fund theses preparation or attendance at conferences.

DONATIONS TO RESEARCH FUNDS ARE TAX DEDUCTIBLE

All donations to both research funds are fully tax deductible. Give yourself a tax break and help a struggling research student, as most of the funds go to students.

IS THAT ALL? QUESTIONING THE GENETIC HEGEMONY A talk given by Dr. Geoff Hyde, School of Biological Science, University of NSW

The sequencing of the human genome was announced when only 85% had been sequenced. It is thought that there are many errors in what has been done and completion will be much later. Why make the announcement at this stage? The answer in one word - politics. President Clinton made the announcement as 'one of the great milestones of Science'. Knowing the human genome does not tell us how it works and there are serious misconceptions on how much the genome tells us about development of the organism. Dr. Hyde is a fungal biologist interested in how fungal cells work and thus observes the fungal genome in action.

There are two approaches to research in this field: a wide ranging approach, integrating many features, or identifying the genes. The holistic view is that all genes impinge on biological features, but how much does it explain? Agencies that grant research funds are pleased with quick (and easy) results, like identifying genes. The integrated, holistic approach is harder and much slower to achieve results. Many are questioning the simple approach that the genetic sequence equals life. When the focus is too heavy on genes, we miss out on other important things, not that identifying genes is wrong or bad.

The language used is important. The 'blueprint' metaphor for how the genome works persuades us that by knowing the genome, we know how it works. This view is too simple. Other metaphors, such as 'code', 'language', 'instructions' are also too simple. Statements like 'the genome is a complete set of instructions for making an organism…' are misleading. A designer draws up a blueprint and uses symbols in an economical way. A builder interprets it, using materials. The genome at the biochemical level is a sequence of bases that are replicated very faithfully, hence it is more like a template, but at the tissues and higher levels of organization, this precision cannot be found.

Blueprints are basic with no clutter. The genome is very cluttered. About 97% of the DNA has no function that we know of, but this junk DNA is analyzed and could be used to identify us, hence there are lots of useful applications for it, but this is a side issue to essential life.

Grand statements like 'Knowing the genome we know ourselves' and 'Biology will be fully known by knowing the genome' drown out a more balanced view. There is no precise relationship between the genome and the individual, only a loose correspondence. There are 80,000 genes in the human genome, far less than the number of features to be specified. There are 100 trillion cells in the human body, hence it cannot be true that there is one gene for one feature.

There are features of how the genome works in the development of an organism that do not apply to a blueprint. The genome can get by with relatively few genes because it is influenced by what is going on around them, that is what the rest of the 80,000 genes are doing. A gene may be switched on or off by the environment either inside or outside the organism. A gene may perform many functions, depending on the circumstances, and its working may vary from cell to cell and from hour to hour. Rather than a blueprint, the genome is more like an abstract work of art, like Blue Poles, where the viewers each have different interpretations.

The genome relates to building blocks and what they can do. Tubulin diamer proteins are spherical rather like tennis balls. The amino acid sequence is determined by the genome, but the environment determines that they roll up into balls. The balls may also link up with themselves to form long hollow tubes, the endoskeleton, which may extend the whole length of the cell. These tubes form in cells, but if we isolate the tubulin diamers in a test tube, they will still form tubes. They have the ability to self-organize, rather like crystals and this attribute is only loosely linked to the genome. The tubes may form complex arrays rather like the longitudinal meridians of a globe to form the spindle at cell division. These tubes do not need any information from the genome to organise and are rather like having building blocks with an intelligence of their own.

When the dieback fungus forms spores in the sporangium, the nuclei of the spores become neatly arranged equidistantly from each other by tubules growing out from the nuclei and jostling for space; i.e., the nuclei let them fight it out amongst themselves. Many other examples could be given. When nerves grow out and connect up, the axon of the neurone grows out at random and when it meets another compatible neurone, it connects up. If it does not meet a suitable neurone, it retracts. When one connects up, others follow.

Many trees have a very smooth dome. Does the genome specify it? No. If the tree is grown in a windless environment, it would not have a dome. In wind, if any one twig grows above the dome, it stops growing until the others catch up and the genes only coordinate the process. Plants are very flexible, but humans are not so. Even identical twins have differences. Our main differences are to do with the nervous system and how it gets wired up. Identical twins may be reared in different environments and their nervous system would then get wired up differently.

This flexibility and self-organizing takes a load off the genes. An analogy may be found in traffic control which may be done with either traffic lights or roundabouts. Roundabouts are much cheaper to maintain and work just as well, with some cooperation from drivers. Complex systems work better if the components are given some credit for intelligence.

In *Drosophila*, there are master genes for the main segments of the body that are lined up in exactly the some order as the body. The same master genes are in us and they control the very early development of the embryo. They are very precise and it is here that genes behave most like a blueprint. Once the major areas of the body have been specified, then one gene will do different things in different segments. There may be other genes like this, but it will take much more research - about fifty years – to work it out.

If the human genome sequence leads us to think we know everything, it has been a con job. It is not known what the genome means and much more work will have to be done before we know what it all means

FUTURE DIRECTIONS OF PUBLISHING

As foreshadowed in the last Newsletter, a questionnaire requesting your view about publishing is included. Please take the time – it won't take long – to fill it out and return it. There is an electronic version on the web site which you can send back on email. The Council must make some important decisions soon and you will assist us if you make your views known.

We have received one reply in response to our invitation for opinions about electronic publishing in the last Newsletter – thank you Paul Meeks. Paul writes:

> *"I anxiously read the statements of Alan Andrews and must concur ...... I believe that far too many journals have either changed their formats or ignore papers of fundamental achievements and progress in science. This journal provides a forum and incentive for all levels of science to publish their work and ensure that useful work has a place where it can be published regardless of how big or small the work is. I would be disappointed if the journal went electronic or stopped printing. Some elements of progress have their limitation."*

STATUS OF OUR JOURNAL: A report to the membership by the editor, M.L. Augee

Up to the 1940s *Proceedings of the Linnean Society of New South Wales* was a major journal of scientific research reports. Indeed if we go back into the 19th Century it was arguably the major scientific journal in Australia. However following WWII the number of papers and the frequency of publication fell off rapidly. This was due to the post-war renewal of scientific research, which brought with it the birth of a number of specialist societies. Many of these societies, here and overseas, began publication or increased publication of scientific journals. Also, CSIRO journals appeared with government funding and have risen to be truly world class publications with wide distribution. As scientists and naturalists (if such a distinction can be made) began to choose specialist journals in which to publish, *Proc. Linn. Soc.* clearly lost favour. No *Proc. Linn. Soc.* was published in 1991 or 1993. Irregularity of publication is the kiss of death for a scientific journal. Professional scientists lose interest and subscribers, especially libraries and their agents, cancel subscriptions. Fewer manuscripts submitted and a decreasing distribution set up a cycle of decline. When I reluctantly accepted editorship in 1995 it was with the specific request to make up for the lost volumes and thereby keep faith with subscribers (especially libraries) who had prepaid for issues that had not appeared. This was done, and Volume 121, which only got published with a 1999 date by the narrowest of technicalities, marked the fulfilment of obligations and the establishment of a one volume per year schedule. Or did it?

That the Society was able to publish two volumes in 1998 and reasonably substantial volumes in 1996 and 1998 was due to atypical events. Volume 116 was largely composed of papers arising from a symposium (Living in a Fire Prone Environment) held by the Society and Volume 117 was composed entirely of papers from another Linnean Society symposium (Quaternary Vertebrates). Volume 118 contained six papers on crayfish and Volume 119 contained eight. The Society owes a debt of gratitude to Dr John Merrick for organising those papers. Without the above contributions we would now be at least two if not three years behind publication.

Volumes 121 and 122 (in press) are thin, especially Volume 122. Two of the papers in Volume 121 were actively recruited by me as editor and one actually authored by myself. I was only able to recruit one paper (in addition to those submitted) for Volume 122.

What kind of scientific journal in these times cannot find enough material to fill one issue a year? I think the honest answer is "one that no longer has a real function". The changes in publication patterns have produced alternatives that are, in target audience and breadth of circulation, far more attractive to authors. The clear danger is that authors will send to *Proc. Linn. Soc.* only papers which they consider minor or which would have no chance of publication elsewhere. As editor for five years now, I have advised council that there is clear evidence that the quality of papers submitted is well below that printed by other scientific journals.

At this point the cost to the society should also be considered. The mode of publication we use is very expensive - about $15,000 per volume. We distribute to 149 members, 67 subscribers and provide 210 free copies to universities and the Australian Museum for them to use in exchanges. Can that money be better used? Are there alternatives?

Yes there are alternatives and ways by which the Linnean Society could once again be innovative. That was the reason I proposed in the last newsletter that we consider electronic publishing. Another alternative has recently arisen; that we continue to publish in print but that the publication return to being a true *Proceedings* as an irregular publication of thematic volumes and/or papers arising from symposia. In regard to the latter, it may be advantageous at times to combine with other societies or organizations.

Finally, I would like to repeat the advice that I have given to the council of the Society based on more than 5 years of attempting to edit a journal of declining relevance:

1). The decline in number and quality of submissions will continue. It is irreversible. Even if we could mount some sort of campaign to attract more papers, why do so when there are other avenues of publication available for the very few quality papers we currently receive?

2). The expenditure of the bulk of the Society's available funds on an activity of questionable value is hard to defend. That money would have a much more positive contribution if used in the Society's grant program.

3). The alternative, which will probably be offered in the questionnaire to accompany this newsletter, of publishing BOTH in print and electronically is the worst possible scenario. The drain of resources will continue and the effort involved will increase.

4). Electronic publishing is not some pipedream of the future. There are already hundreds of scientific journals doing so. These can be accessed through databases such as EAI (Expanded Academic Index), Ovid and Proquest depending on which is available at the library being used. Most libraries will have acatalogue of e-journals (for example at UNSW http://www.library.unsw.edu.au/~ddqc/ej.html). E-journals can also be accessed through publisher lists such as Academic Press, Blackwells, Cambridge University Press, CSIRO, Elsevier, Springer, Wiley, etc. Although I have not had time to check this list, here are a few direct journal addresses supplied by the library at UNSW:

>Journal of experimental medicine, http://www.jem.org/
>Journal of general physiology, http://www.jgp.org/
>Journal of general virology, http://vir.sgmjournals.org/
>Journal of heredity, http://www3.oup.co.uk/jhered/
>Journal of medical genetics, http://jmg.bmjjournals.com/
>Journal of petrology, http://www3.oup.co.uk/petroj/
>Journal of pharmacology and experimental therapeutics: http://jpet.aspetjournals.org/
>Journal of plankton research, http://www3.oup.co.uk/plankt/
>Journal of tropical pediatrics, http://www3.oup.co.uk/tropej/
>*Mechanisms of development:
http://www.elsevier.com/inca/publications/store/5/0/6/0/9/0/
>Microbiology, http://mic.sgmjournals.org/
>Mind, http://www3.oup.co.uk/mind/
>Molecular pharmacology, http://molpharm.aspetjournals.org/
>Nephrology, dialysis and transplantation,: http://ndt.oupjournals.org/
>Neural computation, http://neco.mitpress.org/
>News in physiological sciences, http://nips.physiology.org/
>Nucleic acids research, http://www3.oup.co.uk/nar/
>Physiological genomics, http://physiolgenomics.physiology.org/
>Protein engineering, http://protein.oupjournals.org/
>QJM: quarterly journal of medicine, http://qjmed.oupjournals.org/
>Rheumatology, http://rheumatology.oupjournals.org/
>Vaccine http://www.elsevier.com/inca/publications/store/3/0/5/2/1/

SUMMARY: There are only three realistic options:

i. Carry on as before "because that's the way we've always done it and change is difficult" and sink further into irrelevancy.

ii. Change publication medium to electronic - continuing to publish refereed scientific papers (see discussion in previous newsletter).

iii. Continue print publication but publish only thematic issues and true proceedings when sufficient, high quality material is available and as resources allow.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

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IN THIS ISSUE

NEW MEMBERS

We welcome
Mr. Jean-Claude Herremans
Ms. Michelle Lemon, Graduate School of the Environment, Macquarie University
Ms. Elizabeth Anne Lindsay, University of Wollongong
Mr. John Paterson, Macquarie University.
Ms. Xiufu Zhang, University of New England.
Ms Nikola Streiber University of Sydney.
Mr. Kiourmars Ghamkhar, Royal Botanic Gardens.
Ms Anne Musser, Australian Museum
Mr. David Chapple

CHANGE OF SECRETARY
Claudia Ford has resigned as Secretary of the Society, for she now has heavy commitments at the University of New South Wales. Dr. Mike Augee has taken over the job of Secretary. He will continue as Editor of the Society.

RESULTS OF QUESTIONNAIRE: Future Directions of Publishing

Our many thanks to all the Members who responded to the questionnaire. Some changes will have to be made to reduce costs, but be reassured, Members wishes are paramount. The future of the Proceedings will be in line with the findings of this survey.

Total number of respondents = 49

1. ***PUBLICATION OF THE PROCEEDINGS.*** *The Society publishes scientific papers in all branches of Natural History. All papers are fully refereed by reviewers who are authorities in the appropriate field. In your view, publication of the Proceedings (by some means) is*

1. *Very important*	2. *Important*	3. *Not important*	*(circle ONE only)*
30	**14**	**4**	
Total Very Important/Important = 92%			

Comments:

To many members, outside NSW particularly, the Society would be irrelevant <u>without</u> publication
The Proceedings is the main reason for my membership of the Society.
I think the Proceedings fill a useful niche
Without the Proceedings, I do not think the Society will survive.

2. ***MEANS OF PUBLICATION.*** *Electronic publication is becoming more common (see arguments for and against electronic publication in Newsletter No. 97 and this issue). In your view, the Society should*

1. *Continue publishing on paper*	2. *Only publish electronically*	
28	**8**	
3. *Publish both electronically and on paper*	4. *Cease publication*	
7	**1**[1]	*(circle ONE only)*
Total for publishing on paper = 79%		

[1] Qualification 'in its present form' Same person rated Proceedings 'important' in Q. 1

Other comments on electronic publication

I like the idea of electronic publication, but I think (on its own) it would attract even fewer contributions than we get now.
I believe it would be a disaster to publish electronically. For me, very much so, as I am part way through describing the Nymboida fossil Flora
I really prefer to have the journal published on paper, but I guess it is all a matter of money.
Explore electronic publication, but the papers must be easily printable and of good quality.
I like to read the Proceedings in the car in traffic jams – impossible with electronic form.

3. ***CONTENT OF THE PROCEEDINGS.*** *The Proceedings contains a mix of natural history papers and on occasions, special thematic issues such as papers from a symposium. Do you approve of*

1. Special thematic issues only	*2. Continue with the present mix of papers*	
8	**35**	*(circle ONE only)*
Total for present mix of papers = 81%		

4. ***THEMATIC TOPICS.*** *If the Society is to publish papers on some theme, could you suggest a theme and/or partner organization that may be interested in using the Proceedings for publication.*

Suggestions: (Selected topics)

Research and conservation of threatened species of the Sydney Basin/NSW NPW
Management (based on science) in the forests of eastern NSW/NSW NPW AND SFNSW
Natural History of the Blue Mountains
Natural History of Royal National Park
Workshop proceedings of NSW Nature Conservation Council
Weed biology and management
Biographical contributions on Natural Historians
Fish: scientists and students in NSW Fisheries, Universities etc.
Regional Natural Histories, including Geology, Flora, Fauna of an area, e.g. Sydney Basin, South Coast, Northern Rivers, New England, Northern Inland Plains etc, similar to those produced by the Roy. Soc. S.A.
Symposium on the Wollemi Pine – fossil history, taxonomy, diseases, ?insects, management and policy, with view to possible publication.

5. ***ANY OTHER COMMENTS.*** *Your views will be welcomed.* (Selected comments)

To publish or not to publish is, for the Society, to be or not to be. In my view, while it continues, it has to publish. Its publications have to be accessible as possible to all, and this means, even now, publishing on paper.

'Electronic publication only' would cut out any nomenclatural papers on plants (including fossils) and possibly on animals (depending on the form of electronic publication) for at least the next 5 years. (Three other members made similar comments)

Publication of taxonomic papers is unsuitable electronically. These papers need a guaranteed life of at least 200 years. Computer technology is superceded in less than a decade.

The Society has an important role publishing papers on aspects of the biology and geology of NSW, and other parts of Oz and the SW Pacific. I think the Proceedings is taken by a sufficient number of libraries and museums internationally to have a solid basis on which to build (comment from an expatriate).

It is easy to forget that one can be first-rate or fashionable, but very rarely both, and what is scorned today (e.g. taxonomy) may just as well come back into fashion tomorrow.

If someone prints out a copy of a paper free (from an electronic publication), how does that benefit or make money for the journal publisher?

If you have difficulty obtaining papers, get yourself (and the Proceedings) more widely known. (Much the same comment from another member).

Editor's comment: Thank you, again, everyone who participated. There are many good suggestions and efforts will be made implement at least some of them. A publicity program to get the Proceedings more widely known is being planned. We have no shortage of suggested thematic topics, but they will require organizing by someone who knows the field. If any member would like to organize a thematic issue, we would be delighted. Conference proceedings are a good source of thematic issues, and it any member knows of a conference that may generate publications, please let us know.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS ARE TAX DEDUCTIBLE

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

DEATH OF MEMEBERS

We regret to report the recent deaths of Dr. Doug Waterhouse, Sir Rutherford Robertson and Mr. Martin Scott.

Douglas Frew Waterhouse, 3 June 1916 – 1 December 2000

Doug, as he was known, was one of four sons of Gowrie and Janet Waterhouse. His father was a bush walker with a keen interest in wildflowers who became a devoted camellia grower. His huge garden in Gordon is now maintained as a national legacy. Doug's uncle Athol Waterhouse was a noted naturalist who published the first comprehensive catalogue of Australian butterflies, and it was his influence that set Doug on the path to becoming an entomologist.

Dr. Waterhouse graduated from Sydney University with first class honours and a University medal in 1938, then joined the CSIR (later to become the CSIRO). He launched straight into research on the pest sheep blowfly, then costing Australia dearly in lost production. During the War Years, he worked on repellents, especially against mosquitoes, and after the war, did some work on the wool moth and more on the sheep blowfly.

He identified the active ingredients in the repellent Aerogard for the scientific literature, but it was not harmful to the Australian bush fly. By now, Doug was spending more time at senior management. One of his favourite stories concerns the 1963 Royal visit to Canberra, then plagued with bush flies. He was called to Government House, where they demanded to know what he was going to do about the flies. This was an ideal time to try out a new repellent, so the CSIRO staff demonstrated its effectiveness to the Royal aides. Next day, Doug was alarmed to see the Queen still brushing off the flies. It turned out no-one had been game enough to get close enough to apply the repellent in case it stained her clothes. A quick spray in her general direction was all the Royal entourage was willing to try. But the press was quick to see the benefits and the publicity made the repellent a commercial success.

As head of CSIRO Entomology, he concentrated on solving practical problems. One of the more successful programs was the introduction of over 50 species of dung beetles to deal with the huge pasture fouling problem caused by European cattle and the attendant problem of increasing numbers of dung-breeding flies. As a result, both of these problems are significantly reduced today. Biological control has seen huge payoffs in terms of pest and weed management not only in Australia, but also in many of our neighboring countries, especially among Pacific Island nations, where successful programs have restored local economies and livelihoods.

Dr. Waterhouse retired in 1981. He published over 100 scientific papers and several books, the latest jointly with Dr. Don Sands of CSIRO Entomology, due out soon. The publication of this latest book will be an opportunity to hold a special event next year to celebrate his life and legacy.

Dr. Waterhouse was elected as Fellow of the Royal Society, Fellow of the Australian Academy of Science and Fellow of the Australian Academy of Technical Science and Engineering, many other academies and learned bodies overseas, as well as numerous awards and medals, demonstrating the high regard he was held in by his peers globally. He was made an Officer of the Order of Australia (AO) in 1980.

He was committed to Education and advised on the establishment of the University of Canberra when it was set up as a CAE, with Dr. Waterhouse the founding chairman of the CAE Council in 1968. He also served on school boards.

Dr. Waterhouse is survived by his wife Dawn and their four children and their families.

Sir Rutherford Ness Robertson, 29 September 1913 to 5 March 2001

Sir Rutherford (Bob) Robertson was born in Melbourne. His father was a Baptist minister and his mother had a natural curiosity and an interest in science. He suffered polio in childhood. He went to Sydney University and studied chemistry and Botany. After graduating, he received a Science Research Scholarship and a Linnean Macleay Fellowship which allowed him to continue doing research for three years. He studied the stomata (leaf pores) of plants of the Sydney region.

An 1851 Exhibition scholarship allowed him to go to Cambridge University where he studied the transport of nutrients around plant cells. He married Mary Rogerson in 1937 and gained his PhD in 1939. He returned to Sydney University and became an assistant Lecturer in Botany. After the start of World War II, which restricted shipping, he collaborated with CSIR (later CSIRO) on better ways of storing apples, pears and wheat.

In 1946 he was invited to head the plant physiology and fruit storage section of CSIR, which then had laboratories in Homebush Abattoir. He negotiated with the botany department of the University of Sydney to pool resources for a plant physiology unit. During the 1950's he continued to explore the link between plant respiration, which produced energy, and active transport of charged particles, which consumed energy. This was cutting edge science at the time.

Bob Robertson was invited to join the CSIRO executive. In 1962 he decided to return to a position where he could do his own research. He became Professor of Botany at Adelaide University. His time for his own research was short-lived, for in 1965 he became part-time chairman of the Australian Research Grants Committee, which allocated research funds. In 1969 he became Master of University House at the Australian National University, which gave him the chance to do his own research.

He became President of the Australian Academy of Science in 1970, having been elected to the fellowship soon after the Academy was formed in 1954. While President, he led a group that discussed with French scientists the atmospheric testing of nuclear weapons in the Pacific. They disagreed on the likely effects. He became director of the ANU Research School of Biological Science in 1973 and continued to follow his research interests. He retired in 1978.

Bob Robertson was knighted in 1972 and became a Companion of the Order of Australia in 1980. In retirement, he continued as Deputy Chairman of the Australian Science and Technology Council and Pro-Chancellor of the Australian National University. He continued his research at the University of Sydney until 1986. He made a lasting contribution to science through his own research, his leadership of others and his influence in university and government administration.

He is survived by his wife Lady Robertson and his son Robert.

THE BARRINGTON TOPS – A VERY DIFFERENT PLACE IN GLACIAL TIMES

A visit to the Barrington Tops is a magical experience as the road winds through majestic tall eucalypt forests. The gullies harbour lush subtropical rainforest with palms and groves of treeferns. At higher altitudes, we encounter temperate rainforest with *Nothofagus*, the Southern Beech. On the plateau above 1,000 m altitude, we find the sub-alpine snow gums and large grassy areas with expansive swamps. It is well to visit the Barrington Tops in summer, for winters are cold, with heavy frosts and occasional snow falls. This region is a National Park now, so it should escape the worst of Man's destructive influence in the future. But what of the past? Susan Sweller is studying the palynology of Burraga Swamp and can tell us that the Barrington Tops once looked very different.

Burraga swamp is set in the *Nothofagus* forest and looks like a football oval surrounded by a wall of trees. A core drilled in the centre of the swamp went down over 6 m and carbon dating showed that the base is about 40,000 years old. At the base, the sediments are clay, which could only have been deposited in a lake. The pollen content shows that the vegetation was an open eucalypt woodland (Fig. 1) with some shrubs and grasses. There were some water plants in the lake and a fringe of swamp plants in the shallow edges of the lake. The climate was cooler and drier than today.

By about 20,000 to 17,000 years ago, during the height of the last glacial period, the lake had dried up and the trees had disappeared (Fig. 2). The landscape was now treeless, with a shrubby, grassy vegetation and it was much colder and drier. Work by Galloway (1965) shows that during the glacial period, the summers would have been like our present winters and the glacial winters would have been very cold and inhospitable. There was no actual glacial activity on the Barrington Tops, but it was subjected to periglacial activity, with permanent snow patches on the southern side of the slopes and the surface few centimeters of the soil would alternately freeze and thaw. No doubt periglacial activity and the reduced vegetation on the slopes around the swamp caused increased erosion and was responsible for the thick sand and gravel layer deposited at this time.

After 17,000 years ago, the climate started to improve. Water reappeared in the lake and the grasses and shrubs became more prolific. After 15,000 years ago, eucalypts started to come back. Then about 10,000 years ago, treeferns and other ferns became prominent (Fig. 3). It was becoming warmer and wetter. A few *Nothofagus* appeared and gradually increased, so that by about 6,500 years ago, the temperate rainforest had become fully developed (Fig. 4). About this time, the lake become shallow enough for swamp plants to grow over the whole of the surface and peat began to form. The climate had reached approximately that of today, and has remained much the same to the present (Sweller and Martin 1997).

The palynology of sites found in an arc from southwestern Victoria, through the Victorian Highlands and the highlands in New South Wales have been studied. They all show similar patterns of change in the vegetation during the last glacial period. This whole area was virtually treeless. At higher altitudes, such as the Snowy Mountains and the Victorian Highlands, alpine plant communities were greatly expanded. The Barrington Tops is the most northerly site recording treeless vegetation (Sweller and Martin in pess).

With an improvement in the climate after the glacial period the trees gradually come back. Where had they gone during the glacial period? We think that they survived the harsh climatic conditions in small sheltered gullies and gorges, and expanded out from them when the climate improved. We often see a more lush kind of vegetation in the gullies and gorges today, and they are the 'nuclei' for change, should the climate become wetter.

References

Galloway, R.W., 1965. Late Quaternary climates in Australia. The Journal of Geology 73, 603-618.

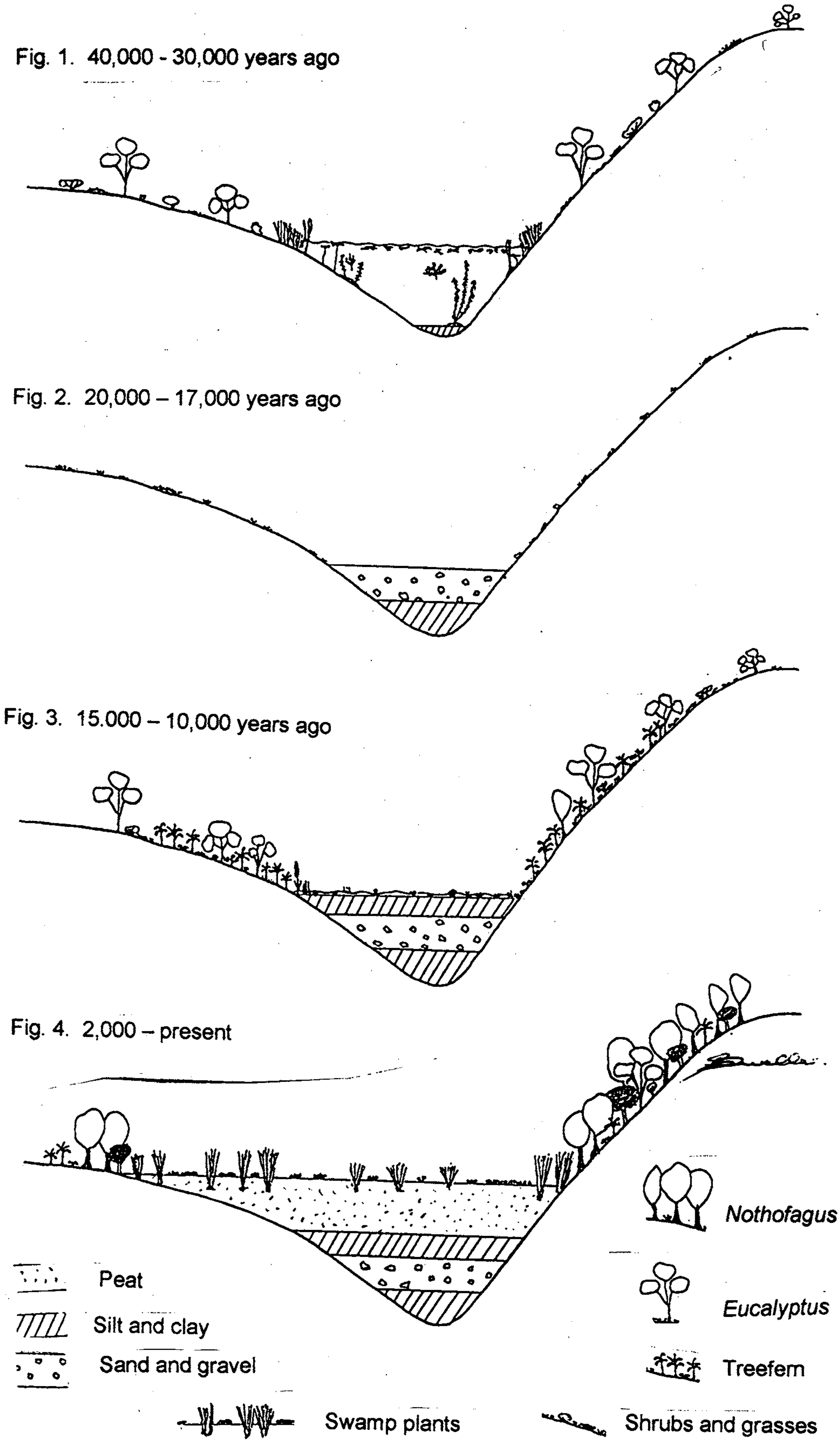
Sweller, S., Martin, H. A., 1997. History of the vegetation at Burraga Swamp, Barrington Tops National Park, Upper Hunter River Region, New South Wales. Proceedings of the Linnean Society of New South Wales 118, 23-50.

Sweller, S., Martin, H. A., in press. A 40,000 year vegetation history and climatic interpretations of Burraga Swamp, Barrington Tops, New South Wales. Quaternary International.

- Helene A. Martin

Figs. 1-4. Reconstruction of the Vegetation at Burraga over 40,000 years – Next Page.

Figs. 1-4. Reconstruction of the Vegetation at Burraga over 40,000 years.



LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 23 May, at 6 pm, in the Charles Moore Room (next to the Classroom), Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

MARY WHITE

will discuss the topic of her latest book,

RUNNING DOWN, WATER IN A CHANGING LAND

Australia's water resources are most precious and under threat. To understand what is necessary for sustainable use of the land's water resources, a knowledge of the continent's geological past is necessary.

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Wednesday 20 June, at 6 pm, in the Charles Moore Room (next to the Classroom), Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. RICK CAVICCHIOLI

School of Microbiology, University of New South Wales

EXTREMOPHILES – BUNGEE JUMPERS OF THE MICROBIAL WORLD

Microorganisms proliferate in a range of enormous environmental extremes; temperatures (>100 °C to < 0°C), pH (1 - 13), high pressures, high salt (saturated NaCl), low nutrients. To adapt to these extremes, they have evolved specific growth and survival strategies. Our research presently focuses on the earth's two most prevalent extremes, low temperature and low nutrient environments. The talk will provide a broad overview of extremophiles and brief coverage of some of our work. In particular I will highlight the use of modern approaches, such as genomics, for investigating the biology of extremophiles.

****

Wednesday 18 July, at 6 pm, in the Charles Moore Room (next to the Classroom), Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr BETTYE REES
School of Biological Science, University of New South Wales

THE FASCINATION OF FUNGI: FABLES, FACTS, FEARS AND FORSEEABLE FUTURE

It has been said that the further east one travels in Europe, the greater the love of fungi. With the predominantly Anglo-saxon background in Australia, fungi are regarded with suspicion. With our new, multi-racial society, attitudes towards eating fungi are changing, and interest in cultivating indigenous Australian species on the rise. However, basic taxonomic research into the identity of Australian species is still seriously under-funded and progress in describing new species slow. How should we address this problem?

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Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 100 JULY 2001

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members

Ms Rachel Sims, Australian National University
Mr. Ian David Endersby

DONATIONS TO RESEARCH FUNDS

We have received a total of $570 in donations to the Research Funds. Ms Janet Aitkin gave to the Betty Mayne fund and Mr. Richard Faulder, Dr. D. Horning, Dr. E.N. Marks and Anonymous gave to the Joyce Vickery Research Fund. We are most grateful for these donations and thank our generous members.

Awards from the research funds go mainly to struggling students (see reports below). All donations are fully tax deductible. To the donors, thank you again.

AWARDS FROM THE RESEARCH FUNDS

We received fewer applications than in previous years, for reasons unknown to us, and this has allowed us to make larger grants than in the last few years. All things being equal, members are given preference over non-members.

BETTY MAYNE SCIENTIFIC RESEARCH FUND AWARDS FOR 2001

There were 4 applications, all of a high standard. Two of the applications were outstanding in their attention to detail

CARTHEW, Karen (Ph.D. student, Dept of Physical Geography, Macquarie University)
PROJECT: Sedimentology, age and palaeoclimatic significance of modern and Quaternary travertines at Riversleigh, NW Queensland.
This project seeks to resolve the stratigraphy and chronology of Quaternary travertine-forming events at Riversleigh, and to develop a sedimentological model (based on contemporary travertine depositional environments) that can be used to interprete these. This will provide details about the palaeoenvironmental history of terrestrial tropical Australia, and will assist in the protection of Riversleigh's significant travertine formations through input to the development of suitable management practices. Awarded: $400

MUSSER, Anne (Australian Museum, Sydney)
PROJECT: Evolution of the Monotremata: Palaeontology, Morphology and Biogeography of the Monotremes.
The study is being developed as a Ph.D thesis, which is now in its latter stages. Examination and analysis of locally available fossil monotreme material is almost complete, and a study trip to view overseas collections in order to provide comparative data on which to formulate conclusions about the relationships between monotremes and other mammals is now necessary. This has to be done firsthand by measuring, photographing, and illustrating all relevant material, rather than relying on incompletely published data. Results of the study will be critical to understanding early mammal phylogeny. Awarded: $700

PATERSON, John (Hons student, Division of Earth and Life Sciences, Macquarie University)
PROJECT: Lower Ordovician geology and palaeontology of Mt Arrowsmith, northwest NSW.
The project aims to undertake detailed mapping of the southern end of the Lower Ordovician overturned syncline on the west flank of Mt Arrowsmith, and to describe the fossil faunas from the Tabita and Pingbilly formations. This will enable interpretations of the palaeoecology and palaeoenvironments of these units to be formulated. Descriptions of the faunas will allow correlation of the Mt Arrowsmith Ordovician succession with those known from central Australia. Awarded: $700

WEBECK, Kim (Hons student, Geography & Environmental Science, Univ of Newcastle)
PROJECT: Palaeoecology of Arltunga (Northern Territory) using rodent middens.
The study aims to reconstruct vegetation history and climatic changes occurring over the past 15,000 years by using the middens of the stick-nest rat, which has been extinct on the mainland of Australia for the past century. Middens preserved in caves and rock shelters of arid Australia can be reliably dated at 50 – 10,000 years old. They contain plant and animal remains which will assist in environmental interpretation. A macrofossil database will be developed, and environmental changes modelled to explain the fossil record. Awarded: $350

J.W. VICKERY SCIENTIFIC RESEARCH FUND AWARDS FOR 2001
There were a total of 14 applications

GHAMKHAR, Kioumars, PhD student, UNE and Royal Botanic Gardens Sydney
PROJECT: Molecular phylogeny of Abildgaardieae (Cyperaceae)
Molecular sequence data will be used to elucidate taxonomic limits and phylogeny of Abildgaardieae and close tribes Arthrostylideae and Schoeneae. These will be analysed separately and together with non-molecular data, some collected by Ghamkar, some by another PhD student at UNE. Results will be published jointly. Awarded $700.

HYMAN, Isabel, PhD student, University of Sydney
PROJECT: Evolution of the semi-slug in Helicarionidae (Mollusca, Pulmonata).
This is one of several groups of land snails in which a slug-like form has evolved. It is poorly known. Molecular, morphological and anatomical techniques will be used to test generic limits and relationships. Awarded $700.

LEMON, Michelle, PhD student, Macquarie University
PROJECT: Function of acoustic behaviour in free-ranging Bottlenose dolphins (*Tursiops aduncus)* in Port Stephens, NSW.
This will investigate the development and function of distinctive vocalisations of these dolphins in a complex coastal habitat. Surface and acoustic behaviour and habitat preferences will be compared in summer and winter. This will complement other studies of this population of c. 150 dolphins, which is the focus of an increasing tourist industry. Awarded $700.

LINDSAY, Elizabeth, PhD student, University of Wollongong
PROJECT: The impact of bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*) on coastal ecosystems of NSW.
Bitou bush is a noxious introduced environmental weed of coastal areas but its impact on ecosystem processes such as nutrient recycling and therefore on other organisms is largely unknown. This study will assess the impact of infestations on nutrient recycling in coastal dunes. This will have important management implications, especially on revegetation of sites after weed removal. Weed control has been halted for 12 months in the study areas so that this research can proceed. Awarded $700.

SIMS, Rachel A., B. App. Sci. (Ecology and Environmental Science) student, ANU
PROJECT: Living on the edge: Thirsty wallabies and hungry crocodiles.
The aim is to investigate behavioural interactions between the Saltwater crocodile (*Crocodylus porosus*) and the Agile Wallaby (*Macropus agilis*), specifically how the crocodiles hunt wallabies on river banks and what behavioural adaptations the wallabies use to minimise predation risk (such as digging waterholes beside the Daly River). Awarded $600.

Smith, Helen M., part time PhD student, University of Sydney, part time technical officer in Arachnology, Australian Museum.
PROJECT: A study of twig-mimicking spiders with special focus on taxonomic revision, behaviour and variation in the genus *Poltys* (Araneidae).
This group of orb-weavers is poorly known, owing to their cryptic appearance and nocturnal habits. The males are very small and rarely collected by general collectors. Collecting trips for

this study have greatly increased specimen holdings, especially of males. This has revealed the morphological plasticity of some species, but gaps remain in the collecting. Awarded $700.

STAPLEY, Jessica K. PhD student, ANU
PROJECT: Female mate preference in lizards: Assessing the maintenance of female preference in a non-resource-based mating system.
Female mating preference for male phenotypic traits will be studied in and between populations of the Mountain Log Skink (*Pseudemoia entrecasteauxii*). Non-territorial lizards are an ideal group for studying female mating preferences and the evolution of secondary sexual traits. Males provide little more than sperm to the female, so this is an opportunity to investigate the maintenance of mate preference in a non-resource-based mating system. This can then be compared with similar studies in birds to look for common elements. Awarded $700.

STREIBER, Nikola, PhD student, University of Sydney
PROJECT: Revision of the Chloantheae (Lamiaceae).
Recent phylogenetic studies in the angiosperm families Lamiaceae and Verbenaceae have focussed on northern hemisphere members. The tribe Chloantheae is endemic to Australia, with 10 genera and about 120 species. Generic limits and tribal relationships are being elucidated in this study using molecular sequencing and morphology. Awarded $700.

ZHANG, Xiufu PhD student, UNE
PROJECT: Systematic studies in Schoeneae (Cyperaceae): Phylogeny and biogeography of *Carpha* and relatives.
The sedge genus *Carpha* has been variously delimited by different botanists, depending in part on interpretation of spikelet structure. The distribution of this and other genera in the Schoeneae is broadly Gondwanan, but there has been little biogeographic analysis. Morphological, anatomical and molecular features are being studied to elucidate the limits of the genera and to explore their historical biogeography. Awarded $700.

OBITUARY: BERNHARD RALPH, 1916 – 2001 by Janet Lake (daughter) and Pamela Rickard (colleague)

Bernhard John Frederick Ralph was born in Auckland where his father was a Congregational Minister. In 1929 his father transferred to Hobart where Bernhard attended the Friend's School and matriculated in 1931 (aged 15), winning the University Prize in Chemistry. His parents decided he was too young to go to university so he repeated the year taking different subjects and graduating as dux.

Bernhard studied for a Bachelor of Science degree part-time at the University of Tasmania whilst working, first for Electrolytic Zinc (Pasminco) and later as a demonstrator in Chemistry at the University of Tasmania. By the time the war broke out, he was a fully qualified chemist and twice attempted to enlist. The first time he was told that he was not allowed, as he was a qualified chemist. Later, around 1943, having met some American scientific personnel through work in the volunteer naval patrol, he offered himself to the Airforce as a scientific officer in the special unit. When the best they could offer him was trainee cook he returned to the University.

Ralph had a choice when he graduated: to continue professionally in Zoology or in Chemistry. The two disciplines were combined in his first research topic, which involved the hepatopancreas of the southern crayfish. It was round about this time that he first dabbled in fermentation, by brewing beer in his father's basement. His crayfish work was cut short when the war got going because there was a need for more nationally urgent projects. He spent quite some time therefore looking at the possibility of using eucalypt wood waste as a source of sugars for making industrial alcohol. Work on this project, which concerned wood-rotting fungi, also introduced him to microbiology and serious study of fermentation. Other work during the war included studies of the alginate of giant kelp.

In 1946, after a short term in Melbourne working for CSIR Division of Forest Products he received an ICI Research Fellowship to the University of Liverpool to do a PhD. His thesis, "The Chemistry of Higher Fungi" described the isolation of various metabolites from two species of Australian fungi. Ralph was the first to successfully culture these fungi in the laboratory. In 1947, Bernhard's fiancee, Barbara Edith Wills, sailed from Hobart and they were married in Liverpool.

At the completion of the PhD, he had a choice of a number of positions both in England and Australia. Excited by the prospect of being part of the new University of Technology at Ultimo (which had been founded in 1949), he accepted the position of lecturer in biochemistry in the School of Applied Chemistry (in 1950). He was the first biologically trained appointee in the new university, but by 1956 the School of Biological Sciences had nine academic staff members and offered a degree course (to honours level) in Applied Biology. The new school was accommodated in five corrugated iron buildings (the 'tin sheds'), which had been erected as temporary training facilities during World War I.

Plans for a Medical Faculty in 1961 led to big changes at the University of Technology (which became the University of New South Wales in 1958). Since Ralph's School of Biological Sciences was to provide a significant input into the pre-clinical training of the medical students, its transfer to Kensington was fast-tracked. Ralph played an important role in the planning of the Biomedical Building at Kensington and the move there from the 'tin sheds' at Ultimo.

Ralph pioneered the formal teaching of biotechnology in Australia, with teaching and research programs concerned with the application of biochemistry and microbiology to industry. Until then, the fermentation industries employed microbiologists and biochemists who spoke a language which was unintelligible to their colleagues, the chemical engineers. The first formal post-graduate course in biochemical engineering was initiated until 1965; it was a co-operative course between Ralph's School and the School of Chemical Engineering. Research degrees (PhD and MSc) specifically in biotechnology became available from 1968 and a MSc(Biotech) by coursework was introduced in 1974. Biotechnology teaching was introduced into the undergraduate Science Course in 1970. As well as the traditional industries, such as brewing and wine making, and the newer (and rapidly expanding) industry of antibiotic production, a third generation of biotechnology, genetic manipulation, was in its gestation phase.

Ralph continued to develop other research, particularly the application of biological phenomena to industrial processes. He attempted to establish an alginate industry in Tasmania based on the local giant kelp. In 1964 he initiated research projects in geomicrobiology and the biodegradation of minerals and he rapidly built an international reputation in this area. He also studied the role of microorganisms in the generation of pollution from uranium minesites (in collaboration with the Australian Atomic Energy Commission) and the leaching of a wide range of Australian mineral ores containing compounds of metals such as iron, nickel, copper, zinc, tin and gold.

In addition to his teaching and research activities, Ralph was a tireless administrator. In the 1950s he was appointed foundation Head of the School of Biological Sciences and foundation Professor of Biochemistry. In 1963 he became Dean of the Faculty of Science and continued in this role until 1968 when concurrently he became Dean of the newly formed Faculty of Biological Sciences and foundation Head of the newly formed School of Biological Technology (later re-named School of Biotechnology). His enthusiasm was infectious and he inspired a high level of academic performance. He was a devoted and supportive family man and seemingly looked upon his staff and students as extended family.

Ralph loved the Australian outdoors; the keen young bush-walker and camper later became the enthusiastic angler. Much of his time after retirement was spent at his Hawks Nest cottage, chosen for its proximity to rivers and beaches which provided good fishing grounds.

For his commendable service to applied science, he was elected a Fellow of the Academy of Technological Sciences in 1978 and served several years on its Council. In 1999 he was awarded a University of New South Wales Medallion.

Ralph is survived by two sons, Christopher and Timothy, and two daughters, Susan and Janet. His wife, Barbara, died in 1989.

RUNNING DOWN, WATER IN A CHANGING LAND, a talk given by Mary White

In the first part of her talk, Mary outlined Australia's unique geological development and its influence on natural resources. About 240 million years (my) ago, Australia was part of the supercontinent Pangea and the South Pole was located at Bourke. Bits of the supercontinent drifted off at intervals, until Gondwana was formed. About 160 my ago, inland eastern Australia was a huge fresh water basin and the sediments deposited formed the Great Artesian Basin (GAB). About 118-120 my ago, seas covered much of inland Australia and marine rocks were laid down, capping the freshwater rocks of the GAB.

The GAB is a major groundwater resource in inland Australia, and very important in the arid areas. The intake of water occurs along the Western Slopes of the Dividing Range. Water travels very slowly, about 1 m per year, towards Lake Eyre. When it reaches Lake Eyre, the water bubbles out of mound springs and then it is about 2 my old. Bores in the GAB are usually allowed to run free and 96% of the water is lost by evaporation. Ferals drink from the open bore drains and as a consequence, are impossible to control.

New Zealand and the Lord Howe Rise separated from Australia about 84 my ago and most of the New Zealand sub-continent has sunk. The edge of the Australian continent was tilted upwards, forming the Eastern Australian Highlands. The Murray Basin and central Australia tilted downwards, and hence drainage was diverted inland. The Tasman Sea opened about 60 my ago.

At 45 my ago, Australia finally separated from Antarctica and moved northwards at the rate of 6.47 cm per year.

At the time of separation, the continent was green and wet, and forests flourished in inland Australia. Lush, green forests suggest a good fertile soil, but this is not the case, for the high rainfall washes nutrients out of the soil. The nutrients in the ecosystem are all held in the forests and when leaves fall off the tree, they rapidly decompose and the nutrients are taken up immediately. The early settlers found this out the hard way; they cleared the rainforest, burnt the trash and had good crops for three or four years, before the soils became infertile. Australia has so much of these infertile soils because it is so old and the rain has been leaching out the nutrients for hundreds of millions of years.

Not all soils are poor; soils formed from basalts are fertile. Volcanic activity started in northern Australia where the basalts are 40 my old. The basalts become progressively younger down the eastern highlands, and in Victoria, volcanic activity started 5 my ago. The fertile soils of the Darling Downs have formed from basalts. Agricultural practice may cause erosion with the subsequent loss of this valuable resource, the fertile soil. It is estimated that at the present rate of erosion, the fertile Darling Downs soil will all be lost in 30 to 50 years time.

As the seaway between Australia and Antarctica opened up, it allowed the Circumpolar Current which goes round and round Antarctica to develop. The warm current which previously traveled down the east coast of Australia to Antarctic was blocked by the Circumpolar Current, thus restricting heat transfer from the tropics to the high latitudes. The temperatures at the coastline of Antarctica about 55 my ago were like those in Sydney in summer. Cooling started with the development of the Antarctic Current and just kept on going for millions of years, cooling the whole world and culminating in an ice age.

Twenty my ago, inland Australia was still well watered and there were riverine forests along fresh water rivers. Fresh water dolphins, now only found in the Ganges of India and in the Amazon Basin, and flamingos were present in central Australia. Then followed a great decrease in rainfall and a corresponding decrease in broad-leaved forests and an increase in the sclerophyllous eucalypt forests. By 15 my ago, fire was becoming an important part of the environment and as the forests opened up, grasslands developed. The last 6 my has seen a major cooling, culminating in the beginning of the ice ages about 2.4 my ago.

Australia was not alone in experiencing this drying and cooling period. In Africa, there were similar trends. As the tropical forests contacted, the apes came down out of the trees and the hominoids developed, leading to human evolution.

During the last ice age, 20-18,000 years ago, Australia had half the rainfall of today and it was twice as windy. The continental shelves were exposed and the sea would have been 20 km away from Manly. Tasmania and New Guinea were connected to the Australian mainland.

The wind mobilised sand dunes which may be up to 300 km long in the Simpson Desert. Only the edges of the continent had woodlands and forests and there were extensive grasslands over much of Australia. Aborigines have been in Australia for 60,000 years, but most of them probably lived around the edge of the continent during the glacial period. Recovery from these harsh conditions started about 14,000 years ago

The glacial history of Australia is very different to that in the northern hemisphere where there were vast ice sheets. The ice stripped off the ancient soils and ground up the rock so that when the ice retreated, soils formed anew on fresh rock and as a result, are more fertile. When Europeans came to Australia, they expected to find soils like those in Europe. European agricultural practices, suitable for these more fertile soils, have proved a disaster for Australian soils.

The changes in sea level accompanying the glacial period have left their mark on Australia. During low sea level, the rivers carved out the valleys so that when the sea rose and drowned the valleys, estuaries like Sydney Harbour were formed. During the rise in sea level, the suphur in sea water reacted with the iron in the clays of the drowned soils, forming pyrite. When exposed to the air, the pyrite oxidises to sulphuric acid, the cause of our acid sulphate soils. Although rainfall has increased since the glacial period, about 70% of Australia is acutely arid, 15% is subjected to aridity, leaving 15% well watered. The well watered regions around the edge of the continent have been substantially altered.

There are two major food bowls in Australia, the Western Australian wheat belt and the Murray Darling basin. About one third of the WA wheat belt is unusable because of salinity and the Murray Darling is badly affected by salt. In these inland areas, there is very little drainage and the streams end up in lakes or flood plains. The salt is not flushed out to sea and it accumulates. Removing large quantities of water for irrigation and regulating the rivers to uniformity also reduces the river flushing and then there are problems with blue-green algal blooms. Flood periods are necessary to rejuvenate the ecosystem and recharge the groundwater. Isotopic studies show that most of this salt is modern, brought in from the ocean by the wind. There are marine geological strata in some places, but leakage of salt is rare

The natural ecosystem can cope with these adverse conditions. Deep-rooted arid trees and shrubs keep the water table low and are resistant to high concentrations of salt in the soil, provided it is not waterlogged. When the natural vegetation is cleared, the shallow-rooted grasses allow the water-table to rise, concentrating the salt in the soil and where it reaches the surface, the salty water discharges and salt scalds develop.

In northern Australia, most of the grazing is done by termites which recycle the grasses and the A horizon of the soil is made up of old termite mounds. Too much grazing by cattle causes soil erosion. Too much burning will also encourage soil erosion. The loss of soil always means loss of soil fertility for the plant nutrients are concentrated in the top 5 cm or so.

It has taken Europeans a long time to appreciate the special nature our country and the effects of mismanagement on the land. Management will have to improve to save and repair the damage already done to a vital resource, the soil. To be fair, most farmers and graziers recognise this, but they do not all agree on what new management practices are required. There is also considerable dispute over the allocation of water, the vital resource that is becoming more and more limiting. Management practices will have to be radically changed if sustainability is to be achieved.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 19 September, at 6 pm, in the Charles Moore Room (next to the Classroom), Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. GRAHAM NICOLSON

Department of Health Science, University of Technology

FUNNEL-WEB SPIDERS: FROM VENOMOUS VILLAINS TO TOXIC TREASURES

Prof. Nicolson will talk about characterising the active neurotoxin that kills humans as well as presenting some of his group's newer work on insecticidal applications of the spider toxins.

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Wednesday 24 October, at 6 pm, in the Charles Moore Room (next to the Classroom), Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. PETER WHITE

THE HUMAN CREATION OF PACIFIC FAUNAL PATTERNS

Humans have been translocating mammals between Pacific islands for the last 20,000 years. They have been causing extinctions among a wider range of animals (birds, reptiles, mammals) for at least as long. I will review some of the evidence , discuss some probable reasons for these behaviours and raise some implications for our current views of Pacific faunal patterning.

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Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

/ ,

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 101 **OCTOBER 2001**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members
Ms Maree Ann Koch, the University of New England
Mr Ian David Lindley, Australian National University
Mr Masatoshi Sone, the University of New England
Ms Michelle Cotton, University of Sydney

NEW COUNCIL MEMBER

We welcome Mr Jean-Claude Herremans to the Council. Jean-Claude has a keen interest in Natural History, and in Arachnology in particular. He has been a long standing Council Member of the Royal Zoological Society.

PAPERS PUBLISHED BY THE SOCIETY NOW ON DISC

All papers published by the Society from Volume 1 of the Proceedings in 1875 to Volume 122 in 2000 have been listed and are on disc as text file and is available to Members on request. They are listed alphabetically by author and by subject. Our thanks to Jean-Claude Herremans, our new Council Member, for undertaking this huge job.

PAPERS ACCEPTED FOR PUBLICATION

Bann, G.R. and Jones, B.G. "The Coolangatta latite member and associated tuffs: newly identified basal units in the Gerringong volcanics, southern Sydney Basin, NSW"

Jefferies, E.A. and Fox, B.J. "The diet of the Pilliga mouse from the Pilliga Scrug, northern NSW"

Timms, B.V. "Limnology of the intermittent pools of Belt's Creek, Paroo, arid Australia, with special reference to biodiversity of invertebrates and succession"

Webb, J.A. "A New Marattialean Fern from the Middle Triassic of Eastern Australia"

Whitelaw, M.J., Batts, B.D., Murray-Wallace, C.V. and McRae, C.R. "Diagenesis of the Organic Matrix in *Anadara trapezia* During the Late Quaternary: Preliminary Findings"

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2002. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project.

The regulations governing the Fellowship are available on request. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 1st December 2001.

EXTREMOPHILES – BUNGEE JUMPERS OF THE MICROBIAL WORLD: a talk by Dr Rick Cavicchioli, School of Microbiology, University of NSW.

As the name suggests, extremophiles inhabit extreme environments. Microbes are found living in hydrothermal vents at 113 °C. Organisms can grow in temperatures up to 140 °C, but they have not been isolated. Microbes are found under great pressure, in the Mariana Trench, one of the deepest places in the ocean. They may be found in extreme acidity of pH 0.7, equivalent to battery acid. Some bacteria can grow in severe nutrient depletion, e.g. Milli-Q water, the most purified water possible. They can grow in extreme cold, -12 °C to –17 °C and are found 4 km below the surface of the ice at Lake Vostok in Antarctica. Some can withstand extreme toxicity and one organism uses benzene sulphate as a substrate. One even lives in the water core in nuclear reactors. Radiation disorganises DNA, but some microbes can repair the DNA. Some organisms grow on crystalline salt and a spore survived 2,500 years in salt.

The study of extremophiles has taken off in recent years because of their applications, for example biodegradable detergents, paper bleaching, chemical synthesis (e.g. antibiotics), optical switches. A protein produced by a halophyte is used to screen for tumors. Microbes that can utilise toxic substances could be used to clean up toxic and nuclear sites.

Bacteria are not the only extremophiles. Some fungi can withstand very harsh conditions, particularly the ones that together with alge, form lichens. Tardigrades (water bears) are less than one millimeter long but can withstand 125 years desiccation, temperatures from –25 °C to 150 °C, pressures up to 6,000 atmospheres and x-rays up to 1,000 times that which can be endured by humans. In general, not much is known about tardigrades.

Hydrothermal vents release sulphuous compounds at temperatures of up to 250 °C. It is thought that the microbes living around the vents produce heat-resistant proteins. Methane producing microbes grow at 85°C or 110°C. If the hydrothermal vent is found at depths in the ocean, the methane is liquid because of the pressure, and it forms methane hydrate. Worms live in the methane, but they are probably living off the bacteria. Some of these worms live in temperatures up to 80 °C. Sulphur bacteria also live around the vents and *Sulfolobus* in Yellowstone National Park requires a very acid environment. Bacteria are also found in the Great Artesian Basin in Australia where the water may be hot, but it is only heated because of the pressure at depth. Very little is known about these bacteria in Australia as there are only one and a half people studying them.

Dr Cavicchioli studies marine oligotrophic ultramicro bacteria; very small bacteria capable of living in nutrient poor waters. One species, *Shingomonas alaskenis*, represents the bulk of the organisms in the ocean and there are 100,000 to one million cells per millimeter of water. There are two ways of coping with a low nutrient status – the 'feast or famine' (copiotroph) or the 'tortoise' (oligotroph) strategy. The slow-growing but more prolonged 'tortoise strategy' organisms are more resistant to stress. Analysis of the proteins, which are an expression of the genetics, can distinguish the two types. *E. coli* is the most studied copiotroph.

Lake Vostok is located in the middle of Antarctica and is 230 km long, 50km wide and 4km deep. The ice has been drilled to a depth of 3,623 m, to water one million years old, at 0°C and under high pressure. The ice is oligotrophic and organisms have been isolated all the way down through the core. The problem is how to sample the lake without contaminating it. The Vestfold Hills in Antarctica are bare ground and there are lakes here, but they are only 10,000 years old. Dr. Cavicchioli studies Antarctic microorganisms from the Vestfold Hills.

There is considerable interest in these Antarctic microorganisms because it is thought that they may be relevant to life in space. Europa, one of Jupiter's moons, has a crust of ice, probably over water, and is the most likely candidate to have life.

A great deal of money is being spent on genomics, but it is a powerful tool and microbes can't really be studied without it. The Australian Genome Research Facility has been set up, but it has no money and Australian researchers have to go to America for funds. Once a genome sequence is known, the genes are put into functional groups and then the proteins they manufacture can be studied. It is these special proteins that are of particular interest and hold promise of application to practical problems. DNA melts at 100°C hence organisms living at high temperatures need special proteins to 9 hold it together and act as a buffer. There will be many more examples of special proteins.

There is much interest in extremophiles for biotechnology and for astrobiology. Dr Cavicchioli predicts that astrobiology is about to take off. The International Journal of Extremophiles was started in 1997.

THE FASCINATION OF FUNGI: FABLES, FACTS, FEARS AND FORSEEABLE FUTURE, a talk given by Dr. Bettye Rees.

The oldest fossil fungi are found in the Devonian and are 400 million years old. Fungi have been found on fossil leaves and on roots: the latter were probably mychorrizal. The first association of man with fungi was through the degradation of crops.

The Romans prized fungi for food. Claudius was killed by 'Caesar's Mushroom' which is edible, laced with the juice of a poisonous mushroom, *Amanita philloides*, the Death Cap. Symptoms of poisoning do not show until about 10 hours later, when it has left the stomach and gone to the liver. It is then too late to do anything about it, for the poison destroys the liver. The Death Cap is not native to Australia but it has been introduced and is common around Canberra.

The Death Cap is distinguished by a cup-shaped base and most of the species in the genus are poisonous. In France, the pharmacist identifies fungi for you, so you can check what you intend to eat. The English do not eat much fungi, but in eastern Europe, its use is more common. In Russia, where people are hard pressed, they eat more fungi and deaths are rising. Eastern Europeans in Sydney go out to Oberon in autumn and collect mushrooms and pickle them. Some people react to mushrooms even though they are not poisonous.

Australia does not have so many edible species. The common field mushroom, *Agaricus campestris*, is probably not native and was probably brought in on rumninants. Truffles are considered a great delicacy and fetch $2,000 per kilo, and the best quality ones may command up to $3,400 per kilo. Australia does have native species of truffles, but these are not the ones sought by gourmands. Truffles are being cultivated, but as they are mychorrizal, they must be grown on the roots of the correct host, either oaks or chestnuts, and on calcareous soils. The acorns must be inoculated with the spores before planting, and the trees grown for 12 years before truffles are harvested. Truffles are being grown in New Zealand and Tasmania where they are harvested in December-February, the off season in Europe. Unfortunately, the bandicoots in Tasmania like truffles too and may eat all the crop.

Morels are also sought after, and Australia does have native morels but their location is being kept a secret to prevent people denuding them. Attempts are be made to grow them in culture. The Australian morels seem to be the same as the European species, but this is not the case for most of the Australian fungal flora.

Many different species are now being grown. *Lactarius deliciosus* grows on pine tree roots. Bettye had brought in a large jar of pickled *L. deliciosus*, given to her by a Hungarian lady who had collected them, and we tasted them before the talk. The verdict was – very tasty. There are many *Lactarius* species and some of them are poisonous. There are other less obvious uses of fungi for food, such as the widespread use of yeasts in brewing and baking

There are myths about how to tell the edible from the inedible, such as: Toadstools are inedible, mushrooms edible. If the mushroom blackens the spoon, it is inedible. If you can peel it, it is edible. These myths cannot be relied upon.

The red mushroom with white spots, *Amamita muscaria*, has muscarine in the red skin. It is used as an intoxicant and hallucinogen but it is toxic and there have been deaths. It is introduced and grows mainly on pine roots, but has jumped host and now grows on eucalypts.

There is considerable interest in the medicinal uses of fungi. Substances in *Cordiceps* which grows on caterpillars will stop viruses from growing. Some bracket fungi have anti cancer properties. And of course, there are the well known Penicillin antibiotics and Cyclosporin is used to suppress the immune system. Fungi also produce herbicides and pesticides for biological control. They may also be used for biodegradation, and sugar cane waste is one example.

There is an estimated 1.5 million species of fungi, more than the number of flowering plants. Of the estimated 240,000 species in Australia, only 5% have been named. There are so few people working on the fungi that it is estimated it will take a thousand years to describe them all. There is an urgent need to know our fungal flora. The Fungi Map project aims to map one hundred targeted species. People are asked to record the field distribution and whether it is a pathogen, mychorrizal or a rotter, i.e. causes degradation of organic matter.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 24 October, at 6 pm, in the Charles Moore Room (next to the Classroom), Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. PETER WHITE

THE HUMAN CREATION OF PACIFIC FAUNAL PATTERNS

Humans have been translocating mammals between Pacific islands for the last 20,000 years. They have been causing extinctions among a wider range of animals (birds, reptiles, mammals) for at least as long. I will review some of the evidence, discuss some probable reasons for these behaviours and raise some implications for our current views of Pacific faunal patterning.

****

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 102 **DECEMBER 2001**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members
Ms Elizabeth Jefferys, of the Australian Museum
Mr. Michael Davies, of the Australian Museum
Ms Jennifer Kingston, Macquarie University

SUBSCRIPTIONS FOR 2002

The Council of the Society has decided to again hold membership fees at their present level. There is no increase for 2002 and people who renew before 31 March 2002 will receive a significant discount. Fees are:

Membership status	Standard fee	Discount fee (paid before 31 March 02
Full Member	$53	$47
Retired Member	$31	$25
Student Member	$31	$25
Associate Member	$10	$10

A personal renewal form should be included with this newsletter unless you are a Life Member or are on record as having already paid for 2002. If the form should be there but is missing please feel free to forward your cheque anyway!

VACANCY ON COUNCIL – ANYONE INTERESTED?

There is a vacancy on Council If any Member is interested in joining the Council, contact the Secretary. We like to have a range of interests represented on the Council.

PAPERS ACCEPTED FOR PUBLICATION

Ajani, P., Hallegraeff, G. and Pritchard, T. "Historic overview of algal blooms in marine and estuarine waters of New South Wales"

Holmes, W.B.K. "The Middle Triassic Megafossil Flora of the Basin Creek Formation, Nymboida Coal Measures, NSW, Australia. Part 2"

Moulds, M.S. and Kopestonsky, K.A. "A review of the genus *Kobonga* Distant with the description of a new species (Hemiptera: Cicadidae)

Kiernan, K. and McConnell – "Land surface rehabilitation research in Antarctica"

Lindley, I.D. "Tertiary echinoids from Papua New Guinea"

Reid, Amanda "A new cuttlefish from eastern Australia"

Rickards, R.B., Percival, I.G., Simpson, A.J. and Wright, A.J. "Silurian biostratigraphy of the Cadia Area, south of Orange NSW"

Willams, G. and Adam, P. "Pollination of the subtropical rainforest pioneer tree *Alphitoniia excelsa* (Fenzl) Reiss, ex Benth (Rhamnaceae)".

GOOD NEWS! THE PROCEEDINGS INCLUDED IN SCIENCE CITATION INDEX

Our application to ISI to be included in SciSearch (also known as Science Citation Index) has been successful. The selection process was long and rigorous: they required three successive publications for assessment and since we publish only one volume a year, this meant waiting three years. Beginning with Volume 122, 2000, the contents of the Proceedings will be indexed in SciSearch. As SciSearch is now online, this means anyone, anywhere in the world, can search the index by author, topic or place name and get a list of relevant papers, including those in the Proceedings. He can then open the title to obtain the Abstract and author's address.

The Proceedings are also included in Biological Abstracts and Zoological Abstracts.

THE PROCEEDINGS TO GO A4-SIZE IN 2002

Volume 123 (2001) will be the last volume in the current size. The cost of printing an A4 page and our current smaller sized page is the same, hence the change to the A4 size will result in considerable savings since we can fit more on the larger size. Authors will need to take this into consideration when planning diagrams and photographs. An up-to-date Instructions to authors will be available in the new year.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please note:
Please read instructions carefully.
Original plus six (6) copies required for both the Betty Mayne and Joyce Vickery funds.

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $800, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their

supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **31st March, 2002.**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $800.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **31 March 2002**

ADVICE TO APPLICANTS

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested, or why the project is important, and how it would add to knowledge in that particular discipline. The proposed budget must also be fully justified. Students should seek help from their supervisor, or someone versed in the art of writing grant applications, if they are doing this for the first time.

The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only be used for research. This means we cannot fund theses preparation or attendance at conferences.

DONATIONS TO RESEARCH FUNDS ARE TAX DEDUCTIBLE

All donations to both research funds are fully tax deductible. Give yourself a tax break and help a struggling research student, as most of the funds go to students.

GARDENING BOOKS DIRECT FROM THE AUTHOR

Successful Organic Gardening and *Growing Peas and Beans* are available direct from the author, Dr. David Murray, at $20 each (including postage within Australia if required). Just phone (02) 42 292 171 or write to 7 Acacia Avenue, Gwynneville NSW 2500. Dr. Murray has just finished his next book, *The Gene Trade – A Guide to the Genetic Manipulation of Plants* which will be available sometime next year.

ROBERT BROWN 200

An international conference celebrating Robert Brown's time in NSW and his contribution to science at the Royal Botanic Gardens Sydney, 8 - 10 May 2002

In May 1802, Robert Brown first set foot in Sydney as surgeon-naturalist on Matthew Flinders' expedition. He returned several times over the next three years, making a pre-eminent contribution to knowledge of our local flora. A three-day conference celebrating his time in this region and his lasting scientific contributions will be held under the auspices of the Royal Botanic Gardens Sydney, Greening Australia (NSW) Inc., the Linnean Society of London and the Australian Systematic Botany Society.

The conference will include invited talks, and posters, on two broad themes:
- Brown's lasting influence on botanical systematics
- Changes in the vegetation of the Sydney region since his visit: current conservation and land management issues.

Further information: http://plantnet.rbgsyd.nsw.gov.au/brown200. Or contact Professor David Mabberley (chair of the organising committee): dmabberley@rbgsyd.nsw.gov.au, phone 02 9231 8111, fax 02 9251 7231.

FUNNEL-WEB SPIDERS: FROM VENOMOUS VILLANS TO TOXIC TREASURES: a talk given by Prof. Graham Nicolson

Funnel-web spiders are aggressive, venomous and dangerous. Most of them live in the ground but some species dwell in trees. The Sydney and the Blue Mountain funnel-web species are the best known.

There are about 42 species in two genera, found down the southeast strip of Australia. Funnel-webs are jet black and shiny, and when viewed from above, have long, protruding spinarettes, which distinguish them form trap-door spiders.

The male Sydney funnel-webs account for all deaths. Only one in ten bites receive venom. If venom is received with a bite, the motor nerves and muscles start twitching. The respiratory muscles also twitch, blood pressure goes up and then drops. Glandular secretions, saliva, tears and bronchial secretions are excessive. All this leads to respiratory-cardiac collapse. Until 1990, it was not known why this happened.

Prof. Nicolson has a colony of some 30 to 100 spiders and 'milks' them for venom. The spiders are reluctant to part with their venom and they have to be irritated to get them in an agitated state before they can be milked. Fractionation of the venom into its components shows that it is a mixture of many compounds. The toxins are peptides (small proteins) and can be tested for activity.

'Verustoxin', originally isolated from the Blue Mountains funnel-web, is active in primates and new borne mice, but not in non-primates, and this is the reason why cats and dogs are immune. The toxins have more modern – and longer – chemical names. When the toxin is sequenced, it is found to have 42 amino acid residues with some very unusual bonds which hold the chain in a tight globule that is very stable and ideal for practical purposes, such as insecticides.

Nerves communicate by a change in action potential (voltage) which rises and then falls back to the resting state when the nerve impulse has passed. With the toxin, the action potential rises then falls incompletely which means the nerves fire off continuously, and this causes all the observed symptoms.

The membranes of cells have pores in them to allow ions of sodium, calcium etc through. A current flows through the channel (on the ions) and the change in voltage opens the channel. Normally the voltage drops and rises quickly to close the channel and thus stop the nerve impulse. The pores have two gates to control the sodium: the activation gate opens the channel and then the inactivation gate closes it. With the toxin, the inactivation gate is jammed open.

In nature, there are a number of other toxins that target the sodium channels, and there are seven different sites on the channel that can be targeted. Some of these are puffer fish toxin, conch shell toxin, poison dart toxins, plant toxin and scorpion toxin. Is the funnel-web toxin similar to these? The toxin is made radioactive so it can be identified and traced.

It is found that the funnel-web and the scorpion toxins act the same way, but when analysed, the amino acid sequences are very different. When the chain is folded into a tight globule, the active site is formed by the same amino acids in the same configuration in each of the toxins. The positive charge of the amino acids forming the active site binds with the negative charge of the sodium channel. The charged, active site is the same for all these sodium channel toxins.

The main funnel-web toxin binds to both mammalian and insect sodium channels, but the venom has quite a few other toxins and some of these are very specific for insect sodium channels. Some have been patented in the USA as potential insecticides. As these toxins are very specific for insects, they would be safe for other creatures. The problem is that they are very poorly absorbed and virtually have to be injected to be effective. If the toxin is engineered into a baculovirus, also very specific for insects, even orders of insects, it can be used to target caterpillars that are major pests of crops. Trials show reasonable success, but although the toxin kills quickly, the baculovirus acts slowly because it must develop as an infection.

If you are bitten by a funnel-web, the toxin usually acts slowly and you would feel it in a half an hour (there are exceptions). Antivenins bind with the toxins and prevent them from acting, except when the toxins have already bound to the tissues. After treatment with an antivenin, it takes about two days for the body to eliminate it and you would feel sick during this time.

The Linnean Society of NSW

2002 Annual General Meeting

The Annual General Meeting of the Society will be held at 6 PM on 20 March 2002 in the Charles Moore Room, Royal Botanic Gardens, Mrs Macquarie's Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 5:30 PM.

Six members of council are due to retire at this AGM:

J-C. Herremans*
D. Keith*
D. Murray*
P. Myerscough*
A. Osborne
I. Percival*

Those members indicated by (*) offer themselves for re-election. Dr Armstrong Osborne is not standing for re-election.

Council recommends the election of Dr Ian Percival as President of the Society for 2002.

Council recommends that the current auditiors, Phil Williams Carbonara, be retained for 2002.

Further nominations are invited for vacancies on council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nomination must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.*Nominations must be received by the Secretary at the Society's offices by 31 January 2002.*

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 103 **APRIL 2002**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members

Dr Amanda Reid of Bulli, NSW
Dr Penelope Ajani, NSW Environmental Protection Authority
Dr Gustaaf M. Hallegraeff, University of Tasmania
Dr Tim Pritchard, NSW Environmental Protection Authority
Dr Lawrence Sherwin, NSW Geological Survey
Ms Margaret Whitelaw, Macquarie University

Dr John Farrell, Macquarie University

NEW COUNCIL MEMBER

We welcome Dr Margaret Humphreys to the Council. Dr Humphreys is Curator of Invertebrates at the Macleay Museum and has recently obtained a PhD in spider systematics. She has an interest in breeding phasmids and was one of the team of four to climb Balls Pyramid and rediscover the long thought extinct Lord Howe Island Phasmid. She has traveled extensively throughout Australia and New Guinea collecting spiders.

HONOUR TO Dr GEOFF WILLIAMS

Congratulations to Dr. Geoff Williams who was awarded the AOM for services to Conservation and Biodiversity

NEED A TAX BREAK? Donations to the scientific research funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

DR. GEOFFREY KESTEVEN: A LONG-TIME MEMBER OF THE SOCIETY.

The Society has just learned of the death in February 2001 of Dr. Geoffrey Kesteven, aged 86, who joined the Society in 1937. Dr. Kesteven studied Zoology and graduated with Honours from the University of Sydney in 1937, winning the University Medal. He obtained a position with the NSW Fisheries to study the Murray Cod and he also led the development of the oyster fisheries in the Georges River. In 1939, he married Mona (Budd) Scott and transferred to CSIR (later CSIRO) Fisheries, working on estuarine fisheries. He was unable to enlist in the War because of a medical condition and during the war, worked on food production and distribution in both Melbourne and Sydney. In 1947, he became Assistant Controller of Fisheries Australia and an adviser to the Indo-Pacific Fisheries Council in Singapore and Bangkok. The University of Sydney awarded him a Doctor of Science in Marine Biology, in 1948. In 1952, he became a Biologist with the Food and Agriculture Organisation in Rome, becoming Chief Biologist of the Fisheries Branch. He returned to Australia in 1960 to become Assistant Chief of the Division of Fisheries and Oceanography, CSIRO. He left CSIRO in 1968 to manage a succession of FAO fisheries projects in Mexico and Peru. He retired to Sydney and continued contributing on fisheries management and his last paper was published in 1999. He is survived by his wife, a daughter and four sons

WHAT IS THE NSW BIODIVERSITY RESEARCH NETWORK?

The NSW Biodiversity Research Network has been established to facilitate communication and cooperation among stakeholders in research on biodiversity in NSW. These stakeholders include government, private and community organisations, and individuals - both those who do the research, and those who use the research. Currently biodiversity research is coordinated to some extent within government agencies, but not across all research organisations. There is a need for more consultation among organisations before research programs are established, and for greater coordination of existing programs.

One of our goals is to identify gaps and priorities for biodiversity research in NSW and to outline these in an upcoming website and NSW Biodiversity Research Strategy document. Our website will also summarise and link the research of relevant organisations, and thus serve as a central point of reference for biodiversity researchers and students in NSW. We also aim to form enduring links among people, by providing opportunities for communication, such as an electronic mailing list, newsletters, and meetings or mini-symposia. The outcomes will be increased awareness of biodiversity research priorities among stakeholders, better coordination of biodiversity research and funding bids across agencies, and an improved basis for biodiversity management and conservation in NSW.

The initiative for this Network arose out of the NSW Biodiversity Strategy (hard copy published by the National Parks and Wildlife Service, 1999; available online at http://www.npws.nsw.gov.au/services/index.html). The Network Steering Committee now holds regular meetings of interested agency and university partners. Current and past members of the Steering Committee include representatives from National Parks and Wildlife Service, the Australian Museum, the Royal Botanic Gardens Sydney, the University of Sydney, the University of Wollongong, Macquarie University, NSW Fisheries, the Department of Land and Water Conservation, CSIRO, the Zoological Parks Board, NSW Agriculture, and NSW State Forests.

If you would like to get involved, or receive further information, please contact:

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NSW Biodiversity Research Network Coordinator
Royal Botanic Gardens Sydney, Mrs Macquaries Road,
Sydney, NSW, 2000.
Telephone: 2-9231 8159; Fax: 2-9251 4403
Email: Meredith.Peach@rbgsyd.nsw.gov.au

THE GREATEST BARGAIN IN HISTORY.

In 1784 Sir Joseph Banks received word that the collections of Carl Linnaeus were for sale for one thousand guineas. At the time he was having breakfast with several scientists including James Edward Smith, a 24 year old medical student. Smith's father doubted that the collections would be allowed to leave Sweden "for such a paltry penny". Smith senior thought that the famous book collection alone was worth more than the thousand guineas.

The catalogue Smith received covered far more than he had thought possible. There were: about

- 19,000 plant-sheets
- 3,200 insects
- 1,500 shells
- ~ 7 -800 corals
- 2 500 stones and minerals
- c, 2500 volume scientific library

Smith sent half the purchase price to a merchant in Amsterdam to the credit of the vendors and 26 large chests arrived in London in October 1784. In addition to the list above there was a collection of manuscripts from Carl and his father and by other contemporary scientists. There was also the entire correspondence of Linnaeus and also about 3,000 letters from many correspondents.
The posessor of this treasure would come to occupy a central position in natural science as it included what we would now call 'type specimens' for all of the specimens from which Linnaeus had built his descriptions in *Species Plantarum* and *Systema Naturae*.

Smith went overseas for about two years to complete his studies. Soon after his return he got in touch with influential men interested in the natural sciences and with them formed the Linnean Society in 1788.

When Smith died the Linnaen Society bought all his collections from his widow for 3,000 guineas.

This short article is based on the book "Carl Linnaeus" by Knut Hagberg translated from the Swedish by Alan Blair and published by Jonathon Cape.

BOOK REVIEW: International Women in Science, a biographical dictionary to 1950, by Catherine M.C. Haines, (ABC-CLIO, 2001, price $199.95 from DA Information Services or $180 from the University of New South Wales Bookshop, price subject to the exchange rate. It is also available as an e-book. Visit abc-clio.com for details).

This book focuses on women who were involved in science in a memorable way at some time in their lives. All were pioneers to a large or small effect, some in dramatic fashion, others in quiet persistence. The time frame covers women who flourished in the 1600's to those who had started their career by 1950. The majority of the women were born in Britain; the remainder were from other countries in Europe, Australia, China, India, Kenya, Japan, New Zealand, and South Africa. There are entries for 23 women from Australia and Isobel Bennett, Dorothy Hill, Mary Hindmarsh and Joyce Vickery will be names familiar to Society Members, to name only a few. Women born in North America are not included in this book, as their lives have already been detailed in *American Women in Science (1994).*

The women whose lives are detailed here worked within a broad range of scientific disciplines, and the names are listed under some 49 professions. They were either caught up in original research or applied the discoveries of others to further the well-being of the world. Many left full-time work when they married or had children and later used their experience in administration, communication, education and encouraging the study of science. All showed their considerable determination in their work, overcoming numerous obstacles and making the best of difficult situations.

The number of women working in science prior to the 20 th century is surprising. There are two entrees for the 17 th century; Maria Sibylla Merian, an entomologist, natural history artist and writer, born in 1647 in Frankfurt-am-Main, and Lady Mary Wortley Montagu, an advocate for inoculation against smallpox, born in 1689 in England. There are an impressive number of women working in science during the 19 th century. Joy Adamson, Marie Curie, Mary Leakey, Florence Nightingale, Beatrix Potter and Miriam Rothschild are a few well-known names.

This book is an inspiration to girls and women contemplating a career in science. It should be in every girls school library and is very suitable for the biographical section of general libraries. It is rather pricey, but given the large number of biographies, is good value for a library.

THE HUMAN CREATION OF PACIFIC FAUNAL PATTERNS, a talk given by Dr. Peter White

Recent archaeological research has led to the understanding that human settlement has always had an impact on the animal populations. There are two basic mechanisms that cause these changes: translocation, deliberate or accidental, and extinctions. There is no doubt that people moved animals westwards from New Guinea into Wallacea. Dr. White studies the archaeology of the islands to the east of New Guinea (Fig. 1).

The islands as far east as the Solomons have been settled for at least 4,000 years, and some for much longer. These islands are classified as Near Oceana. The islands further away, or Remote Oceana, have been settled only in the last 3.000 years and in New Zealand, for only 800 years.

The Bismarck Archipelago, just northeast of New Guinea, includes New Britain, the closest to New Guinea, New Ireland, the furthest from New Guinea, and Manus island which would have been out of sight from land as there are no small islands nearby. New Britain is volcanic and the soils are unsuitable for bone preservation, but New Ireland is limestone with lots of caves and very good for preservation, hence is the best known.

New Ireland is 350 km long and much of it is only 2-3 million years old. There is one Pleistocene assemblage older than 50,000 years, older than human occupation There are a number of sites 25-30,000 years old and occupied by people. A total of 29 mammals (27 bats, and 2 rats) have been found. Within the last 20,000 years, two species of rats, one possum (20,000 years) and one wallaby (10,000 years) were introduced. The species are the same as those found on New Britain. Manus Island has a similar pattern, but the species of possum, which is also found on New Britain, is different to that on New Ireland.

It is unlikely that these introductions were simply escaped pets, especially the larger animals. To become established, sufficient animals to breed would be required and they would have needed the right conditions to become an established population. Thus translocation implies intention and not accident. The people may have wished to bring some familiar animals to their new home, similar to when Europeans settled Australia, and they tried to recreate their familiar landscape. They may have wanted them for food or their pelts for trade.

In the Solomons, many islands would have been connected up at the time of low sea level and movement between islands would have been easy. Unfortunately, there are no Pleistocene records of these times. The early mammal faunas included 5 species of rats, 2 of which became extinct 2-6,000 years ago. The reason for their extinction is not clear. Humans brought in pigs and dogs but no marsupials. There is the odd possum bone, but not the numbers found in New Ireland. There was no megafauna on the Solomons to go extinct, whether by humans or not. The main impact of humans has been on the birds and some one third of the bird species have become extinct, not as bad as on some islands where 50-90% of the birds became extinct as the result of human occupation.

When Remote Oceana was settled, the people brought pottery etc, that is the people were not simple hunter and gatherers. They also brought pigs, dogs and chickens. These islands are widely separated by large water gaps and were dominated by birds, many of there flightless. Hawaii lost 50% of the birds due not only to hunting, but to competition with an introduced rat, *Rattus exulans*, found on every island that has had humans. This rat, the size of a house mouse, would eat anything, even snails and has had a big impact on the birds.

These islands were settled by deliberate exploration and not by drift. So why are the introductions not the same everywhere? Some introductions may have failed and some absences may have been by deliberate choice. There is clear evidence of contact between the islands after settlement. On small islands, pigs may be more of a nuisance and they were eradicated. There are no pigs on the southern part of Vanuatu and New Caledonia, and they were not brought in with first settlement. Cook left a male and two female pigs and a male and female dog on New Zealand. The fate of the dogs is unknown. The pigs failed to become established. It may be that these were tropical pigs and did not do well in New Zealand, although they had overwintered. They may have been kept separately on not fed the supplementary diet during the winter, or they may have been eaten.

Rattus praetor, a large rat with spiny belly hair, native to New Guinea, is not found New Britain, the area directly opposite New Guinea, but it is found in some of the Solomons and some small islands offshore of New Guinea and some remote islands. Its distribution is spotty and is more like a wild distribution in Near Oceania and an introduction in Remote Oceana. It was eaten as its bones are found in archaeological sites.

Marsupials were not moved into Remote Oceana as they would have been more difficult to transport and keep alive. Possums are more adaptable but they are not prolific breeders like pigs and usually have only two offspring at the time. Rats eat anything and would be very easy to transport and would easily become established in their new home.

Island biogeographers have in the past attributed all distributions to the environment but the archaeology shows that faunal patterns are a rat and human creation. Does the patterns seen now reflect the original patterns? The more questions we ask, the more problems we uncover. DNA work is being done, but it is hard to get good DNA out of fossil bones.

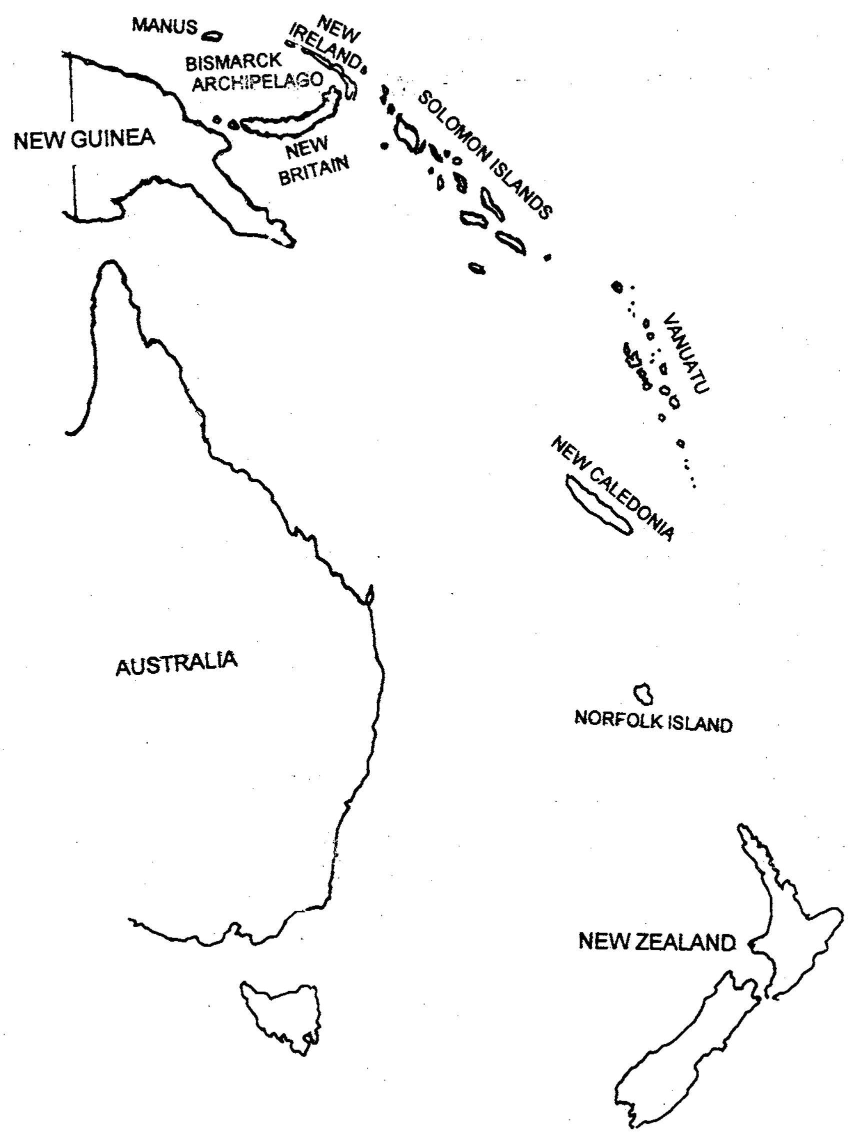

Fig. 1 The southeastern Pacific islands

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 22 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr ANDREW GANNON

Division of Science and Mathematics, Birmingham Southern College

CHRISTMAS ISLAND CRABS AND WILDLIFE

Dr. Gannon will describe the natural history of the remote and beautiful Christmas Island. The focus will be on the ecology and physiology of the unique and diverse land crabs found there, but in order to understand that we must start with the geology of the island, the plants, the birds and the other animals. There will be discussion of human impacts, past and present, and species introduced to the island by humans, such as the Yellow Crazy Ant. Finally, the economic, political, and social forces that threaten the survival of the special plants and animals of Christmas Island will be considered.

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Wednesday 19 June, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. PETER REEVES

School of Molecular and Microbial Biosciences, University of Sydney

VIBRIO CHOLERAE **- A BACTERIAL SPECIES WITH TWO LIFESTYLES**

Vibrio cholerae is one of a group of *Vibrio* species found mostly in salt and brackish waters, often in association with invertebrates or fish. Many, including *V cholerae* cause occasional food poisoning when they contaminate food. However *V. cholerae* also causes major pandemics of acute human diarrhoeal disease which waxes and wanes over time. The seventh pandemic began in 1961 after a lull of many years since the 6th pandemic. in the 70s it spread from Asia to Africa and in the 90s to South America.

Molecular studies show that the pandemic forms are highly clonal and also allow insights into the relationships of the 6th and 7th pandemic clones, their origins from the environmental forms, and hints at least of diversification during the life of pandemic 7.

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Wednesday 24 July, at 6 pm, in the Caley Seminar Room,
Royal Botanic Gardens.

Enter from the gate to Reception, Mrs. Macquaries Rd.

DR STEPHEN WROE

Institute of Wildlife Research, School of Biological Sciences, University of Sydney

THE MYTH OF REPTILIAN DOMINATION IN THE UPPER TERTIARY AND PLEISTOCENE OFAUSTRALIA

The notion that Australia's middle Tertiary to Pleistocene large terrestrial carnivore faunas were dominated by reptiles has gained wide acceptance. However, a review of the literature does not support this interpretation. 'The methodology is dubious and there is' much speculation concerning the lifestyles of large extinct reptiles that has been presented as fact. In reality, it has yet to be demonstrated that the majority of fossil reptiles underpinning the story of reptilian domination were actually terrestrial. The accelerating pace of discovery of the new large mammalian carnivore species has undermined any prima facie case for reptilian supremacy regarding pre Pleistocene Australia.

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Wine and cheese will be served from 5.30 pm

Everyone Welcome.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 104 **JULY 2002**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members to the Society:
Mr Craig R Sloss, School of Geosciences, University of Wollongong
Ms Samantha Lloyd, School of Biological Sciences, University of Wollongong
Ms Amy Rogers, Department of Zoology, University of Melbourne
Ms Clare Dempsey, School of Earth Sciences, Macquarie University
Mr Partha Bhattacharye of New Delhi, India
Mr Barry Day, Entomology Department, Australian Museum

LINNEAN MACLEAY MEMEORIAL LECTURE

Prof. Michael Archer, Director of the Australian Museum, will give the Linnean Macleay Memorial Lecture on Wednesday 27th November. The title of his address will be announced in the next newsletter.

AWARDS FROM THE RESEARCH FUNDS

The applications this year were all of a high calibre and each projects was worth funding. Three of the applications to the Joyce Vickery Scientific Research Fund involved earth sciences projects and were transferred to the Betty Mayne Fund. Unfortunately, the amount requested far exceeded the funds available for disbursement. As a consequence, all applicants received some funding, but not as much as requested. All things being equal, Members of the Society are given precedence over non-members.

BETTY MAYNE SCIENTIFIC RESEARCH FUND

DEMPSEY, Clare: School of Earth Sciences, Macquarie University.
PROJECT: The role of terrestrial plants in Palaeozoic extinctions.
The project aims firstly to determine whether the Palaeozoic extinction events documented for marine invertebrates also affected plants, and secondly, to examine the possibility that the plants themselves may have contributed to these extinctions. The project has a strongly bibliographic basis. Awarded $300.

GARVEY, Jillian: School of Zoology, La Trobe University.
PROJECT: Taphonomy, palaeoecology and palaeocommunity structure of an Early Carboniferous (Tournasian) fossil fish locality near Mansfield, Victoria.
A locality originally excavated in the 1880s has been re-opened and detailed taphonomic and sedimentological studies have been conducted on a layer-by-layer basis. New fossil localities have been located and previously undescribed microvertebrate material is being studied. Field work is still in progress. Awarded $720.

MATHIESON, David: School of Earth Sciences, Macquarie University.
PROJECT: Investigation of acid-dissolved residues from limestones of the western Lachlan Fold Belt, NSW.
Limestone are relatively rare and scattered in the western Lachlan Fold Belt (in the Condoblin-Nymagee-Cobar-Bourke region). This project aims to investigate microfossils, including conodonts, brachiopods, ostracods and other biota obtained from acid dissolution of the limestones. This will enable the determination of thermal maturity, accurate age dating and stratigraphic correlation of these horizons. Awarded $235.

PATERSON, John: School of Earth Sciences, Macquarie University.
PROJECT: Middle Cambrian trilobite taxonomy, biostratigraphy and biogeography of the Undilla region, NE Georgina Basin, Queensland.
The Middle Cambrian trilobites of the Undilla region were first collected and documented by A.A. Opik of the former B.M.R. some 35-40 years ago. Progress in systematics since then has meant that re-evaluation of the established taxa is overdue. The results will be applied to refining biostratigraphic correlations both within the Georgina Basin as well as elsewhere in Australia where the Middle Cambrian successions occur. Awarded $360.

SLOSS, Craig: School of Geosciences, University of Wollongong.

PROJECT: Predictive modelling of the response of estuarine environments to changing environmental conditions using biostratigraphical and sedimentological evidence preserved in barrier estuaries of the NSW south coast.
The project aims to improve the resolution of techniques used for dating Holocene estuarine deposits by using aspartic acid racemisation in conjunction with other (mainly isotopic) age-dating techniques. By constructing predictive models of sedimentation trends in estuarine environments together with associated floodplain systems, the study will assist future management of these environments. Awarded $500.

STROTZ, Luke: School of Earth Sciences, Macquarie University.
PROJECT: Late Holocene foraminifera from Tuross estuary and Coila Lake: temporal distribution, environmental implications and preservation potential.
Description of living and fossil (Holocene) foraminifera and other shelly faunas collected by surface sampling and coring in the two lakes will allow differences between the two regimes (one marine-influenced, the other recently closed) to be determined. Study of the temporal variation in foram assemblages in the two environments over the past 1500 years will enable reconstruction of the depositional histories of both localities. Awarded $390.

JOYCE VICKERY SCIENTIFIC RESEARCH FUND

BECK, Nadeena R.: Centre for Resource and Environmental Studies, Australian National University.
PROJECT: The effect of habitat fragmentation on dispersal and population genetic structure in cooperatively breeding white-winged choughs.
This study will monitor and compare the reproductive success of chough groups in fragmented and non-fragmented habitats. It will use microsatellite markers to measure levels of relatedness between breeding pairs in the two habitats. This species may be in the decline and it is important to gain a thorough understanding of dispersal behaviour and metapopulation structure while the species is still abundant. Awarded $500.

CHAPPLE, David: School of Botany and Zoology, Australian National University.
PROJECT: Does colour pattern polymophism influence social behaviour in White's skink, *Egernia whitii*?
Field observations, reproductive and genetic studies will be used to evaluate the extent and structure of social organisaation in *E. whitii*. DNA microsatellite studies will be used to examine the mating system of *E. whitii*, paternity and sex of young, relationships within and between groups. Evidence from population segregation and habitat use data will be used to determine if colour pattern polymorphism influences social behaviour. Awarded $600.

DAVILLA, Yvonne: School of Biological Sciences, University of Sydney.
PROJECT: Assessment of pollinator assemblage, floral display and reproductive output of *Trachymene incisa* at Myall Lakes National Park.
This study will be the first record of the pollinator assemblage and flora phenology of *T. incisa*. It will provide a snapshot of patterns of pollinator effectiveness, identify those pollinators of most importance and allow for estimation of the effect of the introduction of honey bees on the pollinator assemblage. The results also will have relevance for understanding the biology of rare and vulnerable congeners of *T. incisa*. Awarded $400.

EAGLE, Janelle V.: School of Marine Biology and Aquaculture, James Cook University.
PROJECT: Do complex water movement patterns around reefs cause settlement, biodiversity or productivity problems?
This multidisciplinary research examines the distribution patterns of the pelagic and benthic stages of coral reef organisms and the relationship of these patterns to the complex water flow patterns that occur around reefs. The study should detect if and where biodiversity, productivity or recruitment hotspots

occur around reefs and whether water flow, larval and food supply patterns can predict their locations. Awarded $500.

FISCHER, Joern: Centre for Resource and Environmental Studies, Australian National University.
PROJECT: The landscape ecology of reptiles in a fragmented landscape in southern New South Wales
This project will assess habitat requirements of forest dwelling reptiles in a fragmented, managed, plantation landscape. Reptiles have not been well studied in habitat fragmentation studies in southeast Australian forests and these results will be analysed in relation to previous bird and mammal work to provide new insights into faunal responses to habitat change and possible conservation studies. Awarded $500.

GOODMAN, Brett A.: School of Tropical Biology, James Cook University.
PROJECT: Ecomorphology, microhabitat use and life history traits in *Eugonylus* skinks.
This project examines the adaptive responses of skink lizards over a large range of taxa and habitats. Microhaabitat use will be related to morphology. Tests will determine how species morphologically specialised for specific habitats actually perform at ecologically relevant tasks to assess whether trade-offs between performancc and reproductive output relative to non-specialised congeners can be demonstrated. Awarded $500.

KINGSTON, Jennifer: Graduate School of the Environment, Macquarie University.
PROJECT: Species recognition mechanism in Antarctic and sub-Antarctic fur seals.
Part of an ongoing study of re-establishment and speciation of the sub-Antarctic and Antarctic fur seals on remote sub-Antarctic islands that will identify species recognition mechanisms that serve as barriers to hybridisation between the two species when they inhabit the same territory. Awarded $350.

LEMON, Michelle: Graduate School of the Environment, Macquarie University.
PROJECT: The effects of anthropogenic disturbance on the vocal behaviour of free ranging bottlenose dolphins (*Tursiops aduncus*) in southeastern Australia.
This study examines the effects of human-induced sources of underwater noise on vocal behaviour of populations of bottlenose dolphins in two geographically separated and acoustically distinctive coastal areas. Current work will determine if there are consistent patterns of change in the vocal behaviour of dolphins exposed to varying sources of vessel disturbance. Awarded $350.

LLOYD, Samantha M: Department of Biological Sciences, University of Wollongong.
PROJECT: Intraspecific variation in the rare shrub *Grevillea macleayana*: Reproductive effort, pollinator behaviour and reproductive success.
The proposal will examine the effect of variation in reproductive effort on pollinator visitation and subsequent reproductive output in *Grevillea macleayana*. Plant pollinator interactions are poorly known in such rare species, especially the characters that make a plant attractive to different species of pollinators. The results will be used to better understand plant/pollinator ecology, mating systems, fitness and in developing management strategies for rare and endangered plant species. Awarded $600.

McARTHUR, Lorrae J.: Northern Territory University.
PROJECT: Seasonal energetics of some species of frog in the wet-dry tropics of the Northern Territory.
Survival mechanisms in frogs during the Top End dry season will be studied using species with different life histories – burrowing cocoon forming species and tree dwelling non-cocoon forming species. Seasonal physiological energy budgets and associated behavioural biology data will be used to better understand how these native species interact with their environment and assist with their management. Awarded $400.

O'CONNOR, David: School of Biological Sciences, University of Sydney.
PROJECT: Evolution of reptile sociality.
This study of sociality (rare in reptiles) in the skink *Ergenia saxatilis*, will use field studies, behavioural experiments and a molecular analysis of relatedness to formulate and test hypotheses about the

evolution of sociality in reptiles, as well as gain a detailed understanding of the ecology and life history characteristics of *Ergenia saxatilis*. Awarded $300.

PHILLIPS, Ben Lee: School of Biological Sciences, University of Sydney.
PROJECT: Adaptive responses of Australian snakes to the Cane Toad.
This project will determine the likely long-term impact of cane toads on frog-eating snakes (37 species). Resistance to prey toxin, selectivity in prey choice and habitat use different to that of prey are the traits likely to assist in survival of the snakes. The degree of heritable variation and the relative strength of selection for these traits will be assessed. The results should contribute to conservation strategies for susceptible snakes, especially in areas not yet badly affected by toads. Awarded $300.

PUSELDIK, Louise: Department of Biological Sciences, University of Wollongong.
PROJECT: An examination of the relatedness of the Australian and New Zealand *Austropeplea tomentosa*, a small freshwater gastropod.
This proposal forms part of a study of evolutionary relationships of the snail family Lymnaeidae in Australia. Morphological and DNA data will be used to test whether *Austropeplea tomentosa* in Australia and New Zealand really do belong to the same species. Awarded $300.

ROBERT, Kylie: School of Biological Sciences, University of Sydney.
PROJECT: Temperature dependent sex determination in a viviparous lizard *Eulamprus tympanum* –and the likely impact of global warming on the future of its survival.
This project will use an integrated series of field and laboratory experimental studies to document the newly discovered phenomenon of temperature dependent sex determination in a viviparous lizard. This will involve studies of maternal thermal biology, habitat use, conditions influencing basking availability and differential offspring sex ratios in response to population sex ratios and thermal history. Awarded $400.

ROGER, Amy: Department of Zoology, University of Melbourne.
PROJECT: Ecology and song of the Eastern Whipbird.
This study will provide one of the first rigorous test of key hypotheses to explain the function of precisely coordinated male-female duets in a male-led duetting species, the Eastern Whipbird. This will involve field observation, recording and playback and removal experiments, as well as laboratory microsatellite paternity analyses. Awarded $500.

TUCKER, Anton D.: Applied Ecology Research Group, University of Canberra.
PROJECT: Comparative life history attributes in the *Emydura* turtles of the Kimberly Plateau.
This proposal forms part of an ongoing collaborative project, the first comprehensive demographic study into the ecology and evolution of Kimberley Plateau turtles. The study will amass basic life history data in *Emydura* species with particular interest in the role of diet in structuring overall geographic patterns of life history in this species. Awarded $300.

VALENTINE, Leonie, E.: School of Tropical Biology, James Cook University
PROJECT: The effects of rubber vine on small reptiles and birds in riparian systems of northern Queensland.
The exotic rubber vine is a major invasive pest of riparian systems in north Queensland. Little is known of its effects on native fauna in affected areas. This study examines 20 impacted vs 20 pristine sites through snapshot sampling of birds, reptiles and litter invertebrates. Awarded $350.

VAN WILGENBERG, Ellen: Dept. of Zoology, University of Melbourne.
PROJECT: Polydomy in the meat ant (*Iridomyrmex purpureus*).
Polydomy (presence of multiple nests within an ant colony) is widespread but little studied. This project aims to understand which ecological factors select for polydomy in the meat ant. Hypotheses to be tested include echidna predation and increased resource harvesting efficiency. As well, the influence of polydomy on colony mate recognition will be investigated. Awarded $400.

WONG, Bob: School of Botany and Zoology, Australian National University.
PROJECT: Paternal genetic contributions to dominance, attractiveness and viability in the Pacific blue eye, *Pseudomugil signifer*.
This project aims to disentangle the two processes of sexual selection to investigate the heritability of traits associated with male-male competition ('dominance' selection) and female choice ('attractiveness' selection) in an experimental design that controls for maternal and environmental effects. Paternal genetic contribution to offspring viability will also be examined. This work should contribute to a more comprehensive understanding of the net fitness benefits of female choice. Awarded $400.

VALE Dr DONALD ARGYLE ADAMSON

Don Adamson was a Lecturer in Plant Science at the Macquarie University. His research work was initially in cell biology, but he became interested in the wider field of the natural world. His scientific publications branched into ecology, geomorphology, archaeology, palaeontology, geology and climatology, in Australia, northern Africa, Antarctica and the sub-Antarctic. After his retirement, he continued in his research work.

Don was a member of the Linnean Society for many years. He was a Council Member in the late '70s and early '80s. During this time, he gave the Society a number of lectures and lead a field trip in the Blue Mountains. Don will be remembered for his enthusiasm for Natural History and the generosity of his time to the Society and his many colleagues and students.

OBITUARY: Prof SAMUEL WARREN CAREY AO (1911-2002)

Sam Carey grew up in the Campbelltown NSW area and studied chemistry, physics, mathematics and as a fill-in subject, geology at the University of Sydney. He was influenced to take up geology by the retired Sir T.W. Edgeworth David who had been on Ernest Shackleton's 1907-1909 Antarctic expedition. He studied the Werrie Basin in northern New South Wales for his Master's degree which was conferred in 1934. He then joined oil search companies and explored parts of New Guinea that had not been seen by white men. His activities in New Guinea convinced him of the dynamic nature of the earth and lead to his lifelong interest in tectonics (the science of large-scale movements of the earth – continental drift and the like). His thesis on "Tectonic evolution of New Guinea and Melanesia" earned him a Doctor of Science degree from the University of Sydney.

In 1942 he joined the war effort and trained personnel for work behind enemy lines. He also became a paratrooper. After the war, he moved to Melbourne and then Tasmania to become Chief Government Geologist. In 1946, he was appointed the Foundation Professor of Geology at the University of Tasmania where he developed an outstanding reputation and a large geology student body. He was a proponent of continental drift at a time when it was heresy, but events proved him right. He went on to develop his idea of an expanding earth, but that concept has not been accepted and barring the discovery of as yet unknown physical laws, seems unlikely.

In the early 1960's, Australia was beginning to accept that it would have to find its own hydrocarbon resources. Based on Lewis Week's knowledge of the Lakes Entrance Oil Shaft and Carey's map of anticlines extending into the offshore Gippsland Basin, BHP started oil exploration there.

Carey retired in 1976 but remained active. He was enthusiastic about the promotion of science to the public through the scientific societies. In all he did, he was a larger than life figure and enjoyed the controversial limelight. He is survived by his wife, four children, five grandchildren and two great grand children. For a more detailed account of Prof. Carey's life and work, see *The Australian Geologist* No. 123 (June 30, 2002), pp 38-39.

CHRISTMAS ISLAND CRABS AND WILDLIFE - a talk by Dr Andrew Gannon

Christmas Island is very isolated with steep sides and ocean over 4,000 m deep surrounding it. It is a volcano capped with biogenic limestone formed from coral reefs, rising to a height of about 600m. It has several terraces surrounding the island, so that in cross section it appears stepped. The people all live on one corner of the island at South Point, near the harbour. The Europeans, Malays and Chinese live in their separate towns, but segregation is voluntary. The Malays and Chinese were brought in to work the phosphate mine. They were grossly underpaid and the union became strong and eventually took over the mine. Union Day is a holiday and a time for festivals.

When an island surfaces, animals gradually colonise the island and reach an equilibrium. The larger the island, the greater the diversity of species it can support. Christmas Island is small. The greater the distance from the mainland, the fewer the species arrive at the island. Christmas Island has 4 species of birds, 14 plant species, 5 reptiles, 11 crabs, 2 bats 1 shrew and an unknown number of insect species. There are 2 extinct species of rats also.

The rainforest covering the island has a dense canopy with an open understorey. The crabs keep it open by eating seeds and seedlings. On the Terraces, the rainforest is more marginal. *Barringtonia racemosa* is the canopy tree and the arenga palm produces fruits that the crabs love to eat. *Inocarpus fagifer* likes wet places around springs and *Pandanus christmasensis* grows in dense thickets and crabs love to eat the fruit. A very unusual fresh water mangrove, *Bruguiera*, is found at Hosnies Springs 30 m above sea level, probably because of uplifting of the island. The stinging tree, *Dendrocnide* is there also. The introduced *Carica papaya* (paw-paw) and *Leucana leucophala* (mimosa) grow on disturbed land.

The reptiles include the introduced barking gecko and the brown snake, possibly introduced also. There is an endemic fruit bat or flying fox and an insectivorous bat. The shrew has not been seen since 1986. Feral cats are a problem for lizards and birds. The great frigate bird is found everywhere and is always around, but the Christmas Island frigate bird is found only on Christmas Island, They skim the water to get a drink, and if they land in the water, they cannot take off from the water. The Abbot's booby is very noisy and nests in trees - it is endangered. The brown booby nests on the terrace cliffs. The golden bosun bird (found only on Christmas Island), the red tailed tropic bird, the white tailed tropic bird and the common noddy tern are sea birds that nest on the island. The endemic Christmas Island pigeon is largely a fruit eater. The brown goshawk, a Christmas Island sub-species is endangered. Chickens have gone feral on Christmas Island.

There are 11 species of land crabs, the most diverse in the world. Land crabs have reduced gills and expanded gill chambers which function as lungs. They will drown if immersed in water. They reprocess urine to cut down on water loss. The least adapted to land are the intertidal crabs. The horn-eyed and ghost crabs manage on land but must immerse in water and the blue land crab needs burrows. The robber, red, yellow, nipper and little nipper crabs are the most adapted to terrestrial conditions and only need water to breed, but they will dig burrows in the dry season. The robber crab eats coconuts, loves mangoes and will rob your picnic. They steal things out of houses and are edible, but the Muslims think they are unclean, so they are not eaten on Christmas Island. They live for more than 10 years and seem intelligent, trying different things to escape if caught.

Red crabs are dominant over the island and will eat almost anything, from pandanus leaves, fresh, dead and rotting, and will even eat dead crabs. They must migrate to the sea to breed and the larvae need a month in the sea before coming on to land and migrating back to the forests. Blue crabs are opportunistic herbivores and live partly in the fresh water springs. They migrate to the sea to breed, like the red crabs and when the larvae come back to land, they swim up the creeks to the springs.

The reason for so many crabs is that there are almost no predators. The two extinct species of rats may have been predators, for it is thought that there were not as many crabs prior to human occupation. The cats do not eat the crabs. This may be about to change as a result of the introduced yellow crazy ant.

Dr. Gannon studies the crabs to determine if their breathing is in keeping with their behaviour and ecological niche. Animals that breath water have trouble getting enough oxygen but no trouble getting rid of the carbon dioxide, whereas it is the reverse for animals that breath air: they nave no trouble getting enough oxygen, but have trouble getting rid of carbon dioxide. Animals that breath air can slow down their ventilation rate because they get enough oxygen, but when carbon dioxide builds up, it makes the blood acidic and the ventilation rate speeds up to get rid of the excess carbon dioxide. Hence the ventilation rate responds to carbon dioxide. In aquatic animals, the ventilation rate responds to oxygen. Ventilation rate may increase up to 1400% in response to increased carbon dioxide in the terrestrial crabs. The blue crabs can breathe air or water and behave like terrestrial animals in air and aquatic animals in water. There is an almost a complete gradation from the entirely aquatic to entirely terrestrial crab.

The rainforest on Christmas Island is still substantially intact and is a unique combination of plants, but there are threats to the ecosystem. The yellow crazy ant was introduced about 1973 and remained just another ant until 1989, when they formed supercolonies and became much more aggressive. The ants kill the crabs and as the seedlings are not being eaten, they grow into a dense understorey. Most crab migrations have to go through the supercolonies and the juveniles coming back on land must also go through the supercolonies to reach their rainforest home. The ants are being baited and it seems to work to break up the supercolonies.

There are other threats. A satellite launcher is being built at South Point, close to the inhabited area, but construction is causing a lot of disturbance. Construction always brings in exotics. The environmental impact statement has not yet been finished. They want to start phosphate mining again, which will bring in weeds. The immigration and detention centre is planned for an unrehabilitated mine site and it has been granted an exemption from an environmental impact study. Again, there will be disturbance.

LINNEAN SOCIETY OF NEW SOUTH WALES

P R O G R A M M E

Wednesday 24 July, at 6 pm, in the Caley Seminar Room,
Royal Botanic Gardens.
Enter from the gate to Reception on Mrs. Macquaries Rd.

DR STEPHEN WROE

Institute of Wildlife Research, School of Biological Sciences, University of Sydney

THE MYTH OF REPTILIAN DOMINATION IN THE UPPER TERTIARY AND PLEISTOCENE OFAUSTRALIA

The notion that Australia's middle Tertiary to Pleistocene large terrestrial carnivore faunas were dominated by reptiles has gained wide acceptance. However, a review of the literature does not support this interpretation. The methodology is dubious and there is much speculation concerning the lifestyles of large extinct reptiles that has been presented as fact. In reality, it has yet to be demonstrated that the majority of fossil reptiles underpinning the story of reptilian domination were actually terrestrial. The accelerating pace of discovery of the new large mammalian carnivore species has undermined any prima facie case for reptilian supremacy regarding pre Pleistocene Australia.

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Wednesday 21 August, at 6 pm, in the Caley Seminar Room,
Royal Botanic Gardens.
Enter from the gate to Reception on Mrs. Macquaries Rd.

Dr MALCOLM BUCK

School of Biological, Environmental and Earth Sciences

University of New South Wales

MAYOR ISLAND VOLCANO. A PERFECT PLACE FOR A?!

The island called "The Mayor", or Tuhua as the Maoris call it, was a place of remoteness off the east Coast of the North Island, New Zealand, visited only by big-game fishermen. The Mayor first captured my imagination one day when I visited it as part of an International Conference. Several, years later I returned to spend a lonely but exciting month on the island, with a tin boat and Sea-gull outboard motor.

The Mayor is a spectacular Holocene volcano, with a deep central caldera and ornately carved coastline, and volcanic sequences that are quite stunning and complex. This talk will take you to The Mayor - a virtual field trip.

Wednesday 23 OCTOBER, at 6 pm, in the Caley Seminar Room,
Royal Botanic Gardens.
Enter from the gate to Reception on Mrs. Macquaries Rd.

Dr CHARLES MORRIS

School of Science, University of Western Sydney

GREVILLEA GERMINATION - SEED STRUCTURE AND RESPONSE TO FIRE SIGNALS

Seeds of eastern Australian *Grevillea* species from heath and woodland habitats show a general pattern of germination and emergence in the post-fire period. Recent research has highlighted the way in which the seeds 'sense' that a fire has occurred. Smoke, and the heat shock from the fire seem to be involved, although the results from different experiments on the same species can sometimes give conflicting results. Results from germination experiment, and from a recent study of the structure of the seed, will be the topic of this talk.

****

Wednesday 27 NOVEMBER

LINNEAN MACLEAY MEMORIAL LECTURE

Prof. MICHAEL ARCHER

Director of the Australian Museum

Details will be announced in the next Newsletter.

****

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 105 **OCTOBER 2002**

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IN THIS ISSUE

NEW MEMBERS

We welcome the new members to the Society -
Mr. Scott Priestley
Ms Pia Winberg, School of Biological Sciences, University of Wollongong

NEW POSTAL ADDRESS

The Society has a new postal address, PO Box 82, Kingsford, NSW 2032, which will be more convenient for the Secretary. The old Matraville postal address will operate until next year.

DONATIONS TO THE RESEARCH FUNDS

The Society thanks J. Barkas, who gave a donation to the Betty Mayne Research Fund and D.S. Horning, A.O. Nicholls, Z. Johanson and 'Anonymous', who all gave a donation to the Joyce Vickery Research Fund. Your generosity is much appreciated. All donations are fully tax deductible.

VALE ALEC BLOMBERY

Alexander Morris Blombery died on September 11th 2002, aged 89. He was an engineer with a passion for native plants and, in his retirement, spent many hours working as a volunteer at the Stoney Range Native Flora Reserve at Dee Why. Under Alec's guidance, it has become a showplace for native plants, including a man-made rain forest. Alec was a Member of the Society of long standing and regularly attended the Society's lectures. In its early beginnings, the Society would have had many members like him, amateurs with a passion for natural history.

Alec wrote many books on native plants and the State Library lists 23 of them. Many of his works were illustrated by Betty Maloney, the renowned wildflower painter who died the year before. He was most generous, always happy to share his vast knowledge. He will be much missed by his family, friends, native plant lovers and members of the Linnean Society.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2003. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 1st December 2002.

MONOTREME III - A symposium on Monotreme Biology, 10-11 July 2003

This symposium is being sponsored by the Linnean Society of NSW and the Australian Mammal Society. It will be held at Sydney University immediately following the AMS annual meeting.

Papers are invited on all aspects of monotreme biology. Authors will be invited to submit papers, both research and review, for a special section of the *Proceedings of the Linnean Society of New South Wales.*

The symposium is open to all interested parties and members of the Linnean Society wishing to attend will be offered a special rate. Registration fees will be determined primarily by the cost of hiring the lecture theatre at Sydney University.

To be on the mailing list for further details and registration forms, please reply to the convenor:

Dr M.L. Augee
Linnean Society of NSW
PO Box 82
Kingsford NSW 2032

or: linnsoc@acay.com.au

Further details will also be available on the LinnSoc website
http://www.acay.com.au/~linnsoc/welcome.html

***VIBRIO CHOLERAE* - A BACTERIAL SPECIES WITH TWO LIFESTYLES:** A talk given by Prof. Peter Reeves.

V. cholerae shows some basic factors about evolution in bacteria, but because of their small size, they are not so easily studied. They are so small that there are about 100,000 million, about the human population, in a cubic millimeter of solution. If they are reproducing rapidly, they can double their number in 5 minutes, but a more common rate would be double the number in 10-15 minutes. To reproduce, they just grow big and them divide into two. In higher organisms which reproduce sexually, the genes are stirred up and re-sorted and no two individuals are the same, but in normal bacterial reproduction, this does not happen and they produce clones. Just occasionally, though, there is a transfer of a small part of the genome between two bacteria, but it is rather rare.

Clonal growth means that when the environment is right, bacteria quickly fill it up. With *V, cholerae,* very few individuals rapidly become huge populations. This means that when a bacterium gets a good gene, it quickly becomes the whole population. For example, there are many clones of *E. coli* which inhabits the intestinal tract. Hence bacteria are characteristically adaptive clones, adapted to particular niches. We are probably the host to several clones of *E. coli* and we don't know it, but *E. coli* does us no harm.

V. cholerae colonises the upper part of the small intestine. It can be mild, but the toxins of the more virulent varieties causes massive secretion of fluids which is the cause of severe diarrhea. If fluid uptake can keep pace with fluid loss, then the victim will soon recover, but this does not always happen. *V. cholerae* lives in the marine environment and there is enormous variety. It is recorded from ancient India and it came out of India in 1817. Epidemics occurred in the USA in 1832, '48 and '66. Epidemics indicate poor hygiene. A trail of epidemics, a pandemic, may be followed. It is thought that pandemics 1-6 are the same clone, but pandemic 7 (P 7) is different. P 7 spread out of Indonesia in 1961, extending to some Pacific islands, Africa and southern Europe in 1970. There is enough of P 6 and P 7 around to be studied (the older strains did not survive).

The pandemics and the environmental strains in the wild both have toxin genes. The toxin genes in some strains in the Gulf of Mexico and in estuaries in Queensland do not cause trouble because the drinking water and sewerage are kept separate. At most, they may cause diarrhea in people who catch and eat local, infected crustacea. Studying these strains is a long and complicated process which comes up with simple answers.

To sequence the proteins, we need to choose one that is present in all of the strains, that is a necessary 'house-keeping' gene. There was no known house-keeping gene for all strains, making the choice difficult. The environmental strains are all different, and P 6 and P 7 have some genes in common, but others are very different. This means we have to look a many genes before deciding which ones to study. In comparison, *V. cholerae* is very different to *Salmonella* where all the genes are virtually the same. In evolutionary terms, this means the rate of transfer of genetic material between individuals is much higher in *V. cholerae,* about 4-5 orders of magnitude higher than in *Salmonella.*

Now that the genomes for 60 bacteria have been published, including *V. cholerae* we can identify some housekeeping genes. All the environmental strains are different, but P 6 and P 7 are related. This is confirmed by serological typing which shows that all pathogens are serological type 1 and all the environmental strains are not type 1.

Serological typing tests the outer polysaccharide coats of bacteria. Bacterial cells have the expected outer membrane surrounded by a cell wall, then an additional outside envelope of polysaccharide chains, and there is enormous variation in these polysaccharides. *V. cholerae* has over 200 serological types, meaning that it has a large number of genes to make the polysaccharides. The outbreak of *V. cholerae* in 1991-1993 was serological type 0/39, quite different to previous outbreaks, meaning there had been a genetic change from the older strains. 0/39 was very successful, but people quickly built up immunity to it. P 7 has been changing with time, and there has been two invasions into Africa.

V. cholerae does not have a good infection system, for it stays in the gut and cannot get through the wall. It has only become endemic because some humans live with there own faeces. Other animals do not become infected with *V. cholerae*. Inoculation does not do any good because the inoculant stays in the blood and *V. cholerae* stays in the gut. Other methods stimulate the secretion of antibodies into the gut, but we do not have good vaccines. *V. cholerae* is easily treated, drink lots of sugar and salt solution, but this does not always happen in villages. Prevention is better than a cure and *V. cholerae* is easily prevented: good public hygiene, keeping drinking water free from sewerage.

THE MYTH OF REPTILIAN DOMINATION, a talk given by Dr. Stephen Roe.

In 1887, the eminent palaeontologist, Richard Owen thought the Pleistocene mammalian fauna was similar to that of Africa today, with large herbivores being kept in check by large and powerful carnivores. There was a giant goanna, thought to be 7 m long and a carnivorous marsupial lion. By the late 19th to early 20th century, many people questioned whether the lion was a carnivore and thought that the only carnivores were giant goannas, crocodiles and snakes, all reptiles. Dr. Wroe has reviewed this subject in the light of the many fossil finds in recent years and improved methods for estimating size from fragments of bone.

There seems little doubt now that the marsupial lion was carnivorous and it shares characters with the sabre toothed cat. It had well developed shearing teeth that were good for slicing meat, and they were twice the size of the teeth of the sabre toothed cat. It had a very robust body, even more than the sabre toothed cat, with powerful shoulders and fore-limbs - it was the Arnold Schwarzenegger of the animal world. It also had a masive thumb claw. All these features would have allowed them to take prey much bigger than themselves, but it did not have the sabre teeth. The marsupial lion actively attacked prey, and its characteristic bite marks, healed over, have been found on a diprotodon.

The giant goanna is only known from fragments and its size was originally estimated by extrapolation from one finger bone. There are always problems with these estimates and the choice of living model, for example, a long slender lizard or a short fat lizard, will make a difference to the answer. It has been overlooked that reptiles have indeterminate growth and the older the are, the larger they get. Mammals, on the other hand, grow to a specific size then stop growing. For the ecology, the mean size of the predator population is far more important than a few giants. On Dr. Wroe's revised estimates of the giant goanna, it was probably no more than 5 m long, but the average size would have been about 3.5 m long and weighing 158 kg, which is about the average size of the salt water crocodile.

There have been a number of estimates of the size of the marsupial lion, but Dr. Wroe's estimate is an average of abut 130 kg, with a maximum of 164 kg. This is smaller than the African lion but larger than the leopard which is about 45 kg. The leopard is a formidable hunter and can kill a man. Thus the marsupial lion is more like a leopard, that is an Arnie Schwarzenegger leopard. It would have been a very specialised hunter.

Goannas are basically carrion feeders, and while they will hunt and kill, it is easier to scavenge. The giant goannas probably fed off the scraps left by the marsupial lion. Today, big cats typically leave 20% of the carcass. There was also a giant snake, estimated to be about 5-6 m long and weighing 250 kg, but since a python, a very long snake was used as the model, it is probably and over-estimate. Using better estimated, it was probably only 20 kg. It had small and weak jaws that could not disarticulate, hence could only eat small prey. It probably only ate large bats. Both the goanna and the snake were probably semi-aquatic.

There was also a giant crocodile, *Quinkana*, originally estimated to be 3 m long and 200 kg. A 3 m salt water crocodile is only 94 kg. On revision, *Quinkana* was more like 2 m long and 25 kg. It was thought that this crocodile was terrestrial because its feet had hooves. This type of crocodile elsewhere in the world had hooves also, but they have all been found in aquatic environments, hence the hooves are likely to be an artifact of preservation. The fossils have also been found in caves, but salt-water crocodiles will go into caves, particularly at times of stress. And they can travel overland if they want to. There is thus doubt that *Quinkana* was terrestrial.

The three reptilian carnivores are not very common in the fossil record whereas the marsupial lion is quite common. There were other marsupial carnivores as wall. There was a powerful thylacine, bigger than a rotweiler, a fox-sized thylacine and a small, quoll-sized thylacine. There is thus no evidence for the old myth that reptiles were dominant.

There is more to this than simply reconstructing the fauna. Reptiles are cold-blooded and do not need to eat as much as the warm-blooded marsupials. It has been suggested that reptiles were the dominant carnivores because the soils are very poor, hence productivity was low, but there is no simple relationship between productivity and diversity. Curiously, the largest animals were around in the ice age, when low temperatures would have limited productivity, and they died out when the world warmed up again. There is no simple relationship between the environment and diversity or body size. Diprotodons have probably been over-estimated also. They were probably smaller than an African elephant but larger than an Asiatic elephant, hence our largest herbivore was not very large when compared with other faunas elsewhere in the world.

If North America is compared with Australia, it had an incredibly rich Pleistocene carnivore fauna, because of interchange with Asia via the Bering Strait which was land at times of low sea level. It has recently been connected to South America also. In comparison, Australia is the smallest content; it is flat with no major rivers or mountain ranges to act as boundaries to isolate populations and encourage speciation. And this is the most likely reason for the relatively poor carnivore fauna.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 23 OCTOBER, at 6 pm, in the Caley Seminar Room,
Royal Botanic Gardens.
Enter from the gate to Reception on Mrs. Macquaries Rd.

Dr CHARLES MORRIS

School of Science, University of Western Sydney

GREVILLEA GERMINATION - SEED STRUCTURE AND RESPONSE TO FIRE SIGNALS

Seeds of eastern Australian *Grevillea* species from heath and woodland habitats show a general pattern of germination and emergence in the post-fire period. Recent research has highlighted the way in which the seeds 'sense' that a fire has occurred. Smoke, and the heat shock from the fire seem to be involved, although the results from different experiments on the same species can sometimes give conflicting results. Results from germination experiment, and from a recent study of the structure of the seed, will be the topic of this talk.

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LINNEAN MACLEAY MEMORIAL LECTURE

Wednesday 27 NOVEMBER at 6 pm

In the AUSTRALIAN MUSEUM THEATRETTE, College St Sydney

Prof. MICHAEL ARCHER

Director of the Australian Museum

THE THYLACINE PROJECT

The last Thylacine died in the Beaumaris Zoo in Hobart in 1936, loathed by sheep farmers - some of whom engineered its downfall. Lots of heartfelt wishes and denials of extinction later, Benjamin, as she was called, is still the last-known concrete evidence for a living

Thylacine. Sightings are personal, untestable and notoriously unreliable evidence for survival beyond this period. This talk will examine the deep-time history of the Thylacine --what we DO know about its passage through time, the reasons for its extinction -- what is being deduced through historical studies, and examples of claims that it still survives (which are, to say the least, provocative). Which brings us to a very interesting threshold between the past and the future which could conceivably see the death of extinction and the return of the Thylacine. Is this playing God? Or was that done when we exterminated the Thylacine? To bring it back could be seen as playing smart human and would probably have the approval of the gods ('The last enemy that shall be destroyed is death'; Revelation ch 21 v 4). What could be done with the AM's pickled pup? Is the Thylacine Project a waste of time and effort? What HAVE we done already that we were supposedly not going to be able to do? IF we continue to succeed, what else could be contemplated here beyond the Thylacine? Is the return of dinosaurs possible? It's a changing world and many of the most exciting and (to some) terrifying genies are already out of the bag. What are the objections to the Thylacine Project? There are a number, which will be discussed, but the most impressive come from those who claim to see infallibly into the future and know the Thylacine Project cannot possibly succeed. In 1895 Lord Kelvin, President of the Royal Society of London, declared 'Heavier-than-air flying machines are impossible.' Lord Kelvin's spirit is alive and well, and as sadly stultifying as it was in 1895. If we look forward to as much innovation in genetic technology in the next ten years as has occurred in the last decade, it would be a very brave individual indeed who said today what was impossible tomorrow. Fortunately, many of the brightest geneticists have a far more optimistic view and it is by this light and willingness to try that the Thylacine Project and the Australian Museum continue to move steadily into the future.

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Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 106 **DECEMBER 2002**

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IN THIS ISSUE

NEW POSTAL ADDRESS

The Society has a new postal address, PO Box 82, Kingsford, NSW 2032, which will be more convenient for the Secretary. The old Matraville postal address will cease operating early next year.

NEW MEMBERS

We welcome Dr. Lawrence Mound of the Division of Entomology, CSIRO

SUBSCRIPTIONS FOR 2003

The Council of the Society has decided to again hold membership fees at their present level. There is no increase for 2003 and people who renew before 31 March 2002 will receive a significant discount. Fees are:

Membership status	Standard fee	Discount fee (paid before 31 March 02
Full Member	$53	$47
Retired Member	$31	$25
Student Member	$31	$25
Associate Member	$10	$10

A personal renewal form should be included with this newsletter unless you are a Life Member or are on record as having already paid for 2002. If the form should be there but is missing please feel free to forward your cheque anyway!

PAPERS ACCEPTED FOR PUBLICATION

Holmes, W.B.K. The middle Triassic megafossil flora of the Basin Creek Formation, Nymboida Coal Measures, New South Wales Australia. Part 3. Fern-like foliage

Lindley, I.D. Echinoids of the Kairuku Formation (Lower Pliocene), Yule Island, Papua New Guinea: Clypeasteroida.

Lindley, I.D. Echinoids of the Kairuku Formation (Lower Pliocene), Yule Island, Papua New Guinea: Regularia.

Lindley, I.D. Echinoids of the Kairuku Formation (Lower Pliocene), Yule Island, Papua New Guinea: Spatangoida.

Mound, L. and Williams, G. Host-plant disjunction in a new species of Neohoodiella (Insecta, Thysnoptera, Phlaeothripinae), with notes on leaf-frequenting thrips in NSW subtropical rainforest.

Pinder, A. First Australian Records of three species and two genera of aquatic Polychaetes (Clitellata: Annelida).

Smith, K.A. Larval distribution of some commercially valuable fish species over the Sydney continental shelf.

Stoltz, L. Holocene Foraminifera from Tuross Estuary and Coila Lake, South Coast, New South Wales: a preliminary study.

Williams, G. New distribution and biological records for Native Dung Beetles in the tribe Scarabaeini from northern New South Wales

Zhen, Y.Y., Percival, I.G. and Farrell, I.R. Late Ordovician fauna from allochthonous limestones within the Silurian Barnby Hills Shale, central New South Wales.

TERCENTENARY OF LINNAEUS' BIRTH

The Linnean Society of London is planning to celebrate the tercentenary of Linnaeus' birth in 2007. A resume of the planned celebrations and scientific meetings may be found on their web-site (www.linnean.org) under News and events. Any participation from members of the Linnean Society of NSW would be welcome.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please note:
Please read instructions carefully.
Original plus six (6) copies required for both the Betty Mayne and Joyce Vickery funds.

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $1,000, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude

award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **31st March, 2003.**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,000.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **31 March 2003**

ADVICE TO APPLICANTS

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested, or why the project is important, and how it would add to knowledge in that particular discipline. The proposed budget must also be fully justified. Students should seek help from their supervisor, or someone versed in the art of writing grant applications, if they are doing this for the first time.

The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only be used for research. This means we cannot fund theses preparation or attendance at conferences.

DONATIONS TO RESEARCH FUNDS ARE TAX DEDUCTIBLE

All donations to both research funds are fully tax deductible. Give yourself a tax break and help a struggling research student, as most of the funds go to students.

VALE MARILYN FOX

Marilyn Fox died in October 2002 after a battle with cancer, She was diagnosed with Breast Cancer in 1996 by a routine mammogram. It was caught at an early stage and treated successfully, and she remained free from it until her death. In 2000, however, she was diagnosed with Peritoneal Cancer, (a form of Ovarian Cancer) at an advanced stage, and its diagnosis is almost invariably a death sentence. Marilyn wished to publicise these points to impress on women the crucial importance of early detection.

Marilyn (nee Jackson) grew up in the Newcastle district and became a teacher. She taught for three years in Wollongong and married Barry Fox. Marilyn an d Barry then left for Canada to begin teaching in Windsor, Ontario. They traveled in Europe and North America before returning to undertake post-graduate studies at Macquarie University. Marilyn obtained her PhD with a thesis on the forests of Myall Lakes National Park. She was then appointed to the National Herbarium of NSW, Royal Botanic Gardens, as a Plant Ecologist in 1979. She was called on to give expert witness in conservation issues and battles and also mapped the vegetation of the south-western quarter of the state.

In 1990, Marilyn took up a position in the School of Geography, University of NSW and was promoted to Associate Professor in 1994, becoming Head of School in 1998. She taught under-graduate and post-graduate subjects that focused on Australia's environment and biogeography. Her research work focused on plant biodiversity and the theme of human impact on the vegetation, with many publications of her work. As an independent scientist, Marilyn was appointed to a range of government policy groups. She was also a long time member of the Linnean Society of NSW and a Council Member. Her achievements were recognised in the award of the Ecological Society's Gold Medal, and is the only woman to have received this prestigious award.

NEW BOOK "Seeds of Concern – the Genetic Manipulation of plants" by Dr. David Murray

Dr. Murray answers all your questions about Genetically Modified (GM) Plants

HOW are GM plants produced?
WHICH breeding goals are worthwhile and which are not?
CAN the escape of transferred genes be controlled?
WHY have the first transgenic plants been released without full appreciation of the consequences?
HOW dangerous are bacterial proteins produced in plant foods?
IS anyone monitoring the unespected effects of gene transfer?
WILL genetically modified plants ever be acceptable to organic growers?
AND much more.

Dr. Murray is offering his book to Members of the Society for $30 (including postage within Australia). Write to DR. D. Murray, 7 Acacia Avenue, Gwynneville NSW 2500.

MAYOR ISLAND VOLCANO, a talk given by Dr. Malcolm Buck.

Dr. Buck took us on a virtual reality field trip in the comfort of our chairs, without the discomfort of travelling in an aluminium dinghy, in all weather.

Mayor Island is 30 km offshore in the Bay of Plenty, New Zealand. It is guestimated that the last volcanic activity occurred about 3,000 years ago. The nearby White Island volcano has had almost continuous activity. The rock types on Mayor Island are unique: they are rhyolites which form sticky lava flows that are explosive and don't go far. The volcano has lost its top and does not look like a volcano and much of the old volcano is under water. Ariel photos show a caldera two km across, formed in a single eruption that blew the top off.

Our virtual trip in the dinghy takes off from Opo Bay landing place, an idyllic spot with a small beach. We travel around a small circular peninsula which was once a parasitic cone or subsidiary vent. From the sea, spectacular cliffs of buff and bluey-grey coloured material were formed from mostly reworked volcanics, lava and air-fall volcanic material and pumice. One coarse blocky layer, a prominent marker horizon, was probably deposited when the top blew off and the caldera was formed. Some of the layers were reddish from iron staining caused by iron transported by ground water. Some lava flows solidify to form columnar structures that may collapse and form caves. Most of the structures seen in the cliffs from our virtual dinghy trip were formed from side vents that are probably out at sea now.

Soils take 100-200 years to form, hence indicate long periods of quiescence. Soils have not yet formed on Mt. St. Helen which erupted in 1980. Soils have formed on Mayor Island which has become vegetated, an indication of a long quiet time. This would have happened many time during its history,

As we traveled around the island, the features seen in the cliffs differed, according to the local history of the pyroclastics. A charred tree, 6.000 years old, lay beneath a pumice layer. Erosion had formed an offshore archway. On the inside of the caldera, on land, the cliffs showed many similar features. There are two lakes in the caldera, one green and the other blue. Another charred tree in the sediments was 8,700 years old. The latest activity has formed a young dome in the centre of the caldera., but there is no eruption vent, just a swollen dome.

The first quiescent period was 8,700 years age when the main drainage patterns were formed. A series of fractures in the dome allowed side vents to form and eventually, the whole of the fractured area was blown off, forming the caldera.

The geology of the whole region contains clues about the eruption. In this region, all winter winds are from the west. In summer, the winds are from the west from the ground up to 20 km, and above 20 km, they are easterlies. Thus if the eruption was in summer, and it was a big one with an eruption column going up above 20 km, the debri would have been carried onto the New Zealand mainland. The eruption of Mt Pinatubu in the Philippines did not result in a caldera. The eruption of Krakatoa is known to have produced an eruption column 50 km high. There are ash layers from Mayor Island on the mainland, hence the last eruption would have been somewhere between Mt. Pinatubu and Krakatoa in size.

The nearby White Island is continuously venting gas, and this means it is a safe volcano. It is the volcanoes that go to sleep for a long time that are dangerous, for they are more likely to blow up, like Mt St Helens. Mayor Island has been sleeping for 3,000 years!

GREVILLEA GERMINATION - SEED STRUCTURE AND RESPONSE TO FIRE SIGNALS – a talk by Dr. Charles Morris

In the field, the bulk of *Grevillea* seeds germinate after fire and only a few will germinate in between fires. Without fire, most of the seeds will not germinate and they appear to be dormant. Many native species show a similar response to fire. So what does the fire do to stimulate germination?

There are two main cues from a fire that may affect seeds. Heat shock may cause germination and this applies especially to peas and wattles. The combustion products in smoke may also stimulate germination and this was first realised in the US. In South Africa in 1990, they were trying to grow an endangered species and had tried almost everything, but nothing worked. In desperation, smoke was tried and the whole lot germinated. Many species in fire-prone vegetation respond to smoke. Some seeds require scarification (not requiring fire) to break the hard coat so that they can imbibe water before they will germinate.

Dr. Morris used seven species of *Grevillea* in his experiments and all responded positively to smoke. With heat shock, some of the species responded at 80°C but not at 120°C. The best germination came from a combination of heat and smoke and the smoke cue is the strongest. So how exactly do these cues work?

In legumes, scarification to the seed coat and heat shock are needed for germination, hence dormancy is controlled by the seed coat. *Grevillea* does respond to heat, but water uptake occurs equally in unscarified and scarified seeds. So does this mean the seed coat is not controlling dormancy?. Dr. Morris removed the seed coat and the result was 100 % germination, hence it is controlling germination.

According to the text books, the seed coat may act as a chemical as well as a physical barrier. There may be inhibitors in the seed and the seed coat may prevent them escaping. The seed coat may also restrict the uptake of water and oxygen. When the seed coat is cut off and put back on again, germination is still 100 %, hence there does not appear to be any chemical inhibitors in *Grevillea*..

Smoke may have an effect on the external surface of the seed coat or it may affect the internal cuticle beneath the seed coat by opening up channels and allowing inhibitors to escape. Smoke has over 700 chemical compounds in it but it is not known which ones promote germination. Oxides of nitrogen are implicated, though, because they stimulate the germination of some species, but not of others. We are still searching for the active ingredient(s). Too much smoke will kill seeds.

Dr. Morris then studied the structure of the seed to see if it had an influence on germination. The seeds of his study were long and thin, like an oat grain (there are other types of seeds in *Grevillea*).When dry, the edges fold in along the length of the grain and 24 hours after soaking in water, they fold out and the seed becomes flattened. The seed has no endosperm and two large cotyledons, like a pea. The cotyledons stain for protein bodies, the food reserves. The seed coat has a number of layers, including a hard sclerenchyma layer, and not all of them completely surround the seed. The lipid layer(s) would be impermiable to water and are the most likely to be affected by smoke. At one end of the seed, there is a non-cellular plug.

Animals like to eat the seeds, for the protein would make them very nutritious. Rats peel the seed coat off first, thereby removing the tannins, but marsupials scoff them down whole. It is not known if the marsupials do not have the dexterity to peel the seeds, or they have a more robust digestive system that can cope with the tannins.

The studies of Dr. Morris have provided some answers about germination, but they have generated more questions that will have to be answered before we really understand the germination of *Grevillea* seeds.

The Linnean Society of NSW

2003 Annual General Meeting

The 128th Annual General Meeting of the Society will be held at 6 PM on 19 March 2003 in the Charles Moore Room, Royal Botanic Gardens, Mrs Macquarie's Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 5:30 PM.

Six members of council are due to retire at this AGM:

John Barkas
Mike Gray
Peter Martin
Max Moulds
Alex Ritchie
Karen Wilson

and all offer themselves for re-election.

Council recommends the election of Dr Ian Percival as President of the Society for 2003.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2003.

Further nominations are invited for vacancies on council (6), the office of president, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office. ***Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2003.***

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 107 **APRIL 2003**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER
Form for donations to the Scientific Funds
Registration form for Monotreme Conference
Report of the Society's affairs for 2002

NEW MEMBERS

We welcome our new members

Mr. R.G. Beattie of the School of Geology and Palaeontology, Australian University
Ms Christina Low of the School of Physical Geography, Macquarie University

NEED A TAX BREAK? Donations to the scientific research funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

MONOTREME SYMPOSIUM

All members are invited to attend a symposium on Monotreme Biology being held by the Linnean Society of NSW 10-11 July 2003 at Sydney University. Major themes of the symposium will be ecology, evolution, behaviour, conservation and captive management of echidnas and platypuses. Review papers have been scheduled to give an overview of major areas of study and therefore the symposium should be of interest to a wide audience. Members of the Linnean Society of NSW are entitled to a discount on the registration fee (see attached registration form).

The symposium is titled "Monotreme III" as it is the third in a series, the first two of which were sponsored by the Royal Zoological Society of NSW in 1978 and 1992.

This symposium is being held in conjunction with and immediately following the annual meeting of the Australian Mammal Society. Anyone wishing further details of that meeting can obtain them from the Secretary of the Linnean Society.

NOMINATIONS FOR AWARD FROM FIELD NATURALISTS CLUB OF VICTORIA

The Field Naturalists Club of Victoria Inc. awards the Australian Natural History Medallion in recognition of services to Australian Natural History. The Society may submit a nomination. If any member has suggestions about a suitable nominee, please let the Secretary know.

LINNEAN MACLEAY MEMORIAL LECTURE - THE THYLACINE PROJECT by Prof. Michael Archer, Director of the Australian Museum

'Does extinction have to be forever' – Prof. Archer's well publicised quest to bring back the Tasmanian tiger is regarded by some as a bit of madness. Prof. Archer's story of the Tasmanian Tiger, as far as we know it, made for a fascination lecture. We know very little about the Tasmanian Tiger as it disappeared before its biology or behaviour had been studied. The last one died in captivity in December 1936, but the Thylacine story begins in deep time, some 23 million years ago.

At Riversleigh, northern Australia, in the early Miocene (23 million years ago), there was a high biodiversity. One block of limestone, about a meter long, had the bones of 64 different species of mammals, more than there is today in the whole of the rainforests of north Queensland. There were 7 different Thylacines, from large to small. At Alcoota, Central Australia, in the late Miocene (about 7 million years ago), there were only two Thylacines, one very large. Five million years ago, there was only one Thylacine, the same as the Tasmanian Tiger. Ten thousand years ago, the last Thylacine in New Guinea died out and five thousand years ago, they disappeared from the Australian mainland. A find in the Kimberleys gave a very young date at first, but when re-dated, it was 4,500 years old. A mummy of a Thylacine found in a cave on the Nullabor Plain looked as if it had died only recently, but dating put it at 4,500 years old. So Thylacines were on the way out when Europeans first arrived in Australia.

The Thylacine died out on the Australian mainland when dingoes arrived in Australia. Who brought the dingoes to Australia? Not the Aborigines, for they had been here for some 40-50,000 years and were well established all over Australia before dingoes arrived here. Pottery on the Continental Shelf suggests that it could have been someone else. Why did the Thylacine loose out to the dingo? The Aborigines took to keeping dingoes as pets very quickly – was this because they were keeping Thylacines as pets?

In the early settlement of Tasmania, the properties were all owned by the English who installed managers. When the properties did not make enough money, something had to be blamed, and the Thylacine was an easy target. It is now clear that the persecution was unjust. Records show that there were very few Thylacine attacks on sheep and most of the attacks were by wild dogs. It was easier to blame the Thylacine than to admit failure to control the wild dogs. This topic has been thoroughly researched by Robert Paddle – see his book 'The Last Tasmanian Tiger, the History and Extinction of the Thylacine'.

A Thylacine pup pickled in alcohol is regarded as a time capsule as alcohol preserves the DNA. Prof. Archer was challenged – 'Could we resurrect the Thylacine?' At the time, it was regarded as impossible, but there have been so many advances in the field that many 'impossibles' have been achieved. The clone Dolly the sheep was regarded as impossible. A cell taken from a 4-5 year old sheep replaced the nucleus in an egg cell which grew. It is argued that Dolly was 4-5 years old when borne which accounts for her early arthritis. But sheep and other farm animals often get arthritis. Dolly is a star attraction and she gets lots of visitors who feed her treats, and she spends a lot of her time standing on her hind legs, stretching over the fence, so her arthritis cannot be really bad. Dolly is doing well and producing lambs, just like any other ewe.

Chromosomes have telomeres, caps on the end that get shorter with age, hence a worn telomere would disadvantage a clone. A study of cloned animals, however, shows that the telomere is 30% longer in cloned animals, thus compensating for being born 'old' and they should live longer. Some remarkable things have been achieved by cloning. Red deer are endangered and they have been cloned, using white-tailed deer for the mothers, to build up numbers. Lama eggs and camel sperm have produced hybrids that are not known in the wild. They are perfectly healthy hybrids, but it remains to be seen if they are fertile. Cats and dogs have been cloned. The first cat, called CC (Copy Cat) is black and white, like her parent, but the pattern is not the same as the parent. Cloning has come a long way and will undoubtedly progress further.

So why not try to resurrect the Thylacine? DNA in large chunks has been retrieved from the pup, after some trouble with finding the right PCA (polymerase chain reaction), and it is just like fresh DNA, behaving the same way. DNA has also been retrieve from dried bits of muscle still attached to skins, and it behaves the same as that from the pickled pup. There are other picked specimens around, so there is a considerable source of DNA. So Prof. Archer's team has already done what was predicted as impossible.

The next step is to sequence the DNA from a near relative and use it as a guide to reassemble the Thylacine DNA, The numbat and Tasmanian devil are the nearest relatives. The Tasmanian devil is the most likely candidate for surrogate mother. Even with the reconstructed Thylacine nuclear DNA, the resurrected animal will have to make do with the surrogate mother's mitochondria, but cross species studies show that this would not be a problem. The picked pup is female – what about a mate for the reconstructed Thylacine? A Tasmanian devil Y chromosome would do just as well, but there are pickled male pups in other museums. The DNA can be retrieved from muscle on dried skins and from teeth just as well as the pickled specimens, so there should be no trouble reconstructing a male. Sounds like science fiction, but it just may succeed.

Prof. Archer answered some of the criticism of his project. Some people think why bother with conservation if we can bring back extinct species? Conservation is much cheaper, DNA research is very expensive. Two years have cost $120,000 for one and a half salaries, and as research project funds go, this is very ordinary, but it needs much more support if it is to proceed. There is interest from all around the world from people wanting to be in on it.

Some say we are playing God – Prof. Archer says we played God by extermination the Thylacine. Some church groups are violently opposed to his project but one Churchman said 'God gave life, God did not take it away'. DNA is also being recovered from insects trapped in amber millions of years old. Why not bring back the dinosaurs? Dinosaurs are not extinct, they are the birds of today.

If he succeeds in resurrecting the Thylacine, Prof. Archer intends to put a breeding population back in the wild. The Thylacine's environment is still there, much the same as it was, except that Tasmanian devils have become more common. The bush and other animals are much the same. Some people say they are still there and 'sightings' keep cropping up. Psychologists tell us that if we want to see something badly enough, we will see it. With the Thylacine back as top predator, Prof. Archer says ‘the balance of nature will be restored’.

Reference

Paddle, R., 2000. The last Tasmanian Tiger, the History and Extinction of the Thylacine. (University of Cambridge Press).

Editor’s Note. Since this lecture, Dolly the sheep has died, aged 5 years. She had to be put down because of a sever respiratory problem.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 21 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. TERRY DAWSON

School of Biological, Earth & Environmental Sciences, University of NSW

ARE RED KANGAROOS THE KINGS OF THE OUTBACK?

WHAT ABOUT THE BIG BIRD, THE EMU

Over many years our group at UNSW have shown that red kangaroos are superior mammals when it comes to living in harsh arid environments. Their capabilities are equal to or superior to those of most large, arid adapted mammals found through the world. They have excellent water conservation mechanisms, especially urine concentrating abilities. They can withstand extremely high environmental temperatures. Additionally, they can extract sufficient energy and nitrogen from poor quality fibrous vegetation. Because of our mammal centred viewpoint we often overlook the abilities of birds and, in this case the emu. The emu has very different physiological characteristics (probably dinosaur derived) to those of mammals. For example, they only concentrate their urine to a fraction of that of the red kangaroos, yet their water1osses are not much different from those of the kangaroos. Overall, the emu does things in a very different way to the kangaroos but it is the emu that is able to wander around foraging during the hottest part of summer days in the arid zone. The kangaroos on the other hand are restricted to the shade of trees and bushes in these circumstances. So then who are the kings of the outback?

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Wednesday 18 June, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr SVETLANA RODGERS

Centre of Advanced Food Research, School of Management,
University of Western Sydney

BOTULISM PREVENTION WITH MICROBIAL CULTURES

Minimally processed foods are growing in popularity and modern technologies can deliver freshness to our tables. However, the reduction in the severity of processing poses food safety risks including botulism. *Clostridium botulinum*, the bacteria causing botulism is recognised as one of the most important foodborne pathogens. The ways of controlling this bacterium in refrigerated foods are limited. The advantages and disadvantages of physical, chemical and biological methods are discussed. The protective cultures identified by the Center of Advanced Food Research (UWS) 'stand out' owing to their natural image, temperature responsive inhibition, minimal impact on product sensory characteristics and contribution into the 'food safety through nutrition' concept.

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Wednesday 20 august, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. RICK SHINE

School of Biological Sciences, University of Sydney

SEX IN THE SNAKE DEN:
A TALE OF SERPENTINE LUST, RIVALRY AND CROSS-DRESSING

School of Biological Sciences, University of Sydney

In the severely cold prairies of Manitoba in central Canada, garter snakes (Thamnophis sirtalis) overwinter in communal dens. The snakes emerge in spring, and court and mate near the den before dispersing to their summer ranges. The result is extraordinary aggregations of sex-crazed serpents, sometimes more than 20,000 within an area the size of a normal living room. This situation provides a unique opportunity for behavioural observations on the mating system, and for experimental studies on communication systems in snakes. The research has revealed many remarkable phenomena, notably the fact that some males ("she-males") produce female-like pheromones and hence are courted by other males. The talk will discuss the adaptive significance of female mimicry, and several other aspects of snake biology.

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Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

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NEWSLETTER NO: 108 **JULY 2003**

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IN THIS ISSUE

NEW MEMBERS: We welcome
Ms Andrea Leigh, School of Botany and Zoology, Australian National University
Mr David Mathieson, School of Earth Sciences, Maquarie University
Mr. Timothy Moulds, University of Adelaide
Ms. Samantha Waller, Vision, Touch and Hearing Research Centre, Queensland University

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

BEATTIE, Robert, School of Earth Sciences, Australian National University
PROJECT : Palaeoenvironmental and palaeoecological synthesis and analysis of the Upper Permian insect bed at Belmont, N.S.W.
All previous scientific research on the Belmont Fossil Insect Beds has dealt with descriptions of the fauna, with the exception of one paper describing the geological context of the insect-bearing horizon. The project therefore aims to undertake the first palaeoenvironmental and palaeoecological synthesis and palaeoenvironmental analysis of the insect bed, utilizing both existing Museum specimens and also undertaking new collections and particularly noting the vertical distribution of the fossil fauna and flora. Awarded $ 270.

CROMER, Louise School of Zoology, University of Tasmania
PROJECT : **Antarctic freshwater lake fauna: palaeobiogeography, palaeoecology and applications to climate change studies**
The project aims to use zooplankton preserved in sediments from Antarctic freshwater lakes to determine the relationship between their abundance and other indicators of climate change such as air temperature and precipitation. This will be undertaken through analysis of sediment cores from several different localities, which will help in determining whether climate change occurred uniformly in the region. The record of invasion and extinction of zooplankton species preserved in the cores, combined with determination of the fauna currently inhabiting the lakes, should reveal which species are relatively recent colonisers and which have been long-term Antarctic residents. Awarded $ 600.

PARKER, Katherine. School of Zoology, La Trobe University
Project: Depositional environment of the mid Visean tetrapod site at Middle Paddock, Ducabrook, Queensland: geology and taphonomy
The tetrapod fossils found at Middle Paddock are significant in occurring in sediments of middle Visean (Early Carboniferous) age, within 'Romer's Gap'; they also represent the oldest tetrapod body fossils known from the Southern Hemisphere. The depositional environment and palaeoecology of this site, which also yields fish fossils, will be revealed through a detailed analysis of the taphonomy of the faunal remains, both in the field and through microscopic examination in the laboratory. Awarded $ 430.

RIGGS, Naomi, School of Geosciences, University of Wollongong
PROJECT: Heavy elements in Ostracods as indicators of past environmental change and pollution.
Mortality rates observed under laboratory conditions in three common genera of ostracods, in particular due to uptake of precisely controlled amounts of heavy metals, will be used to investigate trace metal uptake in sub-fossil ostracods. These will be extracted from sediment cores taken in a range of sites varying from heavily polluted to pristine, all with a history of 200-300 years of sedimentation. Analysis of these ostracod carapaces, and comparison with the laboratory control examples, should show the potential reliability of ostracods as pollution indicators. Awarded $ 300

AWARDS FROM THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The applications for the Joyce Vickery Scientific Research Fund this year were all for projects worth funding. An explanation of the significance of the project is very important and if not adequately explained, down-grades the quality of the application. Unfortunately, the amount requested far exceeded the funds available for disbursement. As a consequence, applicants receiving funding, were not awarded as much as requested. All things being equal, Members of the Society were given precedence over non-members.

CHAPPLE, David, School of Botany and Zoology, Australian National University.
PROJECT: The evolution of complex sociality and colour polymorphism in the skink *Egernia whitii* species group.
This skink exhibits a number of unusual characteristics: social aggregations of close relatives, colour polymorphism which is probably related to environmental and ecological factors, scat piling, the construction of elaborate burrows and herbivory. There are some 30 species in the group and these features are developed to differing degrees indifferent species. Awarded $700.

CLARKE, Simon J., School of Geosciences, University of Wollongong.
PROJECT. Breeding strategies in garden skink using stable carbon isotope signature of eggs.
'Capital breeders' rely on body stores to support reproductive output whereas 'income breeders' utilise the nutrients from the regular daily intake of food. The stable carbon isotope signature of the egg would be a non-invasive way to monitor how a species acquires and utilises resources. Awarded $450

COLLINS, Kym T., Australian Mammal Research Centre, Mosman NSW.
PROJECT: Mother-pup vocal recognition and reunion in the Antarctic Weddell seals.

Mothers produce individually distinct calls; this project aims to track the vocal development of pups. An unexpected opportunity to go to Antarctica requires funds for recording equipment. Awarded $ 500.

CURREY, Alice, Department of Zoology, La Trobe University.
PROJECT. The ecology of two blue-tongue lizard species in an urban environment.
Of the two species in Victoria, one occurs over a large area of Australia and the other has a restricted distribution. They are some of the few native fauna that do well in urban and disturbed areas, probably because they can utilise 'artificial' shelters and garden pests such as snails. This study will focus on how the two species co-exist. Awarded $350.

De BRUYN, Mark, School of Natural Resources, Queensland University of Technology.
PROJECT: Evolutionary history of the giant freshwater prawn, *Macrobrachium rosenbergii.*
This species is commercially important and occurs from India and Vietnam, down through southeast Asia to New Guinea. It has been divided into 'eastern' and 'western' subspecies, but the taxonomy of the commercial and wild populations need sorting out. Awarded $ 600.

DUFFY, Angela, School of Natural Resources, Queensland University of Technology.
PROJECT. Population genetics of Frazer Island dune lake taxa.
The dune lakes are isolated habitats, rather like islands. This hypothesis will be tested by the study of four species with different dispersal mechanisms. The genetics of populations in the different lakes will be compared. Awarded $ 350.

DZIMINSKI, Martin A., School of Animal Biology, University of Western Australia.
POJECT. Variable egg size in quacking frog – a strategy for survival?
These frogs lay their eggs in temporary pools which are unpredictable. The size of the eggs laid are extremely variable: many small eggs, fewer large eggs or a mixture of sizes. Large eggs can develop very quickly in pools that rapidly dry out. Small eggs are slower to develop, but many more of them can be produced, whereas mixed sizes could cope with any uncertainty. Experiments will test these hypotheses. Awarded $ 600.

GLAVANIC, Ana, Biological Sciences, Flinders University.
PROJECT. Evolution of the bivalve *Neotrigonia*
There are currently six species of *Neotrigonia,* a genus that has survived since the Mesozoic. DNA analysis and morphological studies will resolve taxonomic uncertainties. Fossil data will also be used to calibrate the 'molecular clocks'. Awarded $ 350.

HOGAN, Fiona, Deakin University.
PROJECT. Genetic variability of the Powerful Owl across its range.
The Powerful Owl extends from the South Australian/Victorian border to southeast Queensland and is rare and endangered. An assessment of genetic variability is necessary for sound conservation management. Awarded $ 350.

LOW, Christina, Department of Physical Geography, Macquarie University.
PROJECT. The distribution and mobility of heavy metal contaminants in Old Man Saltbush and sediments on streams near Broken Hill.
Industry at Broken Hill may have contaminated sediment with heavy metals which are transported in streams. Old Man Saltbush is drought fodder for stock, hence heavy metals may enter the human food chain. Perversely too, lamb cured with saltbush is a delicacy served to visitors and maybe a fasttrack to accumulation of heavy metals in humans. Samples of sediment and saltbush will be analysed for heavy metal content. The methods used will assay the fraction available to plants. Awarded $ 900.

ROSSENDAL, Jason P. Department of Zoology, La Trobe University.
PROJECT. Life history and ecology of the southern water skink (*Eulamprus tympanum*).
The basking behavior of two populations of water skinks, only 6 km apart but with a difference of 1,000 m in altitude will be monitored. Different temperature regimes may have an important effect on life history. These skinks are viviparous and temperature regime may affect gestation period, sex, performance and fitness of offspring. Awarded $ 200.

Van DONGEN, Wouter F.D., Department of Zoology, Melbourne University.
PROJECT. Functions of multiple ornamentation in the golden whistler (*Pachycephala pectoralis*)
The question is: why do so many bird species have multiple ornamentation, i.e elaborate plumage and complex song). These ornaments on the male signal fitness to the female, but why is more than one necessary? There are a number of hypotheses why this is so, eg. 1) ornaments maybe used to signal to males (competition) as well as females, 2) long range (song) and short range (plumage) communication, 3) more than one ornament may backup or reinforce the message. Experiments will be conducted to test these hypotheses. Awarded $ 350.

VYTOPIL, Elaine G., Department of Environmental Biology, University of Adelaide.
PROJECT. Taxonomic boundaries in the seaweed *Ecklonia* spp.
Ecklonia, a large brown seaweed, forms forests that support a huge biodiversity in southern Australian waters and it is crucial to understand the taxonomy and ecology of these forests for effective conservation strategies. Awarded $ 350.

WALLER, Samantha J., Vision, Touch and Hearing Research Centre, University of Queensland.
PROJECT. The role of colour in social interaction in reef fish.
Coral reef fish are renowned for their exquisite colours, but the role of colour in behavioural ecology of reef fish is not well understood. Experiments with damselfish will determine whether colours and patterns play a role in interspecific and in intraspecific communication. The colour vision capabilities of damsefish will be assessed also. Awarded $ 800.

WAN, Sirena, School of Biological, Environmental and Earth Sciences, University of NSW.
PROJECT. Conservation genetics of grey-headed and black flying foxes.
The grey-headed flying fox is listed as vulnerable because it is a pest of orchards and the black flying fox is threatened. While many individuals are migratory, some are relatively sedentary, spending the whole year in the one camp. Moreover, the two species will interbreed. This study will concentrate on the genetics of the sedentary part of the population. Awarded $ 700.

WONG, Bob B.M., School of Botany and Zoology, Australian National University.
PROJECT. Molecular phylogeny and biogeography of the Pacific blue eye fish.
Blue eyes are endemic to Australia and New Guinea, occurring in rainforest streams, swamps, tidal mangrove creeks and desert springs. A species may be widespread and exhibit considerable morphological variation. The resolution of taxonomic uncertainty should improve the understanding of the biogeography. Awarded $ 650.

OBITARY: MERVYN EDWARD GRIFFITHS,1914-2003

Mervyn Griffiths (who always preferred to be called "Merv) was educated at North Sydney Boys' High School and obtained his Bachelor Degree in Zoology with first Class Honours in 1937, followed by his Master of Science in 1938 at Sydney University. Merv first began publishing in the scientific literature in 1936 with a paper on *The colour changes in batoid fishes* in the Society's *Proceedings* and contributed six further papers to this journal between 1936 and 1942.

After completing his Master studies, Merv was awarded the Travelling Research Scholarship for the 1851 Exhibition, which took him to McGill University in Montreal, Harvard University and the National Institute for Medical Research in London. From this work he produced 10 papers, including research on *diabetes mellitus* and the secretory functions of the pituitary. In 1941 Merv returned to the University of Sydney where he continued his work on diabetes in the Department of Medicine, where he was a Linnean Macleay Fellow in Physiology in 1941. The fellowship was renewed in 1942, but only until he joined the Royal Australian Air Force.

Merv was in the Empire Air Training Scheme in Edmonton, Canada and became a Pilot Officer in 1944. He was Commanding Officer of the 3rd Malaria Control Unit in Darwin from 1944-45 and left the RAAF in 1946. He joined the Institute of Anatomy in Canberra and continued his research in diabetes, publishing his work on the biochemistry of diabetes through to 1957. He then returned to zoology, joining the C.S.I.R.O. Wildlife Survey Section [which later became the Division of Wildlife Research] as a Senior Research Officer in June 1957. In 1959 he was awarded his Doctor of Science Degree by

Sydney University for his thesis entitled *The Relationship of the Pituitary Gland to Experimental Diabetes and the Action of Insulin.*

Although his initial published works at the C.S.I.R.O. were concerned with rabbits, Merv became interested in the biology of marsupials. In 1965 he published his first paper on the biology of the Monotremes, and his monograph on the *Echidnas* was published in 1968. During his time at the Division of Wildlife Research, Merv was the scientific director of two films, *The Echidna* and the *Comparative Biology of Lactation*, both of which won awards.

Merv retired in October 1975 from the C.S.I.R.O. Division of Wildlife, but not from the field of wildlife research. His interests broadened and Merv published a further 33 publications to add to his pre-retirement total of 43. His classic work, *The Biology of the Monotremes* (1978) pulled together all of the disparate research carried out on the group to that time. Merv was variously honoured by scientific societies, including being awarded the Peter Aitken Medal by the South Australian Museum in 1988 and becoming a Fellow of the Royal Zoological Society of N.S.W. in 1991.

Merv Griffiths died on 6th May 2003. The above summary of his academic life cannot adequately describe his contribution to biological science in Australia. Throughout his academic career Merv remained a great "generalist" in a world of increasing numbers of scientific "specialists". His encouragement, generous advice, support and sometimes cajoling, are deeply appreciated by many of these specialists.

Tom Grant
Sydney
May 2003

ARE RED KANGAROOS THE KINGS OF THE OUTBACK? WHAT ABOUT THE BIG BIRD, THE EMU, a talk given by Prof. Terry Dawson, School of Biological, Earth and Environmental Sciences, University of NSW.

Prof. Dawson graduated in Agriculture and worked on research in animal physiology. He went overseas to work on the physiology of jack rabbits living in the desert. People kept asking him about kangaroos and he realised that, at the time, we did not know anything about them. He started work on kangaroos at Fowlers Gap and notice that emus did not drink very often, and they could not catch them because they would not go into the traps around the watering places. So for a long time, everyone thought that emus did not need to drink. He then received a grant to build a tower so they could watch what went on. They would empty the traps at 7-8 am, leave the gates open while they had breakfast, then come back at 9 am when the sheep came in to drink. With the tower, the observer saw that all the emus came to drink, every day, between 8 and 9 am!

There are problems with living in hot dry deserts. Water is scarce, both as free water and in food. Energy is scarce or unavailable in dry grass and plants may have poisons. Such poor quality food is deficient in nitrogen, the next greatest scarcity after water. This does not apply to termites which can use dry grass and wood for food, hence there is a wealth of small carnivores that live off termites. Temperatures are extreme, very hot in the day but very cold at night. Animals can withstand high temperatures if they have water to evaporate and low temperatures with extra energy, but both are limiting in deserts.

Big animals in deserts can't hide, but bigness gives them some independence. They have a lower surface area for heat and water loss. Metabolism is small relative to gut size which is especially significant for herbivores that have to eat rubbishy vegetation. The cost of locomotion is relatively low. Most energy is expended in taking steps and big animals have longer legs. It pays to be big if you live in a hot, dry desert.

Kangaroos can live up to 20 km from water and it takes an energy equivalent of two days foraging to go and get a drink, but they only need to drink once every five days. They have a very low water requirement. The kidneys are good at concentrating the urine and they are able to recycle nitrogen.

They have excellent thermoregulatory abilities. They can extract maximum energy from limited food with their complex gut.

Even with all these good features, kangaroos rest in the shade at midday when the soil temperatures may be up to 60° C. The real problem is the incoming solar radiation and the kangaroos avoid it. The emus, however, stay out in the midday sun. Kangaroos reflect 36% of the incoming solar radiation and emus reflect 17%, with the rest being absorbed into the feathers. The question is, how much gets to the skin? The conductance of the coats of kangaroos is higher and up to 20% gets to the skin. The emu feathers are good insulation and with a little wind, almost none of the incoming solar radiation gets to the skin. The emu feathers are just like an umbrella. This question is important for cattle with white skin as they get cancer.

Kangaroos are able to adjust the blood flow to the skin. As they heat up, the blood vessels expand and more blood goes to the skin for cooling, but above 35° C, the vessels contract and cooling must go on through the lungs and water loss is reduced. Sweating in humans, where we just sweat when we are hot, is unusual. Most animal only sweat when the heat is produced internally during exercise. In kangaroos, the nose looses a lot of heat and they lick their forearms for extra cooling when at rest. The kidneys of kangaroos produce very concentrated urine, 4-5 times more concentrated than sea water whereas emus' urine is only half as concentrated as sea water, but the end result is achieved in very different ways.

The first step in the production of urine is filtration. Filtration in the kidney pushes water, salts and waste products out of the blood. The kangaroo has a mammalian kidney with a very high filtration rate, such that not much more than the blood cells and proteins are left in the blood. This very dilute urine then passes down a long loopy tube and all the substances the body wants is reabsorbed back into the blood. About 99% of the water is reabsorbed, as much of the salts as is necessary is reabsorbed, etc, so that the end result is reconstituted blood with the correct amount of everything. This may seem a round-about way to achieve a re-balanced blood consistency, but is very good for getting rid of plant poisons and other substances that may only be encountered occasionally.

The emu has a reptilian kidney and the main difference between it and the mammalian kidney is that it does not have the long loopy tubes so it cannot concentrate the urine like the mammalian kidney. Emus have a low filtration and a low re-absorption. In the bird, the urine goes to the cloaca where more water is absorbed and some nitrogen is saved. Birds excrete waste nitrogen as uric acid which is not very soluble and precipitates out in the cloaca, hence water is not needed to flush it out of the system. Uric acid also binds to salts so they are excreted dry also. The end result is much the same as that for the kangaroo, but it is achieved in a very different way.

Kangaroos drink every five days and emus, every day, but the emu can go for a very long time without drinking. The male sits on the eggs and during that time, they do not drink or eat. They need 7 kg of fat and they just metablolise the fat. The metabolism during incubation is quite different.

The digestive system of the kangaroo has a four-chambered fermenter where microorganisms break down the food. Emus have a simple gut, but they can change the small intestine into a fermentation chamber. They can also regurgitate food back into the gizzard for reprocessing, the equivalent of a kangaroo chewing its cud. Hence emus can survive on dry grass, but they do need some berries and green feed.

After all his studies, Prof. Dawson concludes that kangaroos are superbly adapted to the desert environment, but the emus do almost as well, although the end result is achieve in a very different way. The main difference is that the kangaroos have a better digestive system and can live almost entirely on dry grass, whereas emus require some green grass and berries. It used to be thought that kangaroos, being marsupials, were 'primitive', but their adaptations for survival in the desert are very sophisticated.

LINNEAN SOCIETY OF NEW SOUTH WALES

P R O G R A M M E

**Wednesday 20 August, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Prof. RICK SHINE

School of Biological Sciences, University of Sydney

SEX IN THE SNAKE DEN:

A TALE OF SERPENTINE LUST, RIVALRY AND CROSS-DRESSING

In the severely cold prairies of Manitoba in central Canada, garter snakes (*Thamnophis sirtalis*) overwinter in communal dens. The snakes emerge in spring, and court and mate near the den before dispersing to their summer ranges. The result is extraordinary aggregations of sex-crazed serpents, sometimes more than 20,000 within an area the size of a normal living room. This situation provides a unique opportunity for behavioural observations on the mating system, and for experimental studies on communication systems in snakes. The research has revealed many remarkable phenomena, notably the fact that some males ("she-males") produce female-like pheromones and hence are courted by other males. The talk will discuss the adaptive significance of female mimicry, and several other aspects of snake biology.

****

**Wednesday 17 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

DR MARGARET HUMPHREY

University of Sydney/Australian Museum

and

MR STEPHEN FELLENBERG

Insektus

ON THE BRINK: THE PRECARIOUS SURVIVAL OF THE LORD HOWE ISLAND PHASMID

Dryococoelus australis, the endemic Lord Howe Island stick insect, or land lobster, was thought to have been wiped out about 80 years ago by introduced rats. However, reports that this

impressive insect may have survived on Balls Pyramid, a barren oceanic spire 25 km from Lord Howe Island, led a NPWS team to investigate.
Margaret, a member of the team, will talk about the rediscovery of what is possibly the world's rarest animal, and Stephen will discuss the conservation issues, particularly the captive breeding program in which he is currently involved.

****

Wednesday 22 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. GREG SKILBECK

Department of Environmental Sciences, University of Technology Sydney

THE SOUTH PACIFIC RECORD OF EL NINO OVER THE PAST 20,000 YEARS – WILL THIS HELP PLANNING IN AUSTRALIA?

"Occurrence of the El Nino climate phenomenon has been well established from instrumental records dating back nearly 120 years. Events happen every 3-5 years on average and last for around 18 months. Instrumental records also show that more severe El Ninos occur about once every 40 years, but these records are just not long enough to reliably establish or allow prediction of this lower frequency pattern. For variability beyond 100 years we have to delve back into the natural records of sediments, soils and fossils. A number of palaeoclimate studies addressing the past activity of El Nino have emerged over the past 5 years, contributing to an understanding of the role of El Nino over the past 450,000 years. These range from studies of coral laminations, deep oceanic sediments, and planktonic biota, to the investigation of lake sediments from surrounding areas. The ocean-atmosphere conditions that result today in an El Nino event have apparently occurred for at least several hundred thousand years. It seems clear that El Nino was not well developed between 15,000 and 5,000 years ago, but has been intensifying since that time. The questions that remain unclear are, has this Pacific ocean-atmosphere coupled system produced climate conditions in Australia similar to today over this period of time, and if El Nino is getting worse, can we predict how much worse and over what time period this will occur? In this talk Dr Skilbeck will review our current knowledge of the palaeo-El Nino, present some new information from the eastern tropical Pacific (the home of El Nino), and speculate about what we in Australia are in for in the future."

****

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 109 **SEPTEMBER 2003**

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IN THIS ISSUE

Included with this newsletter – Notice of symposium 'Reduction of Roadkill'

NEW MEMBERS: **We welcome**

Ms Matilda Thomas of Geosciences Australia, Canberra

Mr Martin Dziminski, School of Animal Biology, University of Western Australia.

PAPERS ACCEPTED FOR PUBLICATION

Lindley, I.D. The Yule Island fauna and the origin of tropical northern Australian echinoid (Echinodermata) faunas

Timms, B.V., Shepard, W.D. and Hill, R.E. Cyst shell morphology of the fairy shrimps (Crustacea: Anostraca)

Mound, L. and Masumoto, M. *Trichromothrips veversae* sp. n. (Insecta: Thysanoptera), and the botanical significance of insects host-specific to Austral bracken fern (*Pteridium esculentum*).

SPECIAL SYMPOSIUM: REDUCTION OF ROADKILL – 18 Nov 2003

Roadkills cause the unnecessary deaths of numerous animals and how to reduce the slaughter is very topical. The details of this symposium are on the flyer included with this newsletter. It is free to members of both Societies but bookings are essential as numbers are strictly limited.

BOTULISM PREVENTION BY MICROBIAL CULTURES, a talk by Dr. Svetlana Rodgers.

Bacteria are everywhere and most of them do us no harm, most of the time. Some are completely harmless all the time; some are harmless under normal circumstances, but may cause trouble if they get into the wrong place, and a few are pathogenic or produce poisons. It is important that we are exposed to the harmless bacteria because they stimulate the immune system, as if to give it exercise, so that it is strong and efficient when harmful bacteria come our way. It is not a good idea to destroy all bacteria if there is no reason to do so. As an example, our salad vegetables are washed in water with chlorine to destroy all bacteria. They do not stay bacteria-free for long and if there is harmful bacteria around, they become established easier in the absence of the harmless ones. And now that the vegetables are being handled, the bacteria are more likely to come from us, hence more likely to be harmful than the natural bacterial flora.

Probiotics is the addition of beneficial bacteria in food to keep down the harmful 'bad guys' and an example is the use of lactic acid bacteria in yoghurt. This principle may be extended to other foods. A particular need is the freshly cooked, heat and eat foods, e.g. soups, casseroles. These foods are cooked in large cookers, the food is pumped out, chilled and packed under a vacuum, with no preservatives added. The advantaged of these foods is that they are cooked at normal cooking temperatures and have a fresh taste, not the overcooked taste of tinned food, but the disadvantage is that while the bacteria have been killed, their spores survive these lower temperatures. These foods are perfectly safe if handled and stored in the recommended temperatures, but this cannot be guaranteed. Hospital meals are prepared in this way, as are foods available in convenience stores and supermarkets.

The real danger is botulism spores. The bacteria are everywhere and they are not infectious, so do us no harm, but if allowed to grow, they produce a powerful poison. Cooking kills the bacteria, but not the spores, which grow only in an anaerobic environment, the very conditions created by vacuum packaging. What is the solution to this problem?

Heating sufficiently to kill the spores overcooks the food and it tastes like tinned food. Irradiation kills the spores, but it kills off everything else as well and it requires capital equipment. The ph could be adjusted to an unfavourable level for the botulism bacteria, but this would make the food very acidic. Chemicals may be added e.g., salt, spices, lactate, but the amount of salt required is far too high, spices cannot be added to everything and so much lactate would be required that you would taste it and it would spoil most foods.

In the probiotic way, a small amount of culture of a 'good guy' is added, not enough to taste. Then, if the food is stored at the correct temperatures, both the 'bad guys' and 'good guys' do not grow. If temperatures are allowed to rise, say the delivery was left too long on the loading dock on a hot day, then the 'good guys' would grow and produce a bacteriocin which would suppress the growth of the 'bad guys'. If the good guys grow a lot, they spoil the food, but it would not kill you. The lactate producing bacteria are the good guys, but because they do not produce the lactate until needed, only small amounts are required.

Dr Rodgers tested out this hypothesis using seafood chowder stored at 10 °C for 10 days, a really severe heat abuse. The control, without lactate culture, was full of greenish gas bubbles, a sign of the botulism organism at work – it looked revolting. The test with the lactate culture did not have any gas bubbles and microbial tests showed there was no botulism bacteria present, even though it would have been completely spoiled. After seeing pictures of the test, I think it will be a long time before anyone in the audience will eat seafood chowder!

The idea is simple but its application to the manufacturing process is not so simple. The culture must be added to the food at the right stage, after cooking and without introducing any contaminants. There are different strains of the lactate bacteria and some are better inhibitors than others. This kind of food should be distributed chilled at 3 °C, but we do not have chilled distribution and manufacturers freeze the food, but freezing spoils the taste. The advantages of this method are the lower temperatures used in cooking which give a better taste and an increase in shelf life, up to three weeks. It is not used commercialy yet, but a patent has been applies for. Other cultures may be used against other bacteria, for example, *Listeria.*

SEX IN THE SNAKE DEN: A TALE OF SERPENTINE LUST, RIVALRY AND CROSS-DRESSING, a talk by Prof. Rick Shine.

Prof. Shine is an Evolutionary Biologist with a passion for snakes The problem with studying snakes is that they are mysterious, secretive and rather rare, and in Australia, venomous, hence it is difficult to find enough of them if you want to study mating systems. In Manitoba, Canada, garter snakes hibernate in deep holes and all emerge at the beginning of spring and mate in a frenzy before dispersing, hence Manitoba in spring is a good place to study snakes.

The garter snake is harmless and the most common snake in North America. In Manitoba, the snakes must find a den deep enough so that they do not freeze during the long harsh winters. All snakes from far and wide use the few deep holes in the limestone country. They spend eight months underground and when they emerge, mate furiously in balls of snakes with one large female in the centre and many small males all writing together. They can be up to knee-deep and the bottom ones get crushed. All this writhing creates a rustling sound and they are oblivious to people around them – you have to check your pockets to see that the snakes have not taken refuge there. This concentration of snakes have been used to work out how snakes communicate. Communication is all chemical, by means of pheronomes. They have lipids in the skin that change slightly when they are sexually active. These pheronomes identify male from female, indicate state of health, etc. There are many dead snakes, crushed or killed by crows, and the males court them, even when they are putrefying, showing that the pheronomes are very stable.

As well as males and females, there are 'shemales', males that are actively courted by other males. The shemales are identical to the other males, but they have more testosterone. It had been thought that the shemales knew who the females were, but they confused the other males hence gained an advantage in mating. There is a disadvantage, though, the shemales would court themselves and go round in circles.

Garter snakes are easily handled, so they could be used for experiments to test out these ideas. When caught, they do nothing, not even hiss, unless the temperature is less than 10 ° C, when they are too sluggish to run away, and then they display. In snakes that fight, the male is bigger than the female, but in garter snakes, the males are smaller than the females. It was thought that the size of males did not matter for mating, but trials showed it did. Perhaps size did not matter as much as in the snakes that fight, but the big garter snake males had more matings. The males have two penises and two testes that make up two separate systems. They usually use them alternately, so that when one is exhausted, he can get right back to business, using the other one. In hot weather, however, they use the right one almost exclusively, so they must be right handed(!).

So why the 'cross dressing'? There are up to 30 % shemales in each den and they lack the male identifying chemical. Shemales are courted about half as much as the females. They also court the females, but they are very poor at it, taking about twice as long as the regular males. Many shemales are dirty because they have just emerged from the den. They are also fatter than the males. All the snakes loose body mass after emerging from the den, up to 10 % in two weeks. Could it just be a transitory state? After eight months in the den, could it be that it takes a few days to get up to speed?

When a shemale first emerges from the den, he is vigorously courted by other males. After two days, he is a regular male. It is likely that every male is a shemale when he first emerges from hibernation, cold weak and slow. And what better way to warm up than use all those hot-blooded males piled on top of you? The pile of males is good protection from the crows which tend to pick on the smaller snakes. Hence cross-dressing is a good survival mechanism, not a mating system. In autumn, the ration of males to females is 1:1.

When they first emerge, the females mate then leave, whereas the males hang around the dens for weeks. When the female mates, the male deposits a plug that lasts for 48 hours, preventing further mating. DNA analysis has shown that the females mate more than once, the other time(s) probably away from the dens. The females bear live young.

If the winter is unusually cold and the ground freezes to greater depths, whole dens may be killed. The snakes show no aggression in and around the dens, but after dispersal, they will bite, but they are not venomous. They will go up to 20 km from the den, then return to the same den at the end of summer. The small snakes tend to avoid the dens used by the bigger snakes, probably because they can utilise holes too small for the big ones. In warm climates, there may be no need for shemales, but this has not been studied.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

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Prof. GREG SKILBECK

Department of Environmental Sciences, University of Technology Sydney

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LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 110 **DECEMBER 2003**

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IN THIS ISSUE

Included with this newsletter :
Your subscriptions for 2004
Notice of AGM and nominations for Council
Notice of research grants offered by the Society
Draft of revised Rules and Bylaws

NEW MEMBERS: We welcome

Dr Elizabeth May, School of Biological Sciences, University of Sydney

PAPERS ACCEPTED FOR PUBLICATION

Cohn, J. "Effects of slashing and burning on *Thesium australe* R. Brown (Santalaceae) in coastal grassland of NSW".

Moulds, T. "Review of Australian cave guano ecosystems with a checklist of guano invertebrates".

Rickards, R. B. & Wright, A. J. "Early Silurian graptolites from Cadia, NSW".
Young, G. C. "A Devonian brachythoracid arthrodire skull (placoderm fish) from the Broken River area, Queensland"..

SUBSCRIPTIONS FOR 2004

A notice of your subscription for 2004 is included. Remember, if you pay before March 31, a discount applies.

REVISION OF THE SOCIETY'S RULES AND BYLAWS.

The Society is revising the Rules and Bylaws to bring them up to date with current practices and technology. A draft copy is included with this Newsletter and it will be discussed at a Special General Meeting to be held immediately after the Annual General Meeting. Members views will be welcomed.

DARWIN DAY – 12 FEBRUARY 2004

In commemoration of Charles Darwin, 'Father of Evolution', the Australian Museum Society , the Australian Skeptics and the Humanist Society of NSW have joined forces to create a half day forum. The day will commence with the presentation of the Darwin Day Awards. These include:

- 'The Huxley'(named after Thomas Henry Huxley, for original contributions to the science of evolution and evolutionary theories)
- 'The Wilberforce" (named after Bishop Samuel Wilberforce Oxford, for the anti-evolutionists who, through stupidity of their argument or actions, has done the most to promote evolution as a fact)
- 'The Gould' (named after Stephen Jay Gould, for services to education and promotion of science in areas relevant to natural history and evolution)

This is your chance to vote for these awards – place you nominations now
For more information and online voting, visit www.users.on.net/skeptic/darwin/index.htm or call The Australian Museum.
The Darwin Day Awards will be held on 12 February 2004, 9.30am to 1.00pm, in the Alistair McKerras Theatre, Sydney Grammar School, entrance via Stanley St. Sydney. Tickets are $10 per adult, school children free. To make a booking, contact The Australian Museum Society, 6 College St Sydney, 2010, phone 9320 6225 or Fax 9320 6051.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please note:
Please read instructions carefully.
Original plus six (6) copies required for both the Betty Mayne and Joyce Vickery funds.

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $1,000, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **31st March, 2004.**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,000.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 31 March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **31 March 2004**

ADVICE TO APPLICANTS

Unsuccessful applications usually fail because of inadequate explanation of what hypothesis is being tested, or why the project is important, and how it would add to knowledge in that particular discipline. The proposed budget must also be fully justified. Students should seek help from their supervisor, or someone versed in the art of writing grant applications, if they are doing this for the first time.

The Society is bound by a ruling from the Taxation Commissioner that the Research Fund can only be used for research. This means we cannot fund theses preparation or attendance at conferences.

DONATIONS TO RESEARCH FUNDS ARE TAX DEDUCTIBLE

All donations to both research funds are fully tax deductible. Give yourself a tax break and help a struggling research student, as most of the funds go to students.

ON THE BRINK: THE PRECARIOUS SURVIVAL OF THE LORD HOWE ISLAND PHASMID: a talk given to the Society by Dr Margaret Humphrey.

Dr Humphrey recently accompanied an expedition to Balls Pyramid, Lord Howe Island, to locate *Dryococelus australis*, the endemic Lord Howe Island stick insect. Lord Howe Island is some 600 km east of Port Macquarie and it marks the southernmost occurrence of the coral reef. Balls Pyramid is the largest volcanic oceanic spire in the world and is 25 km southeast of Lord Howe Island. About 1900, these stick insects were common on the island and were regarded as a pest. They got into roofs, and scrabbled around, but they were good for fish bait. They were nocturnal, spending the day in cavities and burrows, and were more common in the rainforest areas, but there are no records of their host plants. In 1918, there was a shipwreck on the reef and this probably introduced rats to the island. By 1920, the stick insects, a native skink, five bird species and a burrowing cockroach were in decline, all attributed to predation by the rats and mice.

It is very difficult to land on Balls Pyramid and rough seas make it dangerous. With very steep slopes, climbing is difficult and if the stick insect was on the brink, so were the expeditioners. In places, they had to make their way along a vertical rock face, with the raging surf below, If anyone fell, there would be little hope for them. It is debatable whether climbing should be allowed, for Balls Pyramid is an important bird-nesting site and if an accident occurred, it would be very difficult to get help in, and since then, Balls Pyramid has been closed to all except conservationists doing remedial work. The expedition had planned to stay for one night, but took provisions for 5-6 days, in case rough seas delayed their departure.

An earlier expedition had found dead stick insects and a photo taken about 1970-1980 showed patches of the endemic *Melaleuca howiana* which were not there in 2000. The south side is almost vertical and nearly always in shade, so there is no vegetation there, but elsewhere, the vegetation is mainly sword grass and very old *Melaleuca howiana* draped over the rocks. The dead sword grass and sea bird burrows would make good homes for the stick insects. One *Melaleuca* was growing near a small soak, so it was well watered and quite lush. Droppings were found under the bushes, but there is a large cricket also on Ball's pyramid. The stick insects are nocturnal, so the good climbers went back at night to find them eating the tips of the lush *Melaleuca*. They saw two adult females and one juvenile.

Stick insects are easy to rear, but eggs were not collected on this trip because the population seemed very small and the right conditions for keeping them in captivity had not been set up. A later trip, in a wet year, found five lush *Melaleuca* bushes, 25 females and two males. On another, even later expedition, they had permission to collect two pairs. One pair went to Stephen Fellenberg of Insektus and the other to the Melbourne Zoo, as both of these had a good record for breeding invertebrates.

The stick insects were set up in large cages and given different habitats but only fed *Melaleuca howiana*. About a week later, they became very ill with diarrhea. The Melbourne ones recovered and have since laid lots of eggs that are hatching. Stephen's insects died, but they laid eggs first. The goal is to breed up enough insects and reintroduce them back to Lord Howe Island, but the rats and mice will have to be dealt with first. A new Zealand firm has a good reputation for eradicating rats and mice, for a price of $6 million. If enough stick insects are breed, they may be kept as pets.

Adults do not usually change their diet, but if introduced to new foods when young, they may take them. Some plants are universally liked by most phasmids, such as roses and brambles. A Close relative of the Lord Howe Island stick insect lives in New Guinea and New Britain in hollow tree trunks, in colonies, coming out at night and returning to the same burrow. If you were to put your hand in, you could get a handful of males, females and young ones, but be careful, the males have a spine on their legs and they use it for defense.

The dead insects found in the 1960's were collected from birds nests. There are not many sticks on Balls Pyramid, so perhaps the birds were using dead ones for nesting material Maybe birds could have originally brought them to Balls Pyramid, but it is more likely that fishermen using them for bait introduced them. The *Melaleuca* was probably not the original food plant, but it is the only choice on Balls Pyramid. Birds are probably not a predator, for they are all sea birds.

If the Lord Howe Island stick insect is to be reintroduced back to Lord Howe or any of the small offshore island, the rats and mice would have to be eradicated first. At present, they are looking after the *Melaleucas* on Balls Pyramid, stabilising those likely to collapse off the rocks and eradication the morning glory vine that would smother them.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 111 **APRIL 2004**

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IN THIS ISSUE

Included with this newsletter :
Form for donation to Scientific funds
Report of Society's affairs for 2003.

NEW MEMBERS: We welcome

Dr. Gregory D Edgecombe: Australian Museum.
Mr. Brett A. Goodman, School of Tropical Biology, James Cook University.
Ms Joanne Isaac, School of Tropical Biology, James Cook University.
Mrs Alison Mokany, School of Botany and Zoology, Australian National University.
Mr. Euan G. Richie, Dept. Zoology, James Cook University
Ms Michelle Yerman, University of New England and Australian Museum.
Mr. Daniel Warner, School of Biological Science, Sydney University.

A SPECIAL GENERAL MEETING

will be held Wednesday 21 July 2004 at 6 PM in the Classroom at the Royal Botanic Gardens to finalize the adoption of changes to the Society's Rules and By-laws as accepted at the Special General Meeting held on 24 March 2004. No changes have been made to the copy as circulated to all members prior to the AGM. However anyone needing another copy should contact the Secretary.

NEED A TAX BREAK? Donations to the Scientific Research Funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

THE SOUTH PACIFIC REORD OF EL NINO OVER THE PAST 20,000 YEARS- WILL THIS HELP PLANNING IN AUSTRALIA?

A lecture given by Prof. Greg Skilbeck.

El Nino means different things to different people. For us in Australia, it means drought, but for the Pacific, it means floods and for South America, the failure of fishing. In India, it means the failure of the monsoon. The effects of El Nino may be correlated around the equator, globally. All of these effects, however, mean disruption and often hardship for the people. If we know about past events and the behavior of El Nino, it may help us plan for future events and lessen the harsh impact.

Bits about El Nino have been known for a long time but it was not until the 1970's that connections were recognised. High insolation at the equator heats up the tropics and initiates a circulation towards the poles. The earth's rotation deflects the air movements so that winds circle the globe. Oceanic circulation is similar, but ocean currents are deflected by the continents. Then there is air and ocean interaction, so that complex circulations result. The incoming solar radiation changes seasonally so that the strength of the low pressure systems change also.

The cold Humbolt current flows up the coast of South America and cold upwelling pools in the eastern Pacific. The warm water pools in the western Pacific. There may be a gradient of up to 6° C from east to west in the surface waters. In an El Nino event, this gradient breaks down. The Southern Oscillation Index, the atmospheric component, is normally high in the west and low in the east. In an El Nino event, winds break down and may reverse, and blow onshore in the eastern Pacific, causing rains, unusual in this normally desert coastline. In the east, westerly winds blow offshore of Australia, causing drought. The cause of the El Nino event is often said to be the currents, but the winds play a part too.

Instrumental records go back to 1876, but they are dodgy before 1935. There are satellite records since 1972 and high resolution records after 1982. Historical records of droughts in Australia and India, floods on the Nile etc go back to the 1500's. Proxy data may be gleaned from anything that reflects a record of surface sea temperature, rainfall, or nutrient change, in biological or sedimentary material. Good dating is essential.

The Southern Oscillation Index (SOI) is the difference between the pressure at sea level for Darwin and for Tahiti and gives numbers between –35 and +35. The global pattern is known as ENSO (El Nino Southern Oscillation). Using the numbers, normal is +, trends towards El Nino -, with El Nino events having values of –16 to –18. More El Nino events occurred during the periods 1875 to1915, and 1993 to 1998. Super El Nino events, when numbers went very high, occurred in 1973, 1983, and 1998. Prof. Skilbeck studies the periodicity of these events with the hope of being able to predict them.

There is a potential of a super El Nino event every 15 years and periods of 40-60 years when there are more El Nino events, but the periodicity is not very clear. It is well known that changes in carbon dioxide may cause climatic change, but not all climatic changes are accompanied by a change in carbon dioxide. For example, the carbon dioxide levels remained much the same before and during the Little Ice age (about 14th to 19th centuries), and during the Viking warm period when Vikings settled in Greenland.

To go back before historical records, lake sediments are studied. Prof Skilbeck has studies coastal lakes, e.g. Tuggerah and Myall Lakes, and used magnetic susceptibility (a measure of mineral input into the lake, more clay etc washed in during more rain), organic carbon (a measure of plant productivity) and calcium carbonate deposition (a measure of lack of runoff) etc for climatic information. Periodicities of about 250, 810 and 1,500 years were found. Are these long term El Nino periods? We cannot tell unless we know the base level of the El Nino rate, but the cores are too short for that.

Corals have a layered growth and there should be a change in growth rate with El Nino events. Oxygen isotopes, the calcium/magnesium ratios etc. may be measured, but corals are only a few hundred years old, so we have the same problem of finding the base rate of El Nino. There are older coral of about 150,000 years.

Varved lakes in the high Andes have been studied and the sediments cover 12,000 years. The resolution is in decades and they don't have a base rate. There is an increased rate of sedimentation during El Nino events, because of increased rainfall and runoff. El Nino was reduced from 15-6,000 years ago, during the period following the last glacial period.

ENSO has been around at least 130,000 years, i.e for a full interglacial/glacial/interglacial cycle, but people disagree about whether ENSO was weaker/reduced or stronger/enhanced during the last glacial period. This may be because different people measure different things to decide this question.

Prof. Skilbeck went on an Ocean Drilling Program cruise and is comparing the different microfossil communities which reflect different nutrient levels. A core close to the coast of Peru is highly laminated and has been sampled at 1cm intervals, so a high resolution result will be obtained, hopefully annual layering. The core goes back to 20,000 years, to the last glacial period. The input from volcanic activity must be ruled out.

The results show that before 6,000 years ago, there were not many ENSO events. After 6,000 years, the ENSO events increased, and this evidence is very similar to that from the lakes in the Andes. There is a 2.000 year and a 112 year cycles in the Andes lakes data. These results are relevant to Australia. Are ENSO events and the weather disasters that accompany them linked to global warming? Can we predict ENSO events and use them in planning? Unfortunately, there is insufficient evidence and some of it is conflicting. However, the 50-60 year cycles of intense and not so intense ENSO events may be useful, but there is so much to be worked out before predictions can be made.

To the question 'what do the SOI figures given with daily or weekly weather forecasts mean?', Prof. Skilbeck answered 'Nothing'. Daily and weekly figures vary wildly. Monthly averages, however do have meaning.

BOOK REVIEW: Webb, J.B. 2003. The Botanical Endeavour Journey Towards a Flora of Australia. Surrey Beatty & Sons. Chipping Norton. ISBN 0 949324 92 2

The development of science and of 'European' Australia marched in parallel across the nineteenth century.

We tend to think of Australia, and its institutions, as young, but think of science, and particularly sciences such as botany or zoology, as old. While the oldest European universities were old in 1788 they were very different from the universities of today. Some, indeed, taught botany, but they were not the research institutions that we would expect universities today to be. The concept of major government-run scientific institutions, carrying out research for the public good, had barely been thought of, let alone developed. For the European colonial powers the expansion of empires provided the impetus for the development of state sponsored and run science.

This book provides an introduction to this rapid period of change. Botanical collectors played an important role in providing material for the development of botanical science and in the exploration and appreciation of the Australian bush.

Webb provides a sampling of the early collectors – illustrating the range of background, experience and motives of those to whom we owe a lasting debt. In the late eighteenth and early nineteenth centuries collecting objects of all sorts was very much in vogue. Herbarium specimens were sold, as indeed were whole collections. Given the continuing importance of early specimens for taxonomic and biogeographic research, modern botanists have need to be able to track down collections. Webb provides examples of the tortuous routes by which some Australian specimens reached their current repository, but many collections in private hands may have been lost or are still to be relocated by botanical sleuths. Today, the major herbaria around the world are public institutions, but there are still many private herbaria 'out there', at risk of being lost if the collector looses interest or executors fail to recognize the importance of dried plants. I am not aware of commercial trade in specimens between collectors – but may be I don't move in the right circles.

However, collection mania still occurs in other areas of natural history – although frequently these days with a strong association with illegal activities such as the illegal collection of fossils, or unauthorised trade in endangered species of animals and plants.

The collectors discussed by Webb would mostly be known to members of the Linnean Society, but one much neglected figure is rightly given attention. Phillip Barker Webb was an Englishman of independent means who carried out important botanical work in Mediterranean Europe and the Canary Islands. Given the common stereotype of the insular monolingual Englishman, Webb was a marked exception. He spent much of his life in Europe and actively promoted collaboration amongst a network of botanists and zoologists across the continent.

Webb's importance to Australian botany arises from his accumulation of a very large collection of Australian herbarium specimens. This collection is now in the Botanical Museum in Florence. Of particular importance is the inclusion of a large number of specimens from Labillardiére's herbarium (purchased by Webb following Labillardiére's death). Labillardiére's specimens have never been comprehensively studied – providing an excuse, if one were needed, for Australian botanists to visit Florence.

One of the other towering figures in nineteenth century botany was George Bentham, for all that he was never formally trained as a botanist. He never visited Australia, but his seven volume *Flora Australiensis* is a remarkable work of scholarship and good sense. Like Webb he was multiligual and interest in southern European floras – his first publication being a catalogue, in French, of the flora of the Pyrenees and the Bas-Languedoc.

There is much that is interesting in this book, and it will introduce many to the quite remarkable personalities who laid the foundations of our knowledge of the Australian flora. However, there are some features which are less satisfactory. On internal evidence the book would appear to have been completed in 2000, yet did not appear until 2003. Unfortunately this means that the author was unable to draw upon the much expanded second edition of Volume 1 of the Flora of Australia. In discussing individual collectors the author draws specific attention to a handful of specimens. There may be a reason why these particular examples were chosen – but it is not obvious to me, and I found the flow of reading interrupted as I tried, unsuccessfully, to determine a reason.

The development of botany in Australian universities is discussed only briefly, and only in regard to Sydney. It would have been interesting to have learnt about the rest of the universities – particularly Melbourne given the magisterial presence of von Mueller in that city. Were there any interactions between the infant university and von Mueller, was systematic botany a feature of the curriculum?

The author's underlying thesis is "we wuz robbed" – expressed in the conclusion to the chapter on Bentham. "However, well into the 19th century he stands, with the Hookers behind him, as a symbol of the European interest which delayed for Australia her coming of age in the realms of botanical science."

Although I can appreciate the argument I would contend that the story is more complex, and does not reflect as badly on the European botanical establishment as the author would have us believe. When New South Wales was first established the scientific infrastructure to hold herbarium specimens was scarcely developed in England, and the establishment of institutions in the new colony was scarcely at the top of the priority list. New South Wales, and later the other colonies, was not the sum total of empire. It could be argued that in terms of collecting and taxonomic effort we were better served than many other places.

With the benefit of hindsight we could argue that moves to 'independence' could and should have happened earlier – but in the absence, in either London or Australia, for such a move the centralization of 'research' effort in London worked to our benefit. More specimens survived in European institutions than might have if subject to the vagaries of climate, mould and insects in Australia. Rather than worrying too much about the past (although learning lessons from it), the question to address is whether Australian and world botany is best served by having so many type specimens retained in European institutions. Are the specimens our equivalent of the Elgin Marbles, and should the support of the great and the good be sought for a campaign of repatriation?

Paul Adam

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 19 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. JIM BASINGER

University of Saskatchewan

"An Arctic Eden: Life Before the Great Freeze"

The Canadian High Arctic is a land of snow and ice, where sparse vegetation of the tundra provides meagre support for some of the world's hardiest animals. Yet while frigid polar climate may seem somehow natural, indeed inescapable, the fossil record in the very high latitudes tells quite a different story. In 45 million-year-old deposits on Ellesmere and Axel Heiberg islands, at 80°N, we find the exquisitely preserved remains of great forests of dawn redwood, swamp cypress, pine, oak, alder, walnut, and ginkgo. These fossil forests provide a window on a world quite unlike our own, a time of global warmth and ice-free poles. Because polar regions are sensitive indicators of global climate, we can use arctic fossils to help in our understanding of the cause and consequence of climatic change. Thus the record of the past provides insight into evolution of Earth's environments, and perhaps helps us to peer into our future.

Wednesday 21 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

MR. DROR BEN-AMI

School of Biological, Environmental and Earth Sciences,
University of New South Wales

Conservation in the urban fringe: the Swamp Wallaby, *Wallabia bicolour*, a case in point

Loss of habitat has been documented as one of the greatest threats to wildlife conservation. Yet, the conversion of rural to urban landscape has been increasing dramatically worldwide. While urban areas tend to accommodate mostly exotic flora and fauna, they can also retain a substantial amount of native species. Conservation inside or on the fringe of urban areas can directly maintain species biodiversity and indirectly support conservation efforts by increasing the positive interactions between humans and nature. The Swamp Wallaby is a common macropod that is often one of the last medium sized marsupials to survive in proximity to urban areas. It faces a number of human caused disturbances such domestic predators, road kill, fires, human presence, loss of habitat and increased non-native vegetation. This study aims to understand the biology of the Swamp Wallaby within the urban context and to propose appropriate conservation measures.

Wine and cheese will be served from 5.30 before each lecture.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 112 **JULY 2004**

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IN THIS ISSUE

Included with this newsletter :

Flyer: 'The Evolutionary Legacy of the Ice Ages'
Flyer: Taxonomy for the Twenty-first Century'

NEW MEMBERS: We welcome

Mr. Andrew Baker, University of Technology, Sydney.
Ms Amber S. Beavis, Australian National University, Canberra.
Ms Kerstin Bilgmann, Macquarie University, Sydney.
Ms Heidi-Jane Caldon, Macquarie University, Sydney.
Mr. Robert P. Gibson of Dubbo.
Dr Thomas R. Grant, University of New South Wales, Sydney.
Mr. John Hagden, University of New England, Armidale.
Mr. Lindsay Popple, Universiy of Queensland, Brisbane.
Miss Joanna Wiszniewski, Macquarie University, Sydney.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS

The Society has received donations to the Research Funds to a total of $ 1,168. Our thanks to the generous donors: Dr. J.M.E.. Anderson, Anonymous, Dr. I. Brewer, Prof. T.C. Chambers, Mr. R.J. Faulder, Dr. D.S. Horning, Ms Z.M. Johanson, Prof. J.A. Keast, Dr. A.O. Nicholls and Mr. W.S. Semple.

Donations to the Research Funds are fully tax deductible.

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

Three applications were received, all of which merited funding:

BELL, Philip School of Earth and Planetary Sciences Macquarie University
PROJECT : Palaeontology, stratigraphy and geochronology of Neogene vertebrate faunas from the Phosphate Mine, Wellington Caves, N.S.W.
An 8 metre vertical section from a mineshaft in the Phosphate Mine will be sampled and mapped in detail. This section intersects almost the entire cave sequence. The vertebrate macro- and micro-faunas, the sedimentology and depositional environment will be investigated. Correlation of the mineshaft section with previous work will allow a more complete reconstruction of the geological history of the cave system. The macrofaunas and the associated speleothem deposits, will be absolute age dated using Uranium-Thorium dating of enamel from fossil teeth. At least three dates (at a cost of $900 each) will be necessary. Awarded $600.

CALDON, Heidi School of Earth and Planetary Sciences Macquarie University
PROJECT : Faunal and floral (algal) dynamics in response to oceanic patterns through two Late Silurian – earliest Devonian global extinction events (Lau and Klonk events). Two significant global extinction events have been recognised in the Late Silurian (Lau event) and across the Silurian-Devonian boundary into the earliest Devonian (Klonk event). The sequence of extinctions in a broad spectrum of biota will be studied in the richly fossiliferous carbonate rocks of the Broken River region of northeast Queensland. The investigation will involve facies interpretation, cyclostratigraphy, estimation of water depths and subsidence rates, calculation of a sea-level curve and spectral analysis of these. Taxonomic content of each section will be documented, using the microfossils to finely constrain correlation and provide a timeline to measure extinction rates. Awarded $877.

HOLMES, W.B.K. (Keith), University of New England
Descriptive taxonomy of the Middle Triassic flora from the Basin Creek Formation, Nymboida, N.S.W. – Pteridospermophyta and Cycadophyta
This study will continue description of one of the most diverse Triassic floras known in the world with documentation of the pteridosperms and cycads. Three papers dealing with other elements of the flora have previously appeared in the *Proceedings of the Linnean Society of New South Wales*, with a fourth paper in the series submitted. Awarded 700.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

The applications were all considered significant and commendable, but there were insufficient funds available to award grants to all of the applicants and to give the full amount requested by the successful applicants. All things being equal, Members of the Society were given preference.

BAKER, Andrew, University of Technology, Sydney

PROJECT: The impact of exotic pines on the structure and function of woodland ecosystems in the Jenolan Caves Karst Conservation Reserve.
Studies will compare the plant and invertebrate assemblages in pine affected and non-affected areas. The breakdown and colonisation by invertebrates of leaf litter from exotic and native species will be compared. Awarded $ 300

BEAVIS, Amber, Division of Botany and Zoology, Australian National University.
PROJECT. Real-time dispersal patterns in two genera of funnel-web spider.
This will be the first study on funnel-web spider behaviour and will use the new Radio Frequency Identification (RFID) technology to track the movements of spiders in real time. The findings may be adapted for the use of RFID on other invertebrates and log-dwellers. Awarded $ 600.

BILGMAN, Kerstin, Graduate School of the Environment, Macquarie University.
PROJECT: Genetic population structure of the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) & the Short-beaked common dolphin (*Delphinus delphis*) in South Australian waters.
This study aims to find out the numbers of migrations between populaions found in different localities. This work is important for management strategies. Awarded $ 500

CARTER, Dean, Ecosystem Management, University of New England.
PROJECT: The utility of seed banks in maintaining genetic diversity in the endangered shrub *Grevillia beadleana.*
This species is found in five disjunct and declining populations. The dynamics of the seed rain, the seed bank and the relationship between the genetic diversity stored in the seed bank compared with the above ground population and how theses factors affect population persistence and turnover will be studied. Awarded $ 250.

FINN, Julian. Sciences, Museum of Victoria.
PROJECT: Australia's argonauts ('paper nautiluses'): taxonomy, biology and a revision of the family Argonautidae (Mollusca: Cephalopoda).
The taxonomy is based almost entirely on the shells. This taxonomic revision will incorporate morphological characters of both sexes (only the female produces the shell, the males are very small). Periodic mass strandings provide new material. Awarded $ 250.

GOODMAN, Brett, Zoology, James Cook University.
PROJECT: The effect of nest temperature on the life history traits of the tropical skink *Carlia longipes*.
This lizard always lays the same number of eggs, but may vary the size, accorting to the environment. A slight variation in temperature may make a big difference to the offspring. This study will examine the effects of egg size and temperature on the life histories of the offspring. Awarded $ 250.

HODGON, JOHN, University of New England.
PROJECT: Systematic studies in *Juncus* L. (*Juncaceae*).
Juncus is a large genus with about 40 species in Australia. Putative hybrids between species within sections of the genus are common, and several species complexes exist. This study will determine the relationships among the taxa and the origin of the reported hybrids. Awarded $ 500.

ISAAC, Joanne, Mammal Ecology Group, Biological Science, James Cook University
PROJECT: Complex sex allocation in the common brushtail possum, *Trichosurus vulpecula*
The interpretation of sex ratio bias seen in polygynous mammals is difficult. This project tests local resource competition and maternal condition as factors in several hypotheses of maternal control of offspring sex ratios, using marked Magnetic Island possum population.
Awarded ss$ 500.

MOKANY, Allie, School of Botany and Zoology, Australian National University.

PROJECT: Biodiversity & ecosystem function of aquatic systems.
This study will examine biodiversity of ephemeral aquatic systems and determine the relationship between biodiversity and function of the freshwater pond systems. It aims to understand how the relationship changes in response to environmental change (a simulated drought). Awarded $ 350.

MOULDS, Tim, Centre for Evolutionary Biology and Biodiversity, University of Adelaide
PROJECT: Endemicity, population dynamics and conservation of the cave pseudoscorpion *Protochelifer narracoortensis* in the Otway Basin, southeast Australia.
This study will determine the endemicity of the pseudoscorpion and its dependence on bat guano. Gene flow between populations within a cave and between cave systems will be tested. Awarded $ 600.

POPPLE, Lindsay, Dept. of Zoology and Entomology, University of Queensland.
PROJECT: A molecular comparison across 'song types' of the cicada taxon *Pauropsalta annulata* Amyot (Hemiptera: Cicadidae).
There are at least three different song types in this morphologically near uniform species. The range of distribution, plant association and some morphologies differ with the song type. This study will determine it the different song types type are different species. Awarded $ 500.

RITCHIE, Euan, CRC Tropical Savannas, James Cook University.
PROJECT: Phylogeography of the antilopine wallaroo *Macropus antilopinus*.
This is the only large kangaroo restricted to the tropics and there is an eastern and a western population. This study of the genetic variation will assist conservation management. Awarded $ 500.

SMITH, Helen, The Australian Museum
PROJECT: A study of twig mimicking spiders with special focus on taxonomic revision, behaviour and variation in the genus *Poltys*
This taxonomic study of orb-weaving spiders of the genus *Poltys* and its generic relationships will use morphological, molecular and behavioural data, with emphasis on cryptozoic (twig mimicking) behaviour. Awarded $ 500.

WALLER, Samantha, Vision, Touch and Hearing Centre, University of Queensland.
PROJECT: The role of ontogenetic colour change in social interaction in reef fish
When the colour of juvenile fish is different to the colour of the adult, it may serve as camouflage so that the adult will allow the juvenile to occupy the same territory. This hypothesis will be tested with observation and experimentation. The fish visual system characteristics will also be studied. Awarded $ 500.

WARNER, Daniel, School of Biological Sciences, University of Sydney.
PROJECT: The adaptive significance of temperature dependent sex determination: an experimental test using an Australian agamid lizard.
The sex of many reptiles is determined by the temperature the embryo experiences during development. It is thought that incubation temperature can shape fitness-related phenotypes differently for males and females. This study will test that hypothesis. Awarded $ 500.

WISZNIEWSKI, JOANNA, Graduate School of the Environment, Macquarie University.
PROJECT: Genetic population structure of coastal bottlenose dolphins (*Tursiops aduncus* from south-eastern Australia.
The genetic structure of populations along the NSW coast will be studied to determine whether there is sex-based dispersal between populations and whether there are geographic boundaries to the populations. Awarded $ 300.

YERMAN, Michelle, Australian Museum.
PROJECT: The systematics & ecology of marine interstitial amphipods in Australia & New Caledonia

Interstitial amphipods are 1-3 mm long and live in the spaces between sand grains. The taxonomy, diversity and abundance of interstitial amphipods will be studied over a latitudinal gradient from tropical and temperate Australia, as well as New Caledonia. Awarded $ 600.

SCIENCE WEEK EVENTS

A Public Lecture: "How many plant species will survive the 21st Century?", by Prof. Peter Raven, the renown Botanist and Conservationist, will be held on Saturday 14 August, 1.30-2.45 pm, in the Choral Hall, Conservation of Music, Macquarie Street, Sydney. The lecture is free but bookings are essential. Ring 9231 8182 for bookings.

Behind the Scenes in Plant Sciences. What work is done inside the National Herbarium? Come and see the historic collection and newest technologies. Also view a new exhibition 'Exploring collectors: two centuries of botanical discovery" 14 August, 3.00-4.45 pm, at the Reception, Royal Botanic Gardens. Cost, $15 (Members $12), including refreshments at 3pm. Bookings essential, 9231 8182

AN ARCTIC EDEN: LIFE BEFORE THE GREAT FREEZE: a talk by Prof. Jim Basinger, University of Saskatchewan

Today, the vegetation in the high latitudes is zoned according to temperature, especially in the northern hemisphere which is mostly land. The vegetation depends on the climate which is largely determined by latitude. Today, the boreal forest consists of conifers and deciduous shrubs, but vegetation zonation was very different in the past. The climate in the high latitudes was once warm. In the Eocene, 45-50 million years ago, the Earth was largely ice free.

Prof. Basinger studies the fossil plant remains on Ellesmere and Axel Heiberg Islands, at about latitude 80°N. There has been very little continental displacement with time, so that this region has remained at about the same latitude for many millions of years. Pictures of the study area show a seemingly barren land, but there is plant life present. Mountain heather, saxifrage, and lousewort are all very small plants, some no bigger than a mosquito. They grow nestled between rocks. The arctic poppy is rare. The arctic willow is the only tree, with horizontal branches and only the catkins sticking up. The animal include musk ox, which are dangerous: more people are killed by musk ox than by polar bears, arctic hares and polar bears. Prof Basinger has not seen a polar bear, and does not want to meet one, either.

Field work must be done in July. In June, there is too much snow and mush. In August, it starts snowing and you might not get out. Aircraft are used to get around. The fossil plants occur in black coaly bands which were once the forest floor. Stumps up to 3 m in diameter may be found here and nothing like it grows within 3-4,000 km. The wood is preserved and can be burnt. The stumps can be excavated to show the roots.

Preservation was a very gradual, normal process of sediment accumulation. The floor of the basin subsides episodically and the forest can keep up to some degree by forming peat. If subsidence is rapid and a lake forms, the forest trees survive, but they cannot reproduce for the seeds need dry ground to germinate. The stumps below water level and the whole of the forest floor are preserved, but the parts above water decay. Fallen logs may be preserved also and they show that these were tall trees of a big forest. Preservation is very good and there has been little change to wood, leafy twigs and seeds. The temperature was rather like that of Melbourne today.

The flood plains supported swamp cypress, dawn redwood, cedar, walnut and larch. Occasionally, a big, once in a 100 year flood would bring down sediment and bury the forest floor. On well drained soils, there grew birch, ginkgo and oak, both deciduous and broadleaf.

The swamps were dominated by deciduous conifers. River borne sands accumulated sticks, chunks of wood, spruce cones and evergreen conifers, probably transported from the upland spruce and pine forests.

Fossil alligators are found in association with these forests and alligators do not tolerate cold weather, hence the winters must have been mild. The trees were deciduous because of the dark winters. The climate was seasonal and this is reflected in the conspicuous growth rings in the wood. In today's climate, the wood produced after summer shows a preparation for a cold winter. The fossil wood does not show this preparation: it just stops growing because of the darkness.

In the early Tertiary when the poles were practically ice free, the bottom water of the ocean in the high latitudes was some 10-12°C warmer than today, hence the oceans tell the same story as the plants on land. The palaeogeography of the Arctic has not changed much since then. In the southern hemisphere, however, there were big changes with the development of the Circum-Antarctic Current, cutting off the heat transfer from the tropics to Antarctica. With the build up of ice on Antarctic, cold water drained into the deep oceans, chilling the oceans from the bottom up. Two and a half million years ago, there were still trees on Ellesmere Island, but the tops of the trees showed the influence of cold, blasting winds, similar to northern Sascatchewan today. The Arctic tundra is thus very young.

Greenhouse gasses have been building up over the last 100 years and the carbon dioxide increase may be measured in gas bubbles found in ice cores. These cores go back more than 100,000 year and show that the carbon dioxide varies in harmony with the temperature, the higher the temperature, the more the carbon dioxide. Will our over production of carbon dioxide cause and increase in temperatures? In pre-industrial time, the carbon dioxide concentration was 260-280 ppm. It is now 380 ppm and the Earth has not seen a concentrations like this for 20-30 million years. What is the likely effect? Modelling of modern climates shows that equatorial climates will not change much. In the high latitudes in the northern hemisphere, however, the summers will be a little warmer but the winters will be 10-14°C warmer, rather like the climate experienced by the fossil flora.

Climatic change seems to go from one steady state to another. We do not know what the next steady state will be.

PROGRAMME

SPECIAL GENERAL MEETING
Wednesday 21 July, at 6 PM in the Classroom in the Royal Botanic Gardens

The Special General Meeting will finalize the adoption of changes to the Society's Rules and By-laws as accepted at the Special General Meeting held on 24 March 2004. No changes have been made to the copy as circulated to all members prior to the AGM. However, anyone needing another copy should contact the Secretary.

Wednesday 21 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

MR. DROR BEN-AMI

School of Biological, Environmental and Earth Sciences, University of New South Wales

Conservation in the urban fringe: the Swamp Wallaby, *Wallabia bicolour*, a case in point

Loss of habitat has been documented as one of the greatest threats to wildlife conservation. Yet, the conversion of rural to urban landscape has been increasing dramatically worldwide. While urban areas tend to accommodate mostly exotic flora and fauna, they can also retain a substantial amount of native species. Conservation inside or on the fringe of urban areas can directly maintain species biodiversity and indirectly support conservation efforts by increasing the positive interactions between humans and nature. The Swamp Wallaby is a common macropod that is often one of the last medium sized marsupials to survive in proximity to urban areas. It faces a number of human caused disturbances such domestic predators, road kill, fires, human presence, loss of habitat and increased non-native vegetation. This study aims to understand the biology of the Swamp Wallaby within the urban context and to propose appropriate conservation measures.

Wednesday18 August at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. DAVID COHEN

School of Biological, Environmental and Earth Sciences, University of NSW.

New approaches to mineral exploration in areas of deep, weathered cover in eastern Australia

Most of the Australian continent is covered by a deep mantle of intensely weathered and mineralogically complex materials - "the regolith". The agricultural and grazing industries are heavily dependent on conservation of the regolith (soil and groundwater resources). For the minerals sector, the regolith may be a resource in itself or an impediment to exploration. In areas of transported regolith, geochemical exploration for mineral deposits has traditionally been viewed as nearly impossible. Recent studies suggest, however, that metals can migrate vertically through hundreds of metres of cover and form subtle haloes at surface above mineralisation. Theories to explain this migration range from the formation of giant natural batteries, seismic pumping or the action of vegetation.

Wednesday 22 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr MIKE GRAY

Australian Museum

Funnel-web spiders – revisited

The Funnel-webs (Atracinae: Hexathelidae) are a common group of spiders in eastern Australia. They are best-known for their highly toxic venom, but this notoriety has receded somewhat since the advent of an effective antivenom. This talk will deal with aspects of the taxonomy, distribution, behaviour and toxicity of the funnel-web spiders. Current morphological taxonomy recognises 38 species which can be identified only from specimens, although species boundaries remain problematic in the "infensa" group. Good knowledge of distribution patterns is a useful aid to reliable identification. Several species groups are currently recognised in the largest genus *Hadronyche*. Generic and species group relationships will be examined using morphological and (hopefully) DNA data. Results of a medical study of funnel-web spider bites will also be presented.

Wednesday 20 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

DR. STEPHEN GALE,

School of Geosciences, The University of Sydney,

MAKING THE EUROPEAN LANDSCAPE:
EARLY CONTACT ENVIRONMENTAL IMPACT IN AUSTRALIA

With the arrival of European technologies and land use practices, the Australian environment was subjected to massive environmental shock. Conventional wisdom, however, is that the initial environmental impacts of the European settlers were minor and that the greatest changes did not occur until the second half of the nineteenth century or later. Yet there is evidence that the adjustments that took place in the first years of contact were of such magnitude that they have governed environmental response ever since.

Wine and cheese will be served from 5.30 before each lecture.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 113 **OCTOBER 2004**

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IN THIS ISSUE

NEW MEMBERS: We welcome

Mr. Joshua Larsen, University of Wollongong

PAPERS ACCEPTED FOR PUBLICATION

Allen, S, and Huveneers, C. First record of an Australian fur seal (*Arctocephelus pusillus doriferus*) feeding on a wobbegong shark (*Orectolobus ornatus*).

Holmes, W.B.K. and Anderson H.M. The middle Triassic megafossil flora of the Basin creek Formation, Nymboida Coal Measures, New South Wales. Part 4. Ukomasiaceae. *Dicroidium* and affiliated fructifications.

Keith, D. and Pellow, B. Effects of Javan rusa deer (*Cervus timorensis*) on native plant species in the Jibbon-Bundeena area, Royal National Park, New South Wales.

Patterson, J.R. Revision of *Discomesites estaingia* (Trilobita) from the lower Cambrian Cymbric Vale Formation, western New South Wales: taxonomic, biostratigraphic and biogeographic implications.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2005. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 1st December 2004.

SUBMISSION TO THE PREMIER

The Society has sent a letter to the Premier, Mr. Carr, expressing its concern at the withering of Government support for scientific work in state institutions. Staff at the National Herbarium of the Botanic Gardens, the Australian Museum, the Geological Survey of New South Wales, the former National Parks and Wildlife within the Department of Infrastructure, Planning and Natural Resources have all suffered very substantial cut-backs. The program to map the state's vegetation has been transformed from a rigorous ground-based survey to a simplified program based largely on satellite imagery. While satellite imagery gives indication of the structural changes in the vegetation as occurs in clearing, it gives very little information about the species within the vegetation types, and such information is necessary for conservation of biodiversity.

The Society stressed that it is easy to disband teams of scientists working on projects, but there is almost always a long lead time before new teams begin to be fruitful in producing relevant results. Moreover, cutbacks of personnel usually fall disproportionately on younger, less established people, but it is necessary to have young, energetic and motivated young people involved in any long term project. There is little point in loading up the Government's scientific services with policy makers and managers if the underlying scientific personnel and the support for their scientific work is whittled away.

The Society sought assurance that the Government would renew, not diminish its commitment to its scientific services. Without a strong support for science, the basis of strategies for conserving biodiversity, and the management of land, natural resources and bushfires, are undermined.

CONSERVATION IN THE URBAN FRINGE: THE SWAMP WALLABY, *WALLABIA BICOLOUR*, A CASE IN POINT, a talk by Mr. Dror Ben-Ami.

Why study the swamp wallaby in the urban environment when it is not endangered and appears to be managing quite well? Conservation is becoming more about ways that both humans and the wildlife can live together. There are no pristine wilderness regions left and wildlife cannot be confined to reserves. We must learn to live with wildlife.

The study area was Muogamarra Nature Reserve, with boundaries of the Pacific Highway, the Hawksbury River and suburbia. It is a series of steep ridges and ephemeral creeks. Muogamarra Nature Reserve once had four other medium sized animals, the wallaroo, red-necked wallaby, koala and wombat, now all extinct in the region. Their disappearance is attributed to human activity: road kill, predation by domestic dogs and foxes, increased fire, non-native vegetation and urban development. It is thus imperative we manage the swamp wallaby to sustain the population.

The swamp wallaby is a survivor. It is solitary, prolific, cryptic and occurs near urban centres. It is a browser and will eat almost anything. It extends all down the east coast and is one of the few animals to have maintained its range in the face of increasing human activity. Life expectancy is 8-12 years and it starts breeding at 15-18 months.

Population Management Analysis (PVA) has been developed as a management tool to predict future populations. PVA requires considerable research into the factors taken into account: e.g. breeding habits, annual fecundity, annual mortality, catastrophes, population, etc. PVA is good for restricted areas like Muogamarra Nature Reserve, and may predict whether the population will decline, and if so, whether it will decline to zero in, say 30 or 100 years. This sort of analysis can highlight the factors that cause the most risk to the population, but there are so many variables and there is always some uncertainty about the analysis.

Surveys of six major ecosystems, both on land and in the marine realm, all show decline, The biggest risk to wildlife is urbanisation, and urbanisation is increasing rapidly, globally. Urbanisation means habitat loss for wildlife and disturbance at the interface of the 'wild' regions and suburbia. We need to know how the swamp wallaby reacts to disturbance.

In the Muogamarra region, the roads, towns and clearings are all on the slopes with the gentle gradients. The swamp wallaby uses the flatter areas for its core area, but the home range includes all terrain. They have highways in the rough terrain that are used frequently. There are four main types of vegetation in the Muogamarra sanctuary, and the wallabies use them all, hence the loss of one would not be a disaster.

There are 20-30 wallabies killed on the roads in a year. Domestic dogs and foxes are the main predators and swamp wallabies are the main item on their menu, as shown by an analysis of the predators' scats. It is interesting to note that the scat analysis showed up human remains. In other studies, when scat analysis showed up human remains, the police, when notified, have gone out and found a body. But when the police for Muogamarra were informed, they were not interested and thought Dror might be a nut case. Even with these hazards in urban areas, the wallabies are doing better in their core area, close to towns, probably because they like the non-native vegetation found there.

Fire is a threat to the wallabies. Of the six radio-collared wallabies, all six survived a prescribed burn. All six survived a wildfire after a prescribed burn also, but with a wildfire without the prescribed burn, there were fatalities. With a fire, the animals go to the bottom of the valley and stay in their home range. Most retained their home range after the fire.

Urbanisation is the real issue for conservation. We need to conserve wildlife in urban areas, even the common ones, for there is less and less wildlife. Management for swamp wallabies would include prescribed burns and something needs to be done to decrease the road kill and predation.

NEW APPROACHES TO MINERAL EXPLORATION IN AREAS OF DEEP, WEATHERED COVER IN EASTERN AUSTRALIA, a talk by Dr. David Cohen

The regolith is the weathered mantle overlying the hard bedrock. An understanding of the regolith has developed only in the last 25 years. Prior to this, geologists were only concerned with the hard rock. The regolith is essential for life, for it produces the soil for plant growth and contains the ground water. In Western Australia, where it is very flat and stable, the regolith may be up to 300 m deep and 50 million years old. In Canada, where the regolith was stripped off by glaciation, the present regolith may be only 10,000 years old. In Australia, much of the regolith was formed in times when the climate was wetter, during the Miocene. In the present drier climate, especially in arid regions, the regolith is being stripped off in soil erosion.

Open cut mines are good for exposing a section through the regolith. A gold mine near Cobar shows a layer of iron rich nodules at the top; once called laterite, now called ferricrete. There may be a capping of silica enrichment, the silcrete, which is extremely hard. Deeper down, the pallid zone is characteristic of the deeply weathered profiles. This profile is now in being destroyed and material is being transported to accumulate somewhere else. Study of the regolith that has formed in situ is not a problem, but the accumulations of transported material, and the alluvium may be 50-60 m deep, is more difficult.

Mineral deposits may be found in old rocks, but they may also occur in younger, sedimentary deposits. Traditional exploration used drilling and geophysical methods and now, geochemichal methods are being developed. Geochemical methods rely on minerals that migrate up from bedrock deposits into the regolith, but this seems counter-intuitive. It seems more likely that the falling water table at the onset of aridity would carry minerals down, not up, but geochemical processes are very complex. Manganese and iron oxides have a great effect on geochemical processes because they have a great capacity to absorb minerals as they go through cycles of wetting and drying. Carbonates in weathered systems mobilise minerals, including gold which was once thought to be completely stable and immobile.

A sample of lag (the stones and gravel lying around on the surface) is very complex. It may contain fragments of the underlying rock, lumps of massive iron oxide which could have cone from anywhere, older grains cemented by younger material and more. Some bits of iron rich lag may be magnetic, others non-magnetic. The reason appears to be bushfires, for if the iron rich rock fragments are heated to 600°C, some will become magnetic. Minerals may be extracted from lag. For example, a gold depoit may be covered with 5-10 m of lag which if treated with dilute acid, releases gold. Enzymes are also used to treat lag and break down manganese crystals which are very young.

The vegetation may be sampled and the mineral content of the species measured. Some species take up minerals and concentrate them. Conifers are the best geochemical indicators and may take up large amounts of minerals. In western New South Wales, the leaves of white cypress pine are used. Eucalypts, on the other hand, do take up minerals, for the angiosperms are better at keeping minerals out of the plant. The uptake of minerals will be influenced by the mycorrhizal fungi associated with the roots. Gymnosperms have one type of mycorrhiza and angiosperms have several other kinds of mycorrhiza.

Trees take up minerals from the regolith and then drop them in their leaves. Bacteria break down the leaves, thus concentrating the minerals at the surface. Bacteria are found throughout the regolith and may methlylate minerals ('biomethylathion'). The methylated form is highly mobile and may move through the profile. Biological communities are associated with sulphide deposits and they produce complex organic molecules which have the potential to react with minerals.

When sulphide minerals oxidise and produce acid, it sets up an electrochemical cell or natural battery. The metals move towards the cathode which is at the outside of the top of the cell. In Canada, there are circles in the forest, where buried sulphide minerals have set up an electrochemical cell. The water around these circles is a couple of degrees higher in temperature, another result of the electrochemical process. Once a metal gets to the surface, there are other oxidative-reductive processes around the natural battery.

How do we detect these natural batteries? It is not as easy as it appears. The metals may be trapped in recently formed minerals and there may be older recycled minerals: they are very complex. A treatment called 'selective and partial extraction' is used but it is not known what this technique does. Machines can measure very weak concentrations of minerals. Site variability is extreme and very different concentrations may be found within 5 m. There is great variability in mineralisation and in the background levels.

The same geochemical processes are found in arid landscapes in western New South Wales, in wet glaciated landscapes in Canada, where the minerals in the regolith may have been transported long distances by glacial processes, and in wet tropical landscapes in Indonesia. Over a mineral deposit, calcium and magnesium disappear in the centre of the cell and there is an enrichment zone in a circle at the outer extremes of the cell. This is exactly the prediction of the natural battery. Acid is generated in the centre of the cell and moves the minerals out to the periphery, where they are deposited.

In conclusion, there is much to be learnt about the geochemical processes of minerals in the regolith, but they offer hope of detecting mineral deposits which are hidden deep below the regolith.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 20 October, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

DR. STEPHEN GALE,

School of Geosciences, The University of Sydney,

MAKING THE EUROPEAN LANDSCAPE: EARLY CONTACT ENVIRONMENTAL IMPACT IN AUSTRALIA

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Wine and cheese will be served from 5.30 before the lecture.
EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 114 **DECEMBER 2004**

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IN THIS ISSUE

NEW MEMBERS: We welcome

Mr. James Valentine, Centre of Ecostratigraphy and Palaeontology, Macquarie University.

PAPERS ACCEPTED FOR PUBLICATION

Moulds, T., The diversity and biogeography of subterranean guano Arthropod communities of the Flinders Ranges, South Australia.

Wood, A., Collections of Galerina (Agaricales, Fungi) made by J.B. Cleland and housed in the State Herbarium of South Australia.

Young, G., A new phyllolepid placoderm (Devonian fish) occurrence from the Dulcie Sandstone, Georgina Basin, central Australia

SUBSCRIPTIONS FOR 2005

A notice of your subscription for 2005 is included. Remember, if you pay before March 31, a discount applies.

FIRST NOTICE OF 2005 ANNUAL GENERAL MEETING

The Annual General Meeting will ge held on the 30th March, 2005, and the first notice of the is attached at the back of this newsletter (white page).

FREE COPY OF "AUSTRALIAN WILDLIFE"

We are enclosing a free copy of the Autumn 2004 "Australian Wildlife" which is the journal of the Wildlife Preservation Society of Australia. It includes a report on a seminar on "Road Kill" and some papers arising from that seminar. Although you might not know it from the material in the magazine, that seminar was jointly sponsored by the Wildlife Preservation Society and the Linnean Society. Other items in that journal are the views of the WPS and not necessarily those of the Linnean Society, of course.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

SUBMISSION OF APPLICATIONS FOR RESEARCH FUNDS

The date for submission of applications has been brought forward to 15th March , 2005
Please mail applications to:

The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $1,000, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **15 March, 2005. Submit to The Secretary, Linnean Society of NSW, PO Box 291**
Manly, NSW 1655

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery

Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,000.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 15th March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **15 March 2005. Submit to The Secretary, Linnean Society of NSW, PO Box 291**
Manly, NSW 1655

FUNNEL-WEB SPIDERS REVISITED, a talk by Dr. Mike Gray

The Australian funnel-web spiders are well known as one of the most venomous groups of spiders in the world. Although they have caused only 13 deaths, their presence in the most heavily populated regions of the country has emphasized their medical significance. The funnel web spiders make up the subfamily Atracinae and are a southern group related to the Macrothelinae, comprising the New Zealand tunnel web spiders *Porrhothele* and an Afro-Indian genus, *Macrothele*. Atracine and macrotheline spiders have only four spinnerets or silk spinning organs and represent a derived group within the six-spinneret austral family Hexathelidae.

There are currently 13 valid species in two genera, but Dr. Gray proposes four genera, based on anatomical details. An analysis of the DNA will come later. The four groups are: (1) All species of *Atrax*, the funnel web spider, have a large conical spur on leg tibia 2, a low carapace, a short basal middle tooth row in the fang groove and 'longish' spinnerets. (2) The 'illawarra' group has a long head area, thickened, spineless front legs, a swollen palpal tibia and short spinnerets. (3) The 'lamington/anzaes' group has a high head, reduced number of cuspules (short rounded spinules on the labium or lip) and a palpal tegulum with a large membranous area. The northern outlier in the Cairns region, *A. anzaes* belongs here. (4) *Hadronyche* has the middle tooth row increased to full length of the fang groove. The *adelaidensis* group is a trapdoor builder and has a short sternum. The *cerberea* group has a lengthened labium. *H. cerberea* is the southern tree funnel web spider and *H. formidabilis* the northern tree funnel web spider. The *infensa* group has dorsal spines absent on the femora of legs 1 and 2.

The genus *Atrax* is confined to the coast and southern highlands south of the Hunter River in NSW. By contrast, *Hadronyche*, as presently constituted, extends from the southeast of South Australia to southeast Queensland.

There are two significant disjunctions at each end of the range of the funnel web spiders. In the south, the *adelaidensis* group is confined to the subhumid Gulf Ranges of South Australia, separated from the eastern distribution by the dry, open country of the Murray Basin. They are behaviourally unique in being the only funnel web spiders that build trapdoors. It seems likely this group was isolated from the main eastern distribution by the Miocene Murray Basin inundation. To the north, *Atrax anzaes* is the only funnel web species known from north Queensland (Daintree region rainforest), with a gap of 1000 km separating it from its relatives in southeast Queensland. The occurrence of *A. anzaes* indicates that an extension of funnel webs into the Irian region is possible, rather than suggesting a northern origin for the group, for its relationships are clearly austral. *A. anzaes* seems allied to the southern species of Hadronyche in the 'lamington' species group, all seemingly short range endemic rainforest species. It is likely that these are all moisture dependent relictual species that survived in refugia that persisted through the late Tertiary/Pleistocene climatic drying cycles.

The bulk of the species in *Hadronyche* are placed in the *infensa* and *cerberea* species groups. These groups are separated, north and south respectively, but with some overlap, by the Cassilis Gap; the Goulburn/Hunter River Valley region that extends inland almost to Mudgee. This area of low relief has been present well back into the Tertiary. The only major exception to this north-south divide is the distribution of the tree funnel web spiders. The northern tree funnel web spider, *H. formidabilis* extends from the Illawarra region to southeast Queensland. This species is associated with large trees in wet tall open-closed forest habitats. It may have reached its current distribution as wet forests contracted northwards. *H. cerberea*, the other tree dwelling species, has a similarly large distribution south of the Cassilis Gap: it is commonest in open forest habitats and presumably arose as this habitat increased. These tree dwelling species have unusually large distributions, probably because they exploit a niche little utilised by other spiders and have relatively large spiderlings, hence may be relatively good dispersers.

The tree funnel web spiders live in holes in the trees and build their funnels under the bark. They prefer rough-barked species, like paperbarks and Banksias. They live on insects and beetles that tunnel in the wood, and even tree frogs.. The fallen logs and leaf litter on the ground are good habitat for ground dwelling species. The funnel has silk trip wires around the entrance. Most funnel web spiders feed at night, but the tree dwellers have been observed feeding in the daytime when the days are cool and dull. For the Sydney funnel web spider, *Atrax robustus*, egg sacs appear in the burrows over spring/summer and 2nd and 3rd instar spiderlings disperse during late summer into autumn. The male Sydney funnel web spider wanders during summer and autumn, and this is typical for may species. Some southern species show increased activity with the autumn rains. The alpine funnel web, understandably, shows no activity at all during winter. Females show limited activity outside of their burrow, especially after heavy rain, and some do wander off.

The venom of the male Sydney funnel web spider is much more toxic than the venom of the female. The male wanders and is excitable, adding to the problem. For the tree funnel web spiders the venom of both sexes is toxic. The venom is a cocktail of substances. For the Sydney funnel web spider, one component affects the sodium gates at innervated muscles and gland receptors, preventing their closure and causing muscle twitching or paralysis and glandular activity. Insects and primates are badly affected by the venom, but other animals seem immune to it.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2005 Annual General Meeting

The 130th Annual General Meeting of the Society will be held at 6 PM on 30 March 2005 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquarie's Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 5:30 PM.

Six members of council are due to retire at this AGM: Jean-Claude Herremans, Margaret Humphrey, David Keith, David Murray, Peter Myerscough and Ian Percival

All retiring councillors offer themselves for re-election and council recommends their re-election.

In accordance with the Society's By-law 7(b), the attendance record (out of nine council meetings in 2004) of retiring councillors is listed herewith: Herremans(8), Humphrey (7), Keith (2), Murray (4), Myerscough (7) and Percival (9).

Council recommends the election of Dr M.L. Augee as President of the Society for 2005.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2005.

Further nominations are invited for vacancies on council (6), the office of president, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nomination must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of his/her willingness to accept such office. ***Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2005.***

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 115 **APRIL 2005**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER:

Record of the Annual General Meeting, March 30, 2005

NEW MEMBERS: We welcome

Mr Timothy Curran, Botany Department, University of New England
Ms Rebecca M.B. Harris, University of Tasmania
Mr. Jürgen Kellermann, Botany Department, University of Melbourne
Ms Amy Palmer, University of Sydney
Mr Geoffrey M. White, University of Tasmania
Mr Jongi Zhen, Australian Museum.

DONATIONS TO THE RESEARCH FUNDS.

The Society has received generous donations from Dr. J.M.E. Anderson, Dr. I.M. Brewer, Dr. D.S. Horning, Dr. D. McAlpine, Dr. A.O. Nicholls, Dr. C.N. Smithers and Anonymous, for a total of $1,326. Our many thanks to all the donors. In 2004, almost $10,000 was available for research grants, but it was not nearly enough to meet all the worth-while applications. We hope to build up the fund even more, and donations are much appreciated.

CONFERENCE: WILDLIFE HEALTH IN A SHRINKING WORLD

This International Wildlife Disease Association Conference will be held in Cairns, 26 June to 1 July 2005. It will cover aspects of ecology, management and conservation. For more information, contact Lee Skerratt, School of Biomedical Sciences, James Cook University, Townsville, Australia 4811, email Lee.Skerratt@jcu.edu.au, Ph: +61 (0)7 4781 4838, Fax: +61 (0)7 4779 1526

MAKING THE EUROPEAN LANDSCAPE: EARLY CONTACT ENVIRONMENTAL IMPACT IN AUSTRALIA - a talk by Dr. Stephen Gale.

The initial environmental impact of European settlers was thought to be minor and that the greatest changes did not occur until the second half of the nineteenth century. The impact, however, was major and at its most dramatic very early, within a few years of settlement. Hard hoofs compacted the soil and increased runoff, and agriculture modified the soil. Finding the evidence to prove that these modifications happened very early, however, is not easy.

Little is known of the soils before Europeans moved in. Sir Thomas Mitchell wrote of the soils encountered in his explorations: soils were so soft that they were easily unsettled by the wind, and 'sandy rotten ground' so bad that carts and horses sunk into them up to the axles. John Oxley also mentions soils in the account of his journeys and his descriptions generally concur with the idea that pre-contact soils were loose, light, organic, soft and with a high infiltration rate. Today, hardly any soil remains in a pre-contact state, but some was found beneath a very old homestead, near Tocal, north of Newcastle. It was soft, and the structural stability of the aggregates was low, unlike modern soils which have a high structural stability of the aggregates..

There are a number of descriptions of soils in the diaries of the early settlers. George Thomas Lloyd records that the soils were soft and friable when first settled, but had become hard and compacted after 2 years. A Mr. Froggart in Western Australia records that the pastures were transformed within three years. Native grasses were thin and discontinuous, and the soils were easily eroded. There are numerous reports of gullying within two years of settlement. The removal of trees and cultivation of the slopes of the Hawkesbury caused "acres of ground" to be removed and the sediments were dumped on the low lying lands.

The Tocal Basin is enclosed and retains all the sediment washed into it. Dr. Gale sampled the sediments with a dense network of cores and lead isotope 210 was used to date the sediments. Before settlement, there was practically no sediment being deposited. After 1822, the time of first settlement, there is a big change in the rate of deposition which became fifty to five hundred times greater and a thick layer of sediment was deposited in the lake. The minerals in this layer of sediment were very like the pre-contact soil, hence the sediment would have come from erosion of the soft soils. Most deposition took place early in post contact years and 80% of the sediment was deposited within the first 25-40 years. After this time, rates of sedimentation declined, and then erosion relied on the rate of pedogenesis which made material available for transport. Initial impact was by far the greatest on soils.

Settlement had a big impact on the vegetation. The conventional story is that the settlers cleared trees, introduced annuals and native grasses were lost. For the Pilliga Scrub. however, the present dense forest is not the result of 100 years of clearing, but 100 years of growth. The Aborigines burnt the area regularly, keeping it open and grassy. Farmers prevented the burning, allowing trees to grow. Tall mixed eucalypt forest with a well developed understorey was uncommon before settlement, it would have been open and grassy beneath the trees.

In a pollen diagram from the New England region, *Casuarina* was dominant in the vegetation before grazing started. Sheep were introduced in 1837 and there was a dramatic decline in *Casuarina*, and an increase in eucalypts and grasses. This change supports the conventional wisdom, but it is only one site. Kershaw's work in Victoria, comparing pollen data just prior to contact with the modern data, also shows a dramatic decrease in *Casuarina* and an increase in eucalypts and grasses. Most pollen diagrams, however, are not detailed enough to provide evidence about first contact.

The changes in the soil after first contact are irreversible, given the low rate of pedogenesis. These early changes have governed the environment ever since. There is a difference in soil chemistry, before and after first contact, suggesting that the sediment source must have changed, but Dr. Gale is still working on that one. The soft soil under the old homestead is 60-70 cm higher than outside, showing just how much has been lost. The house was put down without any foundations, hence there would have been minimal disturbance associated with building of the house.

Procedures to combat soil erosion need to take this history into account. In effect, the horse has already bolted.

PROGRAMME

Wednesday 20 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. STEPHEN J. SIMPSON

School of Biological Sciences, University of Sydney.

LOCUSTS AS MODEL SYSTEMS FOR UNDERSTANDING HUMAN OBESITY

Nutrition is an extremely complex problem. Animals must balance the location, selection, ingestion and use of numerous nutrients against multiple and changing needs. Nutrients come packaged within foods at different concentrations and ratios, along with other compounds, some of which are indigestible or even toxic. Foods are, in turn, distributed more or less irregularly in time and space and finding and eating them can be costly and dangerous. In my talk I will first introduce a set of models, known as the 'Geometric Framework', which we have derived to deal with the complex, multidimensional problem of nutrition. These models were derived from studies on insects, notably locusts, and I will show some of the results of these experiments. We have also applied the models to other animals, most recently humans, and I will show how application of the Geometric Framework has provided new insights into the dietary causes of the obesity epidemic.

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Wednesday18 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. BARRY FOX

School of Biological, Environmental and Earth Science, University of NSW

THE RECOVERY OF MAMMAL POPULATIONS AFTER FIRE

After a fire, the vegetation recovers through a series of stages (succession). Does the recovery of the mammal populations go through a series of stages also? Is the recovery of the mammals dependent on the succession of the vegetation?
The main species in the mammalian succession following fire for wet heath in eastern Australia are rodents, with *Pseudomys gracilicaudatus* (eastern chestnut mouse) being followed by *Rattus lutreolus* (swamp rat) which becomes dominant with increasing time since fire. The abundance of both species has been shown to correlate with vegetation density, but in markedly different ways. In experimental plots with 60-70% of the vegetation cover removed by clipping, the abundance of the swamp rat was significantly reduced, while the abundance of the eastern chestnut mouse remained relatively unchanged.
In the early stages of succession after fire in dry heath, *P. novaehollandiae* (New Holland mouse) and *Mus domesticus* (house mouse) are abundant, but they are uncommon in wet heath habitats. However, in the clipped wet heath habitats, they became abundant, indicating that the mammal succession had been reset back to a new beginning by clipping the vegetation. These experiments in the manipulation of the vegetation cover demonstrate that it plays a causal role in the succession of mammals after fire.

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Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 116 **JULY 2005**

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IN THIS ISSUE

NEW MEMBERS.

We welcome Mrs Lynne Bean, University of Canberra

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

Casey, Erin MUCEP, Macquarie University.
Project: Faunal diversity and biostratigraphy of Early Cambrian small shelly fossils from the Andamooka Limestone, Stuart Shelf, South Australia.
The taxonomic description of a little-known Early Cambrian fauna from a limited number of drill cores will be of considerable regional biostratigraphic significance. It should facilitate precise correlation between the Stuart Shelf, the Flinders Ranges succession, and outcrops in the far northwest of NSW, with the possibility of international biostratigraphic correlations to North America and Siberia. Awarded: $686.

Larsen Joshua, School of Geology, University of Wollongong.
Project: Petrology and Geochemistry of Cainozoic basalts from Barrington Tops, NSW.
Mapping and measuring sections, which surprisingly appears not to have previously been done thoroughly, will have significant relevance to the geochemical evolution of Cainozoic

basalts which cover a good deal of the northern and central parts of NSW. The study of xenoliths is of considerable importance in providing palaeogeotherm and source data on the magma. This research involves study of the earliest phases of the Barrington Volcano. Awarded: $800.

Dr Zhen, Yongyi, Palaeontology, Australian Museum.
Project: Ordovician conodont biostratigraphy and zonation of eastern Australia.
The Latest Cambrian to Early Ordovician conodont faunas from the Koonenberry Belt of far-western NSW will be documented. Working with colleagues, a Middle Ordovician conodont assemblage from west of Parkes, NSW will be described and some Tasmanian Ordovician conodont faunas will be investigated. This project, combined with published data, will enable precise correlations to international successions at all levels in the Ordovician. Awarded: $1000.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

The applications were all considered significant and commendable, but there were insufficient funds available to award grants to all of the applicants and to give the full amount requested by the successful applicants. All things being equal, Members of the Society were given preference.

Andrew, Rose L., School of Botany and Zoology, Australian National University
Project: Applying molecular techniques to better understand the reproduction of *Eucalyptus tricarps*, red ironbark.
Eucalyptus tricarp is an important component of the endangered Box-Ironbark Woodland. Very little of its habitat remains intact and it is slow growing and produces little seed compared with related species, despite copious flowering. DNA-based genetic markers will be used to study patterns of mating with the hope of explaining the poor reproductive success of *E. tricarpa*. Awarded $400.

Baker, Andrew C., Department of Environmental Sciences, University of Technology, Sydney.
Project: Do ecosystem responses to *Pinus radiata* invasion differ between geographically disparate regions?
Pine plantations may have a significant impact on adjacent vegetation. This project will study the penetration of pine leaf litter into the surrounding vegetation and examine whether it suppresses native vegetation and facilitates the introduction of other exotic species. The decomposition of the leaf litter will be studied to see if an influx of pine litter alters nutrient cycling. Awarded $400.

Clemente, Christofer J., School of Animal Biology, University of Western Australia.
Project: Locomotion in Australian *Varnus*, ecomorphological and ecophysiological perspectives.
Most studies on lizard locomotion have used small species. Large goannas can run fast. This project will seek *Varnus giganteous*, the largest goanna at 2.4 m and study its locomotor capabilities. It is hoped this study will enable prediction of the locomotory capabilities of the extinct giant goanna *Megalania prisca*, which had a body length of 5 m and tail length of 2 m, and lived until about 19-26,000 years ago. Aborigines lived in Australia at that time also, leading to the question: Could humans have outrun such a giant predatory lizard? Were they hunters or hunted? Awarded $600.

Corey, Ben, Applied Ecology Research Group, University of Canberra.
Project: Comparative ecology of the Inland Carpet Python in two landscapes.
The inland form of the carpet snake, *Morelia spilota metcalfei*, is present in low numbers and is declining. Conspecifics in rural habitats in coastal eastern Australia are thriving. Both inland and coastal habitats are much altered and disturbed. Why are the coastal forms coping well but the inland form is declining? Awarded $300.

Curran, Timothy J., Centre for Ecology, Evolution and Systematics, University of New England.
Project: Are dry rainforest trees more drought tolerant then their congeners from mesic rainforest types?
Drought tolerance related traits will be measured for leaves, stems and the whole plant, and water use efficiency will be assessed to answer this question. Awarded $500.

Depczynski, Martial. School of Marine Biology, James Cook University.
Project: The ecological significance of cryptic reef fish.
Small cryptic fishes make up 50% of reef fish assemblages yet remain virtually unstudied. Many of these abundant species have high mortality rates and correspondingly short life spans, often of only 8-14 weeks. As a consequence, their reproductive strategies must differ from other reef fish, but these strategies are unknown. This study will investigate the reproductive strategies of two species of cryptic reef fish. Awarded $300.

Ferraro, Paul A. Museum Victoria.
Project. The taxonomic status and population structure of the Mahogany glider (*Petaurus gracilis*)
The Mahogany Glider has a restricted range in the wet tropics and its habitat is fragmented. It is recognised as endangered and only a small proportion of the population resides in nature reserves. The taxonomy is uncertain: it has been classified as a subspecies of the Squirrel Glide (*Petaurus norfolcensis*) and as a distinct species. A possible Squirrel Glider-Mahogany Glider hybrid suggests incomplete speciation which would have significant conservation implications for the Mahogany Glider. The taxomony will be studied using molecular methods and DNA analysis. Awarded $300.

Frisch, Ashley J., School of Marine Biolgy and Aquaculture, James Cook University.
Project: Hybridization in coral trouts (Genus *Plectropomus*).
The coral reef species the bar-cheek coral trout (*Plectropomus maculatus*) and the common coral trout (*Plectropomus leoopardus*) are reputed to hybridize. Evidence for hybridization relies on the presumption that hybrid individuals have intermediate coloration and morphology, but this paradigm does not allow for mere polymorphism. Mating events will be studied. Awarded $300.

Gagliano, Monica, School of Marine Biology, James Cook University.
Project: The development of UV facial patterns in coral reef fish.
Many fish are sensitive to UV light and UV reflecting patterns on face and fins are well suited for communications. A current hypothesis proposes that that UV facial markings on *Pomacentrus amboinensis* may be used to communicate social status and/or fitness of the fish. These UV patterns are not present on pre-settlement larvae, and they develop during the first month after settlement. The development of these UV patterns will be studied. Awarded $500.

Harris, Rebecca M. B., University of Tasmania.
Project. Insect body size: the importance of temperature and the potential influence of climate change.
Global temperatures are rising. There is a growing body of work on the impact of elevated temperatures due to climatic change on the physiology, phenology and distribution of plant and animal species. However, very little research has been carried out on the potential impact on body size. This project will study the relationship between latitude, temperature and body size of insects. Insects are a significant portion of the global biodiversiy. Awarded $500.

Hsu, Tina T-T., School of Biological Sciences, University of Wollongong.
Project: Are hardwood plantations suitable for small forest birds?
Hardwood plantations of Eucalypts are thought to be better than softwood pine plantations, but not as good as native vegetation, for biodiversity. Plantations are, by there nature, even

aged. This project will focus on foraging behaviour and territory partitioning of small forest birds in native hardwood plantations on the mid north coast of N.S.W. It is thought birds are representative of the needs of many other animals. Awarded $300.

Hurley, Victor G. Monash University.
Project: Peregine falcons: breeding success and conservation/management implications in Australia.
Peregine falcons are well documented internationally, but they have been given scant attention in Australia. They are rare and endangered in Victoria. Long term population dynamics and intervention strategies (including nest boxes), will be studied. Awarded $300.

Kawakami, Takeshi, University of New South Wales at the Australian Defence Force Academy.
Project: Chromosomal rearrangements and speciation of morabine grasshoppers: a molecular genetics approach.
There are 12 distinctive species/races in the morabine grasshopper *Vandiemenella viatica* species group, as defined by classical chromosomal studies. The underlying hypothesis is that chromosomal rearrangement has lead to speciation, but this hypothesis has not been widely accepted. This project will use modern molecular methods to find out the status of the chromosonal races and if chromosomal rearrangement leads to speciation. Awarded $300.

Palmer, Amy N.S., Marine Sciences, University of Sydney.
Project: A non-destructive method for investigating the genetic structure of a rare group of marine animals in N.S.W.
Chiton species (*Ishnochiton* spp.) congregate under some boulders but not under others. It is not known why they congregate, but one species, *Ishnochiton lentiginosa*, is known to brood its young, but this appears to be an exception. This project will compare the distribution and population dynamics of the brooder species and the broadcast spawners, using DNA analysis. Being relatively rare, the animals will not be destroyed by taking samples for DNA analysis. Rather, it will be made to crawl across a glass slide and the cells left in the slime from the mollusc foot will be analysed. Awarded $600.

Renner, Matthew A.M., Institute of Wildlife Research, University of Sydney.
Project: Character state evolution and homology within the Australasian leafy liverwort family Lejeuneaceae.
The family and its sub-families are well characterised, but most genera are not well circumscribed. This project will use DNA anaysis to investigate generic limits. Awarded $400.

Richie, Euan G., School of Tropical Biology James Cook University.
Project: Ecology and conservation of the antilopine wallaroo (*Macropus antilopinus*).
The antilopine wallaroo is the only large macropod to be restricted to the tropics. Populations are declining in parts of the Northern Territory and Western Australia, probably due to inappropriate fire regimes. Survey data and museum records, used successfully in Queensland will be extended to the Northern Territory and Western Australia. Awarded $ 600.

Thompson, Vanessa, Deparment of Zoology, University of Melbourne.
Project: Are local populations of endemic and non-endemic reef fish self replanishing? A comparison of the populations genetics of *Amphiprion mccullochi* and *A. latezonatus* .
Many marine taxa have a two phase life cycle in which relatively sedentary adults produce larvae that develop in the pelagic environment before recruiting in the adult habitat. How far do these larvae disperse before recruiting into before recruiting into the adult population? This question is crucial for conservation of marine biodiversity. Awarded $400.

While, Geoffrey M., School of Zoology, University of Tasmania.
Project: Using reptiles to test avian hypothesis of hatching asynchrony.

Hatching asynchrony, when eggs in the clutch hatch at different times, usually results in the youngest chick dying before fledgling. It is thought that there must be some advantage in hatching asynchrony, and there are a total of 17 competing hypotheses attempting to explain it. *Egernia*, a social skink, gives birth to its litters over several days or even weeks and is ideal for testing hypotheses about hatching (or birthing) asynchrony. Awarded $400.

Yek, Sze-Huei, School of Tropical Biology, James Cook University.
Project: Assessing biodiversity and Climate Change in the Queensland wet tropics using ant species abundance and incidences.
Models of species richness have been traditionally used to provide assessment for conservation purposes. Sites with higher numbers of species are accorded a higher conservation value. Alternative models are based on phylogenetic diversity. Ants provide an ideal candidate to test these models. Awarded $300.

NEW BOOK: LIFE OF MARSUPIALS by Hugh Tyndale Biscoe

In *Life of Marsupials*, one of the world's leading experts explores the biology and evolution of this unusual group – with their extraordinary diversity of forms around the world – in Australia, New Guinea and South America. For more information, visit the CSIRO Publishing website, http://www.publish.csiro.au/pid/4781.htm or write to CSIRO Publishing, PO Box 1139, Collingwood, Vic 3066, phone 03 9066 7601

LOCUSTS AS MODEL SYSTEMS FOR UNDERSTANDING HUMAN OBESITY: a talk by Prof. Stephen J. Simpson.

Nutrition is an extremely complex problem. For good nutrition, animals must balance the location, selection, ingestion and use of numerous nutrients against multiple and changing needs. Nutrients come packaged within foods at different concentrations and ratios, along with other compounds, some of which are indigestible or even toxic. Foods are, in turn, distributed more or less irregularly in time and space and finding and eating them can be costly and dangerous.

There are two major food requirements, carbohydrates and protein and a balance is needed between the two. Animals eat until they reach their intake target. What are the regulatory mechanisms control the target intake?

Locusts are ideal laboratory insects for experimentation. When locusts are given varying amounts and dilutions of food with the optimum carbohydrate/protein ratio, they all end up on their target intake. One group given a very dilute food had to eat five times as much to achieve its target intake. That they reach their target intake shows that they are regulating their food intake. If given food with a very poor carbohydrate/protein ratio such that they cannot reach their target intake, and then put on a balance ratio, they soon are back on track to reach their target. How do they do it?

The activity of locusts' taste receptors can be measured. In effect, they taste the food, 'taste' their own blood and then manage the difference. When fed protein deficient food, the taste receptors become very sensitive to protein. Locusts can be trained to associated food with a colour. When deficient in some nutrient, they immediately go to the colour for the food to correct that deficiency. If the locusts must eat excessive carbohydrates to reach their target intake for protein, then they become obese. The target for protein takes priority.

Similar experiments are done with humans. They are given free choice for two days, then put on a diet restricted for either protein or carbohydrate/fats, then given free choice again. Those on high protein suffered a slight excess of protein and a deficit of carbohydrate, while those on high carbohydrate suffered an excess of carbohydrate: they were eating excessive carbohydrates trying to reach their protein intake. When given free choice again, both groups returned to near normal. Rats were given eight different pairings of carbohydrates and protein and they all ended up near their targets. If unable to reach their protein target, they abandoned carbohydrate regulation in an attempt to satisfy the protein target.

The British literature on human nutrition shows that the protein intake is maintained about 12-18% of total energy requirement. The carbohydrate/fat mix is maintained about the same. Tell people to cut down on animal fats and the intake of vegetable oils goes up. Similarly, tell them to reduce sugar intake, and the consumption of complex carbohydrates increases. Thus it appears that people are regulating their intake.

In the USA, protein intake was about 14.6% in the 1960's, but it had reduced to 12.5% in 2000, and there was 14% more carbohydrate/fat in the diet. This looks like a small shift, but the result is a huge explosion in obesity. In the USA, 60% are overweight or obese! If the protein/carbohydrate ratio is higher than the normaltarget, and the Atkins diet is 45% protein, energy intake is reduced ant it may allow weight loss, but health risks are associated with the imbalance: there may be bone decalcification, kidney problems, etc. Excessive carbohydrates are associated with obesity, heart disease, diabetes, etc. Excessive carbohydrate and fat may stimulate the liver to burn protein, and then the body needs a higher protein intake, leading to a vicious circle. Even if the intake remains constant, inactivity can lead to obesity. The conclusion is that people can regulate their intake and the regulation of protein is the most important.

Energy expenditure is important, For hunter gatherers, energy expenditure over metabolic rate is 1.8: for a couch potato, it is 1.2. People vary (genetically) in their ability to burn off excess energy over protein, hence the propensity to put on weight is different in different families. Once fat is put on, it is very hard to get it off. Inuit and Polynesian Islander people had a high fish diet and are used to a high protein content of 25-30% for hunter-gatherers, compared with the western diet of 14-15%. Put them on a western diet, and they have extreme problems with obesity and type 2 diabetes. It could well be the same for the Aborigines, but no-one has tested this hypothesis on the Aborigines..

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 20 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. RICHARD KINGSFORD

Professor of Environmental Science
School of Biological, Environmental and Earth Sciences, University of NSW.

THE FAILURE OF CONSERVATION ON AUSTRALIA'S RIVERS

Australia is facing one of its most serious droughts. Cities are running out of water and major dams on inland rivers are almost dry. Serious as this may be for many of us who live in cities or depend on rivers for agriculture, the impacts of building dams and diverting water are even more crippling. Many of the more important wetland areas in Australia are facing ecological collapse, exacerbated by the current drought. There are solutions but they depend on political will which is not so easy to find when it comes to water for the environment. Conservation of aquatic ecosystems depends on much more than reserves and strikes at the heart of our species' interaction with the planet.

Wednesday 21 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. KAREN FIRESTONE

Conservation Biologist, Zoological Parks Board of NSW and School of Biological Earth and Environmental Sciences, University of NSW.

THE AUSTRALASIAN CONSERVATION GENETICS CENTRE' AND 'CONSERVATION GENETICS OF THE AUSTRALASIAN MARSUPIAL CARNIVORES.'

The Australasian Conservation Genetics Centre is a new research unit within the Zoological Parks Board of New South Wales that is focussed on providing top quality molecular data to aid both in-situ and ex-situ conservation management. This seminar will give an introduction to the ACGC and a number of exciting projects that are being conducted through the Centre

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Wednesday 19 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. PETER CURZON

Director Health Studies Program, Division of Environmental and Life Sciences, Macquarie University

SARS, MONKEYPOX AND BIRD FLU : NATURE BITES BACK

Once we thought that we had won the battle against infectious disease and that the world could look forward to a new aseptic age. Now we face the threat of a range of emerging and re-emerging infections in a hypermobile world, where geographical distance and national borders no longer offer security. The real reasons for the emergence/re-emergence of 'new' infections lie not with the seemingly random nature of the biophysical environment. Rather it is our behaviour, our collective life styles and the way we have modified the environment which have placed us at risk. This talk examines the threat of infectious disease with particular reference to three recent epidemic episodes.

Wine and cheese will be served from 5.30, before each meeting.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 117 **SEPTEMBER 2005**

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IN THIS ISSUE

NEW MEMBERS

We welcome
Mr. Damian Licari of the University of Technology, Sydney
Mr. Mark J. Turner, a palaeontologist.

PAPERS ACCEPTED FOR PUBLICATION

Harris, J.M. The discovery and early natural history of the Eastern Pygmy-possum, *Cercartetus nanus*.

Piper, K. and Herrmans, N. Additions to knowledge of the early Pleistocene wallaby *Baringa nelsonensis* Flannery and Hann 1984 (Masupialia, Macropodinae),

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2006. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 14 November 2005.

THE RECOVERY OF MAMMAL POPULATIONS AFTER FIRE, a talk given by Prof. Barry Fox: A talk given to the Society

After a fire, the vegetation recovers through a series of stages (succession). Animals, however, are dependent on the vegetation, hence succession after fire for animals relies on the recovery of the vegetation. The succeeding changes in the vegetation are from open to dense, and the different stages become more suitable for some animals and less suitable for others. Some species present in early stages of succession may disappear in the later stages if they are out-competed by the new-comers of the later stages. This model has been tested by experiments and found to be true for small mammals, ants and lizards. Prof. Fox described his experiments on the small mammal populations of the Myall Lakes areas.

After a fire in wet heath, the Eastern Chestnut Mouse is the first to return and the population peaks about three years after a fire. The Swamp Rat comes in later and it peaks about eight years after afire. The Swamp Rats are about twice the size of the Eastern Chestnut Mouse, and if the Swamp rats are removed, the Eastern Chestnut Mouse population flourishes. The Eastern Chestnut Mouse can now get extra food items, hence competition is controlling this change.

To test whether the density of the vegetation is important, 60-70% of the vegetation cover was clipped over and area of 10 X 10 m. The swamp rats were much reduced and the chestnut mouse remained abundant. Swamp rats will not cross open ground. They travel along their own little highways in the dense vegetation. To trap them, Prof. Fox found he had to put the traps on their highways. He had to learn to 'think like a swamp rat'.

The clipped sites and more open ground are suitable for the New Holland Mouse and the House Mouse. Where vegetation is sparse, the House Mouse reaches peak population after two years and then the New Holland Mouse comes in. The Eastern Chestnut Mouse comes in when the vegetation becomes denser.

To test whether it is the food or the shelter that is the most important, the vegetation was clipped, bundled up and left in situ, thus the food was still there, but the cover had been removed. The animals did not come back, showing that the cover was the most important factor and it provides a home for the animals If animal succession is looked at against the density of the vegetation, then there is a good fit, regardless of time since the fire. The House Mouse comes first, then the New Holland Mouse, followed by the Eastern Chestnut Mouse, and finally the Swamp Rat.

The recovery of the vegetation depends on the weather. If there are good rains in the first growing season after the fire, there is a good recovery of the vegetation. The vegetation provides cover from predators, and in the Myall Lakes region, predation comes from the air, owls, hawks etc. It is thought that the animals that need dense cover need to feel the vegetation around them. Experiments with American voles where glass rods were substituted for a vegetation cover found that the animals were not troubled by light or dark, as long as they could feel something around them.

These experiments show that the habitat is the most important factor for these small mammals. The vegetation provides the home for the animals.

THE FAILURE OF CONSERVATION ON AUSTRALIA'S RIVERS: a talk given by Prof. Richard Kingsford

Prof. Kingsford has done many surveys on the waterbirds on the inland rivers and wetlands. He found that explanations for the birds' population fluctuations and movements were dependent on the state of the habitat, and that means water. In common with the rest of the world, Australia has problems with water: there is not enough to go around. If you have a large jar of water and then pour water out into containers, the level of the water in the jar goes down and it eventually becomes empty, and everyone understands that. If you apply this analogy to rivers and wetlands, people do not believe you.

The inland river systems experience extreme variability: it is either boom or bust and organisms living in these inland wetlands must cope with this variability. Flows down the Cooper Creek reach the lower Cooper about once in every four years and the flows reach Lake Eyre on average about once every 12.5 years. Lake Blanche receives flows every 14 years. Waterbirds are highly mobile and move between 12 inland river basins. Six grey teal were tracked and their movement has been described 'like confetti tossed into the air': each bird makes its own decisions about where it goes.

Flood plains are a huge resource, but this is not often recognised. Flood plains may be up to 80 km wide and over 300,000 birds have been recorded from Lake Eyre when it was only one quarter full. The habitats themselves can be very variable: one of the Currawinya Lakes is salty and clear: it is clear because the salt flocculates clay, and the other is fresh and turbid. The salt lake always has many more birds on it because the clear water allows sunlight to penetrate the water and stimulate a good growth of algae, the basis of the food chain for many other organisms.

With river development plans, flood plains do not have a place. Up to 73% of the annual flow is taken out of the river, mainly for irrigation. Many dams have been built in populated areas, along the Great dividing Range and in Tasmania. The Governments have stopped building large dams, but now there are many private off river storage areas. The more water taken out upstream, the less water available for the major flood plains downstream, and they have shrunk.

Some wetlands have been used for water storage. In the 1950's a weir was put in so that wetlands were flooded to form the Menidee Lakes. Kinchega National Park is caught in the middle with up to 30% of the park being wetland, but the Park management has no control over water within its boundaries. These wetlands once supported black box and lignum communities, but now it is a lake with dead black box.

There are regulated (e.g. Menindee Lakes) and unregulated lakes. Fishing birds do well on the regulated lakes, but many other birds do better on the unregulated lakes. There may be up to 100 times the birds on the unregulated lakes, but it depends on the food available. The biodiversity of unregulated lakes is greatest in the drying stage.

The Macquarie Marshes is a wetland of international importance. It has a nature reserve and a conservation agency, but it also has a irrigation and grazing industry. In the 1960's dams were built and flows were reduced, but they still flooded. In the 1980's, another dam was built and the flow to the marshes was reduced further. About 300,000 birds were counted in the 80's, 1,000 in 2000 and only 20 birds were seen in 2004. Drought has an influence, but history is catching up with it. The flooded areas have been reduced by 40-45% and river regulation has taken out about 100,000 nest in 11 years. The Government regards water going into wetlands as 'wasted'.

The Murrumbidgee river System has 26 dams, including the Snowy Mountains scheme and the Canberra water supply. It also supports major irrigation systems. Flows to the Lowbidgee wetlands at the end of the Murrumbidgee have been reduced by about 60%. About three quarters of the wetlands have been destroyed or degraded by development and what is left is very fragmented. 100,000 to 200,000 birds used to be seen there but not there are less than 50,000.

And what of the future? Are we learning anything? River use is not just an Australian problem. World wide, the two biggest disasters are the Aral Sea, which has dried up because too much water was taken out of the rivers flowing into it. 40,000 tons of fish were once harvested from the Aral sea, but now the fishing boats are stranded 80 km inland. The second is the Mesopotamia Marshlands, once home to half a million Marsh Arabs. Dams in Turkey, Iraq and Iran reduced flows by 80-90%.

Management plans are difficult because rivers cross borders and many authorities have to be involved. State governments charge for the use of water when pumped out of the rivers, but flood water is almost free. This has led to diversion channels to capture flood waters and off river storage. Cubbie Station in Queensland on the Culgoa River is an example: it hijacks almost the entire flow for cotton growing and users downstream are left out, not to mention the wetlands. This is all quite legal.

It is not all bad news, though. The locals heard about a plan for the irrigators to come into the Cooper River in Queensland and set up another cotton growing area like Cubbie Station. They mobilised the scientific community and it took about 4-5 years of pressure to prevent it. There is now an agreement for the Cooper and Paroo Rivers to protect them, and Prof. Kingsford was very involved in saving these rivers.

Conservation is usually about land and wetland management hardly acknowledges where the water comes from. There are still intact river basins and there should be an Australian Heritage Rivers system. Areas of high conservation status need to be identified and plans of management drawn up.

Editor's Note: I had heard that when these wetlands were in their natural state, there were no locust plagues. Locusts were still around, but the water birds kept them in check. I asked Prof. Kingsford if this was true. He said it was and it was not only the water birds but the small mammals that would have been more numerous in the natural habitat. Besides, with greater areas under wetlands, there would have been less land for locusts to use as their breeding grounds. Seems like the environment does bite back.

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LINN S'O'C' NEWS

NEWSLETTER NO: 118 **DECEMBER 2005**

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IN THIS ISSUE

AWARD OF THE LINNEAN MACLEAY FELLOWSHIP

The Linnean Macleay Fellowship has been awarded to Dr Tony Wright of the University of Wollongong.

Dr. Wright is retired after a long career of research on Silurian and Devonian fossils in New South Wales and internationally. He plans further research in Silurian graptolites and trilobites, Devonian corals and (hopefully) Ordovician brachiopods and conodonts. In particular, this will include an Early Devonian coral fauna from Grattai Creek (SW of Mudgee), an important fauna of Ordovician 'inarticulate' brachiopods and conodonts from the New Zealand province, Nelson, and Ordovician conodonts of east-central Iran, in collaboration with colleagues in those countries.

The Linnean Macleay Fellowship was set up in 1903, with a bequest from Sir William Macleay's will. The first award was made in1905. This award to Dr Wright thus commemorates the centenary of the Linnean Macleay Fellowship. We congratulate Dr Wright.

PAPERS ACCEPTED FOR PUBLICATION

Foldvary, G. *Pseudoplasmopora* (Cnidaris, Tabulata) in the Siluro-Devonian of eastern Australia with comments on global biogeography.

Percival, I.G., Zhen, Y.Y. and Pickett, J. Late Ordovician faunas from the Quandialla-Marsden district, south-central New South Wales.

Timms, B.V. The geomorphology and hydrology of saline lakes of the middle Paroo, arid-zone Australia.

Valentine, J.L., Cole D.J. and Simpson, J. Late Silurian (Ludlow) conodonts and linguliformean brachiopods from the Cobra Formation, southeastern New South Wales.

Williamson, P.L. and Rickards, R.B. Eastonian (Upper Ordovician) graptolites from Michelago, near Canberra

Gibraltar Range papers: Volume 127 will have a series of papers on the Biology and Ecology of the Gibaltar Range National Park.

Clarke, P.J. and. Myerscough, P.J. Introduction to the Biology and Ecology of Gibraltar Range National Park and Adjacent areas: Patterns, Processes and Prospects.

Jones, R.H. and. Bruhl, J.J. *Acacia beadleana* (Fabaceae: Mimosoideae), a New, Rare, Localised Species from Gibraltar Range National Park, New South Wales.

Caddy, H.A.R. and Gross, C.L. Population Structure and Fecundity in the Putative Sterile Shrub, *Grevillea rhizomatosa* Olde & Marriott (Proteaceae).

Vaughton, G. and Ramsey, M. Selfed Seed Set and Inbreeding Depression in Obligate Seeding Populations of *Banksia marginata.*

Williams, P. and Clarke, P.J. Fire History and Soil Gradients Generate Floristic Patterns in Montane Sedgelands and Wet Heaths of Gibraltar Range National Park.

Virgona, S., Vaughton, G. and Ramsey, M. Habitat Segregation of *Banksia* Shrubs at Gibraltar Range National Park.

Knox, K. J. E. and Clarke, P.J. Response of Resprouting Shrubs to Repeated Fires in the Dry Sclerophyll Forest of Gibraltar Range National Park.

Croft, P. Hofmeyer, D and Hunter, J.T. Fire Responses in Four Rare Plant Species at Gibraltar Range National Park, Northern Tablelands, NSW.

Campbell, M.L. and Clarke, P.J. Response of Montane Wet Sclerophyll Forest Understorey Species to Fire: Evidence from High and Low Intensity Fires.

Goldingay, R.L. and Newell. D.A. A Preliminary Assessment of Disturbance to Rock Outcrops in Gibraltar Range National Park.

Mahony, M. Amphibians of the Gibraltar Range

Vernes, K., Green, S., Howes and Dunn, L. Species Richness and Habitat Associations of Non-flying Mammals in Gibraltar Range National Park.

SUBSCRIPTIONS FOR 2006

A notice of your subscription for 2006 has been sent out to you. Remember, if you pay before March 31, a discount applies.

FIRST NOTICE OF 2006 ANNUAL GENERAL MEETING

The Annual General Meeting will be held on the 15th March, 2006, and the first notice is attached at the back of this newsletter (white page). The presidential address will be presented by Dr. M.L. Augee, as follows:

WELLINGTON CAVES FOSSILS: THE BEGINNING OF AUSTRALIAN PALAEONTOLOGY

The first Australian fossils to receive scientific study were collected from Wellington Caves by George Ranken in 1830. Later that year Rankin showed Thomas Mitchell, colonial surveyor, the fossil site and he in turn sent several boxes to England. Fossils from these shipments were to create considerable interest in Europe and made their way to the laboratories of Jameson in Edinburgh, Clift in London and Pentland (at Cuvier's lab) in Paris. To their everlasting credit, these early palaeontologists quickly realised the significance of the beasts and that they provided clear evidence against the universal flood and for a localised succession of types.

The real nature of the fossils, especially the extinct megafauna, was largely unravelled by Richard Owen during a long and successful career at the British Museum (1838-1888), during which time Mitchell and others sent fossils and fossil casts.

Scientific collection at Wellington Caves during the rest of the 19th century was carried out by the Australian Museum, and much of the work of Krefft was to create confusion for years to come.

In the first half of the 20th century sporadic collections continued to be made for the Department of Mines (from 1888). Much of this material was stored at the old minerals museum at The Rocks and is now at the Australian Museum. This material continues to be studied by Dr Lyndall Dawson.

Two German palaeontologists, Richard Dehm and Gerhard Schroeder, collected material from the old phosphate mine on the Caves Reserve in 1939. The University of NSW commenced an excavation in Cathedral Cave in 1985, and that work continues today at the Wellington Caves Fossils Studies Center.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

The date for submission of applications has been brought forward to 15th March , 2006
Please mail applications to:

The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $1,000, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **15 March, 2006. Submit to The Secretary, Linnean Society of NSW, PO Box 291Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,000.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 15th March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **15 March 2006. Submit to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

NEW BOOK: Linnaeus' Philosophica Botanica, a new translation by Stephen Freer.

Originally published in Latin in 1751, this book is a comprehensive account of Linaeus' system of classification with special importance attached to the descriptions of plant parts and correct use of technical terms. It also has explanations of the effects of soils and climatic conditions on plant growth. There are memoranda of Linnaeus' botanical excursions and his ideas on garden and herbarium design. This is the first full English translation since 1775, and is beautifully illustrated with original engravings and figures. For more information, see the Oxford University Press web site, http://www.oup.co.uk/isbn/0-19-856934-3.

NEW 1:100 000 SOIL LANDSCPE MAP FOR EDEN – GREEN CAPE REGION

The NSW Department of Natural Resources (DNR) has released a new soil landscape map that will help in long-term planning. It provides detailed information on soil types, land degradation, current land use, geology and vegetation in the area. Together, the map and associated report offer the first comprehensive and detailed inventory of the soil and landscape in the Eden-Green cape area and will contribute to efforts to follow sustainable land use practices.

The map and interpretive report can be purchased from the DNR's information centre at 23-33 Bridge St. Sydney, telephone 02 9228 6333 or fax 02 9228 6555. They are also available through the internet by visiting the NSW Government Online Bookshop http://www.bookshop.nsw.gov.au , then selecting 'Soils' section.

For further information about the soil landscape mapping program, visit the DNR's web-site http://www.dlwc.nsw.gov.au.

WILDLIFE DISEASE ASSOCIATION
The Wildlife Disease Association is dedicated to the conservation of wildlife through sharing the study and understanding o diseases of wild animals. It is an international non-profit organisation of scientists with its parent body in North America and with African, Australasian, European, Latin American, Nordic and Wildlife Veterinarian Sections. Membership is open to anyone. For further information, contact Maria Cardoso (Treasurer WDA, Australasian section) 5 Lenton Parade, Waterloo NSW 2017 or e-mail maria.cardoso@student.unsw.edu.au

THE AUSTRALASIAN CONSERVATION GENETICS CENTRE AND CONSERVATION GENETICS OF THE AUSTRALASIAN MARSUPIAL CARNIVORES: a talk by Dr. Karen Firestone

The Australasian Conservation Genetics Centre collaborates with other Australian organisations on research into conservation of wild populations. It is also concerned with education and arranges lectures and talks to schools. There are also projects applicable to zoo populations. For example, tiger cubs are likely to have a congenital defect and its genetics need to be known. It is likely that the Zoo will receive a number of Asian elephants and their provenance will have to be determined. The genetics of individuals in the breeding program must be known so that healthy offspring are assured.

For most wild populations, little is known about them which is a serious impediment to any effective planning for conservation. The study of the quolls is a good example of what is needed. Quolls or 'native cats' are fierce, nocturnal predators, eating anything up to the size of a rabbit. They were once found over most of Australia but have declined drastically, mainly due to habitat loss and predation.

There are six species of quolls (*Dasyurus* spp.). The Eastern Quoll once ranged over much of southeastern Australia but is now restricted to Tasmania. It was last seen in Vaucluse in 1963. The Western Quoll was once relatively abundant in semi-arid Australia, but is now restricted to southwest Australia and is endangered. However, a captive breeding program is proving quite successful. The Spotted-tailed Quoll is the largest and is now found in Queensland and Tasmania. The Northern Quoll once ranged across northern Australia but its distribution is now restricted to six areas and it is threatened by cane toads. There are two species in New Guinea, but little is known about them.

Predation by foxes, feral cats and dogs are a serious threat and are also a cause of a decline in the populations The recent introduction of foxes into Tasmania is a worry. Poison baits for foxes, dogs and rabbits are also a threat.

The genetics are studied from fecal DNA and from hair. Quolls have community latrines on rock ledges which makes collection of scats very easy. There are some cells from the animal on the outside of the pellets and the DNA is obtained from these cells. Individuals and their sex can be identified and the genetics of one population can be compared with other populations.

A healthy population requires a diverse genetic structure. If diversity is lost, then problems arise. A small number of quolls have been taken to predator-free islands in northern Australia, without knowing whether the genetic structure is diverse. A traditional owner of one of these islands had a burn-off, but at least some of the quolls survived. In the severe fires on January 2003, probably 50% of the quolls were wiped out. It is surprising that 50% survived. There is still considerable diversity in some of the fragmented populations in northern Australia.

The effect of predators and environmental disturbance on the population genetics is a concern. If many individuals die and only a few survive, then the genetics become relatively uniform, the so-called 'bottle-neck'. This can be seen in areas affected by cane-toads, where the survivors are all related.

The study of quolls continues. The effect of the cane toad toxin is of particular concern. The toxin is an animal analogue of digitalis. There seems to be genes that confer some resistance. For the quolls that survive in a cane toad infested environment, it is not known if their survival is due to resistance or to learning to avoid the toads.

SARS, MONKEYPOX AND BIIRD FLU: NATURE BITES BACK, a talk by Prof. Peter Curzon.

Infective agents seem to be on the increase. In the late 1960's early 1970's, it was thought that infectious diseases were defeated (probably because of the success against smallpox) and it was time to move on to things like cancer research,. But this was an illusion: new infections were emerging, especially in Africa. Diseases like West Nile fever and Haemorrhagic fever (in Korea during the war) were being ignored. A virulent haemorrhagic fever burst forth, but was only noticed because it killed workers in the laboratory. Marburg, Ebola, Legionnaire's disease and many more appeared. Both old diseases were returning and new infections were appearing. The microbial world evolves.

Western medicine relies on the 'magic bullet', antibiotics, which react on a stable target, the microbes, which, however, are not stable: they are constantly evolving. Western medicine sees us as the centre and we wage war on diseases that attack us. There is an alternative view: we are just one of the many organisms all struggling to survive. We live in a delicate balance: us, animals, microbes. At this point, Prof. Curzon showed us a favourite cartoon: someone prostrated with SARS and a cartoon microbe labeled 'Nature' walking away saying 'Just to remind you who is in charge'.

It is our actions in disturbing this delicate balance that trigger epidemics. Wars, natural disturbances, land clearance, agricultural and forestry practices all disturb the balance. As examples, in North America, reforestation encourages deer which carry ticks which carry Lyme disease. In NSW, irrigation encourages Ross River fever. Most 'new' infections are not new but have been around for a long time. It is some disturbance of the environment, where the microbe is introduced into a new environment that allows it to proliferate.

HIV-AIDS and Karposi syndrome burst upon the world in the latter half of the last century as a 'new' disease, but there are reports from the 1880-1890's of people in Africa suffering symptoms identical to HIV-AIDS. Then in the latter part of the last century, the disease organism had the chance to expand its boundaries, thanks to increases international travel. Most diseases originate in animals and go unnoticed until they cross over into the human population.

Attempts at medical intervention can backfire: for example, the overuse of antibiotics. Hospital infections are growing and 8-10,000 people die each year from hospital acquired infections. There is not a lot of research into antibiotic and antiviral drugs: the drug companies have opted to concentrate on drugs for degenerative diseases such as cancer, diabetes, high blood pressure and heart diseases because these are the diseases of the rich countries and they can make more money than from infectious diseases that plague poor, third world countries.

Humans seem to be increasing in vulnerability to disease, as witnessed by the increase in suppressed immune systems and increased allergies. It is thought that increased mobility and marginalisation increase vulnerability. Public health statistics are slanted towards mortality or deaths. Most GPs spend their time dealing with morbidity, or sickness. Diseases spread by mosquitoes may cause epidemics. In 1925-1926, there were 600,000 cases of Ross River fever and Dengue fever. These diseases do not kill but incapacitate and downgrade the quality of life.

These days, an outbreak of disease anywhere in the world is a problem for Australia. National borders, time and distance have lost their significance with the increases speed of travel. Diseases have always traveled, but not as fast as today. Immigration used to be the main way for diseases to travel, but today someone may be in the middle of Africa, then on the other side of the world in a few hours, before any disease he may have contracted has had time to cause any symptoms.

Vaccinations protect against epidemics taking hold, but it requires everyone to be vaccinated. In the 1990's the idea that vaccines were bad persuaded many not to be vaccinated, leading to the serious outbreak of whooping cough. It is true some vaccines may cause complications, but the overall good to the community is undoubted. Governments may not disclosed outbreaks of disease, to the detriment of the rest of the world. The SARS epidemic started in China, but the Government did not notify the rest of the world. This attitude is not new: in 1921, Queensland failed to notify the rest of Australia of an outbreak of Bubonic Plague because it feared a loss of tourist trade, and the plague spread to Sydney, so Australia cannot point its finger.

SARS is spread by droplets from infected people and it is very hard to control because someone can fly around the world before any symptoms occur. It is thought that SARS is also an animal virus that jumped to people. The wild animal markets have been implicated, especially the civit cats sold there, but the horseshoe bat is probably the primary host. The SARS epidemic was outdone by the epidemic of fear. Governments fuelled fear and panic with cleansing and wearing of masks which were probably not very effective. The bird flu is being managed by the medics, but nothing is done about the fear. There are socio-economic factors: businesses are starting to take epidemics as a risk factor, like natural disasters.

Monkeypox is the result of globalization and human behaviour. Monkey pox is a viral relative of smallpox but much milder and is found naturally in rats and squirrels in Africa. It appeared in the US in 2003. Pets could be imported into the US without restriction, and the Gambian Giant Pouched Rat, infected with Monkeypox, was imported. Prairie Dogs could be trapped and sold as pets also. The prairie dogs and any rats kept near the Gambian Giant Pouched Rat became infected, and in turn, people became infected. There were no deaths, and there is no specific treatment. Up to 2004, the US exported Prairie Dogs to Japan, and they may carry Bubonic Plague also.

Bird flu threatens the whole world and fear is stoked by the media. Since 2004, probably 250 million chickens have been killed, but flu has been a natural part of birds for a very long time. Migratory birds spread it. There is great concern that it may combine with human flu and become catastrophic, like the 1918 epidemic, but this has not happened, and it is not known why. About 60 people have died from Bird Flu, and all of them have been in close contact with birds. The virus is also found in many animals, including cats and dogs. Health and agricultural authorities have difficulty cooperating when it comes to these infections that invole both people and animals.

Australia is stockpiling Tamiflu and other antivirals. Most antivirals have a short life of about 5 days, when another dose is required. With 400 million doses stockpiled, if health workers are given first priority, then there will be practically none left for sick people. Quarantine, making sick people stay at home has been suggested. The close contact of people and birds makes control almost impossible. Culling of poultry has great economic impact. Birds are culled in poor and rural areas but are vaccinated on the big conglomerate farms.

When Prof. Curzon was asked if he thought the current Bird Flu would turn into a pandemic, he replied that he did not think so, but a pandemic was very likely at some time in the future. With no real means of controlling an epidemic, what is the best strategy that we could adopt, when an epidemic does occur? Stay away from areas where people congregate and avoid contact as much as possible. This may sound pessimistic, but for Prof. Curzon, future epidemics will be 'interesting'.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2006 Annual General Meeting

The 131st Annual General Meeting of the Society will be held at 18:00h on 15 March 2006 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 17:30h.

Six members of council are due to retire at this AGM:

- John Barkas
- Mike Gray
- Greg Edgecombe
- Max Moulds
- Alex Ritchie
- Karen Wilson

and Council recommends their re-election.

Council recommends the election of Dr David Murray as President of the Society for 2006.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2006.

Further nominations are invited for vacancies on council (6), the office of president, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2006.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 119 **APRIL 2006**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER :
Form for donation to Scientific funds
Report of Society's affairs for 2005

NEW MEMBERS

We welcome our new Members:
Miss Cynthia C. Bolton, School of Botany and Zoology, Australian University
Mr. Jamie M. Harris, Southern Cross University.
Ms Leean T. Reaney, School of Botany and Zoology, Australian University
Itzel Vilchis, Tropical Biology, James Cook University
Mr. Stephen Westbrook

DONATION TO THE SOCIETY

Dr. Donald (Woody) Horning has made a donation of $2004 to the society for hardware and peripherals. We thank Dr. Horning for his generous gift, it is much appreciated.

NEED A TAX BREAK? Donations to the Scientific Research Funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

FELLOWSHIP CONFERED ON KEITH HOLMES.

At the Annual General Meeting on 15th March, Fellowship was granted to Keith Holmes, a long time member of the Society. Keith is a Palaeobotanist who has published over 37 papers on fossil leaves and fruits found at Nymboida and surrounding regions. He is an Associate at the University of New England and has been recognized internationally. He has been active in conservation also.

In reply, Keith thanked the Society and outlined how his interests developed. He grew up on a farm in Berowra and attended a small one-teacher school. The teacher, Mr. Dawson, was in his 70's and had been brought in when all the young teachers went off to war. Mr. Dawson encouraged interest in natural history and Keith collected native orchids. There were six different species of native orchids in the school grounds and 57 species within a mile radius of the farm – a far cry from today.

At Homebush High School, the Principal, Mr. Watson had been to Antarctica with Mawson, and was keen to tell stories about it. Keith learnt Latin, but would have been more interested in Botanical Latin than in the Gallic wars. Times were tough and he was not encouraged to go to University. He worked as a laboratory assistant for CSIRO at Homebush and took some night courses, but it was hard work, so he went back to farming. In 1957, the family sold the farm at Berowra and went to the Bellengen River. In 1958-59, Keith went to America on an International Farm Exchange.

Back in Australia, he married Felicity, a farm girl, and moved to a dairy farm in Kempsey. He was still interested in orchids, and has published in 'Australian Plants", but he was finding fossil plants as well, and interest in fossils gradually took over. He would collect a load of fossils from the Nymboida Coal Measures in between milkings. He had found a *Glossopteris* leaf with fructification attached, and showed it to Dr. Plumstead, a Palaeobotanist from South Africa, who was in Australia in 1972-73 for the Gondwana conference. She encouraged publication. Keith took the fossil to Rod Gould, at the University of New England who encouraged Keith to publish it, and that was the start of a long publishing career.

Collaboration with Dr. Plumstead continued, and after Felicity died, Keith retired from farming and traveled overseas, specially to South Africa. He has since married Heidi, also a palaeobotanist and a former student of Dr. Plumstead. Keith has received several grants from the Joyce Vickery and Betty Mayne Research Funds.

We congratulate Keith Homes, Gentleman Farmer and Naturalist of the grand, old tradition.

REVIEW: ***Echidna. Extraordinary egg-laying mammal***
by Michael Augee, Brett Gooden and Anne Musser. 2006.
CSIRO Publishing, price $AU39.95.

This volume supersedes *Echidnas of Australia and New Guinea*, which was published in 1995 by the University of NSW Press. Both Michael Augee and Brett Gooden were also co-authors of that volume and Anne Musser the illustrator. Anne is a co-author of the latest revised and more comprehensive volume but again her illustrations are one of the outstanding features.

The book begins with a preface which dedicates it to the late Merv Griffiths, who many of us remember with great warmth and respect. The first chapter is an easy-to-read introduction to the monotremes and includes a biological profile of the poorly-researched genus *Zaglossus*. This chapter does not prepare the reader well for the following four chapters, which cover the evolution, skeletal anatomy, brain and senses. Chapters 2-5 represent a comprehensive coverage of research in those areas and are very detailed. Even as a biologist (but essentially a lay person in certain fields, especially palaeontology and anatomy) I found these chapters "heavy going".

In Chapter 4 there is an intriguing discussion concerning the size of the prefrontal cortex in the short-beaked echidna. The possibility is presented of the species "farming" its food resource as a result of being aware of the nature of that resource, the factors controlling it and cerebral processing of these data. The authors pose the question, "if echidnas think [as the authors believe they do], what do they think about" while resting up in "dark hollows, logs and burrows?". The answer is "perhaps they have invented a variety of thought games such as cerebral chess, where the opposing forces are ants and termites with delectable queens ruling the soldier knights and indigestible pawns". Having at times, while driving, experienced a kangaroo or wombat crossing the road in front of the vehicle, I have seldom known where to swerve, as a change of direction by the animal can result in a fatal decision by the driver. Echidnas on the other hand are more purposeful in their progression and do not appear to change their minds in such a situation. Perhaps, as suggested by the authors, this reflects the greater awareness and cerebral processing by this species.

Chapter 6 discusses reproduction and considers the more recently reported studies carried out by Peggy Rismiller on Kangaroo Island and by Gordon Grigg and colleagues in the Snowy Mountains of NSW and in Queensland. This chapter is much easier to read, although the description of the work on alpha-lactalbumin and lysozyme stands out from the flow of the rest of the chapter. It appears to have been included simply because it represents new work done since the previous volume was published.

In Chapters 7-9, covering behaviour, food and feeding and metabolism, the writing style changes. The word "we" is used more extensively and the story bubbles along throughout those three chapters, often describing research work in which it seems evident that one or more of the authors has been involved. In Chapter 9 the authors relate findings on reproduction in the short-beaked echidna to its metabolic functioning, providing an interesting discussion of the situation where hibernation in the species does not appear to be utilised entirely to avoid cold or food shortage, as it is in many other mammal hibernators. They pose the question "why do echidnas sacrifice the [energetic] advantage of ectothermy, living in the slow lane [inherited from their ancestors], for endothermy?" The authors answer that question by suggesting endothermy has a definite selective advantage for reproduction.

The final chapter on conservation and management (Chapter 10) seems a little disjointed, ranging from discussion of captive diets, diseases and predators before an anticlimactic ending to the volume with a small backhander on the role of zoos in echidna conservation.

The glossary is welcome but some of the terms selected are surprising. For example *anlage, cribriform plate and desmosomes* seem unnecessary, given their fleeting appearance in the text, some abbreviations are not defined (e.g. MRNA and ACTH) and defining *endangered* simply as "an IUCN definition" is not particularly enlightening. I personally would like to have seen the word *burlap* given an Australian definition in the glossary.

The bibliography is quite restricted and would not make it easy for an interested reader to locate some of the work referred to in the text (e.g. the work of Abensperg-Traun and colleagues).

The content of the volume is comprehensive, more than adequately covering much of the earlier work and that done since the authors produced the original book. The production, including the illustrations and photographic material is generally excellent, although some of the figures and/or their legends (e.g. Fig. 4.2 showing the sensory cortical representation) are not particularly self-explanatory or more complex than perhaps necessary (e.g. Fig. 5.8 detailing the structure of the seromucous gland).

The amount of detail and the terminology seem to me to indicate that the book is aimed at biologists rather than the interested layperson. Having said that however, I suspect many laypersons probably consult books for specific information rather than reading them from cover to cover. In this regard the index seems to work adequately for this purpose. Having been fortunate enough to have been asked to review the book here, I now have my own copy. Had this not happened, I would certainly still have purchased it.

Tom Grant

WHEN DID CENTRAL AUSTRALIA BECOME ARID?

We know that Australia has not always been arid. The central desert was once well watered and Lake Eyre was a permanent lake with a wide swampy border. There would have been may smaller lakes and swamps in the landscape. Fossil leaves found around Lake Eyre were of a size and shape similar to the leaves seen in patches of rainforest on the North Coast of New South Wales. Indeed, temperature and rainfall reconstructions from the fossil plants are not unlike those of the North Coast. So how and when did central Australia become arid?

This well-watered scenario applies to the mid-late Eocene (40 million years ago (MY)), when Australia was adjacent to Antarctica. The flora was generally similar to that found over most of the Australia at that time, but the abundance of the different types of plants was different. Central Australian rainforests were rich in Cunoniaceae, and many other angiosperms, with only a little *Nothofagus*. The swamps had Cyperaceae, Restionacese and Sparganiaceae. In contrast, rainforests of southeastern Australia had more *Nothofagus* and lacked the swamp vegetation. Proteaceae, Casuarinaceae and Lauraceae were fairly common at both southeastern and central Australia. *Eucalyptus* first appeared about this time in central Australia but it was rare. Many leaves are sclerophyllous, and it is thought that sclerophylly developed in response to nutrient poor soils, before the climate became arid. Central Australia had a dry season as far back as 40 MY, unlike southeastern Australia.

About the end of the Eocene (33 MY), Australia separated from Antarctica, allowing a through current, the Circum- Antarctic Current to develop. This current prevented the warm currents from going into the high latitudes and it marks a change to an essentially modern oceanic circulation and climate. There was an abrupt cooling, many ancient species became extinct and diversity was reduced. *Nothofagus* became much more common, especially in southeastern Australia.

By the beginning of the Miocene (22 MY), the climate had warmed up and a diversity of rainforest types flourished in southeastern Australia. In central Australia, sclerophyll vegetation had been increasing and it was probably dominant, with rainforest restricted to small patches in the most favourable habitats. Megalakes deposited dolomite (like the Coorong in South Australia today), showing that there was a hot, dry season to allow evaporation. Although there were many permanent lakes, the water would not have all come from rainfall: rivers from the north drained into these lakes, just as they do today.

By the mid Miocene (15 MY), the first major step towards aridity was apparent: the rivers of inland Western Australia and central Australia had ceased regular flows.

Temperatures plummeted in the late Miocene (10-8 MY), at a time when the Antarctic ice cap was greatly expanded and there was a marked drop in rainfall. Rainforest decreased dramatically in inland southeastern Australia and *Eucalyptus* wet sclerophyll forests with abundant tree ferns (like the Dandenongs in Victoria today) would have been found all along the Western slopes of New South Wales. Judging from the amount of charcoal, bushfires would have been regular events, just like today. In the early Pliocene (5-6 MY), there was a brief period of warmer, wetter climate that allowed rainforest to return to the river valleys of the Western Slopes, before the relentless trend to colder and drier climates returned. Arid, chenopod shrublands and grasslands were found in central Australia.

By Pliocene/Pleistocene time (2-3 MY), the climatic patterns were much the same as today, but it was still considerably wetter. The glacial cycles of the Pleistocene were cooler and drier and the interglacial cycles warmer and wetter, each cycle lasting roughly 100,000 years. We are currently in the intergalcial part of the cycle. About half a million years ago, there was another drop in rainfall and the inland lakes became salt lakes, the modern condition. With each successive cycle, the lakes became smaller. At the last interglacial, Lake Eyre was about three times the size it is today and it was permanent. Since Lake Eyre is fed by rivers flowing from northern Australia, this means that the summer monsoons have become much weaker.

Thus we can say that the first major step toward aridity was seen about 15 million years ago. There have been some steps towards a wetter climate since then, but it seems to have been two steps drier and one step wetter. Even the present interglacial is drier than the one before. Such a history prompts the question, what of the future? Will this trend keep going? We will not go into predictions here, we will leave that to wiser heads than ours.

Reference

Martin, H.A. (in press). Cenozoic climatic change and the development of arid vegetation in Australia.. *Journal of Arid Environments*.

Helene A. Martin

With permission

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 19 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. HENK HEIJNIS

Science program Manager, Climatic Variability and Extreme Events

Sydney Catchment Authority

MUD, MINES AND CONVICTS ??? A RECONSTRUCTION OF THE ENVIRONMENTAL HISTORY OF SOUTHWEST TASMAINIA.

Prof. Heijnis has recently taken up his present position with the Sydney Catchment Authority. He will also dwell on what his new job is about – on the climate of the Sydney region and why does it rain (or not rain) in Warragamba.

****

Wednesday 24 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. MICHAEL BATLEY

Associate, Australian Museum

WHO ARE YOU CALLING PRIMITIVE?

For much of the 20th century it was thought that a large proportion of Australian bee species were primitive forms, closely related to their wasp ancestors. Recent molecular studies have provided the strongest evidence yet that this view should be turned on its head.
The variety (and beauty) of our native bees and their interactions with flowers will be explored in the light of this new perspective, as will some recent discoveries of bee behaviour, which were revealed by the use of video recordings.

Wednesday 19 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/Prof. DAVID ELDRIDGE

Principal Research Scientist, Department of Natural Resources and
School of Biological, Earth and Environmental Sciences, University of NSW,

CREATION OF HABITAT BY DESERT MAMMALS: BILBIES, BADGERS AND ECHIDNAS

The widespread loss of native mammals from arid and semi-arid landscapes has had profound effects on ecosystem structure and function and its ability to recover from stress. Research from arid lands worldwide has confirmed the close links between the survival of mammals introduced back into their native habitat, and the recovery of degraded landscapes and consequently, locally threatened native plants and animals. In higher rainfall areas, the loss of native mammals is thought to be associated with substantial reductions in healthy woodlands and grasslands.

A vast array of native fauna create soil disturbances in deserts. Disturbances such as pits, scrapings and burrows maintain vital ecosystem processes such as water infiltration, litter decomposition, nutrient cycling and plant germination. Often termed 'ecosystem engineers', these animals alter the flow of resources (soil, litter, water) in ecosystems without actually consuming them, and in doing so, create habitat for themselves, and plants and other animals.

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Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 120 **JULY 2006**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new Members:
Ms Rachel L. Clancy, University of Western Australia
Ms Tanya Strevens, Wollongong University
Ms. Karen Youngentob, Australian National University

DONATIONS TO THE RESEARCH FUNDS

The Society has received a total of $2,116 donations with contributions from Dr. J.M.E Anderson, Dr. D.S. Horning, Dr. A.O. Nichols, L. Sherwin, Mrs. J. Ward and anonymous. Our many thanks to these donors, their generosity is much appreciated.

PAYMENT OF SUBSCRIPTIONS FOR 2006

Some members have not yet paid their subscriptions. We would appreciate it if these members could pay their subscriptions as soon as possible.

SMOWY MOUNTAINS-SAWPIT WILDLIFE TOUR with the Wildlife Preservation Society: Leader Dr. Mike Augee

The tour departs from Sydney, Thursday 26 October. Meet Dr. Augee and coach in Canberra.
Friday 27 October, local walks to the fish hatchery.
Saturday 28 October, coach, walk or chairlift to Threadbo, Kosiusko and Charlotte Pass.
Sunday 29 October, visit the power station, the on to a 'wombat search' at Jindabyne
Monday 30 October, homeward bound.
All accommodation and catering arranged. Cost $360. Bookings must be made before 1 October and a deposit of $100 is required at the time of booking.
For further information and bookings, contact the Wildlife Society on 9456-4042 or wildlifepreservation@optusnet.com.au

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

BEAN, Lynne School of Earth Sciences, Australian National University
PROJECT : A fossil dig at the Talbragar Fish Bed site
The project aims to undertake the first palaeoenvironmental analysis of the Fish Bed site, by excavating through the considerable soil cover overlying in situ rock and then digging a trench to obtain vertical sections through the deposit. This will enable the vertical distribution of the fossil fauna and flora to be determined for the first time. If zircons can be recovered, they will be used to be confirmed the age of the beds. Awarded $1000

BOLTON, Cynthja. School of Earth Sciences, Australian National University
PROJECT: Dating the Willandra Lakes Region
This project aims to obtain an accurate record of the stratigraphy of the Willandra Lakes Region World Heritage Area, including Lake Mungo. It will identify stratigraphic units within lake lunette dunes that correspond with past climatic events. These stratigraphic units will be dated via optically stimulated luminescence and analysed using soil micromorphology. Awarded $600.

COMPTON, Jason. Macquarie University.
PROJECT: Biodiversity and palaeoecology of Late Silurian brachiopods of the Quidong Synclinorium, southeastern New South Wales
This study will be the first in-depth examination of the macrofossil communities of the Quidong area. It is expected that a number of new species will be found. This project will assist in a greater understanding of Silurian faunal assemblages and the natural history of southeastern NSW. Awarded $300.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

Requests from the Research Fund far exceeded available funds, and we were unable to grant the amount requested by applicants. All things being equal, Members are given preference.

BARRY, Katherine l., Macquarie University.
PROJECT: Mating behaviour of a sexually cannibalistic praying mantid, *Pseudomantis albofimbriata.*
This study tests 1) 'foraging strategy' hypothesis of mate cannibalism for a predator with moderate sex size dimorphism (mantids) in contrast to previous studies of highly dimorphic species (spiders with small males). The respective males food potential varies markedly; 2) The effects of starvation on mating and related cannibalistic behaviour. Awarded $400.

CLANCY, Rachel L. School of Animal Biology, University of Western Australia.

PROJECT: The dispersal of the honey possums (*Tarsipes rostratus*) in relation to fire history.
Factors involved in the maintenance of honey possum populations include dispersal, fire-free recruitment areas, a fire mosaic and associated vegetation variability. Genetic analyses of honey possums associated with three vegetation complexes with differing burn histories aims to provide data on patterns of distribution, population density, and dispersal patterns in relation to fire, and assist with the management of the honey possum population. Awarded $600.

CUMBO, Vivian R. Marine Biology, James Cook University.
PROJECT: Stress tolerance in corals: the role of the symbiont.
This project aims to test how varying environmental conditions affects establishment of zooanthellae symbionts in *Acropora* corals. Different environmental stress levels will test the partnership. The ability to switch symbionts may ameliorate coral bleaching effects. Awarded 400.

FITZGERALD, Jennifer K. University of Western Sydney.
PROJECT: The impacts of degradation and restoration on the soils of the Cumberland Plain: implications for floristic structure and function.
The project examines soil processes, plant species composition and cover in a variety of vegetation patch types, including effects of past agricultural and restoration practices on soils, and of experimental manipulation of soil properties in enhancing establishment of native species. Awarded $500.

HOLMES, Thomas H. School of Marine Biology and Aquaculture, James Cook University.
PROJECT: The selectivity of predation on newly settled tropical reef fish.
The project investigates the predator-prey dynamics in the early post-settlement of the larval fish stage. Predator selectivity with respect to prey phenotype, performance and size, and previous predator experience will be studied. A model based upon predator selection profiles will attempt to predict size-selectivity of a multi-species predator suite. Awarded $300.

KVINGEDAL, Renate. School of Marine Biology and Aquaculture, James Cook University.
PROJECT: Towards understanding climate change on the pearl oyster, *Pinctada maxima* – genotype by environmental interaction.
The study of interactions of genotype and environment will allow the assessment of the adaptability of the pearl oyster to the global warming effects of climate change and the possible effects on distribution. The effects of water density, salinity and temperature variation on growth and survival will be tested.
Awarded $300

REANEY, Leean T. School of Botany and Zoology, Australian National University.
PROJECT: What determines contest duration in experienced and novice fighters in the black field cricket, *Teleogryllus commodus*.
The relative importance of alternative theories of resource holding potential or RHP ("own RHP" or "mutual RHP") and the influence of fighting experience as determinants of contest duration in animal conflicts are tested using crickets. Awarded $500

RUIBAL, Monica P. School of Botany and Zoology, Australian National University.
PROJECT: Social significance of latrines and faecal scent marking in the Spotted-tailed Quoll, *Dasyurus maculatus*: seasonal and sexual differences in chemical signals.
This study examines the importance of scent marking in the reproductive biology of quolls through analysis of male/female, seasonal and intra-sex differences in the volatile chemical components of scats.
Awarded $400.

SIMS, Rachel A. School of Botany and Zoology, Australian National University.
PROJECT: Being part of the crowd: testing the significance of synchronous waving in a fiddler crab.
Video observation and innovative robotic manipulation will test the adaptive value of mass male synchronicity (claw waving) in the courtship of fiddler crabs as a determinant in female choice of a male "in the crowd". Awarded $300.

STEER, David W. University of Canberra.
PROJECT: Living on the Edge: the predator-prey foraging games between saltwater crocodiles (*Crocodylus porosus*) and agile wallabies (*Macropus agilis*),

This study examines the interaction of behavioural strategies and environmental factors in the predator-prey dynamics of crocodiles and wallabies occupying a riverine ecosystem. Awarded $300.

STREVENS, Tanya C. School of Biological Sciences, University of Wollongong.
PROJECT: The impact of powerline easements on the movement patterns of small mammals in coastal NSW.
This project assesses the barrier effect of powerline easements in relation to their vegetation cover and width, through a study of the presence and movements of small mammals around the easements. It will include seasonal variation, significance of habitat structure and effects of habitat manipulation. Awarded $500.

THOMSON, John A. National Herbarium of NSW, Botanic Gardens.
PROJECT: Microsatellite genome markers for evolutionary studies of bracken ferns (genus *Pteridium*).
Distribution and DNA analysis of continental *Pteridium* morphotypes suggests intra-regional genomic introgression indicative of reticulate rather than linear phylogeny. The proposed development of genetic markers recognising specific microsatellite loci will allow the study of taxonomic and biogeographic patterns of allelic variation and rare but repeated introgressions between bracken morphotypes. Awarded $700.

WHALAN, Steve. School of Marine Biology and Aquaculture, James Cook University.
PROJECT: Are there reproductive fitness advantages between inner and outer shelf reef sponge populations on the Great Barrier Reef?
The ecological effects of terrestrial run-off and sedimentation on corals are relatively well-known, but are inshore reef habitats also sub-optimal for a range of other taxa? This study examines relative reproductive fitness in a common Barrier Reef sponge species at inner, mid and outer reef habitats. Awarded $300.

WHILE, Geoffrey M. School of Zoology, University of Tasmania.
PROJECT: Exploring multiple mating in a socially monogamous lizard, *Ergernia whitii.*
What selective advantage is gained by females that mate with males outside their social bond pair? This project examines regulation of offspring paternity by testing female choice hypotheses (male genetic quality and mating order) and assessing differences in fitness and survival of offspring. Awarded $700

WILLIAMS, Moira C. School of Biological Sciences, University of Sydney.
PROJECT: The invasive potential of *Pinus radiata.*
Pinus invasions have a low profile on the national weed control agenda. This project will determine the current extent of *Pinus* invasion in Australia and investigate factors facilitating pine spread, especially the role of fire, as well as the ecological effects of pine invasion. Awarded $500

ZAMORA-VILCHIS, Itzel. School of Tropical Biology, James Cook University.
PROJECT: Selection pressure of behavioural traits on the immune genes of the wet tropics avifauna of North Queensland.
This study deals with the evolutionary, ecological and behavioural processes involved in the generation and maintenance of the highly polymorphic Mhc immune genes in wild birds. Specifically, it will test if behavioural characteristics that are associated with parasite load, e.g., group size, breeding sociality, dispersion and vertical habitat, are also correlated with Mhc allelic diversity in 16 species of wet tropics birds. Awarded $700.

CSIRO LIST OF AUSTRALIAN VERTEBRATES, A REFERENCE WITH CONSERVATION STATUS, 2ND ED.

Authors: Mark Clayton, John C. Wombey, Ian J. Mason, R. Terry Chesser, and Alice Wells, 2006
CSIRO Publishing
Paperback, 162 pp., ISBN: 0643090754
RRP: AU$59.95

The second edition of the *CSIRO List of Australian Vertebrates* is a nifty little reference book for end users like State wildlife agencies, natural resource managers, NGOs, conservation scientists, and the like. It provides relatively up to date information on the taxonomy, nomenclature, distribution and protection status of a number, but by no means all, of the Australian vertebrates. (And, in this, I find the title of this work a bit misleading as the authors have omitted a large group of the Vertebrata: the fishes). Nevertheless, this is a good reference tool with a great deal of easy-to-access information packed into a relatively small volume.

The first edition was published over seven years ago and it is probably high time that a second edition was produced. This edition expands on the first and includes a whole range of features such as 1) all currently recognized and named species and subspecies of Australian amphibians, reptiles, birds and mammals, 2) all newly described species, 3) updated conservation status, 4) accurate names and current taxonomy for all taxa, 5) broadscale state- and territory-level presence/absence data, 6) data on vagrant and accidental bird and mammal records, as well as a variety of other data. It should prove to be a useful tool for those who need to access this type of data regularly.

However there were a few points that I thought could make this a better, more useful, tool. First of all, once a book of this sort is published, unfortunately, it immediately becomes obsolete. For example, the IUCN Red List of Threatened Species for Australasian mammals has undergone a review as part of the Global Mammal Assessment and has been updated recently. This means that the entire IUCN listing for mammals in the *CSIRO List of Australian Vertebrates* will need to be double checked against the more current IUCN listings. It is true that *any* data that is published, immediately is superceded with new information, but for data of this sort it is particularly critical that current information is available.

To that end, I would have thought these data would better serve the scientific, resource management, and conservation communities as an electronic database that could be continually updated and kept current. If one wanted, one could get a little cynical about the reasons that the author's published a volume that costs nearly $60 (and is already slightly outdated) instead of a free, web-based data set that could be readily updated.

As I mentioned, the title of this book is also little misleading as it fails to include the fishes, a group of animals that are in desperate need of this kind of treatment. We know so little about our marine and freshwater fishes; perhaps there is too little known about the distribution, taxonomy and conservation status these species for inclusion in this edition, but if a start is not made, we can not improve on that. Alternatively, a series of companion volumes, or better yet, websites, would be a welcome addition (e.g. the *CSIRO List of Australian Fishes*, the *CSIRO List of Australian Invertebrates*, or the *CSIRO List of Australian Plants*).

As an aside, as I was browsing through the listings for some species, one record caught my eye. According to these authors, dingoes are considered to be an introduced species. Yet this species is being managed as a native species by a number of State agencies and there is a great deal of concern by conservation managers as to how to appropriately manage this species to prevent extinction due to hybridization with domestic and feral dogs. If dingoes are truly considered to be an introduced species (and I play devil's advocate here), then why not just eradicate them altogether? Curious.

On a final note, I think that this volume would be a fine addition on your bookshelf, but do not let it sit there for too long as it will become outdated rather quickly. As new data comes to light, new species and subspecies will be described and current taxonomic status' will change. Similarly, as the perils that face our wildlife continue (or more hopefully, as recovery plans are enacted and species or subspecies recover), many species' conservation status and distributions will change.

Karen Firestone

RECONSTRUCTION OF THE ENVIRONMENTAL HISTORY OF TASMANIA AND WHY IT RAINS (OR NOT) OVER WARRAGAMBA, by Prof. Henk Heijnis

The talk by Prof. Heijnis has two parts: the work he did in Tasmania and the work he is doing now on climatic change and how it relates to the management of Warragamba Dam.

The aim of the Tasmanian studies was to untangle which parts of the environmental history are natural and which are influenced by Man. Most of western Tasmania looks pristine, but is it? The environment of Queenstown has been greatly modified by mining and smelting, and Dora Lake, on the plateau near Queenstown has evidence of the mining even though it looks pristine. Similarly, a perched lake on an island in the Gordon River also has evidence of mining.

The first settlement in the southwest was a convict colony on Sarah Island, but it was abandoned after 12 years. By 1834, the hunt for minerals was on. In the 1880-1890's, mining intensified and there was smelting at Queenstown. The last smelter closed in 1948. Fallout from the smelter did immense damage to the vegetation around Queenstown and to today, it has not recovered.

The mud in lakes is a 'natural archive' that can hold records of everything that falls into the lake, including the dust and pollution from mines and smelters. Looking at the natural trace elements, arsenic, zinc, copper, and lead content are measured and used to identify mining activities. Lead is used to date the sediments. Gold is also detected in the sediments. Uranium decays to thorium and radium, and the latter decays to radon, a gas. Radon has a half life of 2.3 days and decays to lead which is then deposited from the atmosphere and some of it ends up in the lake muds. The lead then starts to decompose to other isotopes, and it is the ratio of these isotopes that can be used to indicate the age. All these measurements are done at ANTSO, Lucas Heights. In a core of lake mud, the last 200 years is found in the top 10 cm and it is sampled at 2.5 mm intervals.

The lake muds also contain pollen that records the history of the vegetation. When mining started, the rainforest trees started to decline. Some big fires are also recorded in the muds. There was a big drop in the rainforest when smelting started. In the late 1800's, when the open cut mine started, there was a big rise in metals. When smelting stopped, rainforest trees started to increase. The pollution is still going on today, even though mining has ceased: it comes from the mine waste dumps. So there was massive pollution over a very wide area, but with dilution and a decrease with distance from the mine. Pollution from the mine can be found around Cradle Mountain. Mine waste was washed downstream into Macquarie Harbour, and it is toxic. Not much can be done about it, but it probably does not matter as long as storms do not stir up the sediments.

Prof. Heijnis has recently started as Science Program Manager, Climatic Variability and Extreme Events with the Sydney Catchment Authority. He outlined some of the problems associated with Warragamba Dam.

In 1998, there was a big scare about Cryptosporidium in the water supply. Why? Where does the pollution come from? Warragamba Catchment is huge, 70% of the area of Holland (as Prof. Heijnis likes to tell his friends when he visits his home: they have trouble getting their heads around that!). There are many small towns and villages on the borders of the catchment, and most of them had septic tanks which often leak, the runoff ending up in the dom. These towns are now getting sewerage systems.

The big problem today is the lack of rain over the catchment. Why? It rains more on the coast than inland, and Sydney gets an annual average rainfall about twice of that which falls over the Warragamba Catchment, 1500 mm compared with 750 mm (respectively). The climate is what we expect and is based on long term averages. Weather is what we get and the day to day weather is very variable. Some places have a relatively uniform climate and it varies little from year to year.

The tropics and southeastern Australia have extremely variable climate. We may experience a run of wetter than average years, or a run of drier than average years. The El Nino-La Nina cycles originate in the Pacific Ocean. In the El Nino phase, the warm water is evenly distributed over the Pacific but in the La Nina phase, the western part of the pacific is warmer than usual and this brings higher than average rainfall to the northern part of Australia. This cycle lasts about 40 years, and as only two cycles have been studied, it is not known how reliable it is. The Indian Ocean has a similar cycle which lasts about 40 days and northern Australia is subjected to both systems which become weaker to the south.

We have had lower than average rainfall since the bad bushfires at Christmas in 2001, but Warragamba has had an average rainfall during the last year, so technically, it is not in drought. The dam levels, however, have not increased. After the dam was built in the early 1960's, there was a run of years with above average rainfall and the dam quickly filled, so it was hailed as a great success. The last period of above average rainfall was in 1998 when the metropolitan area, Wollongong and Wingicarabee had some very high falls. We have not had any high rainfall events since then, only average rainfall which is not enough to fill the dam.

It is Prof. Heinjis's job to manage this variability. There are sophisticated models that are supposed to make this possible, but climatic variability is particularly difficult to manage. It is hoped that they will be able to predict for the next twelve months whether we will get enough rain to fill the dam. Queensland already does this with its long range weather forecasting. These predictions will help decide whether water restrictions are necessary or not. The way it looks now, Warragamba is not going to fill up in the coming year.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 19 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/Prof. DAVID ELDRIDGE

Principal Research Scientist, Department of Natural Resources and
School of Biological, Earth and Environmental Sciences, University of NSW,

CREATION OF HABITAT BY DESERT MAMMALS: BILBIES, BADGERS AND ECHIDNAS

The widespread loss of native mammals from arid and semi-arid landscapes has had profound effects on ecosystem structure and function and its ability to recover from stress. Research from arid lands worldwide has confirmed the close links between the survival of mammals introduced back into their native habitat, and the recovery of degraded landscapes and consequently, locally threatened native plants and animals. In higher rainfall areas, the loss of native mammals is thought to be associated with substantial reductions in healthy woodlands and grasslands.

A vast array of native fauna create soil disturbances in deserts. Disturbances such as pits, scrapings and burrows maintain vital ecosystem processes such as water infiltration, litter decomposition, nutrient cycling and plant germination. Often termed 'ecosystem engineers', these animals alter the flow of resources (soil, litter, water) in ecosystems without actually consuming them, and in doing so, create habitat for themselves, and plants and other animals.

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Wednesday 20 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Speaker DR. SUE HAND

School of Biological, Earth and Environmental Sciences, UNSW

UNRAVELLING THE LAST GREAT GONDWANAN MYSTERY: THE FIRST LAND VERTEBRATE FAUNA FROM THE TERTIARY OF NEW ZEALAND

Trevor Worthy (Univ Adelaide), Alan Tennyson (Te Papa, NZ), Michael Archer (UNSW) and Sue Hand (UNSW)

This seminar reports on New Zealand's first and only Tertiary land vertebrate fauna. The St Bathans Fauna (Worthy et al.) is preserved in 16-19 Ma Manuherikia Group sediments outcropping near the town of St Bathans, Central Otago, South Island. The work, begun in a pilot project (2001-5), is providing the first fossil data on the origin and longevity of many unique & internationally significant vertebrate lineages including leiopelmatid frogs, tuatara (sphenodontids), kiwi, moa, burrowing bats and, perhaps most unexpectedly, a new group of primitive non-flying mammals. The research is shedding first light on the original biodiversity of land vertebrates in prehuman New Zealand, including the origins, evolutionary and biogeographical relationships of fish, frogs, reptiles, birds and mammals in both eastern Gondwana and the Australasian Region. The St Bathans Fauna also includes the first fossil records for a number of iconic Australian natives, such as the currawong, indicating that trans-Tasman dispersal of fauna has been more common than previously thought.

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Wednesday18 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. COUTRTNEY SMITHERS

Australian Museum

CHANGES IN SUBURBAN INSECT FAUNA

Dr. Smithers has been keeping notes of casual observations of birds, insects and sundry other animals, on and off, for many years. These notes reveal some interesting changes with time. During the period from 1960 to the early 1970s there were some years when migrations of the Caper White butterfly were very strong. It is a pity that few records prior to 1960 are to be found scattered in diaries, newspapers and journals hence records cover widely separated times and deal mainly with the exceptionally strong movements. There appears to have been a decline in migratory activity during the 1970s since which time the movements have been consistently less spectacular in Sydney. Some other migratory species of butterflies (and other insects) show similar declines.

Several butterfly species, "northern temporary invaders", are known to extend their known usual distribution from time to time and appear in Sydney. Some of these will breed for one or two generations if suitable larval host plants are available. Some of them seem to be changing from being "temporary invaders" to being permanent, breeding, residents.

On the other hand, there is currently a lot of concern because it is obvious that some well known and well-loved species have become less common or have disappeared altogether from suburbs in which they have always been regarded as "residents".

In the 1960s almost any suburban light was likely to attract large numbers of insects. It is many years since we have had such equivalent displays of insect activity. I suspect that the extended use of much more powerful street lamps has been a factor in drastically altering the populations of insects in many suburbs. Many resident diurnal species have also been drastically reduced.

The reasons for reductions in migrations, or extensions and reductions of range are probably complex. Some are probably due to slight climatic change, some to habitat alteration, some to loss or recent availability of hosts or food sources and some to the use of powerful street lights as suburban development is extended. Before we can consider what caused the declines or arrivals we must first have clear details of when they occurred. We should also remember, of course, that there has always been change and always will be, with some species disappearing from an area and others arriving. These lines of investigation should be followed up.

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Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 121 **OCTOBER 2006**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new Members:
Ms Jennifer K. Fitzgerald, University of Western Sydney.
Dr. Scott Mooney, School of Biological, Earth and Environmental Sciences, University of New South Wales.

DECEASED MEMBERS

We are regret to report the recent deaths of two long term Members, Miss Aitkin and Dr. Ian Common. Dr. Common was an entomologist working with the Australian National Insect Collection.

SMOWY MOUNTAINS-SAWPIT WILDLIFE TOUR with the Wildlife Preservation Society: Leader Dr. Mike Augee

There are still some places left. The tour departs from Sydney, Thursday 26 October and returns on Monday 30 October. The itinerary was presented in the last newsletter.
For further information and bookings, contact the Wildlife Society on 9456-4042 or wildlifepreservation@optusnet.com.au

CELEBRATION OF THE TERCENTENARY OF THE BIRTH OF LINNAEUS

The Linnean Society of New South Wales, in conjunction with the Royal Botanic Gardens and the University of Sydney, announce a conference to celebrate the Tercentenary of the Birth of Carl Linnaeus, to be held on June 25 - 27, 2007, Royal Botanic Gardens Sydney, Australia.
It will feature Historical perspectives in systematics, Current systematic research and Post-graduate student presentations

Enter the dates in your diary now! Tell your colleagues! For registration and presentation of papers or posters contact: Dr Elizabeth May lizmay @bio.usyd.edu.au
Forthcoming newsletters will have more information

SEED IMPORT NEWS

Dr. David Murray sent this article to LinnSoc News with the hope that it may help others in a similar situation - *Ed.*

I have returned from my recent visit to U.K. gardens, and have legally brought in some seed packets. Not only that, but I persuaded five officials at Heathrow Airport not to subject them to X-rays on my departure, so I have avoided unwanted deleterious mutants, and reduced viability.

'What can you bring in', I was asked by a friend before I left. This is a good question. So I did some homework. Having consulted the AQIS website (www.aqis.gov.au/icon), I at least knew that peas or beans would be refused entry if they came from New Zealand or the U.S.A. So the U.K. should have been an approved country of origin.

I didn't look at the web site any further, but occasionally bought packets of seeds from places I visited, such as the Chelsea Physic Garden, the Henry Doubleday Research Association (Coventry), the Royal Horticultural Society Headquarters at Wisley, and Iden Croft Herb Garden at Staplehurst, near Sissinghurst Castle in Kent. I did not choose plants that were likely to be noxious weeds.

Having filled in my form correctly, I was directed to an officer at Mascot Airport who had a computer and data base at his disposal. The poppies were cleared immediately, as was *Iris siberica*. There were two hold ups. First, one of my pea packets did not have the scientific name of the plant printed on the packet, despite a picture of bountiful pods. This packet was allowed, because after all, it had been printed by an authentic seed company, W. Robinson and Sons. Then my Welsh Onions (*Allium fistulosum*) were not included on the list of approved species. But more to the point, they were not mentioned in the list of disallowed species, so by default, they were admitted. So I came away very pleased with the results. Everything I had presented had been allowed entry.

David Murray.

WHO ARE YOU CALLING PRIMATIVE? AUSTRALIAN NATIVE BEES, a talk by Dr. Michael Batley

When it comes to conservation, everyone thinks of the cute and furries, and maybe butterflies, because they are beautiful, but not other insects. Native bees and should be considered for conservation, and dr. Batley thinks they are beautiful also.

Bees have been around almost as long as flowering plants. Recently, their classification has been questioned. It was thought that the European honey bee was the most highly evolved and other types were more primitive. Recent work with DNA has turned this idea on its head and the European honey bee is now thought to be the primitive one. The earliest fossil bees were social and the family Apidae, which includes the European honey bee, is the oldest family. All four families were in existence 65 million years ago and radiated about the same time, at the time the flowering plants were radiating.

Dr. Batley showed the most exquisite videos of the native bees going about their daily business, and they certainly confirm his claim that they are beautiful. The videos were a tribute to his skill and infinite patience. There are many species of native bees and most of them are solitary: less than 1% are social. Some are tiny, only a few milimetres long.

Native species in the family Apidea include *Trigona*, the stingless bee. a highly social bee that builds nests in trunks of trees. A queen lays all the eggs and chemical signals suppress reproduction of other females. In *Exoneura*, the female is larger than the male and is dominant. They nest in dead, dry, pithy stems. *Oenegilla* is solitary and ground nesting. Each female builds her own nest, but they are grouped together as part of a large aggregation with one common entrance. *Xylocarpus*, Carpenter bees carve out burrows in dead stems of *Banksia* and *Leptospermum* and build single-row chambers for their brood. A ball of pollen is provided for each egg and the first adult to hatch is usually the bottom one, which then chews its way out through the partitions, leaving all the other pupae in a heap in the bottom. There are cuckoo bees too: *Thyreus* is black with white spots and lays its eggs in the nests of *Oenegilla.*

In the family Megachilidae, *Megachile*, the leaf-cutter bee has very hairy legs and abdomen, an adaptation for carrying pollen. It has solitary nests and lines the chambers with pieces of leaf. Other bees may leave their nests unlined or line them with plant resins.

The family Halictidae have short tongues but long hinges to the tongues. There is everything from solitary to highly social in this family. The males may cluster together on grass stems for the night. some species have both winged and wingless males. Most are generalists, but there are some specialists on peas or *Goodenia*. Some are excellent buzz pollinators. The buzzing may be the consequence of nesting underground: it may help to free them if they get trapped by sand grains. Ground nesting species provision the cells with pollen balls, but above ground nesters fill the cell with liquid secretions and lay an egg in it. The short tongue is better for waterproofing the cell.

Not all native bees are good pollinators. *Banksia* is adapted to animal pollination but the *Banksia* bee is a pollen thief and actually squeezes the pollen out of the anthers. The males are larger than the females and are very territorial, actively defending his patch of *Banksia*. *Lambertia* is adapted for bird pollination, but bees will chew holes in the flowers to get at the pollen. *Grevillea buxifolia* is not pollinated by bees, they walk under the pollen presenters. These strategies do not assist pollination.

Many of the bees are generalists, feeding on a whatever native plants are flowering. Some are specialists, for example, the bee that pollinates *Verticordia*, which has very oily pollen that only one bee can handle. But *Verticordia* is only out for a short time, so what do the bees do when their special plant is not flowering? They leave their eggs in the ground during the off period. Specialisations like this increase the chances of extinction, should anything happen to the bees' special plant.

Bees are thought to have evolved from wasps which provision their young with caterpillars. How could this be? The digger wasp provisions its nest with pollen, like the bees. The wasps became hairier with adaptations for collection pollen and there is cooperation with the flowers to effect pollination. Bees feed their young progressively, like wasps. Honey bees and the Carpenter bees are thought to be the oldest. The males of bees are all unfertilised eggs. Some males mate only once, but most mate many times. In some species, the males congregate and spend the night on grass stems.

The videos were captivating and revealed behaviour that would not have been known otherwise. It seems the bees each had their own little personality.

CREATION OF HABITAT BY DESERT MAMMALS, a talk by Prof. David Eldridge

Prof. Eldridge studies the interactions of animals in the ecosystem. Animals may be described as 'ecosystem engineers' that influence and modify the landscape and soils which affect the surrounding vegetation to favour themselves. The classic animal engineer is the beaver. The engineers increase diversity.

When the landscape is more hostile, engineering is more important. In arid landscapes, water and nutrients are limiting, but their distribution is patchy, for example, there are higher concentrations of nutrient under logs on the ground. Almost all of the nutrients are found in the top few centimeters of the soil. Animal burrows also concentrate water and nutrients.

We have lost most of our native burrowing animals, the bilbies and burrowing bettongs, and most extinctions have occurred in arid regions. Bilbies still survive in some pockets and they have been reintroduced in some places. Predators, especially cats and foxes have been blamed for their extinction, and pastoralism and grazing have caused much disruption to their environment. We still have burrowing animals, rabbits and goannas.

Bilbies flourish in cat-proof enclosures. We would expect these enclosures to exclude rabbits, but they get inside: it is thought that baby rabbits can squeeze through the mesh. In the absence of predators, the bilby population increases rapidly; they breed like rabbits and soon there are too many of them. The stick-nest rat and bettong populations recover well also.

The animals dig pits while foraging for grubs, seeds etc. If grains of rice or apple cores are buried, they soon dig them up, and they will dig down up to one meter to get a teaspoon of rice. There are lots of diggings in the dunes and ecotones of the chenopod shrublands, but few in the gibber flats and claypans. The diggings increase the infiltration of water. The leaf litter ends up in the pits and breaks down to release the nutrients. The more the litter, the more the nutrients. Outside of the pit, the litter blows away in the wind.

In an experiment, litter from pits and from the surface was put in trays and watered. Lots of plants came up in the litter from pits but very few came up from the litter outside of the pits. Pits also trap seeds. The soil also has a crust which makes water penetration harder, hence any disturbance of the crust increases the water absorbed.

Who does most of the digging? Paddocks contained single species or combination of species. It was found that goannas did better with bilbies than with rabbits. Billbies did most of the digging, then followed by goannas with rabbits doing the least of all digging. Rabbits preferred to take over someone else's diggings than dig there own. So native engineers do a better job than the introduced engineers.

Prof. Eldridge has worked in America also. In arid America, the native sagebrush has largely been destroyed by grazing and has been converted into annual grasslands. Ground squirrels live there and hibernate for many months. Badgers dig out the squirrels and leave a large mound and the total of mounds may be quite considerable. The badgers dig down about half a meter and bring up soil that is very low in nutrient and hard to wet. So the surface of the mound remains bare, but water runs off and native seeds germinate in a ring around the mound.

Echidnas do lots of digging also. In semi-arid woodland of *Eucalypus intertexta* (gum coolibah) and *Alectryon oleifolium* (western rosewood), pits are found under the canopy and out in the open. Most of the litter is found in the pits, especially the pits out in the open, The bigger the pit, the better it is at trapping litter. It is cooler and moister under the litter in the pits, even though it had not rained for months. Infiltration rates were higher, especially under the canopy. The pits were hotspots for microbial activity and micro-arthropods. The pits concentrate water and nutrients and this influences other taxa. It is very important in the arid zone and contributes to patchiness.

It is always said that bilbies and other mammals were not used to predators before the cat and fox were introduced, but this is not so. Native predators included the dingo, the woma python and eagle. There is a big difference between the grazed land and the enclosures, and when looking along the fence between the two, it is obvious . The grazed land had few shrubs, compared with a diverse, shrubby vegetation inside the enclosures. It is not known what influence the changes caused by grazing would have on the bilby population and whether this would have contributed to their decline, as well as predation. It should be investigated.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

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Dr. COUTRTNEY SMITHERS

Australian Museum

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Several butterfly species, "northern temporary invaders", are known to extend their known usual distribution from time to time and appear in Sydney. Some of these will breed for one or two generations if suitable larval host plants are available. Some of them seem to be changing from being "temporary invaders" to being permanent, breeding, residents.

On the other hand, there is currently a lot of concern because it is obvious that some well known and well-loved species have become less common or have disappeared altogether from suburbs in which they have always been regarded as "residents".

In the 1960s almost any suburban light was likely to attract large numbers of insects. It is many years since we have had such equivalent displays of insect activity. I suspect that the extended use of much more powerful street lamps has been a factor in drastically altering the populations of insects in many suburbs. Many resident diurnal species have also been drastically reduced.

The reasons for reductions in migrations, or extensions and reductions of range are probably complex. Some are probably due to slight climatic change, some to habitat alteration, some to loss or recent availability of hosts or food sources and some to the use of powerful street lights as suburban development is extended. Before we can consider what caused the declines or arrivals we must first have clear details of when they occurred. We should also remember, of course, that there has always been change and always will be, with some species disappearing from an area and others arriving. These lines of investigation should be followed up.

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Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 122 **DECEMBER 2006**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members,
Dr. John Pickett
Daniel J.D. Natusch , School of BEES, University of New South Waled.

SUBSCRIPTIONS FOR 2007

A notice of your subscription for 2007 is included with this newsletter. Remember, if you pay before March 31, a discount applies.

FIRST NOTICE OF 2007 ANNUAL GENERAL MEETING

The Annual General Meeting will be held on the 21st of March, 2007, and the first notice is attached at the back of this newsletter (white page).

PAPERS ACCEPTED FOR PUBLICATION

Holmes, W.B.K. and Anderson, H.M. The Middle Triassic megafossil flora of the Basin Creelk Formation, Nymboida Coal Measures, N.S.W. Australia, Part 6. Ginkgophyta
Kellermann, J. and Udovicic, F. A revision of the *Cryptandra propinqua* complex (Rhamnaceae: Pomaderreae) in Australia.
Robbie, A. and Martin, H.A. The history of the vegetation from the last glacial maximum at Mountain Lagoon, Blue Mountains, N.S.W.
Rose, S. and Martin, H.A. The vegetation history of the Holocene at Dry Lake, Thirlmere, New South Wales.
Todarello, P. and Chalmers, A. The Characteristics of five species of hollow-bearing trees on the New South Wales central coast.
Williams, M.C. and Wardle, G.M. The spatial patterns of invading *Pinus radiata*.
Zhen, Y.Y. Revision of *Microplasma parallelum* Ehteridge 1899 (Cnidaria: Rugosa) from the Mid Devonian Moore Creek Limestone of New South Wales.
Book Reviews:
Adam, P. Linnaeus' Philosophia Botanica translated by Stephen Freer. Oxford University Press.
Augee, M. Lampreys – Life without jaws. M.W. Hardisty. Forrest.

CONFERENCE – TERCENTENNARY OF THE BIRTH OF LINNAEUS – A FESTIVAL OF SYSTEMATICS AND HISTORY

Date, 25-27 June, 2007. Venue, Maiden Theatre, Royal Botanic Gardens

2007 will mark the three hundredth year of Linnaeus' birth. It is planned to celebrate this with a conference to feature historical perspectives and current systematic research. A number of well known speakers have been approached and there will be exhibitions at the Macleay Museum and the Red Box Gallery, Botanic Gardens.

To keep in touch with plans, visit our web site http://www.acay.com.au/~linnsoc/welcome.html

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

The date for submission of applications has been brought forward to 15th March , 2007

Please mail applications to:

The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance

to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund (currently $1,000, subject to Council review). Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **15 March, 2007. Submit to The Secretary, Linnean Society of NSW, PO Box 291Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,000.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 15th March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **15 March 2007. Submit to The Secretary, Linnean Society of NSW, PO Box 291, Manly, NSW 1655**

THE FIRST LAND VERTEBRATE FAUNA FROM THE TERTIARY OF NEW ZEALAND: a talk by Dr Sue Hand.

New Zealand split from Antarctica some 80 million years ago (Ma), before Australia split off. About 61 Ma, New Zealand and the Lord Howe Rise were largely under water and it is not certain how much had emerged. By 43 Ma, Drake Passage was beginning to open up, but Australia was still attached to Antarctica. It was not until 25 Ma that Australia started to separate from Antarctica. Thus New Zealand has been isolated from Australia and Antarctica for a very long time and very little was known about the land vertebrates until about 100,000 (100 ka) years ago. Moas are known to be 2.5 Ma old, and any dinosaurs seem to have been washed in. Mammals were only known from about 18 ka. It has always been assumed that when New Zealand separated from Antarctica, it took a Gondwanan fauna with it, but nothing could have survived the long period of inundation after separation.

St. Bathans is situated in Central Otago and was an old gold mining town, but now has a population of seven plus one ghost that cater for tourists.
When duck bones were found in some sandy clay sediments, Trevor Worthing, a colleague of Dr. Hand, decided on further investigations. The St. Bathans district once had large lakes. The lake sediments yield fish bones and channels and old deltas leading into the lakes concentrate bones of the land animals. The bones come from the Miocene Manuherikia Group (some 19-16 Ma old) and were deposited at a time when the climate was becoming drier. The land owner does not mind his land being dug up: in fact his wife gave him a digger for a present. Washing is easy: the bones are put into a sieve which is put into the stream and the clay is washed away. The bones are quite robust. These assemblages are the first evidence of land faunas from the Tertiary of New Zealand.

They have found lots of fish bones and land snails, some lizards, geckoes, tuatara and skinks, and one frog bone. There was an archaic form of crocodile, the same type as found in Australia and New Caledonia, which suggests that the climate was warmer than the present. There are 25 species of birds, including a swiftlet, of which there are none in New Zealand today: swiftlets are usually found in warmer climates: a diving petrel, the oldest record, 6 species of waterfowl, a gull, a terrestrial rail, an eagle (not as big as a wedgetail), pigeon, owlet nightjar and three species of parrots that do not fit any parrots in New Zealand or Australia today. There are three passerines and one is most like a currawong.

The modern fauna of New Zealand has three native species of mammals and they are all bats. These bats are very unusual and can walk. They forage on the forest floor in the leaf litter and eat almost anything. Bones of these bats are found in St. Bathens, and also in South Australia (26 Ma), Queensland, (25-5 Ma), Northern Territory (12 Ma) and South America (52 Ma). The skeletons suggest that these ancient bats could walk too The New Zealand fossils are most like the South American ones, but New Zealand separated from South America 80 Ma ago. It is thus hard to escape the inference that the bats must have reached New Zealand by dispersal over water.

There is also a primitive mammal about the size of a mouse, similar to some of the mammals around in the Mesozoic. Dr. Hand and her colleagues are still working on that one and the whole assemblage.

At this time in the Miocene, the vegetation included *Eucalyptus* and *Casuarina*, both typically Australian genera and not native to New Zealand today. they indicate a relatively drier climate in the Miocene.

There are suggestions that the whole of New Zealand was drowned from the time it separated from Antarctica, 82 Ma, to 23 Ma. If this is so, the whole of the fauna and the flora would have to have arrived by long distance dispersal, over the sea. The Tertiary fauna and flora of New Zealand certainly have may connections to Australia and South America, whether the whole of New Zealand was drowned or not.

CHANGES IN SUBURBAN INSECT FAUNA: a talk by Dr. Courtney Smithers.

When Dr. Smithers came to Australia, he had to learn a third insect fauna, having already worked with the British and South African faunas. He monitored the insects around his home in Turramurra as a means to get to know the fauna. Recently, he has delved into his notes to see if there were any patterns of change with time. The data was collated weekly as it was thought that this gave the best picture for suburban gardens. Butterflies are the easiest to monitor for they are conspicuous and readily noticed. They can be categorised as migrants, residents or temporary invaders.

Migrants breed inland and when they migrate in the springtime, are easily blown off course by a shift in the winds. The Caper White butterfly, *Belenois java*, migrates north and numbers depend on the winds. There were enormous migrations of the caper whites in the late 60's and early 70's, but then they petered out and for some years now, there have not been any. The Painted Lady butterfly, *Vanessa kershawii* migrates about the same time, but in the opposite direction: it goes south. It shows much the same pattern as the caper whites, but as well, there are local populations of painted ladies that don't move. The last big migration of the Small Yellow Grass butterfly, *Eurema smilax*, was in1988. Dragonflies migrate as well and the last big migration was in1979.

From these big migrations in the 60's and 70's to none or very little today, have migration patterns changed or are they going extinct? Which is 'normal': the 60's and 70's or today? There are so very few records, or even diary entries that could shed some light on this topic.

The Wanderer, *Dannus plexipus* is a resident and when it is not flying around, it clusters together. There are enormous clusters at Camden. The Dingy Swallow Tail is also a resident. Other insect residents, including Citrus Aphid, Milkweed Aphid Tussock Moth, Chafer Beetle and other beetles, Thymnid Wasps, Lace Wings and Ant lions were common in the 60's and 70's and are not common now. A bad drought in '82-'85 certainly affected the populations.

Temporary invaders almost always come from the north and specimens appear in Sydney from time to time. They may be settlers or non-settlers. These include the Large Banded Owl, *Hasora khoda*, the Common Crow, *Euploea core corrina*, which is usually found on Oleanders and the Pale Green Triangle, *Gnaphium eurpylus*, They may stay for a season or two, or for several generations.

Non-settlers include *Catopsilia pyranthe*, a Common Migrant which does not stay because there are no host plants for it in Sydney: its host is the custard apple. If the host plant is ever grown in Sydney, then it has the potential to become a settler.

Of the northern invaders, there are a few records of the Large Banded Owl in Brisbane and northern NSW in the early 1900's By 1914, it had extended further south to Pt. Macquarie. By 1972-73, it was breeding in Sydney. By the early 90's, it had petered out, but by 1997-98, more specimens started appearing earlier, and the most southerly record is Kiama. It breeds twice a year up north, and here in Sydney, it breeds on Wisteria, which has always been around. Most butterflies have a number of host plants, just not the ones mentioned here.

In the late 60's and 70's, floodlights on ovals would have a halos of insects around them, but this is not seen today. Was it the use of insecticides that caused the decline? There is always change, we loose some species, we gain others. It does seem as if species are moving south. Is this global warming? This trend is not only seen in butterflies but in other insects as well. There is so little data and we do not know what was happening further north or before the 1960's. The few records discussed here are not systematic or widespread enough to constitute a scientific study, but these observations hint at what might be happening.

Editors' Note: This problem of declining butterfly populations is not confined to Sydney. The Miami blue was once plentiful on the Florida Peninsula but is now endangered. There is a very successful captive breeding program and they are released back into the wild, where they must endure hurricanes, as well as the usual hazards.
Reference:: Daniels, J.C. and Sanchez, S.J. (2006). The Blues' Revival. Natural History 10/06, 26-28, 75.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2007 Annual General Meeting

The 132th Annual General Meeting of the Society will be held at 18:00h on 14 March 2007 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 17:30h.

Six members of council are due to retire at this AGM:

Alan Andrews
Mike Augee
Robert King
Helene Martin
Elizabeth May
Stefan Rose

and all offer themselves for re-election.

Council recommends the election of Dr David Murray as President of the Society for 2007.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2007.

Further nominations are invited for vacancies on council (6), the office of president, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2007.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 123 **APRIL 2007**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER

Form for donation to Scientific Research Funds
Report of Society's affairs for 2006
Registration form for Conference, Tercentenary of Linnaeus' birth

NEW MEMBERS

We welcome our new members
Prof. Ian A. McDougall "Linneaus Estate", Lennox Head.
Dr. Bree Wilson, School of Agriculture and Veterinary Science, Sturt University

Mr David Och, New South Wales Geological Survey

NO FAX FACILITIES

The Society does not now have fax facilities.

LINNEAN MACLEAY FELLOW

Dr. Tony Wright has been re-appointed Linnean Macleay Fellow for 2007.
In 2006, Dr. Wright focused his studies on Silurian graptolites in the Spring Quarry Creek west of Orange and discovered a new site in the Palings Yards Creek. Collections from the field work are being described. He also carried out field work near Mudgee and Parkes in areas which were expected to yield graptolites, but he was not successful in these localities. Dr. Wright was also working on Devonian brachiopods and corals.
This work will be continued in 2007.

NEED A TAX BREAK? Donations to the Scientific Research Funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

OBITUARY: ILMA BREWER (1915 – 2006)

Ilma Brewer, or Ilma Pidgeon, as she was then, was fascinated with the native bushland and was honoured as the state's most outstanding student in botany in her final year at North Sydney Girls High School. She began her botanical degree at Sydney University in 1932 at a time when few women studied science. She had completed her master's degree by 1936 and was awarded the Linnean Macleay Fellowship for 1937-1941. In 1942, her thesis Ecological Studies in New South Wales earned her a doctor of science degree, rare among women.

Pidgeon was renown for her studies in plant ecology at a time when ecology was just becoming acceptable as an academic study. She was encouraged by Professor Eric Ashby, later Lord Ashby. Her papers on the sandstone vegetation are still consulted today and may be used as documents of what the vegetation was like prior to disturbance, such as sand mining or overgrazing.

During the war, Pidgeon worked with Army Intelligence where her mapping skills were recognised, and married Dick Brewer, a US Army lieutenant in 1943. In 1945, she moved to Connecticut and although still involved in research, focused on being a wife and mother. She returned to Australia and took up a position as lecturer in charge of first year students at Sydney University in 1956. Brewer initiated innovative teaching methods, first television lectures, which were not successful, then the teaching laboratory based on self-paced instruction and reflexive small group learning.

After retiring in 1978, Brewer wrote books about teaching methods. In 1991, she returned to ecological work, and with Rob Whelan, compared her survey of coastal vegetation 60 years ago with the changes wrought by sand mining.

Brewer is survived by her husband Dick, two sons, two grandchildren and a sister.

CONFERENCE – TERCENTENNARY OF THE BIRTH OF LINNAEUS – A FESTIVAL OF SYSTEMATICS AND HISTORY

Date, 25-27 June, 2007. Venue, Maiden Theatre, Royal Botanic Gardens

2007 will mark the three hundredth year of Linnaeus' birth. It is planned to celebrate this with a conference to feature historical perspectives and current systematic research. A number of well known speakers have been approached and there will be exhibitions at the Macleay Museum and the Red Box Gallery, Botanic Gardens. Prof. Paul Adam has agreed to give the talk on Linnaeus' life and the Swedish Embassy is sending a speaker. For details, visit our web site http://www.acay.com.au/~linnsoc/welcome.html and a registration form is included with this newsletter
For further information re: registration, contact Elizabeth May, email lizmay@bio.usyd.edu.au.
Abstracts of papers and posters should be submitted by 31 May, 2007, to Karen Wilson, email karen.wilson@rbgsyd.nsw.gov.au.

GLACIAL TIMES – A VERY DIFFERENT WORLD

We live in warm, wet times (disregarding droughts) of an interglacial period, but only 20,000 years ago, the climate was cold and dry when the world was in the glacial period. This is a very short time ago on the geological time-scale. If we lived then, what would it have been like? Aborigines were in Australia then, and would have experienced the glacial climate.

The glacial/interglacial cycle lasts about 100,000 years. Of this time, only about 10% would have been as warm and wet like the interglacial of today, and 10% like the maximum glacial conditions of 20 - 17,000 years ago. The other 80% of the time, it would have been somewhere in between.

About 30,000 years ago, in the period leading up to the glacial maximum, it was cool and wet. Temperatures were some 2-4 °C cooler than today, and it was wetter. Lake levels were high and lakes which are dry today, like the Willandra Lakes, were full of water. The sea level was some 45 m lower than today. About 25,000 years ago, it became colder and drier. Temperatures were some 3-5 °C colder and the lowered rainfall was felt first in inland areas. The sea level fell rapidly to some 70-120 m below present levels, thus exposing the continental shelf margins. The Australian land mass was increased by 30% and there was a dry land connection between Australia and New Guinea, and Australia and Tasmania (Allen and Lindesay, 1998).

Although it is called the glacial period, there was very little glaciation in Australia and it was restricted to Tasmania and the Snowy Mountains. It was colder, but more important for Australia, it was drier. It was also windier, and sand dunes in inland Australia were mobile. At the height of glacial times, 20-17,000 years ago, temperatures were some 7-8 °C below the present and summer would have been like our present winter. It was also drier, with up to 50% less rainfall than today and practically all of the lakes were dry or very low.

The vegetation of the glacial maximum was less wooded. Pollen studies show that many forest environments of today were either grasslands/herbfields or shrublands. The treeline was depressed and it is thought to have been about 500 m in the Blue Mountains. On the Barrington Tops, the beech forests of today were grasslands and shrublands during the glacial period. Around Sydney, the vegetation would have been mainly sclerophyllous heathlands on the sandstone soils.

With the sea level some 100 m or more lower than the present and the coastline on the continental shelf, Sydney was probably some 15 km inland. Sydney Harbour would have been a dry river valley, the land was well drained and there were few freshwater lakes or swamps. If the Sydney Aborigines wanted a sea-food dinner, they had a long hike to get it. The then coastal strip would have been a plain with a long sandy beach, The familiar headlands and cliffs were far inland (Attenbrow, 2003). Aboriginal habitation during the glacial period was rather sparse.

When the climate improved after 17,000 years ago, the trees started to return to the landscape. The question may be asked, where were the trees during the glacial period? In theory, they were restricted to small, favourable habitats, such as gorges and protected gullies, but evidence of these habitats is hard to find. A palynological study of Mountain Lagoon shows that it was probably one such habitat during the glacial period. There has been a change in the *Eucalyptus* flora from the glacial period to the present, but some species have been there the whole time (Robbie and Martin, 2007). On the Barrington Tops, the beech forest started returning about 10,000 years ago, but we do not know where they were during the glacial period. It is thought that small stands survived in protected gorges. The Thirlmere Lakes were probably another refuge during the glacial period.

Some places were particularly harsh in glacial times. Sand dunes on the Newnes Plateau in the Blue Mountains are now stabilised by the vegetation, but they were active during the last glacial maximum. It must have been exceedingly dry to destroy the plant cover enough to allow the dunes to become mobile (Hesse et al, 2003). There were probably prolonged droughts in the glacial period, just as there are today.

The exposed continental shelf would have been vegetated but we know very little about it. Fig. 1 shows what is believed to have been the vegetation during the glacial period. The desert with active dunes expanded considerably. It is conjectured that woodlands and forests grew mainly on the now continental shelf. Tasmania, Australia and New Guinea were one land mass.

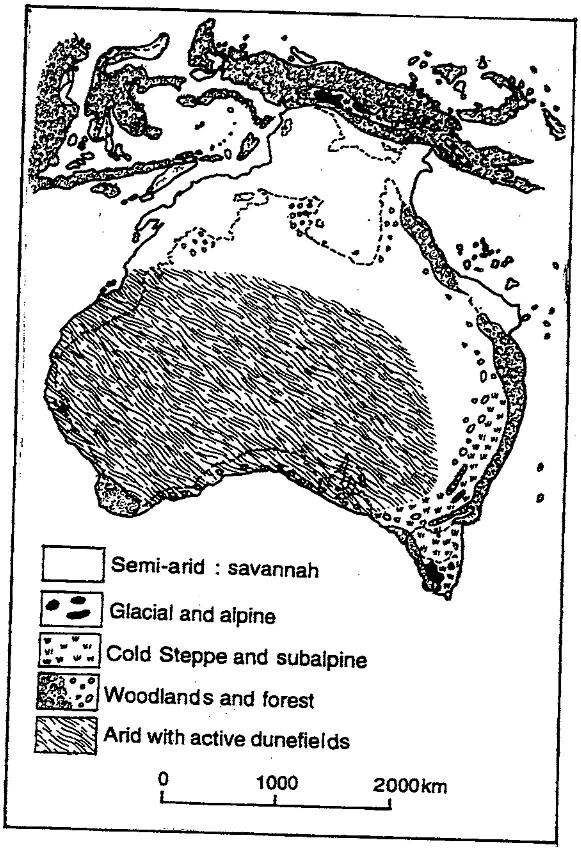

Fig. 1. Probable vegetation over Australia during the height of the glacial period, 17,000 years ago. After Hope (in Allen and Lindesay, 1998).

References

Allen, R. and Lindesay, J. (1998). Past climates of Australasia. In 'Climates of Southern Continents, Present, Past, Future' (eds J.E. Hobbs, J.A. Lindesay and H.A. Bridgman) pp 208-247. (John Wiley and sons, Brisbane).

Attenbrow, V. (2003). Sydney's Aboriginal Past. (University of NSW Press, Sydney)

Hesse, P.P., Humphreys, G.S., Selkirk, P.M. et al. (2003). Late Quaternary aeolian dunes on the presently humid Blue Mountains, Eastern Australia. Quaternary International **108**, 13-32.

Robbie, A. and Martin, H.A. (2007). The history from the Last Glacial 0Maximum at Mountain Lagoon, Blue Mountains, New South Wales. Proceedings of the Linnean Society of New South Wales **128**, 57-80.

Helene A. Martin

PROGRAMME

Wednesday 18 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. EMMA JOHNSTON

School of Biological, Earth and Environmental Sciences, University of NSW,

ECOLOGY AND ECOTOXICOLOGY IN THE DEEP FREEZE

Dr Johnston manages a research program in the nearshore coastal waters of Wilke's Land, East Antarctica. Her research group are working to identify both natural and anthropogenic drivers of the ecology of Antarctic marine communities. She will talk about the importance of ice-cover duration and the impact of contaminants from Antarctic bases.

****

Wednesday 23 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Mr. JOHN ROSS

Senior Project manager – Groundwater Program, Metropolitan Water Plan, Sydney Catchment Authority

GROUNDWATER IN SANDSTONE AQUIFERS IN THE SYDNEY BASIN FOR DROUGHT WATER SUPPLY – RECHARGE/DISCHARGE AND ECOSYSTEM IMPLICATIONS

Groundwater investigations into the deep sedimentary rocks of the Sydney Basin have been under way since late 2004 to explore options for drought water supply. One area that has proved successful is the Hawkesbury Sandstone strata in the Upper Nepean catchment located between the Illawarra Escarpment, Robertson and Bowral-Mittagong in the Southern Highlands.

A large part of scientific effort that has been completed in 2006 and 2007 relates to identifying recharge and discharge areas, and dating the groundwater in storage. Research includes hydrogeogeochemistry and isotope studies. This data has been most useful in identifying flow systems and whether natural ecosystems have any regional groundwater linkages.

The talk will focus on the Upper Nepean (Kangaloon) aquifer and the breadth of studies completed on recharge, discharge and surface water-groundwater linkages.

****

Wednesday 18 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. JUDIIITH FIELD

Australian Key Centre for Microscopy and Microanalysis (and the School of Philosophical and Historical Inquiry) Electron Microscope Unit
The University of Sydney

A VIEW ON CURRENT DEBATES CONCERNING MEGAFAUNAL EXTINCTIONS.

Climate change and modern faunal extinctions are receiving increased attention from the media, politicians and the general public. The faunal extinctions of the Late Pleistocene have also been the focus of considerable debate in the last few years with cause and effect attributed to humans and/or climate -paralleling the modern day debates. Of considerable concern in these academic, and in turn public, debates on the megafauna is the apparent polarization of opinion, with those arguing for a human mediated process now saying it is not if but when and how humans effected the extinction process. This talk will review these arguments and review what we actually know about timing and cause. Why is it so important to attribute blame to our indigenous population when the database supporting any particular cause is so sparse?

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Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 124 **JULY 2007**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER

AWARD TO PAUL ADAM

We congratulate Prof. Paul Adam on his award of Member (AM, Honorary) of the Order of Australia in the General Division for service to Biodiversity Conservation and Education.

ERROR IN DATE FOR TALK BY DR. JUDITH FIELD IN LAST NEWSLETTER

The date advertised for Dr. Field's talk in the last newsletter was incorrect. The talk will be held on Wednesday 18 July: see Programme. The cause of megafaunal extinctions is controversial. There will be a symposium on megafaunal extinctions in September and Dr. Field will be one of the speakers.

LINNEAN MACLEAY MEMORIAL LECTURE

We will be honoured with a lecture from Prof. Chris Dickman of the University of Sydney. Prof. Dickman has studied the desert ecology long term and the recent rains in central Australia have produced amazing changes. See Programme for details.

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

TYNAN, Sarah. Department of Earth and Marine Sciences at the ANU.
PROJECT: The interpretation of the environmental information recorded in the geochemistry of bivalve shells.
The environmental trace element and stable isotope geochemistry of various species of Australian freshwater and estuarine bivalves provide data on how water chemistry and environmental factors such as temperature and salinity are reflected in shell composition. The research has applications in the analysis of data from archaeological midden sites and the recent fossil record, with palaeoenvironmental implications for assessing climate change in Australia and elsewhere as far back as the Pleistocene. Awarded $940.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

BAKER, Andrew C., Department of Environmental Sciences, University of Technology, Sydney.
PROJECT: The impact of *Pinus radiata* on the surrounding native vegetation.
The spread of Radiata Pine has the potential to drastically impact on community structure and function. Preliminary investigations have shown some alarming correlations between increasing pine litter and decreasing native species richness and at the same time increasing exotic species richness. This study will further examine the impacts that radiata pines are having on adjacent remnant vegetation. Awarded $800.

BARRY, Katherine L. Department of Biological Sciences Macquarie University
PROJECT: Mate attraction and recognition in praying mantis,
Previous laboratory studies showed that hungry females were more likely to cannibalise the males than mate. A series of experiments will test the responses of males to females raised under variable juvenile and adult feeding regimes. Awarded $600.

BROOKES, Rowan H. School of Biological Science, Monash University.
PROJECT: Does flowering time influence sex allocation in plants?
Animals have a 50/50 sex allocation but it is perceived that plants have a strong bias towards the female because of abundant seed production. To test the many factors involved, *Stylidium armeria* which has temporally separated male and female phases will be studied. *S. armeria* also grows at different altitudes and has the potential to flower at different times. Awarded $600.

COCKBURN, Alistair R. Department of Earth and Marine Sciences, Australian National University.
PROJECT: Relationships of the green reed frog (*Litoria fallax*) to drought affected acid sulphate soils (ASS).
Runoff from ASS may cause mass fish and oyster kills, but the effect on freshwater biota is largely unknown. Frogs are considered indicators of ecosystem health and environmental contaminants, but the vulnerability of the green reed frog to degraded environments is largely unknown. Awarded $800.

COONEY, Stuart J.N. Department of Botany and Zoology, Australian National University.
PROJECT: Ecological associations and breeding ecology of the hooded parrot.
The hooded parrot (*Psephotus dissimilis*) nests in cavities in termite mounds on Cape York Peninsula. A moth lays its eggs in the nest and the larvae eat the excreta in the

nest, keeping it clean. This project will investigate the symbiotic relationship between parrot and moth and other aspects of the parrot's ecology. Awarded $900.

FELLENBERG, Stephen J., University of Western Sydney.
PROJECT: Studies to optimise the breeding of the Lord Howe Island phasmid in captivity.
The Lord Howe Island phasmid (*Dryococelus australis*) is critically endangered and Mr. Fellenberg has one of the two breeding colonies in captivity. It is hoped that sufficient individuals can be bred to release them back into the wild and conserve genetic biodiversity. Awarded $400.

NATUSCH, Daniel J.D. Biological Sciences, University of New South Wales.
PROJECT: Distribution of the green python (*Morelia viridis)* in Australia.
The green python is mainly found in the semi-deciduous mesophyll vine forests of Cape York Peninsula. This project aims to map the distribution and define the habitat of the python; Awarded $400.

PARES, Amber M. University of Wollongong.
PROJECT: The influence of soil fertility on the relationships between fire regimes and vegetation in the Sydney region.
This project aims to develop a better understanding of the relationship between soils, plants and fire in the biodiverse but fire-prone Sydney region and Blue Mountains. Awarded $600.

PRAHBU, Catherine. Macquarie University.
PROJECT: Memory and memory retrieval in honeybees.
Honeybees use their memory of odours to remember food sources and return to them at times when food is abundant. Odours are used to stimulate visual working memories. A series of experiments will test the bees' odour recalling abilities and foraging memories. Awarded $600.

STELLA, Jessica. School of Marine and Tropical Biology, James Cook University.
PROJECT: Effects of climate change on the habitat and invertebrate communities of coral reefs.
This study will document changes to communities following coral bleaching episodes and test whether motile invertebrates rapidly vacate bleached hosts and seek out alternative habitats, or remain and ultimately die. Awarded $700.

UMBERS, Kate. Department of Biological sciences, Macquarie University,
PROJECT: Mating on mountains: is there a plastic response in mating strategies along altitudinal gradients?
Plasticity will be assessed across several animal groups: skinks, cockroaches and grasshoppers. Their mating systems will be investigated with variations in such factors as natural paternity, mating behaviour and female choice in relation to geographical and environmental dynamics. Genes relating to temperature tolerance will be targeted. This study will assess the animal's ability to adapt to the effects of climate change. Awarded $700.

WILSON, Bree A.L. School of Agricultural and Veterinary Sciences, Charles Sturt University.
PROJECT: Mycorrhizal fungal communities in saline soil of southern NSW.
Increasing salinity in soils has prompted efforts to find and breed more salt tolerant plants, but little thought has been given to the beneficial below ground organisms such as mycorrhizal fungi. Molecular biology techniques used for community-scale DNA fingerprinting will be used for detection, identification and diversity studies of the mycorrhizal fungi in salt affected dryland soils to find any that can tolerate those conditions. Salt tolerant mychorriza spores could be used as a commercial innoculum to improve plant growth in salt affected soils. Awarded $804.

ECOLOGY AND ECOTOXOLOGY IN THE DEEP FREEZE, a talk by Dr. Emma Johnston

Australia claims 42% of Antarctica but this is not recognised by courts or the United States, so the Australian government supports research, with the hope that it bolsters its claim. Dr. Johnston was able to get grants for research projects of her group, and research under such difficult conditions are very expensive.

We think of Antarctica as a pure and pristine environment, but it is not. Before we became environmentally aware, rubbish was dumped on the edge of the ice shelf and when the ice melted in summer, it sunk to the sea floor. The rubbish contained all the usual domestic rubbish and metal objects, including oil drums and lead-acid batteries. Consequently, areas around the bases may be quite contaminated with toxic substances. This practice was stopped at Casey Base in 1986 and Australia does not do this now, the rubbish is brought back to Australia and disposed of properly.

Working in Antarctic waters is difficult. Diving requires complex infrastructure: boats, a chamber for the bends, a doctor. Dry suits must be used in Antarctic waters: the skin is insulated with air pumped into the suit. The diver must be careful how he/she moves: if he puts his feet up, all the air rushes to his feet which are then very light and the diver has great trouble getting himself right way up. For much of the time, they are working in ice slush. Storms brew up quickly and the diver must be able to get back very quickly. Leopard seals are another hazard for divers. Visibility in the water is usually good, except during the diatom blooms which occur in January-February.

Antarctic marine communities are unique: they are consistently cold and temperatures vary only a few degrees around 0°C. Nutrients are fairly consistent, but light varies dramatically, from the almost continuous darkness of winter to the almost continuous light of summer. The ice cover is also very important: in a single year, it may vary by less than a metre, but over a number of years, it may vary from one to 40 m. Anchor ice is attached to the land and ice breaks off each year, hence there are no intertidal communities.

The invertebrate fauna contains lots of filter feeders, sponges and sea squirts, micrograzers, urchins, polychaets and sea cucumbers. Bryozoans are colonial invertebrates and there are many species. Brown algae are found around the islands but not in the bays. Red algae are found at depths greater than six metres. Kelp grows on the exposed sites. Blooms of microscopic algae take off when there is sufficient light.

For the studies, two areas have been chosen: one which is ice covered for most of the year, with only 1-2 months free of ice, and another, a rocky area that is free of ice most of the year. Ice remains a long time in the enclosed bays but in open sited, there may be sunlight for up to six months of the year. Three main environments may be identified: rocky coastlines, enclosed bays and the intermediate habitat.

The ice cover is an important ecological factor: less ice, more sunlight and more algae. Sheltered sites retain ice longer and there is more sedimentation, especially in the lower and deeper sites. Dissolved metals come out of the sediments and metal contamination impacts on recruitment and growth of organisms. Storms re-suspend sediment which them settles over everything and is eaten by the invertebrates. Terrestrial ice breaks off and moves sediment further out from the land.

Dr. Johston and her team are carrying out experiments to asses just what effect the heavy metal contamination has on the biota. It has been thought that the low temperatures in Antarctica would mean solubility of toxic substances would be less in Antarctica. Artificial sediments spiked with copper, lead and zinc contamination is put in sites in Antarctica and coastal New South Wales to test this idea. Contamination is tested on the sediment fauna of amphipods, polychaets, ostracods and gastropods. The metal contaminants do have an effect and resuspension of sediments contributes to the toxicity. Location and substrate have an influence: hard substrates do not have a lot fauna besides bryozoans and sponges. The effect on fauna living on tops of boulders is different to that on the sides.

There are many factors to be taken into account and many questions to be answered. It is thought that polar organisms should be more sensitive to pollution because they have had less exposure, and/or because of the low temperatures, they should be less sensitive. If zinc is present with copper pollution, then copper toxicity is less. There are enough projects here to keep Dr. Johnston and her team busy for a long time.

GROUNDWATER IN THE SYDNEY BASIN FOR DROUGHT WATER SUPPY – RECHARGE/DISCHARGE AND ECOSYSTEM IMPLICATIONS – a talk by John Ross

Before 2000, we knew more about the groundwater in Great Artesian Basin in central Australia than in the Sydney Basin. The Metropolitan Water Plan has been around for four years, but it has now been revamped and repackaged, and groundwater has been elevated in the plan. This plan is for the long term and includes every possible source.

Infra structure was started in 2004 for deep access to Warragamba and Nepean Dams and is just about finished. Pumping from the Shoalhaven River is expensive but it has been the saviour of Sydney Water in the last couple of years. Groundwater is being assessed and they are looking to private partnership for recycling water.

Groundwater is very important and there is lots of it, but we can only get out a small amount. In the Sydney Basin, the Hawkesbury Sandstone is permeable and has most of the water. The Wianamatta Shale is marine and the water is salty. There are pockets of sands and gravels, such as the Botany Sands aquifer, but they are relatively small. Sydney Water is looking for big aquifers. The Kalangadoon and Upper Nepean aquifers have 450 gigalitres and if we can get out 10% of it, we will be doing well. Although the sandstone is permeable, water can only be extracted out of the fractures.

The potential of the study area of Broken Bay to Lithgow to south of Wollongong was unknown in 2003. Initial assessment showed the Upper Kalangadoon and Warragamba/Wallacia regions to promising. Testing is most advanced on the Upper Nepean where drilling started six months ago. Relatively pristine areas have been targeted.

Knowledge of the recharge of the aquifer is important. At Kalangadoon, recharge occurs along the Mittagong Ranges where the sandstone is exposed. The Mittagong Basalt is stratigraphically above the sandstone and has its own aquifers and springs, but the basalts are sealed off by the Wianamatta shale. The water in the sandstone is on its way to the dams on the Nepean river, and it is important to know if we would be borrowing from the future by extracting water at Kalangadoon. The water quality is very good, and Coca Cola would bottle it if it was allowed.

The connection of groundwater with the river systems must be tested. Water is pumped from the bores into the river system to take it to the dam. This way, an expensive pipeline is avoided. This would not work if the groundwater pumped into the river simply leaked back into the sandstone. This does not seem to happen much, although when the streams are inspected, there is some cracking, which acts as a point source hence there is not much leaking. Water from the Shoalhaven is pumped into the streams and there is some leakage into the groundwater.

Groundwater use must be checked with the agricultural section. Stock and domestic bores are low yielding and are allowed. High yielding bores are not allowed: Coca Cola will not be allowed to bottle it.

Water chemistry is important. Water in the Wianamatta Shale is contaminated with, sodium chloride and that from the basalt, with sodium bicarbonate. The closer the site of extraction is to the recharge, the fewer the contaminants. Isotope studies show all the water comes from rainfall.

The nuclear bomb testing in the 1950's produced tritium and if the water contains tritium, it shows it is post 1950's, and most of the water is quite young. Other isotopes show some bores have old water, but the maximum age is 11,000 years, which is pretty young, as groundwater goes.

Ecosystem issues must be addressed, We do not want to drain the upland swamps by pumping the water out of the sandstone. Most swamps have an impervious peat lining and are not connected to the aquifer below, hence this does not happen. Some swamps, however, are only 2-3 m above the sandstone may not be disconnected.

Is the vegetation on the Hawkesbury Sandstone affected by the groundwater? We do not know. There is a half a metre or so of soil above solid rock. It is thought that there is enough rainfall to keep the vegetation going and the trees do not get their roots into the groundwater, except in small alluvial areas where there are large eucalypts and the alluvium keeps damp.

Fauna in limestone deep underground is well known, and some fauna has been found in two of the bores, if they are not contaminants. They are blind shrimps, less than a millimetre long. They are found in the top part of the sandstone.

Test drilling is under way. It is thought that recovery after pumping will take three times as long, and it is planned to pump for 6 months then allow recovery for 18 months, especially if there is little rain. The groundwater extracted from this study area could supply 3-5% of Sydney's water, and if it was extended to other areas, it would be more. Groundwater can only be an emergency top-up for drought periods

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 18 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. JUDITH FIELD

Australian Key Centre for Microscopy and Microanalysis (and the School of Philosophical and Historical Inquiry) Electron Microscope Unit
The University of Sydney

A VIEW ON CURRENT DEBATES CONCERNING MEGAFAUNAL EXTINCTIONS.

Climate change and modern faunal extinctions are receiving increased attention from the media, politicians and the general public. The faunal extinctions of the Late Pleistocene have also been the focus of considerable debate in the last few years with cause and effect attributed to humans and/or climate -paralleling the modern day debates. Of considerable concern in these academic, and in turn public, debates on the megafauna is the apparent polarization of opinion, with those arguing for a human mediated process now saying it is not if but when and how humans effected the extinction process. This talk will review these arguments and review what we actually know about timing and cause. Why is it so important to attribute blame to our indigenous population when the database supporting any particular cause is so sparse?

****

Wednesday September 19, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. JOHN TRIANTAFILIS

School of Biological, Environmental and Earth Sciences, University of New South Wales

SALINITY ASSESSMENT AND MANAGEMENT IN IRRIGATED COTTON GROWING AREAS OF AUSTRALIA

Soil salinisation results from the mobilisation of soluble salts. The source of soluble salts is called primary salinisation and the remobilisation of these soluble salts as a result of agricultural and urban development is called secondary salinisation. Case studies of secondary salinisation and research being carried out in the cotton growing areas to improve natural resource management is also described. The development of a web based geographic information system (GIS) to assist cotton growers improve natural resource management will also be showcased. For further information about the web GIS visit: http://www.terraGIS.bees.unsw.edu.au.

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LINNEAN MACLEAY MEMORIAL LECTURE

Wednesday October 24, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. CHRIS DICKMAN

School of Biological Sciences, University of Sydney

Prof. Dickman studies the long term ecology of the desert biota in an area of the Simpson Desert. The recent rains have produced remarkable effects, great pulses of flowering activity, the movement of long-haired rats into the area and much more. Prof. Dickman will present us with an up-to-the-minute account of effects of drenching rains on populations of the desert biota.

****

Wine and cheese will be served from 5.30 pm

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 125 **SEPTEMBER 2007**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new memebers:
Mr. Damian Cole of Macquarie University
Dr. Brian Douglas of Humpty Doo, NT.

LINNEAN MACLEAY MEMORIAL LECTURE

We will be honoured with a lecture from Prof. Chris Dickman of the University of Sydney. Prof. Dickman has studied the desert ecology long term and the recent rains in central Australia have produced amazing changes. See Programme for details.

2008 MACLEAY MIKLOUHO-MACLAY FELLOWSHIP MACLEAY MUSEUM, SYDNEY UNIVERSITY MUSEUMS

Applications are invited from candidates for the 2008 Macleay Miklouho-Maclay Fellowship. The Fellowship was established in 1988 with funds raised by the Macleay Museum and the Miklouho-Maclay Society to enable a Research Fellow to work at the Macleay Museum in the fields of interest of Sir William Macleay (1820-1891) and Nikolai Miklouho-Maclay (1846-1888). There is no specific application form. Candidates should submit their research proposal together with a curriculum vitae.

Funding is available up to AU$12,000. The successful candidate will be based in the Macleay Museum full time for a minimum of three months or part-time equivalent. Candidates are encouraged to finish their projects within twelve months of the start date.

Information about the Macleay Museum and its collections can be found at www.usyd.edu.au/su/macleay/welcome.htm.

Enquiries and applications should be directed to Ms Catherine Timbrell, Administrative Assistant Sydney University Museums, University of Sydney NSW Australia 2006
E-mail: macleaymuseum@usyd.edu.au Phone: (+61 2) 9351 2274
Deadline for applications: **Friday 2 November 2007**

A VIEW ON CURRENT DEBATES CONCERNING MEGAFAUNAL EXTINCTIONS; a talk by Dr. Judith Field.

Animals much larger than the ones we see today once roamed Australia and are now extinct. They included the Diprotodon which stood four m high and weighed 3 tonne and the marsupial lion, about the size of a lion today. There were large crocodiles, giant kangaroos and wombats, Genyoris, a giant emu and more. Fossils are found all over Australia but particularly in the Lake Eyre Basin, eastern and southeastern Australia. Many of the sites are not dated. Why did they become extinct and why the debate?

The last glacial cycle, 120,000 to 10,000 years (120 to 10 k yr), was the most severe with increasing aridity. The present interglacial is thought to be the driest of all. Extinctions started sometime in the last 200 k yr but humans have been in Australia only for the last 60 k yr at most, and probably only for the last 45 k yr. The height of the last glacial period, about 20 k yr ago, was the coldest and driest period of the cycle and then, the arid core of Australia, now about one third of the continent, expanded to cover 70% of the landmass.

Very large animals were found on other continents during the glacial period and they have become extinct also. The 'Blitzkrieg' theory from the northern hemisphere claims that when humans arrived on the scene, they hunted the naive animals to extinction. This theory has been modified to claim that it was not direct hunting but the use of fire by humans that led to the gradual extinction. The media have sensationalised reports of megafauna, even to the extent that they blame the Aborigines for causing extinctions and this is unfortunate because this sensational argument may be used against the Aborigines and their land claims.

Genyoris the giant emu became extinct about 50 k yr ago in central Australia. From the egg shells, no environmental change could be detected, so humans were blamed. The same argument is applied fossils in a cave in Naracoorte S.A. where the terminal dates are about 45 k yr. Recent discoveries of well preserved skeletons in a cave on the Nullabor Plain are dated about some time between 200 and 400 k yr ago and because they were adapted to arid conditions, it is assumed climate change did not cause their demise, implying that the Aborigines did it! (presumably when they got here, many thousands of years later).

Roberts and Flannery et al. (2001) reviewed some 28 sites with megafauna to asses the date of extinctions. They rejected as unreliable the vast majority of sites with radiocarbon dates done before1995. Only articulated skeletons were considered and this ruled out all archaeological sites. From their selected sites, they came up with a date of 46 k yr for the extinction of the megafauna, about the date most quoted for the arrival of Aborigines in Australia.

Dr. Field is very critical of these studies. Of the sites finally selected by Roberts and Flannery, only two have been published and this means that if anyone wants to find out more about the unpublished sites, it is not possible. The assemblage of animals in the Nullabor cave accumulated over hundreds of years and she thinks the conclusions are extraordinary and mostly imaginary. These former studies overlook two important points: 1) They are based on the view that the last two glacial cycles are unremarkable and just like the ones that went before. This is not so: all records show increasing aridity. And 2), There are about 200 Pleistocene megafauna species that have become extinct but only 21 of these species were still here when the Aborigines arrived and thus extinctions have been an ongoing and almost continuous process.

Dr. Field and colleagues work at Cuddie Springs in western NSW where bones of Diprotodon and Genyoris as young as 22 k yr have been found. Cuddie Springs is now a claypan but it was a lake before the height of the last glacial period when the lake dried out. Continual strong winds blew away all the finer sediments, leaving only the stones which formed a pavement about 25 k yr, capping sediments rich in bone, stone artifacts and pollen.

At Cuddie Springs, about 36 k yr, there is another stone pavement with much older sediments below it. There are many bones of Diprotodon and Genyoris and the rare earth fingerprint shows that the bones here come from a mixed source, but in the upper layers, the bones are all from one source. At 30 k yr, there are stone artifacts and bones, showing the that Aborigines and some megafauna coexisted for a long time after the megafauna was supposed to have gone extinct. At 30 k yr and 27 k yr, the Aborigines were grinding seeds. It came as no surprise to learn that others who study the megafauna are critical of the Cuddie Springs work.

A significant number of megafaunal species became extinct during the penultimate glacial maximum, about 130 k yr and another pulse occurred about 85 k yr. There was probably a mosaic of extinctions over Australia as the suitable habitat was shrinking with increasing aridity, long before Man arrived in Australia. The harsh climate of the height of the last glacial period probably pushed the few remaining species over the edge (Wroe and Field, 2006).

In late September, there will be a symposium in Melbourne about the extinction of the megafauna. Dr. field will be speaking and it should be a lively discussion.

References

Roberts, R.G., Flannery, T.F. et al. (2001). New ages for the last Australian megafauna: continent-wide extinction about 46,000 years ago. Nature 292, 1888-1892.

Wroe, S. and Field, J. (2006). A review of the evidence for a human rolle in the extinction of Australian megafauna and an alternative interpretation. Quaternary Science Reviews 25, 2692-2703.

Editor's Note. Our current drought may give some insight into how some of the megafauna died. Matt Cupper, working on a site at Menindee (Australasian Science March 2007, pp16-17) reports that the rangers in the national park have observed starving kangaroos come to the watering hole too weak to move on. They lie down and die, or get trapped in the mud.

LINNEAN TERCENTENARY SYMPOSIUM, a celebration of the birth of Carl Linnaeus 300 years ago.

The Symposium was held on 7 August at the Royal Botanic Gardens. It started with a guided walk in the Gardens where plants important to Linnaeus could be seen. Although he did not travel abroad, his many students or 'apostles' as they were known went to exotic places and sent specimens back to him.

Karen Wilson gave the first talk, 'Carl Linnaeus: an 18th century scientist but a lasting legacy'. Linnaeus (1707-1778) lived his whole life before the First fleet arrived in Botany Bay. He trained as a physician and was Professor of Medicine and Botany, but this did not limit his interests: he was also interested in zoology, mineralogy, agricultural practices, causes of human diseases and human diet. He experimented whether cattle ate native plants.

In those days, Latin was the language of Science. He communicated with colleagues in Latin and the Professor would write the thesis and the student would defend it – in Latin. He was adept at building on the work of others and could be very persuasive.

His main achievement was the standardisation of the binomial name of living things. Others had used it before him, together with a variety of sometimes cumbersome naming systems, but his tireless work ensured it was accepted as the standard.

Linnaeus also developed a hierarchical system of classification: species fitted into genera, genera into families. The benefit was anyone could use the system and the information. He is reputed to have said, 'God created order, I arranged it'. This hierarchical system is very useful for today's computers.

He also devised a sexual system of classification with 24 classes of plants, based on the arrangement of the stamens and ovaries. He recognised that it was an artificial system but used it as a starting point. Today, we use many different characters and seek natural affinities. His sexual system got him into trouble with people of the prudish mores of the day.

He was a good teacher and attracted able students. He not only published names of plants but of animals also. He was the first to recognise that whales and bats were mammals.

A paper by Paul Adam, 'Linnaeus: King of Natural History', was presented by Elizabeth May since Paul was unable to attend. For many years, taxonomy has been dismissed as 'stamp collecting', but with the current emphasis on biodiversity, it is now appreciated. Linnaeus' sexual system was derided as 'nine men in the same bride's chamber with one woman' (nine stamens, one pistil). At that time, botany was the preserve of the herbalist who recyled much old knowledge, hence Linnaeus brought botany up to date.

Natural history was stimulated by the travels of exploration and voyages of discovery. Linnaeus was the first to cultivate banana in Europe He did not travel out of Europe but he was renown for his travels in Lapland. He took his students with him and his advice to students making field notes, what, where and when, showed he had a good understanding of species and communities. He advocated growing collections in gardens to determine if variation was inherited or just an expression of the environment.

Natural history involves lots of collecting and older collections are important to determine what changes have taken place. Skilled amateurs had an important role to play, especially in the UK. Now, it is left to academics and their students. TV programs give the impression that we know it all, but we don't. Linnaeus had laid the foundation for taxonomy, biogeography, biodiversity and other modern studies.

James Valentine and colleagues presented a paper on the palaeontological perspectives on taxonomic techniques. Preservation is a rare event and it has been estimated that less than 10% of organisms become fossils.

There has been dissatisfaction with the Linnean system of classification and attempts to improve on it, such as the use of DNA and cladistics. These systems cannot be used for fossils. There may be so little difference between the DNA of related species, for example, less than 5% difference between chimpanzees and humans. It requires highly exceptional circumstances for DNA to be preserved. Insects preserved in amber often have their insides eaten out by bacteria. There have been preliminary reports of DNA in dinosaur bones, but it was only contamination. Cladistics, the 'branching tree' uses selected characters and would only work on the hard parts of organisms because that is all that has been preserved.

DNA is regarded as 'molecular clocks'. It is assumed that mutation occur at a uniform rate hence the more the mutations, the less related they are. Where there are dates for an organism from both fossils and DNA, they are different. Fossils provide a minimum age for the organism and are the only direct evidence of the history of organisms.

Ahmed Etman from Egypt presented a paper on the olive leaf hopper, a pest of olive orchards and two predators of the olive whitefly. Rosanne Quinnell of the University of Sydney explained the eBot project that will deliver a collaborative, sustainable repository for digital botanical objects of the Australian flora. A reception and viewing of the exhibition in the Red Box Gallery rounded off the program

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

LINNEAN MACLEAY MEMORIAL LECTURE

Wednesday October 24, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. CHRIS DICKMAN

School of Biological Sciences, University of Sydney

Prof. Dickman studies the long term ecology of the desert biota in an area of the Simpson Desert. The recent rains have produced remarkable effects, great pulses of flowering activity, the movement of long-haired rats into the area and much more. Prof. Dickman will present us with an up-to-the-minute account of effects of drenching rains on populations of the desert biota.

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LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 126 DECEMBER 2007

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IN THIS ISSUE

NEW MEMBERS
We welcome our new member, Ms Hayley.Bates of Cremorne

RENEWAL OF MEMBERSHIP
A renewal of membership form is included if it applies to you. Subscriptions remain the same as last yeas.

ANIMALS AND PLANTS OF SAUDI ARABIA: talk by Michelle Cotton to Wildlife Preservation Society.
Michelle Cotton, one of our Councilors, will give this talk on Wednesday, 6 February 2008 at the Masonic Centre, 169 Castlereagh St. from 12 noon. Lunch will be available. Members of the Linnean Society are cordially invited to attend.

PAPERS ACCEPTED FOR PUBLICATION
Chalson, J.M. and Martin, H.A. A 38,000 year history of the vegetation of Penrith Lakes, New South Wales.
McAlpine, D.K. New extant species of ironic flies (Diptera: Ironomydiidae) with notes on ironomydiid morphology and relationships.
Timms, J.D. The Rockwell-Wombah Lakes, Paroo, Eastern Australia: a ten year window on five naturally salinised lakes.
There are many more papers in the final stages of preparation for the next volume which is due out about March
The Proceedings is available on CD.

DEATH OF DR. DORITHY SHAW.

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page http://www.acay.com.au/~linnsoc/welcome.html

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

Please note this change from previous years. For 2008, Members may apply for up to a maximum of $1,500 and non-members, up to $1,000; for both the Betty Mayne and the Joyce Vickery Research Funds.

The date for submission of applications is15th March, 2007 This date date applies to both the Betty Mayne and the Joyce Vickery Research Funds.

Please mail applications to:
The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $1,500 for Members and $1.000 for

non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **15 March, 2007. Submit applications toThe Secretary, Linnean Society of NSW, PO Box 291Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological and earth sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,500 for Members and $1.000 for non-members.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 15th March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **15 March 2007. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291, Manly, NSW 1655**

SALINITY ASSESSMENT AND MANAGEMENT IN IRRIGATED COTTON GROWING AREAS: a talk by Dr John Triantafilis.

Salts are widespread in the soil and not all kinds are bad. Sodium chloride, common salt is bad for soils for it disperses the clay, destroying the structure of the soil. Salt prevents plants from taking up water and causes physiological drought. Gypsum, calcium sulphate and limestone, calcium carbonate, are good because the calcium causes the clay to aggregate and improves the soil structure. Calcium salts are used when the soils are too acidic. Other less common salts may be toxic, for example, boron salts in California.

Salt, the bad one, is widespread in the soil. If the soil remains dry, crystalised salt does no harm. It is only when it dissolves in water that damage is done to the soils and plants. This happens when the native tree vegetation is cleared and crops or pastures are planted. The trees are deep rooted and readily extract moisture from deep down in the soil. The shallow rooted crops allow water to accumulate in the soil, the water table rises, dissolving and bringing the salt up to the root zone, and eventually to the surface, where it may form salt scalds.

Northwestern New South Wales has good soils and are used for irrigation and cotton growing. The surface soils have plenty of calcium, but the deeper layers are loaded with salt. This can even be seen in rabbit burrows. When it rains, water runs down the burrow to the salty soils which swell up and disperse when wetted and cause a lot of erosion. Further west, it is dryer and there is more salt in the soil.

Plants have different tolerances to salt: in order of lower to higher salt tolerance: legumes, rice, lucerne, cotton, wheat, barley. Saline soils are not a new phenomenon. Historically, the region between the Tigris and the Euphrates Rivers, in the Middle East, wheat was grown exclusively. By 3.500 BC, it was half and half, wheat and barley. By 3,000 BC, there was only 32% wheat, and by 1,700 BC, no wheat at all was grown. They had introduced irrigation and the salts had been mobilised.

The salt in the soil comes from several sources. Winds whip up sea spray and some sea water in aerosol form is carried in clouds. The salt particles are the nucleus for condensation of the moisture into rain. If only light rain falls, the salt is deposited in the soil. It take heavier rains to wash this salt out of the system. This cyclical salt from rain builds up in the soil and is widespread. Aeolian salt comes from dust whipped up off dried up lakes, and this happens especially in glacial periods when it is particularly dry and windy. The salinity problems around Dubbo are due to aeolian salt.

Today, in the delta of the Ganges River, salty clay is being deposited in the sediments. Given millions of years, these salty sediments may turn into salty rocks. This happened in the Sydney Basin 250 million years ago. Then the Sydney region was a huge delta, rather like the Ganges. Out western NSW, 50 million years ago, there was the inland sea in the Murray Basin, and salty sediments were deposited. Further north, around Bourke, the Cretaceous Eromanga Basin deposited salty sediments.

The study of the irrigated cotton fields round Moree showed that the farmers would put their water storage facility on the sandy soils because they were the less productive. The farmers were persuaded that this was not the best: water leaked into the sub-soil too readily whereas if the facility is on clay soil, leakage is much less, hence less mobilisation of salt.

In the Sydney Basin, the Ashfield shale of the Triassic Wianamatta Formation was deposited in a shallow delta. Most of the building in western Sydney in on the Brigelly Shale which sits on top of the Ashfield Shale. Urbanisation removes the deep rooted trees and replaces them with shallow rooted lawns which are watered. During droughts, when the soils remain dry, there is no problem. In times of good rainfall, the water penetrates the soil to depths, then moves downhill, taking the dissolved salts with it and which are discharged at the bottom of the hill. There is thus a potential time bomb in western Sydney. Salty water seeps into buildings and when they dry out, the salt crystalises and does a great deal of damage. This is already happening in some places e.g. around St. Marys.

Some remedial action could be taken by planting trees. It would not be necessary to plant trees everywhere: revegetation of the ridge tops would remove the water before it moved downhill. Dr. Triantafifs' advice for if we were thinking of buying a house in western Sydney, choose a house at the top of the hill, not one at the bottom!

LONG TERM STUDIES OF THE DESERT BIOTA: the Linnean Macklay Memorial lecture, by Prof. Chris Dickman.

Prof. Dickman and his team study an area in the northeast of the Simpson Desert that encompasses the Cravens Peak, Tobermory, Carlo and Ethabuka properties, a total of 6,000 square kilometres. There is considerable diversity in the small mammals and the study of the population dynamics should reveal what environmental factors control them.

The populations of small mammals, lizards and frogs are sampled regularly. The plants are the basic resources and are sampled also, both green parts and the seed bank. Here in the Simpson Desert, red sand dunes reach up to 10 m high. The swales between the dunes support spinifex grasslands with shrubs of Acaicia, Melaleuca and gidgee. The crests of the dunes have more bare ground and support shrubs such as Acacias and Grevilleas.

This is a hot desert with temperatures that may reach 50°C and an average rainfall of 200 mm. The reptiles are very diverse with up to 200 species. There are up to 125 species of birds, from brolgas to budgies. The spinifex pidgeon is common. Many of the birds may be seasonal. There are many small mammals of mouse-to-rat size. The sandy inland mouse and hopping mouse eat seeds and invertebrates. There are dunnarts, engowie, and the mulgara that will eat anything.

In the Simpson desert, summer rainfall is dominant and it may be very heavy, drowning the swales. The hopping mouse, a rodent, increases dramatically after heavy rainfall, but in the dry periods, they are not seen. The sandy inland mouse (a rodent) also increases after heavy rain, but a few are caught in the dry periods. These patterns of populations are expected amongst the rodents. Rainfall stimulates reproduction and they move large distances, up to four and a half to five kilometers.

Of the marsupials, the mulgara shows some peaks in populations in high rainfall and some in dry periods. For other marsupials, there are big captures in the dry periods, because they live in burrows in the swales and get flooded out when it rains. Marsupials may move long distances also: dunnarts, up to 7 km, but the longest distance recorded is 14 km, from droughted areas to where it has been raining.

Rain has some other important effects. Heavy rains, up to 600 mm, stimulate much plant growth. When the rain stops and the vegetation dries out, then it burns and the fires may cover huge areas. The vegetation readily comes back again, particularly the Acacias and Grevilleas. Many animals are not affected by the fire because they shelter underground in burrows.

Resources immediately after a fire are quite good, there are plenty of seeds and underground roots. Spiders and other invertebrates shelter underground also. But when the animals come out of their burrows after the fire, it is bare and open and are easily picked off by predators and all species populations crash.

The main predators are foxes and cats and they also shelter in burrows during fires, but when the small mammal populations crash, then predator populations crash also. If predators are removed, then the small mammals come back.

There are some combinations of species. In an experiment, there were three exclusion zones where the mulgaras were kept out and three open zones for controls. When the mulgaras are kept out, there are more rodents and hairy footed lesser dunnarts, and the dasyurid species crash. The mulgaras keep the rodents down and there are more resources for other species, and thus the mulgaras have a positive effect and increase species diversity.

The next stage of the study will determine the effects of grazing. Cravens Peak and Ethabuka are not grazed but Carlo and Tobermory are grazed. In considering the likely effects of climate change, it is thought that summer temperatures could be 3° hotter. The northern part of the Simpson Desert will probably get wetter and the southern part drier.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2008 Annual General Meeting

The 133rd Annual General Meeting of the Society will be held at 18.00h on 19 March 2008 in the Classroom in the Anderson Building, Royal Botanic Gardens, Mrs. Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17.30h.

Six members of the Council are due to retire at this AGM:

Michelle Cotton
Jean-Claude Herremans
David Keith
David Murray
Peter Myerscough
Ian Percival

and all offer themselves for re-election

Council recommendation for the President of the Society for 2008 will be announced later.

The Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2008.

Further nominations are invited for vacancies on the Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life ordinary Members) of the Society. The nominations must be signed by at lest two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2008.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 127 **APRIL 2008**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER

Report of the Affairs of the Society for 2007-2008
Form for donations to the Research Funds

NEW MEMBERS

We welcome our new members:
Miss Katherine Barry, School of Biological Sciences, Maquarie University
Mr. Des Beechey
Mr Matthew Bulbert, School of Biological Sciences, Maquarie University
Mr. Daniel Decanini, Monash University
Mr Neill J. Dorrington, University of Sydney
Ms. Jean M. Drayton, School of Botany and Zoology, Australian National University

Miss Lucy G. Leahey of Brisbane
Dr. Warwick Nicholas of Canberra
Ms Shannon Smith , School of Geosciences, Sciences, Maquarie University
Dr. Carolyn L. Stewardson of Canberra
Ms Kate Umbers, School of Biological Sciences, Maquarie University

BIODIVERSITY PROJECTS

Volunteers are needed to help with biodiversity surveys being organized by Kate Shearer at the National Parks Association of NSW. If you would like to help in any way, please contact Kate by phone at (02)9299 0000 or at P.O. Box A96, Sydney South 1235.

NEED A TAX BREAK? Donations to the Scientific Research Funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

OBITARY, ISOBEL BENNETT

We are saddened to learn of the death of Isobel Bennett, aged 98. She joined the Society in1951 and was a life member.

Bennett became a leading marine biologist without any formal education. She left school aged 16 and became a secretary. On a cruise, she met the marine biologist Professor William Dakin, who was impressed with her enthusiasm and offered her some work in the Mitchell Library, plotting whale sightings in old ships' logs. She was then offered a position in the Zoology Department, University of Sydney, helping him with many tasks. When he died in 1950, she finished the book he was writing, *Australian Seashores*. She has since published many books, working on them in her own time, late into the night. Her book *The Great Barrier Reef* was published in 1971 and is probably the best known.

Bennett made many overseas cruises in the continuation of her research and was included in international expeditions. She was one of the first women to go to Macquarie Island and made several trips then wrote the book *Shores of Maquarie Island.* All the books she wrote went into multiple editions and were updated. Her experience in the field all along the coast and in the laboratory made her an effective demonstrator and she taught many who later became leading scientists.

In 1962, the University of Sydney awarded Bennett an honorary Master of Science. She has received other prestigious awards, including the Muller Medal from the Australian and New Zealand Association for the Advancement of Science and the Whitley Award from the Royal Zoological Society. In 1995, the University of New South Wales awarded her an honorary Doctor of Science. In 1984, she was made an Officer of the Order of Australia for services to marine biology. She is survived by her sister Phyllis Bennett.

BOOK REVIEW

Native Mice and Rats

Bill Breed and Fred Ford (2007)
CSIRO Publishing, Melbourne
RRP $39.95
ISBN 9780643091665 (paperback)

The dominance of marsupials in Australia often leads to other native mammals being overlooked. This is unfortunate. Not only are there two species of monotremes, but some 76 species of bats and 66 species of rodents occur naturally throughout the continent. The native rodents, comprising nearly a quarter of Australia's terrestrial mammals, form the subject of this timely, informative and very readable book.

Native Mice and Rats provides an overview of the living and recently extinct native rodents that occur in Australia and its offshore islands, with the subject matter divided into ten chapters that cover diversity, distribution, origins and evolution, reproduction, diet and gastrointestinal tract, and then different aspects of ecology, behaviour and conservation. Written by two of Australia's most active and respected rodent biologists, Bill Breed and Fred Ford, the coverage of these topics is up-to-date and authoritative and there is a sense that many observations come from the first hand experience of the two authors. Just one section on parasites and disease was out-sourced to another specialist, and this chapter – by Andrew Breed – has the same readable but authoritative style of the rest of the book. In preferring an overview approach rather than a species by species account, and in giving little attention to the small number of introduced rodents, this book differs markedly from the only other specialist book on the topic – *The Rodents of Australia* (1981) by Chris Watts and Heather Aslin. The choice is a good one, as the reader gains a feel for what makes native rodents special and how this group fits into the Australian environment.

For all the information that is presented, the authors are engagingly honest about stating the gaps in our knowledge of the biology of native rodents, where more research is needed, and where disagreements exist. Indeed, in the Preface they note that they ".. had a bit of a tussle agreeing on a mutually acceptable classification scheme." Looking at the scheme the authors settled upon, I could imagine a gnashing of teeth that would have done their subjects proud: the Pilliga mouse *Pseudomys pilligaensis* is considered to be just an unusual population of the more broadly distributed delicate mouse *P. delicatulus*; the Kimberley mouse *Pseudomys laborifex* is relegated to synonymy with the central pebble-mound mouse *P. johnsoni*; the long-eared mouse *Pseudomys auritus* and blue-grey mouse *Pseudomys glaucus* are rescued from obscurity; several as-yet unnamed species are recognised; and a novel scheme is introduced that places the Old Endemic rodents into a series of informal groups. These taxonomic decisions seemed fine to me, but will no doubt stimulate much discussion in future.

The book is accessible to the non-specialist in part because of the authors' easy writing style, and in part because they use rodents' common names and omit mention of scientific articles and other references in the text. This generally works well, although I was left wondering in some places where information had come from. For example, Table 5.2 presents some detailed data on reproduction in the now-extinct white-footed rabbit-rat that I was unaware had ever been collected, while an intriguing but unattributed quote is given on page 127 about the behaviour of the enigmatic northern hopping-mouse. A good list of references is given at the end of the main text, but this is of little help in following up specific points in the narrative.

The book has been well edited and proof-read, and provides some excellent photographs of its subjects, line drawings illustrating different aspects of their biology, and well organised tabular material. Very few errors are apparent: marsupials have been present in Australia for perhaps 60 million years, not for over 100 million years as suggested on page 2; there is a discrepancy in the number of rodents considered to have become extinct in Table 1.1 and the text (pages vii and 15); and W.D.L (David) Ride has been subjected to a name change on page 174. Finally, I am not convinced that the black rat is a major pest in Australia, as stated on page 149, but this is just my own opinion based on limited field experience with this new invader. These are quibbles, and do not detract from the high standard of information and presentation that this book maintains throughout.

The authors express a wish in the Preface that *Native Mice and Rats* will enhance awareness of native rodents and stimulate efforts to conserve them. This attractive and important book should easily achieve both aims and, at $39.95, it should be widely read. I recommend it highly to general readers, students, professional biologists and anyone with even a passing interest in this most neglected component of our native mammalian fauna.

Chris Dickman
University of Sydney

BOOK NOTICES

THE NEW GUINEA DIARIES 1871-1883

By N. N. Miclouho-Maclay
Translation from the Russian edition and Commentary Essays by B.Wonger
IBSN Paperback 978-0-9775078-1-8
IBSN Hardback 978-0-9775078-2-5
$29 and $39 respectively
Published by Dingo Books 2007
[available from Dennis Jones and Associates email: orders@dennisjones.com.au]

This publication makes available a translation of the New Guinea diaries of Miklouho-Maclay. The diaries had already been translated [perhaps the best known in Australia being that of C L Sentinella (first edition 1975) published in Madang, PNG] and these two translations appear to differ very little one from the other.

Miklouho-Maclay first visited New Guinea in 1871-1872, paid a second visit 1876-1877, and returned for a week in 1883. He was initially sponsored by the Russian Geographical Society, though given barely enough money to equip the expedition. Fortunately the President of the Society, the Grand Duke Constantine, was well connected, brother of the Czar and also administrative head of the Russian Navy, so transport could be arranged. The diaries begin with his landing on the north coast of New Guinea and document his life among the indigenous population he studied and came to respect. Although he had a background as a marine biologist with an early interest in sponges Miklouho-Maclay had broad interests and is now best known for his anthropological studies on humans and their relationships with their environment, based largely on his observations in New Guinea.

Australia became the new home of Miklouho-Maclay and in Sydney he was befriended by Sir William Macleay and introduced to the scientific community. He was a member of the Linnean Society of New South Wales and published in our Proceedings. Unfortunately Miklouho-Maclay died at the age of 42, disillusioned with his attempts to preserve the life style and rights of the Indigenous population of New Guinea. It is interesting to speculate what his contribution to science and particularly to anthropology and the place of the Aboriginal population in post-colonial Australia would have been had he lived longer.

For those interested in the early colonial history of New Guinea the translations of both Wonger and of Senitella have much to offer, and it is in their notes and commentary that they most differ. In two brief chapters following the diary translation, 'Disillusionment and Death' and 'Afterward', Wonger contemplates the impact Mikluoho-Maclay's work could have had. In a chapter somewhat grandly entitled 'Revising Darwin' he also gives his views on the significance of Miklouho-Maclay's work in the context of the social misuse of some of Darwin's ideas.

The chapters in the Sentinella volume entitled 'The Annexation of New Guinea and Death of Maclay' and 'Astolabe Bay After the Death of Maclay' help one to appreciate what Miklouho-Maclay could have achieved, or circumvented, had his ideas for the proper protection of the Indigenous population been carried through. For further reading on the subsequent history of this area I would commend 'German New Guinea - the Annual Reports' edited and translated by Peter Sack and Dymphna Clark (ANU Press 1980).

Robert J King

WILDLIFE AND WILDERNESS IN THE WATERFALL COUNTRY

by Roger Fryer.
CSIRO Publishing, November 2007, ISBN 9780646468693.
Paperback, 131 pages.
$AU 29.95.

To produce a small comprehensive guidebook to cover the area of the 'Tweed, Richmond, Clarence, Macleay, Hastings and Manning Rivers and all their tributaries' is a big ask. Especially is this so if it is to provide 'a resource for schools, teachers, tourists, bushwalkers, government agencies and anyone interested in a region rich in wildlife and wilderness'. No doubt this presented problems to the author and there are likely to be omissions. This book began as a compilation of a weekly column on nature study that the author wrote for a newspaper. Roger Fryer's efforts have produced a good-looking publication, full of lovely colour photographs and including much useful information.

'Waterfall Country' in this book is the region east of the New England Highway, between the northern slopes of the Hunter River Valley in the south and the Clarence River Valley in the north. The coastal escarpment is very distinct here and the rivers and creeks form a myriad of waterfalls as they tumble over the escarpment on their way to the sea. Descriptions of some tableland and coastal locations that fall within this area are included.

The book starts with origins, a brief history of the geology and early settlement. Timber getting has been the main occupation of the region in the past. The rocky and precipitous nature of the terrain has discouraged road building and there are few roads traversing the escarpment from east to west, and the region has remained largely undeveloped. Grazing properties still rely on horse musters. Comments about history and life today in the different parts of the region bring them alive.

The rugged terrain produces a diversity of environments which has led to a wealth of wildlife. Add to this the rich volcanic soils on the tablelands which support (or has supported) rainforest. The coastal strip with floodplain environments add more habitats and the marine parks rate a mention also. Forests with tall trees are rich in possums and gliders. There are twelve species of kangaroos, more than is found in any comparable area in Australia. In swampy areas along the Clarence Rivers, closer to the coast, nesting brolgas and jabirus may be found. These birds are usually associated with Kakadu. The Clarence River is the best described and the reader will probably wish that other places were described as comprehensively.

The book is beautifully illustrated and some photographs are simply stunning. There is a photograph of a group of sugar gliders feeding that Eric Rolls, who writes the foreword, considers is the most amazing wildlife photograph he has ever seen.

The book has information on how to get around, how to stay safe, who is looking after the wildlife and how to be aware of the biodiversity and be conservation-minded. It is a good introduction to this wonderful part of the world and would be a good companion to anyone travelling in the region.

Helene Martin

THE PRESIDENTS ADDRESS: Genetic Modified Plant Breeding, by Dr. David Murray

The President, Dr. David Murray has been following the new plant breeding methods using genetic modification (GM). In 1991, there was a conference about regulation GM plant breeding. The scientists said many things and made predictions, some of which did not eventuate. So what now? His talk assessed how GM plant breeding has turned out after some seventeen years.

First, the points against GM plant breeding. It takes 7-8 years to develop a GM plant. Cotton has many insect pests so resistance to insects was developed using bacterial BT proteins. These bacteria live in the soil and the BT proteins they produce upset the digestive system of insects. But insects adapt very easily. The first GM cotton had one BT protein and the insects soon adapted. When a strain with two BT proteins was developed, it worked much better. For this method to work really well, there should be six BT proteins.

The first GM cotton with only one BT protein still required lots of pesticides, which got into the cottonseed oil, which if eaten, would give you a large dose of pesticides. This method is based on unsound biology. It only encourages insects to adapt and become resistant to many different chemicals.

Making plants resistant to herbicides was thought to be a good thing. Glycoside used in the herbicides breaks down to glycine which is not harmful, whereas while the glycoside remains intact, it is harmful. The glycoside is absorbed by the plant and goes everywhere. With resistant plants, the Americans upped the glycoside content of the herbicides by up to 200%. The crops from plants treated with high glycoside then had a high glycoside content. The use of high glycoside herbicides is not allowed now.

Canola was made glycoside resistant so it could be sprayed to keep weeds down, but the weeds readily adapted to become resistant to glycoside. Also, closely related weeds received the resistant genes from pollen. This could have been avoided if care was taken to keep the resistant genes out of the pollen. Bent grass used for golf courses and bowling greens has been made resistant to glycoside, but if it escapes, it will be very hard to eradicate. Again, the method is based on unsound biology.

Peas and beans are nitrogen fixers and their seeds have a relatively high protein content. Peas are starchy with up to 20% protein and beans may have up to 29 % protein. Some glycoproteins may be toxic and proteinase inhibits digestive enzymes. Beans may have up to 15% of this proteinase and must be cooked. Lupins are a good animal food and a GM variety with double the methionine has been developed. This is a good outcome as the nutritional value has been increased.

Amylase inhibitor inhibits weevils in peas. A GM strain of peas had a good increase in amylase inhibitor and the active amylase part of the molecule was the same, but associated groups were different. Whereas the original amylase inhibitor did not affect mice, the GM variety caused inflammation of the lungs.

A GM strain of maize contains BT proteins and had been approved for animal food but a shipment to Japan somehow got into the human food and had to be recalled. BT toxins are thought not to affect humans but they do, but not as badly as the insects. They are liable to cause allergies.

The promoters of GM crops rely on a fairy story: it is only one gene that we add to the plant. This is quite wrong, it is a gene construct with various bits and pieces, usually in the form of a ring of genes. All these other genes may have effects on the plant. GM potato was bred with lectin from snowdrop to give it protection from pests. Bad effects on the intestinal tracts of animals were thought to be from the constructs. This would have been very damaging to the GM reputation so it was hushed up, by stopping that research and sacking the scientist who discovered it and spoke out. GM foods are being approved without any feeding trials.

Can GM genes be introduced to other species through pollen? If the right promoter is used, then the GM genes could be kept out of the pollen, but lazy work has allowed them to be distributed in pollen. Can viruses change or transfer GM genes into other species? We know that viruses can do this. Committees tick boxes on only a few aspects and they are split up to look at only a few aspects. No one looks at the whole elephant, so to speak. Sir Gustav Nossal says there is nothing wrong with GM crops and on this advice, GM canola will be allowed in some states. But he was using mainly selective economics to support his views. Pigs fed GM canola meal became infertile. Put back on grass, they became fertile again. Back on GM food, infertile again..... Sir Gustav was using his eminence to support GM, not science,

There are some GM projects that have the potential for good. Soils are regularly treated with superphosphate, but not all of it is taken up by plants. What is not taken up becomes locked up in the soil and unavailable to plants. Some soils have 30-40% of phosphorus locked up in them. CSIRO want to develop micro-organisms that will unlock the phosphorus and moke it available to plants. Fire blight in apples is bad in New Zealand and we refuse to import their apples because we are still free of the fire blight. Using GM methods. we should be able to do something about the fire blight problem.

How can we avoid GM food? Avoid highly processed products of soy, canola and maize. Canola oil, cottonseed oil, lethicin from soy and maize starch may come from GM sources, but they are not labeled as such. Macular degeneration has become prominent and omega-3 oils are the best defense against it. Margarine from canola is not good.

Little is known about how the GM methods really work and what there outcomes are, apart from obtaining the desired goal. It is high time that this topic was researched thoroughly.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

**Wednesday 23 April, at 6 pm, in the Caley Seminar Room, Royal Botanic Gardens.
Enter through the 'Reception' gate to the Herbarium, on Mrs. Macquaries Rd.**

Dr. DALE DOMINEY-HOWES

Natural Hazards Research Laboratory, Risk Management Group
School of Risk and Safety Sciences, UNSW

THE AUSTRALIAN TSUNAMI WARNING SYSTEM - PROTECTING AUSTRALIA FROM WAVES OF DESTRUCTION

The 2004 Indian Ocean tsunami (2004 IOT) disaster although catastrophic, only had minor effects on the coasts of Australia. Prior to this event, few had considered the risk that this hazard type might present to Australia. Since the occurrence of the 2004 IOT, the Australian Federal government has committed almost $70 million to the development and deployment of an Australian Tsunami Warning System (ATWS) to help safeguard Australia from future potentially damaging tsunami. In addition, State and Territory Emergency Services are spending additional funds on tsunami research and community risk management. This talk will outline current state-of-the-art tsunami science being undertaken in Australia. We will examine the geological and historical record of tsunamis that have affected Australia, consider those regions capable of generating tsunamis that would be damaging to our coasts and explore the current important research questions that still need to be answered.

The talk will also describe the structure and function of the Australian Tsunami Warning System and consider how it performed following the April 2nd 2007 Solomon Island tsunami that triggered the first warning from the ATWS. The talk will conclude by asking, 'has the deployment of the ATWS made Australian coastal communities safe from future tsunamis?'

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**Wednesday21 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Dr. TOM GRANT

School of Biological, Environmental and Earth Sciences,University of New South Wales

THE PLATYPUS – THE IMPORTANCE OF WHAT WE DO AND DON'T KNOW ABOUT IT.

Since Governor Hunter watched a platypus being speared by Aboriginal people near Sydney in November 1797, the species has become an Australian icon and the subject of great interest to naturalists and biologists. More recently the platypus has also become important to those involved with environmental management and conservation issues – the environmental impact assessment and monitoring industry. Despite over 200 years of research and inquiry, there is still a great deal that is unknown or poorly known about the species. The talk will discuss these gaps in knowledge and whether sufficient is known of the species' biology to permit good decisions to be made regarding its conservation and management.

****

Wednesday 23 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

DR. JOHN PICKETT

SYDNEY IN THE ICE AGE

This lecture addresses the question as to why the two major embayments on which the metropolis of Sydney is situated, Port Jackson and Botany Bay, should be so different in character; when one starts looking for similarities there is hardly any overlap. To explain their development and their differences it is necessary to explore the situation at the time of the low sea-level stand during the last glaciation, when sea-level was as low as -120 metres. In addition to examining the recent geological history of these bays and the processes involved, the origins of other geographic features in the area are explored, and suggestions made for examining the recent biogeography of their ecosystems.

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Wednesday 17 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. DAVID KEITH

Senior Principal Research Scientist, Vegetation Dynamics, National Parks and Wildlife Service

NATIVE VEGETATION: AN OVERVIEW OF BROAD-SCALE PATTERNS AND PROCESSES"

****

Wine and cheese will be served from 5.30 pm before each lecture.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 128 **JULY 2008**

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IN THIS ISSUE

CONGRATULATIONS TO KAREN WILSON

In the Queen's Birthday Honours, Karen Wilson has been appointed a Companion of the Order of Australia for services to botany as a researcher and through the recording and documentation of Australian biodiversity. We congratulate Karen Wilson.

NEW MEMBERS

We welcome our new members:
Dr. George Hangay of Frenchs Forest
Mr. Fernando A. Soley of Maquarie University

NEW PRESIDENT

At the last Annual General Meeting, we elected a new President, Michele Cotton. Michele is a veterinarian who has worked extensively in zoo and wildlife medicine and surgery in Saudi Arabia, the provision of continuing veterinary education in Australia and who is currently studying for a Masters degree in Veterinary Public Health Management through the University of Sydney. Michele has a keen interest in all aspects of Natural History and ecology.

AWARDS FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND

De PAOLI, Mathew. School of Geosciences, University of Sydney.
PROJECT: The eclogite-granulite transition: a case study in Breaksea Sound, New Zealand. This rare suite of high-grade metamorphic rocks may turn out to be the oldest known rocks in New Zealand. In order to isotopically date these rocks, zircons and garnets need to be carefully separated by physical means from the rocks by mineral separation specialists. Awarded $1,000.

DORRINGTON, Neill. School of Geosciences, University of Sydney.
PROJECT. Changes in magnetic inclination during the historical period in southeastern Australia.
This project aims to establish whether the disappearance of the magnetic anomaly dated to between 1770 and1777 has been preserved within the sedimentary record. If it has, then the chronology of this episode will be refined and its use will assist dating of sediments of the earliest European settlement. This is necessary because the precision of ^{14}C dating is easily disturbed by human activity and these sediments are beyond the limit of ^{210}Pb analysis. The geographic extent of the episode will be investigated also. Awarded $1,200.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

BARRY, Katherine L. Department of Biological Sciences, Macquarie University.
PROJECT: Male and female mating strategies in an Australian praying mantis: does being cannibalised improve a mate's share of paternity?
The outcome of matings in natural conditions and controlled experimental matings will be studied. Awarded $1,080.

BOWER, Deborah S. Canberra University.
PROJECT: The impacts of salinity and pH on the development of freshwater turtles – potential effects of dry-land salinity, soil acidification and alkalinity in the Lower Murray River region. These turtles are unique for their eggs take three seasons to hatch. Eggs will be subjected to different experimental environments and the effects on the hatchlings will be studied. Awarded $455.

BULBERT, Matthew W. Department of Biological Sciences, Macquarie University.
PROJECT: The study of mechanisms and interactions of physical and chemical ant prey capture strategies by an assassin bug *Ptilocnemus lemur* Westwood.
The bug has a trichome that is irresistible to ants. Initially the bug waves its tibula to attract the ant's attention. Chemical attraction may be involved also This predatory behavior will be investigated. Awarded $1,023.

DENHOLM, Amy,. School of Animal Biology, University of Western Australia.
PROJECT: Vascular organisation of the salt gland in marine snakes.
These snakes have salt secreting glands to enable them to live in salt water. The glands are highly variable amongst the species and they will be studied. Awarded $350.

DRAYTON, Jean M. School of Botany and Zoology, Australian National University.
PROJECT: The effect of inbreeding on the sexual attractiveness of male black field crickets, *Teleogryllus commodus* – relevant to survival of small fragmented populations.
Inbred males will be tested to determine if their song is attractive to females. Awarded $600.

GWILLIAM. Jessica J. Department of Biological Sciences, Maquarie University.
PROJECT: Fluctuating asymmetry and genetic diversity in commercially exploited sharks.
It is thought that physical asymmetry indicates less genetic diversity and this hypothesis will be tested. The study should show if fishing pressure leads to lowered genetic diversity. Awarded $500.

MACINTOSH, Hugh. School of Marine and Tropical Biology, James Cook University.
PROJECT: Larval biology and chemical ecology of tropical shipworms.
These wood-borers damage timber docks and pilings, causing considerable damage, yet little is known about them. Settlement and recruitment will be studied so that the infective periods and dispersal capacity are better known. Awarded $500.

PEAK, Rachel. School of Environmental and Life Sciences, University of Newcastle.
PROJECT: Investigating cooperative breeding behaviour in amphibians.
Is synchronised calling in hip-pocket frogs competitive or cooperative? The reasons for synchronised calling will be investigated. Awarded $1,000

SHIRLEY, Laura. School of Botany, University of Melbourne.
PROJECT Unraveling the role of ecological, evolutionary and biogeographical mechanisms in the assembly of contemporary plant communities.
This study will examine a Grampians *Eucalyptus* ecosystem from a community phylogenetic perspective. Awarded $800.

SKROBLIN, Anja. School of Botany and Zoology, Australian National University.
PROJECT: Phylogeography and conservation biology of the purple-crowned fairy-wren (*Malurus coronatus*)
The purple-crowned fairy-wren is a riparian species and has a fragmented distribution in northern Australia. It will be studied to find a model for the conservation issues of species that occupy naturally fragmented habitats. Awarded $1,000.

SMITH, Shannon M. Department of Biological Sciences, Macquarie University.
PROJECT: Interactions and dynamics of the eusocial horizontal borer *Austroplatypus incompertus* (Schedel), its host and symbiotic organisms.
This is the only beetle that lives in colonies. It excavates branched galleries in eucalypts, lives in them and cultivates fungi. This study will examine the ecology and identity of the fungi involved. Awarded $1,000.

THRELFALL, Caragh. University of New South Wales.
PROJECT: Micro-bats in the Sydney region: urban ecology of an over-looked fauna.
Microbats provide an important ecosystem function by consuming vast numbers of insects. There has been extensive declines in numbers of microbats in urban areas, but Sydney still has populations. An understanding of bat biology and ecology will assist conservation. Awarded $600.

TRIPOVICH, Joy S. Faculty of Veterinary Science, University of Sydney.
PROJECT: The impact of noise pollution on the ability of Australian fur seals to communicate during the breeding season.
Mothers and pups communicate vocally. This study will asses the effects of increasing tourist related activity, the background noise created and whether it disrupts this communication. Awarded $500.

THE AUSTRALIAN TSUNAMI WARNING SYSTEM - PROTECTING AUSTRALIA FROM WAVES OF DESTRUCTION by Dr Dale Dominey-Howes

The 2004 Boxing Day earthquake in the Indian Ocean and subsequent loss of life and destruction that the tsunami caused has catapulted tsunamis into prominence globally. Australian scientists, however, have been contributing to the study of tsunamis for the last forty years. There is a need to know the hazard and the potential loss so that strategies for mitigation and management can be developed.

For his PhD, Dr. Dominey-Howes identified tsunami in Greece using archaeological and historical records as well as the geology. In Greece, there are two thousand years of written history that can be used. In Australia we only have two hundred years of written history. There is a need to understand the social framework for the development of management strategies.

Tsunamis may be caused by earthquakes, tropical cyclones and other disturbances in the ocean. 80% are caused by movement on the sea floor. The 2004 Indian Ocean event that devastated Banda Aceh and surrounding countries was caused by some 15 m of movement of the sea floor along 100 km of the fault line. This in turn lifted the water column and generated the wave. When the wave travels in shallow water, the base slows down and top topples over. When the 2004 tsunami hit land, it traveled at 20-30 km/hour and was 30-40 m high. It killed 225,000 people and did an immense amount of damage.

The wave traveled globally and was channeled along the mid ocean ridges. It was recorded on the west coast of Australia and in Sydney, but the wave was small. The Chilean earthquake of 1960 had a greater impact on Sydney with a wave of 1.5 m. The Pacific has an early warning system based in Hawaii, but Australia cannot rely on it. The Indian ocean needs a warning system also, and Dr. Dominey-Howes has been consulted to report on it.

Australia is stable but it is surrounded by active earth quake zones down the Indonesian chain of islands, across the north of Australia and into the Pacific. New Zealand is an active zone also. In historic times, earthquakes to the north have caused tsunamis of 6-10 m.

In the 1990's the study of the risk of tsunamis started in earnest. Ted Bryant et al. of the University of Wollongong studied the NSW coast for the impact of tsunamis. They reported on six, possibly eight events in the Holocene and evidence of tsunamis 130 m above sea level, up to 10 km inland, between Newcastle and Eden, but Bryant's work is controversial. The erosional and depositional signatures he reports seem to occur only in Australia and are not seen by geologists elsewhere in the world. Dr. Dominey-Howes is re-examining this report and he found that the most important site at Minnamurra, 40 m above sea level, reported as evidence of a mega-tsunami, is not even marine. It is only soil. He cannot find any evidence of mega-tsunamis.

Dr. Dominey-Howes has found 60 events, 10 palaeo-tsunamis and 50 in historic time along the NSW coastline. There are lots of small tsunamis recorded in tidal salt marshes. He cannot find any evidence of mega-tsunamis at any of the sites where they are supposed to be. The historical records tell us little.

For risk management, we need to assess the hazard, exposure, vulnerability and likely loss. The biggest worry now is that the stresses along the fault line of the 2004 Boxing Day earthquake have moved eastwards towards New Guinea. Any earthquake would then be much closer to Australia and the north west region would be in danger. Not many people live there, hence potential loss of life would be low, but it could do enormous damage to the offshore oil and gas fields.

For eastern Australia, an earthquake along the New Zealand Alpine Fault could affect Sydney. Of much greater concern is the slumping of sediments along the continental shelf which could also generate tsunamis that would hit the coastline in only 3-6 minutes.

Modeling shows how tsunamis impact on the coast and the environmental vulnerability. Damage to buildings would partly depend on the engineering. If a 10 m wave hit Sydney, 200,000 homes within 1 km of the coast would be affected. Low-lying areas around Botany Bay would be the most vulnerable.

There is now a ring of tsunami detectors around Australia. The sensors sit on the sea floor in deep water and relay messages to a floating buoy which sends it by satellite to the Bureau of Meteorology. With a pending tsunami, the Bureau then calculates the risk and sends out the warning. The time available to take action on the warning will depend on the distance from the earthquake.

The 2007 Solomon Islands earthquake gave us the first test of the warning system. The earthquake occurred at 6.40 am and the Bureau of Meteorology had put out the warning 40 mins later. So the detection and warning system worked brilliantly. What happened next was not so brilliant. There was some panic: Manly School wanted to know if it should be evacuated. Because the forecasted effect was so small, Queensland cancelled the warning but New South Wales kept the warning. This caused considerable confusion around the border region between the two states. As to what anyone could do was left to the myriad of state emergency services. The only advice seemed to be: get off the beach and run like hell for high ground, and boats in shallow water should head out to deeper water. Then some people did not take the warning seriously: some surfers on Coogee Beach went out to surf the tsunami!

Clearly, much needs to be done about coordinating state emergency services and working out evacuation plans. People need to know which route they should take out of the low lying areas. There is a great need for education about how we should respond to a tsunami warning.

THE PLATYPUS – THE IMPORTANCE OF WHAT WE KNOW AND WHAT WE DON'T KNOW, a talk by Dr. Tom Grant.

The earliest reports of the platypus were really dreadful, with poor specimens incorrectly drawn and badly interpreted. At first, people could hardly believe it and it and it was thought to be very primitive. By the 1880's, after countless platypuses had lost their lives to science, its anatomy and something of its reproduction was known. By the 1900's, something was known of its field biology. By 2008, the genome has been fully sequenced and published in a paper with 102 authors! But we still don't know much about it, and this is a problem for environmental impact studies where the author(s) must make some prediction as to the likely effect of some proposed development.

First of all, what we do know about the platypus. Its distribution is southeast Australia and it has been introduced into Kangaroo Island. It is found in Tasmania, Victoria, New South Wales and Queensland and as far north as the Burdekin River. In places in the south, it is found west of the divide. Its range has hardly changed since European settlement. Some observers suggest that there has been an increase or decrease in numbers, but it is hard to assess the reliability of these observations.

There is a distinct breeding season. Mating occurs in September, egg-laying in October, followed by four months of lactation. Some animals start breeding when two years old, others not until they are eight years old. We don't know anything about the mating systems, how many breed or the recruitment of juveniles. The venom gland expands with the increase in testosterone but we don't know how it is used. The genetics of the Shoalhaven population failed to show any breeding system.

We don't know how much they move about or just what a population is. Capture rates may be high, but they are quite variable. Females and juveniles may remain in the locality, but the males disappear and we don't know where they go. Recapture rate of the females may be up to 50%, but some males are not recaptured until five years later. There is huge variability. This makes assessment of the population almost impossible. The effects of the drought have been investigated but the platypuses are there and in good condition.

The platypus prefers a cobble substrate and lives on the stone flies and other invertebrates. They avoid fine sediment, the mud. They feed to a depth of one metre and can only dive for about two minutes. Mostly, we do not know the productivity of the rivers, or their food availability, or what regulates the productivity.

It was thought that they could not regulate their body temperature and were therefore primitive. This is not so. They regulate their temperature to 32 °C and can swim in icy cold water, but must eat more food to do so. The platypus is a very specialised animal.

What we don't know becomes important when environmental impact statements (EIS) are required. There is dramatic disturbance during the construction of a large dam. Then the dam becomes an obstruction and it changes the river to a lake. The rivers have moving water which is relatively shallow whereas the lakes have deep, still water, too deep for the platypus to dive to the bottom. Agricultural chemicals tend to accumulate in dams. Downstream of the dam, the flow is regulated and may be the opposite to what happens in nature. All these changes mean a change in the macro-invertebrates that the platypus relies on for food. The EIS relies mainly on inference since there is so little research. Unfortunately, the EIS is not refereed and if it contains wrong information, this may be quoted elsewhere, thus perpetuating the misinformation.

The platypus cannot use lakes, they are too deep and the banks are usually scoured, making them unsuitable for macro-invertebrates. The headwaters of the lake may be more suitable. They cannot swim against strong currents which would sweep away the macro-invertebrates.

Some environmental protection measures are possible. Don't excavate or create major disturbances during the mating season. An environmental flow may be provided, but it is not known what it should be. The platypus lives for twenty years and low numbers make monitoring difficult. There are limits to monitoring: if monitoring shows adverse effects, the infrastructure will not be removed. The EIS is better than before, but there is room for improvement and more information of their environmental biology is needed.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

**Wednesday 23 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

DR. JOHN PICKETT

SYDNEY IN THE ICE AGE

This lecture addresses the question as to why the two major embayments on which the metropolis of Sydney is situated, Port Jackson and Botany Bay, should be so different in character; when one starts looking for similarities there is hardly any overlap. To explain their development and their differences it is necessary to explore the situation at the time of the low sea-level stand during the last glaciation, when sea-level was as low as -120 metres. In addition to examining the recent geological history of these bays and the processes involved, the origins of other geographic features in the area are explored, and suggestions made for examining the recent biogeography of their ecosystems.

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**Wednesday 17 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Dr. DAVID KEITH

Senior Principal Research Scientist, Vegetation Dynamics, National Parks and Wildlife Service

NATIVE VEGETATION: AN OVERVIEW OF BROAD-SCALE PATTERNS AND PROCESSES

****

**Wednesday 22 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Dr. TONY WRIGHT

School of Geosciences, University of Wollongong
and Linnean Macleay Fellow

****

Wine and cheese will be served from 5.30 pm before each lecture.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 129 **SEPTEMBER 2008**

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IN THIS ISSUE

NEW E-MAIL ADDRESS AND WEB SITE

Please note that we now have a new e-mail address, linnsoc@iinet.net.au and the web site is now http://linneansocietynsw.org.au

NEW MEMBER We welcome our new member Mr. Endymion D. Cooper of the School of Biological Sciences, University of Sydney.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2009. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 14 November 2005

MEET THE COUNCIL MEMBERS

Each year we advise you of Council Members up for re-election and a full list of Council Members is published in the Proceedings. Even is you know the names of the Council Members, they are probably just names. In this section and in succeeding newsletters, we introduce the Council Members.

Stefan Rose

I am currently working as an ecological consultant for a small private firm in Newcastle, Ecotone Ecological Consultants Pty Ltd. My specialty is flora ecology, but the work often includes survey and assessment of all the biotic aspects of a site. Fieldwork and travelling is a major part of the position, and the work takes me to many parts of NSW. Projects range from flora and fauna impact assessments for single dwelling development applications to large subdivision proposals and major infrastructure projects such as roads, railways, power lines and dams. This type of work is varied, rewarding and often challenging. The downside is that one often feels like the "meat in the sandwich" – there is frequently undue pressure from the client to downplay the impacts of a development proposal (they're paying you after all), while regulatory authorities demand high and sometimes impractical levels of investigation into sites that often have little in the way of biodiversity values. One needs to keep both sides happy. On the other hand, part of the job also includes biodiversity assessments for local councils and DECC, biodiversity management plans and appearances in the Land and Environment Court as an expert witness. I gained valuable experience in flora and fauna survey and research at the University of NSW (School of Biological Science, now BEES) where I worked for 18 years. My main professional interest is threatened species and ecological community survey and management. Apart from that I am a dedicated traveller (both in Australia and overseas) particularly to unusual destinations and I enjoy bushwalking and camping, house renovating and reading a good book.
Editor's Note Stefan is our Web Master

Karen Wilson, AM

I am a Botanist at the Royal Botanic Gardens Sydney since 1973; currently acting as Manager of the Plant Diversity Section - that's the systematic botany group that maintains the herbarium of 1.2 million specimens and does research into the classification and phylogeny of native plant groups. My own research focuses on the sedges (family Cyperaceae), rushes (Juncaceae), she-oaks (Casuarinaceae) and docks (Polygonaceae). I've also been active in the last decade in various international, national and local initiatives to make systematic information more readily available electronically about the world's organisms. I've been a member of the Linnean Society since the mid-1970s; a member of Council since 1983; President 1994-96; and a member of the Joyce W Vickery Research Fund Committee since 1987 (chair 1990-2000).

David Ronald Murray
My background is in plant sciences and microbiology, with a B.Sc. (Hons) in Botany from the University of Sydney (1964) and a Ph.D. from the same institution (1969). I have edited or written ten books. My special interests are legumes, horticulture and agriculture, and the impact of elevated concentrations of carbon dioxide on plant composition. I have been a Director of the Australian Flora Foundation since 1986, a member of the Executive of the Linnean Society of NSW since 1992, and President 2006-2007. I was a member of the Executive of the Nature Conservation Council of NSW for 13 years (1993-2005) and during that time was an NCC representative on bodies such as the Noxious Weeds Advisory Committee (1993-2003) and the first N.S.W. Biodiversity Advisory Council (1996-1999). I am also the representative of the Australian Plants Society (NSW) to the Australian Cultivar Registration Authority (since 2000), President of the Iris Society of Australia (NSW region, 2005 onwards), President of the Friends of Wollongong Botanic Garden (2006 onwards), a Life Member of the Australian Conservation Foundation, and both Vice President and Scientific Adviser on Plants to the Wildlife Preservation Society of Australia, whose Centenary will be celebrated in 2009.

Mike Grey
I was a research scientist at the Australian Museum. I've worked mostly on the taxonomy and relationships of various families of cribellate spiders (spiders that make "woolly" rather than sticky silk webs for prey capture like the common black house spiders) and also the notorious funnel-web spiders. Another research interest has involved invertebrate biodiversity studies in eastern Australian forest habitats. I'm continuing my taxonomic research interests as a retired museum fellow.
Editor's Note: Mike is the current Coordinator of the Joyce Vickery research Grants Committee.

BOOK REVIEW

Albatross Their World, Their Ways
Tui De Roy, Mark Jones and Julian Fitter
CSIRO Publishing
July 2008
Hardback, 240 pages, colour illustrations
Au$79.95
ISBN: 9780643095557

To say current albatross taxonomy is controversial is an understatement. Readers should note that the taxonomy used in this book is based on most of the recently proposed splits. Thus there is a total of 22 species instead of the traditional 13 species. The authors give the impression that the splits are now widely accepted but I do not think the taxonomy is as cut and dried as they imply. For a contrary view, see the recent book on the systematics of Australian birds by Christidis and Boles.

This caveat aside, *Albatross Their World, Their Ways* is an excellent publication. There is a wealth of scientific and conservation information, and each species is lavishly illustrated.

The book is divided into three parts. The first, which comprises about half of the book, is a series of chapters by De Roy about her journey to photograph as many albatross species at their breeding grounds as possible. While very much a personal account, it nevertheless contains much important information about the natural history and conservation status of each species. The second part, by Mark Jones, is an eclectic collection of short essays, mainly by scientists and conservationists, and also includes a chapter by Jones on the history of human interaction with albatrosses. The third part, by Julian Fitter, is a scientific profile of each species. It gives a comprehensive summary of biological and conservation information. The book also includes a short section on where to see albatrosses, a glossary of terms, suggestions on further reading, and an index.

From a scientific point of view, I was disappointed in the lack of a full reference list. The authors plead lack of space but I do not think a couple of extra pages would have added significantly to the cost of production.

Curiously, the authors adopt a convention of using lower case letters for spellings of the common names of newly split species and upper case for the split group as a whole (thus wandering albatross versus Wanderers). This convention is not, however, followed consistently (see especially Part Three), and furthermore, it is complicated by the use of capitals for locative and eponymous names. It would have been simpler and less confusing to have used conventional spelling for the common names of all taxa.

The information on diagnostic features is mostly quite good but, for the Shy-type albatrosses, there seems to be a distinction on the basis of the "thumb mark" at the base of the leading edge of the wing between *cauta* and *steadi* on the one hand and *salvini* and *eremita* on the other. This feature is present in all these taxa and not just the latter two.

Production values are in general very good. I found perhaps a dozen typos, not many in a book of this size, and only one misidentification: on page 175 the bird caught by the cable is clearly a Black-browed rather than a White-capped Albatross. Unfortunately also, some information on the global distribution map on pages 16 and 17 is obscured by the binding. In addition, this reviewer found it hard to read the captions of the photographs because the type is light-grey in colour rather than black. Perhaps someone with younger eyes might not have had this difficulty but it would be a problem for many older readers.

Despite its faults, this book on these iconic seabirds is well worth buying for the stunning photography alone, to say nothing of De Roy's elegant and evocative prose. For anyone even moderately interested in these wonderful birds, the wild places in which they live, and the processes, both natural and human-induced, that threaten their very existence, *Albatross Their World, Their Ways*, is highly recommended.

David Hair

School of Biological, Earth and Environmental Sciences,
UNSW

SYDNEY IN THE ICE AGE: a talk by Dr. John Pickett.

Dr. Pickett posed the question as to why two major embayments, Sydney Harbour and Botany Bay, are so different in character. Today, Sydney Harbour is deep, with a long convoluted coastline and many islands. Botany Bay is flat, shallow and has only one island. Why? The answer is found in the history of the development of the coastline from the last ice age to the present

We are now in a time of high sea level and the last time the sea was as high was 120,000 years ago. The last lowest sea level, 120 m below present sea level was some 18,000 years ago during the glacial period. Then, water from the ocean was piled up on the land as ice. The sea level rose dramatically after 12,000 years ago and had virtually completed its rise by 10,000 years ago. There have been other earlier times of low sea level. People arrived in Australia before the last glacial period at a time of relatively low sea level.

Today, the ocean outside of the Sydney Harbour Heads is shallow. Botany Bay is also shallow, both inside and outside of the heads. Today, the ocean sand plain is flat and featureless. A study of the topography below the sand by the 'sparker system', a type of echo sounding, shows that the Hawkesbury River once flowed out in a canyon 120 m deep through Palm Beach. The Parramatta River also flowed out through the heads in a canyon, also 120 m deep. The Georges and Cook Rivers joined up to form a major river system that flowed out through Cronulla. A small river that only drained a small catchment from Eastlakes to Paddington and Bondi Junction flowed out through the heads of Botany Bay. All this topography at low sea level times is now buried beneath sand.

Now we have a series of rocky headlands and sandy beaches all along the coastline. Where did all this sand come from? One theory suggests that the sand originated from the shelf area. At the last high sea level, there would have been an inner and an outer sand barrier, similar to today. As the sea level dropped from its former high stand, the sand was stranded on the shelf. When the sea level rose again, it brought the sand back in again.

Large rivers often come near to the coast then turn north and run parallel to the coastline before flowing out to sea, just south of a headland. The Evans River follows this pattern. A suite of 30 species of fossil corals has been found in sediments of the north-flowing part of the river. Today, there are virtually no corals on any of the headlands. These corals would have required warm open water. This indicates that the wide inner barrier of today was not in place 120,000 years ago.

There is an alternative model. The strong southeastern and southerly winds are important for shaping the coastline and reefs. These winds generate currents which flow north along the coastline and build up sand spits which divert the rivers northward. The waves strike the coast from the south east at an angle, moving sand up the beach, but the water and sand flows back at right angles to the beach, and in this way, the sand migrates northwards. When the north-moving sand reaches the headland, it may be trapped in the bay, but it eventually gets moved around the headland.

Large quantities of sand are moved, but where does all this sand come from, if it has not been brought up the shelf by the rising sea level. Does it come down the rivers? The Hunter River is one of the largest but it is not delivering much sand to the sea. That leaves the coastal headlands which are being constantly eroded away. The headlands erode at about 4 mm per year and calculations show that over 10,000 years, more than seven times enough sand than is on the beaches now would have been produced. (There are many fudge factors in these calculations, Dr. Pickett explains)

Where does all this sand go? It moves north along the New South Wales and southern Queensland coast and is stopped by Fraser Island, the largest sand island in the world. The sand is driven onto the beach by the waves and then up into the air by the wind. Fraser Island is on the Darling River lineament which stretches from Kangaroo Island, along the Darling River to Fraser Island. There may be some deep seated reason for Fraser Island blocking the sand movement.

During the last low sea level, when the Cook/Georges Rivers flowed out through Cronulla and the small Eastlakes to Paddington drainage flowed out through the Botany Bay Heads, a basement high separated the two drainage systems. As the sea level rose and a sand barrier built up, it diverted the Cook/Georges River into Botany Bay. The rising sea level submerged the basement high and covered it all with sand, and that is why Botany Bay is shallow.

The colour of the sand on the beaches is also a clue as to its origin. If it was just moved up the shelf as the sea level rose, it should be all much the same colour, since it would have been shuffled back and forth with each fall and rise of sea level, mixing the colours. But the beaches are not all the same colour. They may be white, yellow, black: they are, in fact, the same colour as the local sandstone, thus supporting a local origin for most of the sand on the beach.

Some time ago, Dr. Alberto Albani gave us a talk about his work on the coastline. He described the continental shelf and the large sand bodies found there. There was a proposal to use this sand in the building industry. It would be vacuumed up, transported in barges to the mainland and one barge a day would have been sufficient. This proposal never went ahead. When asked about it, Dr. Pickett explained that the sand would have contained salt and salt, in concrete is not a good idea.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

Wednesday 22 October, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. TONY WRIGHT

School of Geosciences, University of Wollongong
and Linnean Macleay Fellow

PAST AND CURRENT RESEARCH ON PALAEOZOIC FOSSILS.

There was an influx of Iranian geological postgrads at the University of Wollongong in the early 1990s, and it allowed me to not only see fossil collections brought to Wollongong, but also to visit what can only be called a fascinating country, especially in geological terms. These studies are ongoing, but have really only exposed the tip of the iceberg which is now being exploited by follow-up studies by palaeontologists in Iran and Wales.

Current Devonian coral research focuses on the Silurian-Devonian ones which, in addition to the normal calcareous skeleton studied by coral workers, have calcareous opercula or lids. I have had the valuable opportunity of studying some superbly preserved material from round the world, as well as crucial silicified material, mostly from Australia. The detailed nature of the opercula is of high taxonomic importance.

Wine and cheese will be served from 5.30 pm before each lecture.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 130 **DECEMBER 2008**

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IN THIS ISSUE

RENEWAL OF MEMBERSHIP

A renewal of membership form is included if it applies to you. Subscriptions remain the same as last year.

MEET THE COUNCIL MEMBERS

David Keith

I am an ecologist with the Department of Environment & Climate Change (formerly National Parks). I have been there since 1986 and was part of the Ecology section at the Royal Botanic Gardens for four years previously. I work with a small research group on a wide range of biodiversity conservation problems. Some of my favourite projects include population dynamics of long-lived plants, vegetation survey, classification and mapping, landscape conservation planning, vegetation dynamics in relation to fire and grazing in the semi-arid zone, dynamics of coastal heathlands and floodplain vegetation, extinction risk modelling of plants and animals, development of Red List criteria for threatened species and communities, assessing restoration of native vegetation and, most recently, predicting species extinctions under climate change. I've been fortunate to work in a wide range of habitats and with a diverse list of collaborators. In 2004, I authored a book on native vegetation, 'Ocean shores to desert dunes.' I was invited to join the Society's Council in 1990, have been a member since then and currently serve on three of its committees. I have also served on the Council of the Ecological Society of Australia and the NSW Scientific Committee.

Helene Martin
I started out as a plant ecologist, at the University of Adelaide, but switched to palynology which I learnt at the University of British Columbia. Back in Australia at the University of New South Wales, I started on the palynology on the Lachlan River Valley. At that time (mid 1960's) we were in the middle of a drought. Some inland towns had run out of water and it was being brought in by train. The politicians were promising water for the farmers so they were stimulated to start a program to assess the State's ground water potential, which had been neglected up till then (some things never change!). Palynology is necessary for stratigraphy in these unconsolidated non-marine sediments. As well as the stratigraphy, I was able to use the palynology to trace the history of the vegetation and climatic change of the past 50 million years. I have also worked with students who studied the palynology from swamps in the Blue Mountains and surrounding regions and we have traced the history of the vegetation from the last ice age. I have been on Council for a long time, was President in 1981 and have been the Newsletter Editor since its inception. For relaxation, I an very interested in the arts and crafts and enjoy visiting the galleries.

Peter Myerscough
Peter is a plant ecologist who retired fifteen years ago from the staff of the School of Biological Sciences in the University of Sydney. He is still an Honorary Research Associate there, and is actively continuing his research interest in coastal heath.

PLASTIC RINGS A DANGER TO WILDLIFE

Wildlife may get caught up in discarded plastic rings that seal lids on jars, bottles etc., with disastrous consequences. The Wildlife Preservation Society urges us to point out to manufacturers that there is a very simple solution: make the rings so that they break open and can no longer snare wildlife. If you would like to assist, contact the Wildlife Preservation Society for more information and a draft letter, at wildlifepreservation@optusnet.com.au

APPLICATIONS FOR RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

Please note this change from previous years. For 2009, Members may apply for up to a maximum of $1,500 and non-members, up to $1,000, for both the Betty Mayne and the Joyce Vickery Research Funds.

The date for submission of applications is15th March, 2009 This date applies to both the Betty Mayne and the Joyce Vickery Research Funds.

Please mail applications to:
The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests on the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $1,500 for Members and $1,000 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **15 March, 2009. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,500 for Members and $1,000 for non-members.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 15th March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **15 March 2009. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291, Manly, NSW 1655**

BOOK REVIEW

Albatrosses by Terence Lindsey, principal photographer Rod Morris.
Australian Natural History Series : CSIRO Publishing.

Terry Lindsey is well-known in Australia and overseas as a lecturer, and author, artist, and editor especially of books and videos on birds, but also on various other natural history subjects from pondlife to spiders and mammals. All his work is very well researched, and illustrated with a scientific artist's eye, and this compact volume on the Albatrosses of the world is no exception. He is adept at telling you everything you need to know without overdoing the detail. Yet his approach is always personal, his interest in, and in this book his passion for, his subject, shows through the precision of the treatment. It is never trivial.

There is no doubt that in this case the subject is a very special one : familiar to many, even though relatively few people have actually seen an albatross up close, nor watched them gliding close over the stormy wavetops. It is a sight that can change your life, and a close reading of this small book may perhaps give you unexpected insights, not only into the lives of the Diomedeidae, the ablbatross family, but into humanity and its probably troubled future.

Albatrosses is conventionally divided into chapters in logical sequence. Myth and legend, The species, The habitat (the Southern Ocean), Food and Foraging, Flight, Courtship, The nesting cycle, Human impacts. Each deals concisely and accurately with its subject. The authour touches on the current controversy on the taxonomy of the family but takes no side in the lumping/splitting argument.

There is of course an Appendix listing the 13 conventional species and 24 populations of albatrosses, and various associated statistics, a Selected References running to 37 pages, and an Index.

A number of colour photographs illustrate some of the species and some of their activities. There are four black-and-white photos which seem to have been printed with less contrast than the originals. Several drawings, and a graph, by the authour, and a few illustrations from other sources, are included.

Potential readers may think that they've seen it all on TV. Albatrosses are often seen in nature programmes, notably in the seemingly well-documented Galapagos area, and in the news also. But I hope they can learn a good deal more from this new work, for it has a lot to teach. The chapter on the history of and current parameters of the changing Southern Oceans, our very boundary, is alone worth the price of the volume.

L. W. Filewood

NATIVE VEGETATION: AN OVERVIEW OF BROAD-SCALE PATTERNS AND PROCESSES, a talk by Dr. David Keith.

Dr. Keith described twelve major structural formations, each with a number of classes. His lecture was illustrated with many beautiful photographs, as is his book, 'Ocean Shores to Desert Dunes, the Native vegetation of New South Wales and the ACT'.

Rainforests are characterised by a closed and continuous tree canopy composed of relatively soft and horizontally held leaves. There are nine classes of rainforest. Sub tropical rainforests have emergents such as figs and cedar and a sub-canopy of smaller trees including palms They are found from the Queensland border to the Illawarra where the rainfall is more than 1300 mm and on fertile soils. In warm temperate rainforest, species of Cunoniaceae and Myrtaceae are dominant. The soils are high in aluminum and some species are well known aluminum accumulators. Cool Temperate Rainforests are found at higher elevations from the Barrington Tops to the Border Ranges. *Nothofagus* is the signature species in Cool Temperate Rainforests and ferns are prominent. Dry Rainforests, Western Vine Thickets and Littoral Rainforests are more unusual classes and only occupy small areas. Oceanic rainforests and Oceanic Cloud rainforests are restricted to Lord Howe Island.

Wet Sclerophyll Forests have towering eucalypts which may reach 70 m, and a luxuriant understorey which has many rainforest species. Their complex structure make good habitat for animals and they have a rich bird and mammal fauna, especially the possums and gliders. There are nine classes of wet sclerophyll forest. Timber extraction has had an impact on these forests.

Dry Sclerophyll Woodlands are mostly coastal and tableland and have the most diversity. Twenty five classes are recognised. They are found on infertile soils, such as the Sydney sandstones and in the Blue Mountains and are unsuitable for agriculture. The shrubby classes have a woody shrub layer with banksias, waratahs, tea-trees, heaths, boronias and many more. Shrub/grass classes have grasses and fewer shrubs. Heathlands lack trees and have a rich shrub flora and bird fauna.

Grassy Woodlands are dominated by eucalypts, typically the red gums and boxes. They have a rich grass flora and there may be a dozen species in an area the size of a room. They are found on the rich, clayey soils that are good for agriculture and have been extensively cleared. There are seven classes of grassy woodlands. Grasslands lack trees and other woody plants and large tussock grasses are dominant. Broad leaved herbs are found in between the tussocks. The Moree

Plains and Liverpool Plains are the main areas.

Alpine herbfields occupy a relatively small area where the average temperature for the warmest month falls below 10 °C. There are many endemics amongst the small-leaved shrubs, herbs and tussock grasses.

Inland flood plain swamps have emergent, floating and submerged life forms. The water is ephemeral and the water regime influences the life cycles and dominance.

Arid shrublands have species of chenopds dominant and there is much bare ground. The shrub flora is perennial and there are ephemeral herbs and grasses that grow quickly after rains and spend most of the time as seeds.

There are a number of threats to biodiversity. Natural ecosystems become converted into something alien or non biological as land use intensifies. Land clearing induces erosion and sedimentation, and fragments the remaining natural ecosystems, with higher risk of extinctions. Grassy woodlands are most at risk, with only about 20% of their historical distribution left, as they are the most productive for agriculture.

What remains has been altered with the invasion of aliens, the breakdown of biological interactions and spread of pathogens. There may be loss of pollinators, seed dispersors, and mycorrhiza. Complex causes and interactions may result in dieback, as see in the New England region. Diseases are often overlooked, e.g. chytrids causing some species of frogs to go extinct and phytophthora which attacks plants. Phytophthora has the potential to make xanthorrhea extinct.

Over-exploitation of native species threatens them with extinction, e.g. orchids and waratahs. A change in disturbance regimes, e.g. floods and fire, alters the habitat and will disadvantage some species and favour others. Unfortunately, the alien invaders usually have the advantage. With changes in the water regime as occurs with agriculture and urban use, variability declines with regulation, but the native species are well adapted to variability.

Then there is climate change. With warming temperatures, the alpine zone will be most affected, especially the pigmy possum. With rising sea levels, the coastal estuarine communities will be inundated with sea water. There will be changes in species interactions and disturbance regimes.

What can we do about these threats? There are laws to regulate clearing of the native vegetation and they are powerful laws, but regulations need to be monitored and enforced, which are not done so well. Management and restoration, when weeds and ferals are removed and the native species are replanted may take decades, but there is no evidence that it will revert to the original state. Conservation of remnant vegetation in reserves is good, but not all vegetation types are covered. For grassy woodlands, there in not much left to conserve. Land holder engagement, where the land holder has an appreciation of the biota on his land and agrees to conserve part of his holdings when approached and is positive.

We have a long way to go to manage invasive species. New introductions happen all the time and what was a low density invasion for some time may suddenly explode. The remnants are very important and we should do all we can to keep them. Retaining habitat and connections between them so that the biota can move with climate change is very important.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2009 Annual General Meeting

The 134th Annual General Meeting of the Society will be held at 18.00h on 18 March 2009 in the Classroom in the Anderson Building, Royal Botanic Gardens, Mrs. Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17.30h.

Six members of the Council are due to retire at this AGM:

Michael Augee
John Barkas
Michael Gray
John Pickett
Helen Smith
Karen Wilson

and all offer themselves for re-election

Council recommends the election of Michelle Cotton as President of the Society for 2009.

The Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2009.

Further nominations are invited for vacancies on the Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life ordinary Members) of the Society. The nominations must be signed by at lest two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2009.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 131 **APRIL 2009**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER
Form for donation to Scientific Research Funds
Report of Society's affairs for 2008

NEW MEMBERS

We welcome
Ms. Nanette Thomas, School of Botany, University of New England
A/Prof. Anders Hallergren Department of Literature, Stockholm University.

Prof Hallengren is translating Linnaeus' unpublished lecture notes. Although Linnaeus wrote books about his system of classification, they are rather impenetrable and his lectures to students were mush easier to follow. Prof Hallengren presented a short overview of his work to the Council meeting.

VALE JOAN BAIN

We were saddened to hear of the death of Joan Bain in early January. Ms Bain joined the Society in 1960. She worked in the Division of Food Research, CSIRO before her retirement. Ms Bain came to our meetings until quite recently.

VALE ALLEN KEAST

We were sorry to hear of the death of Allen Keast. Prof. Keast was elected to the Society in 1948, He gained a PhD in Zoology from Harvard University and became a Professor at Queens University in Ontario, Canada. Prof. Keast remained a member of the Linnean Society of NSW and was a frequent visitor to Australia. He is best known in Australia as the Editor of Ecological Biogeography of Australia, (1981), in three volumes, with some 70 contributors.

DONATION TO THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

The Society has received $15,000, being the bequest from the estate of the late H. Hewson. Our thanks to the late H. Hewson.

NEED A TAX BREAK? Donations to the Scientific Research Funds are tax deductible

Tax time is coming up again. Donations to the Betty Mayne and the Joyce W Vickery Scientific Research Funds are fully tax deductible. A tear-off slip to include with your donation is found on a separate sheet.

MEET THE COUNCILLORS

Ian Percival

I joined the Linnean Society of NSW in the late 1970s while completing a Ph.D in palaeontology at the University of Sydney, and first published a paper in the *Proceedings* in 1979, describing some Ordovician brachiopods which were the subject of my thesis. Although I subsequently spent a decade working in the oil exploration industry, I was able to maintain my links with natural history (and palaeontology in particular) by keeping up journal subscriptions and in the case of the Linnean Society, joining its Council in the mid 1980s. Shortly thereafter I became Treasurer of the Society, a position I have grown accustomed to ever since (with just a few years' break when I was President in 2001-2004). I also serve on Council as Coordinator of the Betty Mayne Scientific Research Fund Award Committee.

Currently I am a Principal Research Scientist (Palaeontologist) with the NSW Department of Primary Industries. Though I have published papers on a range of Cambrian to Devonian invertebrate fossil groups, my main research interests remain in the Ordovician and concern brachiopods and the biostratigraphically significant group of microfossils known as conodonts. Since 2001 I have set myself the goal of publishing at least one paper per year in the Society's *Proceedings*, which so far I have succeeded in achieving (often in cooperation with colleagues).

Outside of the Linnean Society of NSW, I hold the position of Secretary of the International Subcommission on Ordovician Stratigraphy, I'm part of the Organising Committee for the next International Brachiopod Congress (to be held in Melbourne in early 2010), and I am on the Editorial Board for the international palaeontological journal

Alcheringa. I also try to combine my passion for the natural environment with travel; being a geologist, field trips to out of the way places are part of the territory, so that is not hard to do.

Jean-Claude Herremans, Secretary

I joined the Royal Zoological Society of NSW in March 1969 and became Librarian and Councillor in early 1980.

In February 1980, I joined the newly formed Australasian Arachnological Society, where I am now the librarian. Having collected quite a large number of publications relating to arachnids [+/- 15,000 items], the physical library, due to lack of space, was moved to the Queensland Museum where it is now being cared for by Dr Robert Raven.

As for the Linnean Society of NSW, I have been on Council since September 2001 and Secretary since May 2002.

And now, for something completely different, I collect books and CDs regarding Beethoven, Chopin. I also collect atlases and maps,

BOOK REVIEWS

KOALA: A historical biography
Ann Moyal,.(2008), 256 pp
CSIRO Publishing. Melbourne
ISBN 9780 64 309417
Price $39.95

The Koala has become an internationally recognized Australian icon, a face which launched thousands of items of tourist souvenir kitsch. Koala diplomacy, while not quite in the same league as panda diplomacy, has helped Australia cement its relationship with key trading partners.

This little book (while 256 pages are not insubstantial the format is small) attempts to explain how this popularity came about, and the challenges facing koalas in the future.

Koalas have a broad natural distribution in eastern Australia, but were not lined up on the shore at the commencement of European settlement. The first European record of the koala was made by Governor Hunter's servant, John Price, in his diary in 1798, but this information remained private for many years. The second record was by the Frenchman, Francis Barrallier, in 1802, and while this finding was forwarded, in French, to Joseph Banks by Governor King it was apparently not noticed by the scientific community. It was in the following year, 1803, fifteen years after the arrival of the First Fleet, that the existence of the Koala became more commonly known to the European community with, as reported in the *Sydney Gazette*, the capture of a female and two young. By September, 1803 Governor King was able to report to Joseph Banks on the capture of more specimens, although he commented that as the animal lived on an exclusive diet of leaves it would be difficult to send live animals to England. It was Governor King who commissioned the artist John Lewin to paint the koala, and it is Lewin's illustration of a female koala with young that was subsequently made into a print which appeared in a number of natural history books.

It is from this period that Moyal has uncovered a mystery. Robert Brown, the naturalist on Flinders' expedition is chiefly remembered as one of the greatest botanists to have worked in Australia. However, he also collected and documented a diversity of fauna. Amongst them was the koala, which was sketched by Ferdinand Bauer, the brilliant artist of the expedition and then dissected and described by Brown, Brown prepared a detailed taxonomic description of the koala in Latin (the then universal language for species description). Moyal provides what is probably the first translation of this description. This description differs from all other zoological notes prepared by Brown, where each extended to only a few lines, in its length and detail. If it had been published it would have been the type description, but instead it languished unknown amongst Brown's papers in the British Museum, only being noted by other zoologists in 1994. There is no obvious explanation as to why, having prepared such a detailed description, Brown did not publish it.

Moyal discusses various legends, which demonstrate that the Aborigines had a detailed knowledge of koalas, but my eyebrows rose at the discussion on p72 'There is now little doubt that for a while they (ie. Aborigines) co-existed with the modern descendants of dinosaurs and the argument persists, albeit with some contention, that their hunting skills made them key contributors to the extinction of the smaller dinosaurs.'

The appearance of koalas in literature, particularly children's books is documented, and Moyal argues convincingly that a major generator of the international affection for the koala was Bunyip Bluegum in Norman Lindsay's *The Magic Pudding* (although my own favourite amongst the images of koalas is the world weary social commentator of Patrick Cook's cartoons).

The now standard name, Koala derives from an indigenous name, but the range of names, and spellings, used by early settlers is illustrated. While the combination, koala bear, is etymologically an illegitimate hybrid, native bear, as was quite common in the nineteenth century, is more understandable given the external similarity of koalas to teddy bears, and the bear analogy is also reflected in the generic name *Phascolarctos*.

The slaughter of koalas for their fur is documented, as is the continuing threat from habitat loss and fragmentation, but the lesson from the early history of the European interaction is not explored. The long gap between the First Fleet arrival and the recording of the presence of koalas does not reflect incompetence on the part of the early naturalists but rather indicated the low nutrient state, even by Australian standards, of much of the Sydney region.

Koalas would have been absent from much of what is now Sydney, as they would have been for many other localities. Koalas would have been more abundant on more fertile soils, where the eucalypt foliage would be more nutrient rich (although still containing toxins). Prime koala habitat will not be extensive within the conservation estate. The conservation challenge is largely situated on private land or production forest, but this theme is not explored.

Early research on koalas is discussed, including the discovery of the remarkable digestive system, and the small size of the brain. The importance of koalas to Colin Mackenzies's research on the treatment of poliomyelitis is described – studies which are probably little known of today. A list of topics of recent research on koalas is given (p 193-194) but the findings and the significances of this research are not discussed.

There are many interesting stories in this book, but overall it is disappointing. There are various minor errors which should have been picked up during proof reading, and some alarming howlers (additional to the dinosaurs) and infelicities. For example, we learn (p104) that the Australian Museum zoologist Gerard Krefft was writing about koalas in the third decade of the nineteenth century (i.e. the 1820s) – Krefft was an outstanding scientist, poorly treated by the Museum trustees but not so precocious as to know about koalas before he was born in 1830! The society's editor will be surprised to discover that Wellington is in SW New South Wales; the 'line' as a unit of measurement was not half an inch, while the conservationist and zoologist A.J. Marshall was universally known as Jock, not Alan. Given the high reputation of both author and publisher, slips such as these are alarming.

Paul Adam

MOUND-BUILDERS, Australian Natural History Series
Darryl Jones, and Ann Göth, (2008)
CSIRO Publishing, Collingwood
ISBN: 9780643093454
AU$39.95

Did you know that the Australian Brush-turkey can shed its tail feathers when in danger to avoid being taken by a predator, much in the same way that many skinks can shed their tails? This is just one of the more interesting facts about the three Australian megapodes, birds whose unusual incubation and parenting methods shape much of their lives and their biology. This work offers a synopsis of the current and past knowledge of the three Australian megapode species - the Australian Brush-turkey, the Orange-footed Scrubfowl and the Malleefowl. Like many other megapodes, they build incubation mounds, and unlike a few others which use solar or geothermal heat.

Chapter 1 summarises the history of the megapodes in science, their 'discovery' by Europeans (since indigenous people were already well aware of them), and includes the legacy of the pioneering work of Harry Firth. Firth began studying Malleefowl in 1950 and continued for many years, culminating in the publication of his book "The Malleefowl: The bird that builds an incubator" in 1962. In many ways, the Malleefowl is an exception rather than a rule for megapodes. Chapter 2 briefly covers current taxonomy, distribution and habitat in a broad way for the family and the extra-Australian megapodes, introduces us to a few extinct megapodes, and then settles down to look at these aspects for each of the three extant Australian megapode species. Chapter 3 deals with appearance and ecology, with individual sections for each species on appearance and vocalisations and combined sections on food and feeding ecology, movements and general ecology, moulting and life-span.

Mound construction and maintenance are covered in detail in Chapter 4. Megapode mounds are amazing constructions, and not only for their sheer size and complexity; it's a lot more than just piling up leaf litter and occasionally moving it around. For Malleefowl, this is even more difficult given the semi-arid habitats in which these birds live since there is little moisture to aid in creating heat from decomposition, and as such the level of work involved in mound maintenance is staggering. The significant impacts of mound construction on the surrounding landscape are also discussed.

Chapter 5 covers egg-laying and development through to hatching and the special adaptations of megapode eggs, which includes their thin shells and lack of air cell. Incubation temperature influences the sex of the chicks, a phenomenon which is highly unusual for birds if not unheard of. Chapter 6 covers the life of the chicks, from hatching deep within the mound and their emergence, to their 'social' development in the absence of parental care, and their later development. The early stages of development are most unusual. Chapter 7 covers the social and reproductive behaviour of the adults, the different mating systems of the three species.

The final chapter looks at conservation and management issues for the three species. Historically all three species have been impacted by humans, significantly so in European times, although the Orange-footed Scrubfowl has suffered the least. Both Malleefowl and Australian Brush-turkeys were hunted heavily in early years of European settlement, and the Malleefowl has particularly suffered, now threatened and with a highly fragmented range. Australian Brush-turkeys on the other hand appear to be making some recovery after long years since hunting these birds has ceased. They are now conspicuous on urban fringes in Qld and central-coastal and north-coastal NSW, a recolonising of former areas, in addition to urban expansion, i.e. it is more likely that we are expanding into their range rather than vice versa.

The book strikes a good balance for a relatively short work. In a few instances, clarity could have been achieved with a little more information and some statements seem contradictory at face value. For example, the chicks do not breathe from an air bubble before hatching as other birds do, but begin breathing air after breaking the shell feet first, prior to which chorioallantois (inner egg membrane) provides their life support and oxygen. The whole topic of breathing is most interesting: the comparatively thin egg shells enable water and air exchange, but not breathing air directly. As to how other birds cope with thicker shells, this is not explained.

It is claimed that chicks need to be able to fly as soon as they emerge, but it is later noted that Malleefowl and Australian Brush-turkey chicks usually not fly during the first days. Some early works claims that megapodes can fly upon hatching, but in fact the birds hatch underground, and often spend around 2 days before finally reaching the surface, so even if they do fly upon emergence this is not the same as flying immediately after hatching; regardless such early flight is remarkable in such young birds.

Quibbles aside, overall it is a good read, well written in an informative yet easy to read style and on the whole the synopsis is sound and informative. It would make a good reference and resource, and I would recommend it to anyone.

Frank Hemmings

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 22 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/ PROF. LIZ HARRY

Institute for the Biotechnology of Infectious Diseases
University of Technology, Sydney (UTS)

NO DRUGS FOR BAD BUGS: THE EVOLUTIONARY ARMS RACE

Heralded as one of the most important advances in medicine was the discovery and large-scale production of antibiotics for the treatment of bacterial infections in 1940s. It has saved thousands of lives. Yet this miracle discovery is now threatening to be a worst nightmare due to the resistance of bacteria to many antibiotics curently used. This is not just a problem in hospitals but also in the community, where antibiotic resistant bacterial infections are now occurring. Treatment for infectious disease is now not certain and the hunt for new and effective drugs in the fight against antibiotic resistance is urgent. In this lecture Liz Harry scopes the enormity of drug resistance in bacteria today by exploring the biology of antibiotic resistance in these organisms, and how we can use this to find solutions to reduce it.

Wednesday 20 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

LINNEAN MACLEAY MEMORIAL LECTURE

Prof. TONY LARKUM

School of Biological Sciences University of Sydney

THE MAN WHO INTRODUCED DARWIN TO BEETLES

One of the most important biographical sources for the life of Charles Darwin are the letters between Darwin and his cousin, William Darwin Fox.

In addition we now have the diaries of W.D. Fox, which have never been accessed before. Since Darwin and Fox were undergraduates together at Christ's College, Cambridge, and corresponded with each other for the rest of their lives, dying within two years of each other, the letters and diaries allow us a vivid insight into the unique relationship of these two naturalists and family friends.

Both were studying to be clergymen of the Church of England when Darwin was offered a place on The Beagle. Thereafter their lives diverged, as Fox became the country parson that Darwin might have been. Nevertheless, Fox supplied many facts to Darwin, which were used in the 'Origin of Species' and later books. The views and opinions exchanged between these two men greatly enlarge our appreciation of the life and contribution of Charles Darwin at a profoundly personal level.

Tony Larkum's book on this subject comes out in April, entitled "A Natural calling".

Wednesday 22 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. DES COOPER

School of Biological, Environmental and Earth Sciences
University of New South Wales

THE GENETICS OF HUMAN MALE HOMOSEXUALITY: WHY TWO ARCHBISHOPS AND THE POPE ARE WRONG

Homosexual behavior is widespread throughout mammals. Male human homosexuality occurs in most human ethnic groups. In Western societies, the frequency is about 2-5%. In some groups, and periods of history, it has been tolerated, while in others, the behaviour has led to ferocious persecution. Homophobia persists. Modern scientific studies have established firmly that homosexual inclinations have a strong genetic component. This leads to my first question. Why does a genetic trait which presumably reduces fertility on its bearer remain at such a relatively high incidence in so many populations? The mapping of the of the human genome has begun to allow this question to be more precisely analysed. My second question is also fundamental. Why do so many religious groups spend so much effort in denouncing homosexual behaviour when it is clear that overpopulation which results from unchecked heterosexual behaviour is the central problem facing our species?

WIne and cheese will be served from 5.30

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 132 **JULY 2009**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER
Correction to page 1 of the Report of Society's affairs for 2008

ERRORS IN THE REPORT OF THE SOCIETY'S AFFAIRS FOR 2008

There are some error on the first page of the Report of the Society's Affairs for 2008. The corrected first page is included with this newsletter and if you stick it over the first page of the report circulated with the April newsletter, you will have a correct copy.

CENTENARY OF WOMEN MEMBERS

Women were admitted as full Members to the Society for the first time in 1909, exactly one hundred years ago. They were admitted as Associate Members in 1885, but they could not attend meetings and were denied the vote.

DONATIONS TO THE SCIENTIFIC RESEARCH GRANTS

A total of $1,912 donations to the Scientific Research Funds has been received. Prof. C. Chambers, D. Cole, M. Cotton, Dr. D.S. Horning, Dr. A.O. Nicholls, W. Semple, Dr. L, Winsor and Anonymous contributed to the Joyce. W. Vickery Scientific Research Fund. J.M Anderson, and W.B.K. Holmes contributed to the Betty Mayne Scientific Research Fund.

We thank our donors and their assistance with funds is much appreciated.

AWARD FROM THE BETTY MAYNE SCIENTIFIC RESAEARCH FUND

Only one application was received

Yong Yi Zhen, Palaeontology Section, Australian Museum
PROJECT: Late Ordovician conodont biostratigraphy and paleogeography of northeastern Gondwana.

Two important Late Ordovician conodont faunas from Queensland will be documented: 1) the Fork Lagoons Beds, Emerald area, central Qld, and 2) the Carriers Well Formation and other Upper Ordovician units in the Broken River region of north Qld. Both faunas require extensive systematic revision in order to fully determine their age ranges and biogeographic relationships.

From earlier work, both Queensland faunas appear to be late Katian in age and partially comparable with conodonts from the Malongulli Formation and the basal part of the Malachis Hill Formation in central New South Wales. However possible occurrence of *Amorphognathus ordovicicus* in the Queensland faunas suggested that they may extend well into the Hirnantian (latest Ordovician). If so, these will be the youngest Ordovician conodont faunas known from eastern Australia, and thus will infill crucial gaps in the conodont biostratigraphic successions of this region, and enable a better understanding of the Ordovician biogeographic affinities of northeast Gondwana. Awarded $1,500

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

There were only six application to the Joyce Vickery Scientific Research Fund.

BARRY, Katherine. Department of Biological Sciences, Macquarie University.
PROJECT: Examination of female pheromone use in a sexually cannibalistic praying mantid (*Pseudomantis albofimbriata*).

Previous work has shown that male mantids have the morphological capabilities to detect chemical signals and sense hidden females. This work aims to confirm the presence of a chemical signalling system in this species by determining the composition of volatile chemicals (presumed airborne pheromones) sampled in the females' headspace. Awarded $1500.

COOPER, Endymion. School of Biological Sciences, University of Sydney.

PROJECT: Systematics of the Lepidoziaceae: understanding relationships, biogeography and morphological evolution in this a hyper-diverse family of hepatics.

A liverwort family showing an unusually high variability in gametophyte morphology -- previous morphological studies have resulted in widely differing classifications. This work involves a molecular study of the Lepidozioideae, including all Australian taxa and a range of exotic exemplars, and aims to provide a subfamily phylogeny that will form the basis of a revision of generic and subgeneric boundaries. Awarded $1400.

MOULDS, Max. Australian Museum (retired).
PROJECT: Review of the genera of Australian cicadas (Hemiptera: Cicadoidea).
This is a major revision of the Australian genera that will establish a new classification based upon cladistic analyses of morphological and molecular data. Awarded $1365.

SOLEY, Fernando. Department of Brain, Behaviour and Evolution, Macquarie University.
PROJECT. Araneophagic behaviour of the reduviid bug, *Stenolemus giraffa*.
This behavioural study of a bizarrely elongated reduviid bug will examine the adaptive significance of behaviour and morphology that enable it to invade different types of spider webs and capture the resident spider. Awarded $1200.

WILSON, Trevor. School of Biological Sciences, University of Sydney.
PROJECT. How have pollinators shaped the diverse floral morphology of *Prostanthera* (Lamiaceae)?
A phylogeny of 60 *Prostanthera* spp. has been prepared that includes representatives of major pollination syndromes and geographical areas. The work proposed will better resolve this phylogeny by including species from arid habitats of unknown relationships. Examination of pollination in *Prostanthera* in an evolutionary context will assist in understanding how pollination has evolved in the Australian flora. Awarded $1000.

NO DRUGS FOR BAD BUGS: THE EVOLUTIONARY ARMS RACE: A talk by A/Prof. Liz Harry.

Bacteria cannot be seen with the naked eye but when view under the electron microscope, they are seen to be small cells. The largest, however, is about 1 mm long and it lives in the gut of fish. Bacteria are mostly ignored, but they are everywhere. There are more bacteria on the hand than people in the world. Most bacteria are good and we could not live without some of them. There are more bacteria than cells in the body and some of them in the gut produce vitamins. If we take antibiotics, they kill off the good and the bad bugs, and then we take probiotics to re-establish the good bugs in the gut. Most bacteria can grow very fast and reproduce in about 20 mins, which is good for studying them. The slowest, however, live on the sea floor and take 300 years to reproduce!

One of the worst is tuberculosis (TB), which kills 2-3 million people in the world each year. When people have HIV (aids, a virus) it is TB that usually kills them. HIV and TB work together. Anthrax requires direct contact for infection. Cholera can be picked up from food and water. While we cannot see much structure, we know quite a bit about their molecular workings. Bacteria first attach to the host and enter the body through any break in the skin. They then colonize the host tissue and produce toxins that can alter the function or perceptions of the cells.

The discovery of antibiotics was accidental. Alexander Fleming was growing bacteria which were allowed to grow for only a few days. With the weekend and a holiday interrupting the program, the plates were left for a much longer time. When they were examined, there was a

fungal mould growing in the plates and around the fungus, a clear zone which meant that the fungus produced a substance that killed bacteria. Howard Florey proved the antibacterial properties of the substance that we now know as penicillin.

Antibiotics are usually small molecules which target larger molecules in the bacteria and disrupt some vital function. Resistance to antibiotics began almost as soon as we started using them, but we kept on using them. As new antibiotics came into use, resistance to them started almost immediately. This is because bacteria are used to antibiotics, they are there in the environment. The big drug companies are not doing much about antibiotic resistance because they make more money out of something like Viagra.

Bacteria use three methods to deal with antibiotics: (1) they can make an enzyme to counteract the antibiotics. (2) they can pump out the antibiotic and (3) they can change the permeability of the cell and keep out the antibiotic. The genes for resistance are quite mobile. The bacterial DNA is circular and is carried on a plasmid which may be released into the environment and is then taken up by other bacteria. There may be horizontal transfer from one bacterial cell to another and this is very quick. The resistant strain is usually present in very low numbers, but when we take an antibiotic, it kills off all the susceptible bacteria, leaving the resistant ones and their numbers then rapidly increase. There is more than one gene for resistance. Vancomycin is the last line of antibiotics but it does not always work.

There is more antibiotic resistance in hospitals but it is now coming out into the community. With animals, growth promoters are antibiotics and if the use of growth promoters is stopped, then resistance usually goes down, but some resistance remains the same.

What can we do about it? The old fashion methods work: wash hands, isolate anyone with an infection, especially in hospitals, and when the infection is not bacterial, don't use antibiotics. And don't use antibiotics in agriculture.

Antibiotics work on bacteria in four ways: (1) they inhibit cell wall formation, (2) inhibit protein synthesis, (3) inhibit DNA and RNA production and (4) interupt the foliate mechanism. Most antibiotics inhibit only bacterial processes and humans are not affected. We need new antibiotics and we need to use less of them.

Bacteria are organized into biofilms which are attached to surfaces. The cells grow, congregate and 'talk' to each other within the biofilm and behave like a multicellular organism. The cells in a biofilm are not susceptible to antibiotics but the biofilm releases single cells that are attacked by the antibiotics. 80% of chronic wounds are persistent biofilms. Honey is used as an anti-infecting and healing agent and it works by disrupting the biofilms. Manuka or Medihoney is the best for wounds and burns. Antibiotic resistance to honey cannot be developed in the lab. Prof. Harries is studying how honey disrupts the biofilms. Honey is a mixture of different substances which probably work together.

A question was asked: can we use biological control on bacteria? The answer is Yes: there are viruses that target bacteria, called bacteriophages. The right virus for the bacterial infection is selected from the strains available. The Russians have used this technique.

LINNEAN MACLEAY MEMORIAL LECTURE

given by Professor Tony Larkum
School of Biological Sciences
University of Sydney

THE MAN WHO INTRODUCED DARWIN TO BEETLES

The man who introduced Darwin to beetles was his second cousin William Darwin Fox. He and Charles Darwin became great friends while they were undergraduates together in Christ's

College, Cambridge, in the late 1820s. William Darwin Fox not only introduced Darwin to beetles but also to John Stevens Henslow, Professor of Botany. Henslow and Darwin kept company together to the extent that Darwin became known as "the man who walks with Henslow". It was Henslow who recommended Darwin as a candidate for naturalist on the voyage of the Beagle.

Tony Larkum has had a long-standing interest in Darwin. Darwin's letters to Fox were found in Christ's College in the early 1980s and were drawn to Tony's attention. He has continued to work on them ever since as well as on the diaries of the two men and, where they could be traced, the letters of Fox to Darwin. The letters cover the period from when they were undergraduates to close to their deaths; Fox died in 1880 and Darwin in 1882. Tony's labours on the letters and diaries of the two men are about to result in the publication of a book "A Natural Calling: the Letters and Diaries of Charles Darwin and William Darwin Fox".

In his lecture, Tony not only gave us histories of the two as revealed by their letters and diaries, but also a feel for the ways each wrote their letters; Darwin's were smooth, very readable, full of interesting information and ending with great personal warmth for Fox, while Fox's were stilted and slow to get to the point. Nevertheless, their correspondence was obviously a solace to each of them as they met vicissitudes of life, not least problems of their large families, including deaths of much loved children. There was also an exchange of scientific information with Fox supplying Darwin with results of his breeding of animals on his farm. Fox was also a clergyman with his own parish. In writing "The Origin of Species" and some of his other books, Darwin used information Fox had sent him.

The picture emerges of two well connected country gentlemen and their families, similar to those in Jane Austen's books. One, Darwin, emerges as a scientific giant, the other, Fox, as a country parson and farmer of no great prominence. Yet their lives were intertwined both emotionally and scientifically over a period of fifty years.

Thank you, Tony, for bringing us this picture of the two men, and for reverting to your days in Cambridge to reach us by bicycle on a thoroughly wet and windy night when motorised traffic was almost at a standstill. How, after that, you managed to appear so dapper and composed, delighting us with your lecture, was a marvel to us all.

Peter Myerscough

BOOK REVIEW: FEATHERED DINOSAURS - THE ORIGIN OF BIRDS

By John Long and Peter Schouten, Forward by Luis M. Chiappe
Published in 2008 by CSIRO Publishing, Collingwood;.
Hardback, 208 pp. Price AU$49.95

The proposal that birds originated from theropod dinosaurs is now accepted by most palaeontologists, with few dissenters. Remarkable discoveries over the past decade – mainly from China - include several well-preserved fossils of feathered theropods as well as herbivorous ornithischian dinosaurs with bristle-like structures (*Tianyulong* and *Psittacosaurus*). Until now, however, no one has attempted to visualize this remarkable radiation. *Feathered Dinosaurs*, by John Long and Peter Schouten, fills this void admirably.

Feathered Dinosaurs, from CSIRO Publishing, is a collaborative effort by one of Australia's foremost vertebrate palaeontologists, John Long of Museum Victoria, and one of Australia's most respected illustrators, Peter Schouten, internationally recognized for his many contributions to the art of scientific and wildlife illustration. The forward is written by Luis Chiappe, one of the leading researchers in the field. The result is a highly readable, beautifully illustrated book that is a must-have for bibliophiles.

The book is organized into two sections. The first part is an overview of the debate over avian origins and the transition from coelurosaurian theropods (advanced theropods that include

the most bird-like of the non-avian dinosaurs as well as the fearsome *T. rex*) to birds (known to palaeontologists as 'avian theropods'). Each coelurosaurian group is given a chapter, as are the earliest birds, setting the stage for the species accounts that follow. The rest of the book – a substantial part of the work - is dedicated to illustrated species accounts of non-avian theropods and early birds either known to have been feathered or that can be assumed to have had feathers during at least some part of their lives because of their phylogenetic relationships to feathered species. The species accounts by Long are well-written and provide information on discoveries, anatomy and relationships in a nutshell. Schouten provides an 'Artist's note' for each account, explaining the decisions he made in reconstructing these animals from the information available in the fossil record.

It is the reconstructions of the feathered taxa that make this book such a prize-winner. Peter Schouten, rightly credited as one of the authors, has produced a remarkable set of illustrated reconstructions that reflect a fine eye for anatomical detail with a flair for composition. Colours, probable feather coverings (as insulation or display), possible behaviours and reconstruction of environments have all been meticulously researched. Where little is known of the animal but the skull, Schouten opts for a portrait of the head rather than a 'guesstimate' of what the rest of the animal may have looked like, a wise decision given the unexpected appearance of the body forms of such coelurosaurians as the bizarre therizinosaurs (included in the book).

I highly recommend *Feathered Dinosaurs* to anyone interested in vertebrate history, the origins of birds, and in fact all things dinosaurian (the illustrations and short species accounts make this book accessible to even younger readers with an interest in dinosaurology).

Anne M. Musser

BOOK REVIEW: GREAT WHALES. Australian Natural History series
By John Bannister
Published in 2008 by CSIRO Publishing, Collingwood
Paperback, 160 pages, Price AU$ 39.95

John Bannister, a leading international marine mammalogist, has produced a fascinating and readable account of the world's largest mammals. This book provides a detailed account of these extraordinary and fascinating creatures for the interested layperson along with material for the expert.

The book covers a range of areas from the biology, conservation issues and future concerns for the great whales, the blue, fin, sei, Bryde's, minke, humpback, southern right and sperm whale. It describes structure and biology of each species along with their highly specialized mammalian structure and physiology.

It includes the history of people's association with these huge mammals, at first through legend and wonder, then whaling, and more recently whale watching. Along with the history of people's association with them, conservation issues both past and present are considered.

Tracey Rogers

LINNEAN SOCIETY OF NEW SOUTH WALES

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PROGRAMME

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Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. DES COOPER

School of Biological, Environmental and Earth Sciences
University of New South Wales

THE GENETICS OF HUMAN MALE HOMOSEXUALITY: WHY TWO ARCHBISHOPS AND THE POPE ARE WRONG

Homosexual behavior is widespread throughout mammals. Male human homosexuality occurs in most human ethnic groups. In Western societies, the frequency is about 2-5%. In some groups, and periods of history, it has been tolerated, while in others, the behaviour has led to ferocious persecution. Homophobia persists. Modern scientific studies have established firmly that homosexual inclinations have a strong genetic component. This leads to my first question. Why does a genetic trait which presumably reduces fertility on its bearer remain at such a relatively high incidence in so many populations? The mapping of the of the human genome has begun to allow this question to be more precisely analysed. My second question is also fundamental. Why do so many religious groups spend so much effort in denouncing homosexual behaviour when it is clear that overpopulation which results from unchecked heterosexual behaviour is the central problem facing our species?

Wednesday16 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. BRYCE KELLY

School of Biological, Environmental and Earth Sciences
University of New South Wales

RIVER AND AQUIFER INTERACTION IN THE NAMOI CATCHMENT

Groundwater has been used for irrigating crops in large volumes in the Namoi Catchment since the 1960s. Use of the resource has had a significant impact on where and how water moves between the rivers and the aquifers. This presentation will highlight the research being undertaken by the Connected Waters Initiative at the University of NSW to enhance our knowledge regarding coupled surface and ground water processes. Three dimensional spatial and temporal analyses of the historical groundwater monitoring data have improved our conceptualisation of the hydraulic connections in the aquifers. The dynamics of water movement vary substantially throughout the catchment. In some reaches there is a strong link between the prevailing climatic conditions, streamflow and groundwater levels. In other portions of the catchment it can be demonstrated that the aquifers are poorly connected to the Namoi River. Methods being developed in the Namoi Catchment are transferable to other catchments, and should lead to improved water management throughout the Murray-Darling Basin.

Wednesday 21 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. MARGARET TURTON

Environmental Consultant

THE FRATERNITY OF MATERNITY – MONITORING A BAT MATERNITY COLONY.

Little is known about the ecology of white-striped freetail-bats (*Tadarida australis*), in Australia, and less about the specific breeding and maternity behaviour of the species. This long-term study is monitoring a maternity colony of white-striped freetail-bats located within a building in Sydney. White-striped freetail-bats usually roost in tree hollows, and this maternity roost is the only known colony of white-striped free-tailed bats located within a building in Australia.

This study has the potential to substantially increase the existing knowledge of the White-striped freetail-bat (*Tadarida australis*) in Australia. In particular, knowledge of the species' behaviour during the reproductive season, the variation of calls within the species, observations of when and where atypical calls are recorded and the preferred microclimate of maternity roost sites.

Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 133 **OCTOBER 2009**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER
Symposium on Geodivdrsity, Geological Heritage and Geotourism

MEMBERSHIP

We welcome our new members:
Mr. Michael J. Elgey, with special interest in botany and ecology
Ms Margaret L. Stimpson, with special interest in Proteaceae
Mr. David Lane, with special interest in the biology and taxoonomy of Satumiidae (Lepidoptera)
Mr. Patrick W. Medway, with special interest in wildlife preservation and ornithology.

DONATION TO THE JOOYCE VICKERY SCIENTIFIC RESEARCH FUND

Another anonymous donation to the Joyce Vickery Fund has been received, taking the total of donations this year to $2,012. Our thanks to the donor: it is much appreciated.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS.

The closing date for applications to the Joyce W. Vickery Scientific Research Fund and the Betty Mayne Scientific Research Fund is now the first of March, 2010. For further information, visit our web site at : linnsoc@iinet.net.au

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2009. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 14 November 2009

SYMPOSIUM ON GEODIVERSITY, GEOLOGICAL HERITAGE and GEOTOURISM

This symposium looks the interest and use of geology by the wider community. It will be of interest to geologists, biologists, policy officers, planners and conservation manager, researchers and teachers, geotourism mangers and operators, local government representatives and representatives of interest groups.

This symposium will be held on September 6-10, 2010. For further information, see the article .enclosed with this newsletter

THE GENETICS OF MALE HOMOSEXUALITY: WHY TWO ARCHBISHOPS AND THE POPE ARE WRONG: a talk by Prof. Des Cooper.

Why is male homosexuality so prevalent? Behavior that prevents reproduction should be selected out. Homosexuality in farm animals is well known and it occurs in native animals as well. Koalas are prone to homosexuality and it is known in dunnarts, male and female flying foxes and swans as well. It is common in mammals and birds.

The frequency of homosexuality is about 2-5% in Western societies. A number of genes are involved and for males, heritability is about 30% and in females, 60%. There are different types of homosexuality, depending on definition, making it difficult to investigate. The distribution of male homosexuality is bimodal, i.e. they tend to be either hetero- or homo-sexual, with not many in between. The distribution of female homosexuality is unimodal, i.e. not many at the extremes with most in the middle. More genes are involved in female homosexuality than for male homosexuality and they are quite different. The prevalence of homosexuality remains much the same over the generations.

Homosexuality may be studied using twins, but twins in families tend to be treated the same way, hence the genetic influence is not easily distinguished from the environmental. A study of pedigrees suggests that homosexuality is inherited through the female line and it looks like it is X-linked. Other tests, using attraction, fantasy and self identification may be employed.

Humans are very curious sexually. They have speech and are the only animal with speech. Birds communicate well but they do not have speech. The male has a relatively large penis and testes. and the female relatively large breasts. Humans are receptive the whole time, but they have low fecundity. Animals almost always get pregnant after mating: not so humans. Humans look after their babies for their offspring represents a large investment. Studies of human sexuality are tricky, especially in America. and people are suspicious that they the information could be used against them.

Male homosexuals tend to be later borne and they have older brothers. An Italian study showed the characteristic to be X-linked and it makes females fitter and males less fit. It is an androphilia ('male-loving') characteristic. The females with the characteristic tend to be more dominant and have larger families, whereas the males, if they have the characteristic, tend to be more passive and less fit, especially with regards to reproduction. This characteristic in the females is probably the reason why the relatively high frequency in the population is maintained.

Homophobia, a strong prejudice of homosexuals is common in males, but very few females are intolerant of homosexuality. The churches have institutionalised homophobia. Homosexuality is not a threat, but unbridled heterosexuality contributes to overpopulation, which is becoming serious. In 1804, the world's population was 1 million. By 1927, it was 2 million and in 1960, 3 million. In 1974, it had climbed to 4 million, and 1987, 5 million. By 1999, it was 6 million, and by 20011, it should be 7 million.

More studies about sexuality are needed and the few that we have, have all been done on Western societies. It may be that homophobic behavior is genetic. In animals, homosexual behavior may be transient and when given the chance, they will behave heterosexually and mate with the females. Bulls in one paddock may gang up on the least 'bullish' of the bulls. A dominant cow might be have homosexually to enforce her dominance. Do animals have a strong preference for homosexual behavior?

BOOK REVIEWS

THE COMPLETE FIELD GUIDE TO STICK AND LEAF INSECTS OF AUSTRALIA

By Paul D. Brock and Jack W. Hasenpusch. 2009.

CSIRO Publishing, Collingwood, 2009
Paperback, 216 pages. Price AU$44.95
ISBN:9780643094185

As an arachnologist with an interest in all things small and neglected, I was keen to see this new guide. I frequently find stick insects when out hunting spiders but have never had the time to try to find out more about them. This is my chance!

Starting with a foreword by a noted entomologist such as David Rentz immediately bodes well for what follows. David stresses the enormous contribution that studying live animals rather than only dead museum specimens can make to our knowledge. This is the key aspect of this book – pinned specimens are only illustrated where necessary and precedence is given to good photographs of "sticks" in the field. The book's authors both have a wealth of practical experience. Paul Brock has worked on the world phasmid fauna for many years and has made several trips to Australia to collect and study these insects. He has published many books and papers and is actively involved with entomological societies and the Phasmid Study Group. Jack Hasenpusch is an Australian entomologist with many years experience collecting and raising Australian insects. He is the Director of the Australian Insect Farm in NE Queensland, supplying insects for educational purposes, butterfly houses and research.

The introduction provides plenty of background information as well as introducing the anatomy and morphology of the various stages (egg, nymph, adult). This is followed by chapters on "habitat and ecology" and "collecting, preserving, photographing and rearing". I felt these sections were mostly well balanced, providing the basics, including some history, whilst not overloading novice readers. However, it might have been a good idea to give some more references to further information because here and there in the collecting and preserving sections I was left with the distinct impression that I might not have comprehended the instructions if I hadn't known already. Most important, I could not find any discussion on the need for good specimen data and what information should be recorded as a minimum. Whilst this may seem rather trivial, any researcher who has worked with old types will tell you about the problems that arise from missing labels or partial information (an example in this book are specimens with no, or ambiguous, country of collection!), and if you have ever taken a group of new volunteers into the field you will know how many and varied ways an instruction can be interpreted.

On to the taxonomic parts, and, as the authors are first to admit, this book is far from a complete inventory. But that is not a criticism, rather a call to arms, because this shows how little we really know about our invertebrate fauna. If you consider that stick insects are some of the larger and more popular invertebrates and only an estimated 1/2 to 2/3 of Australian species are described (101 species at the time of this book) think about what this means for everything else. In spiders for example, the group I work on, about one third of the estimated 10,000 Australian species are known. In general, the smaller the animals are in physical size, the smaller the proportion of species is described.

This book aims to reach a wide audience and tries to avoid getting too technical or the use of very small features for identification. It may be just due to what I am used to, but personally I am a bit dubious as to the usefulness of the keys for an initial identification. Two entomologist colleagues tell me these keys worked fine for them (of course they have a reasonable idea to start with) but I really struggled. To be fair, in this case it hardly matters, as the photographs and species distribution maps give a good idea of what is likely. Once you have narrowed it down then the keys will help check important characters to finalise your identification.

My gripe about the key is minor - do not let it put you off buying this book. The photographs are useful, many are excellent, and eggs are shown where known – a detail often missing when only museum specimens can be examined for a work. Although in general I dislike the invention of common names when they can lead to so much confusion, here I did particularly like the fact that the authors force the reader to use scientific names in the index. Yes, there is an index of common names, but it cross references to the scientific name, not the page number. This is an excellent way of familiarising users with the scientific names, which are otherwise all too easy to ignore when common names are so much easier to memorise.

Overall I think the best thing about this book for me is that it exists at all! As I commented earlier, any book on Australian phasmids is by definition a work in progress and there are real discoveries to be made just about anywhere in Australia. This easily portable and accessible guide has to be an excellent way to encourage rapid advances in our knowledge, and there is no better way to reward the authors for their work than to demand a second edition in a few years time to present all the new knowledge that will be generated by this one.

Helen Smith

BOOM AND BUST: BIRD STORIES FOR A DRY COUNTRY
L .Robin, R. Heinsholm and L. Joseph (Eds.)
CSIRO Publishing. March 2009
Hardback, 312 pages. Price AU$39.95
ISBN: 9780643096066

This very interesting book is concerned with the classic Australian ecological pattern of 'boom and bust". As such, it makes a timely contribution to the debate concerning the effects of climate change on arid Australia, especially now that Lake Eyre is filling for the first time in many years. There are several themes, but the principal ones are adaptation to arid environments, in both the short and long term, and the effects man-made changes might have on future environments.

The book comprises 12 chapters written by researchers and experts in various fields, for example, behavioural ecology, history, archaeology and palaeoecology. The common thread is that all chapters are about birds and how they are adapted to survive in arid environments where resources, especially water, are highly variable temporily, spatially and in magnitude. A wide range of species is covered, including the Black-tailed Native-hen, the Emu, the extinct *Genyornis,* the Zebra Finch, the Australian Pelican and the Budgerigar, in order to show how each is (or was) adapted in its own way to a highly variable environment.

Questions investigated include those adaptations which allow bird species not only to survive but to thrive in boom/bust situations, and how birds on the coast know when conditions in the inland are right for breeding. Pelicans, for instance, have to know when fish populations have built up to a sufficient extent.

Of particular importance are the chapters which discuss bird populations under ecological stress and the possible relevance of these situations to human populations. In this regard the chapter on White-winged Choughs is especially instructive, as is the story of *Genyornis,* which apparently was unable to cope with the effects of a period of rapid climatic change when this coincided with the added pressure of the first human invasion of Australia about 45-55,000 years ago.

The book is written for the educated layperson. It mostly avoids jargon, and is written in straightforward English. Chapters are copiously referenced, and major references are contained in the Select Bibliography, so that anyone interested can easily follow up on a particular theme.

There are few production errors. I found a small number of typos, and only one reference for which the footnote number was missing in the text. There is one sentence that ends partway through, and was probably meant to have been fully deleted. In the text the Rabbit Proof Fence #2 is said to lie to the west of Albany but the associated map shows the position of the fence well to the east. Disappointingly for me, there is a reference to "birds and animals", a personal bugbear for one trained in zoology.

These faults, however, are minor. I highly recommend this book. It will appeal to a wide variety of readers. Anyone interested in such topics as Australian desert birds, how they are adapted to their harsh environment, and the effects of climate change, now and in the future, will find much to engage that interest.

David Hair

FIELD GUIDE TO THE FROGS OF AUSTRALIA
By Michael J. Tyler and Frank Knight
Published in 2009 by CSIRO Publishing, Collingwood
Soft Cover, 188 pages. Price $49.95.
ISBN: 9780643092440

As Australia's frog fauna becomes better known and more species are described, new field guides emerge to reflect this change in knowledge of the group of animals. Tyler and Knight have produced the latest compilation of the frog fauna of Australia in a handy, modest –sized book. The book covers 227 native species and is remarkably up-to-date (only one new species has been described since its production). The authors have also taken the trouble of including a number of exotic species, reflecting the increase number of accidental immigrants that arrive in Australia in back packs, shipping containers, air freight or other transported goods.

Unlike other recent field guides, Tyler and Knight have moved away from a totally photograph-based approach to the identification of frogs. They have done this for two reasons firstly, the number of frog species has increased to a point where photographic guides were becoming too cumbersome to be used as reference books in the field, and secondly, many of the newly described species are cryptic or sister species to other previously-described species. As a result there are a number of species that are superficially very similar in appearance. To help resolve this difficulty, the authors have opted to depict each species by colour painting with each frog in the same pose and positioned on the same page as the sister species. This makes comparisons between similar species much easier.

There is a disadvantage in using paintings of frogs in set poses as the sole reference medium: the paintings do not convey a sense of the typical stance or body set of each species. Furthermore, as this is an identification guide, the colour and marking differences between species have been slightly enhanced to demonstrate differences. For a frog officianado, these artistic manipulations of the frog are offputting. In addition, in an attempt to establish the frogs in the same pose, each frog painting is the same size and so no sense of the real size of each animal is conveyed. In photographs, the background usually provides a reference point and frog size can be inferred.

Frank Knight is probably best known for his bird paintings although he has illustrated other animals in various publications. In preparing the paintings for this field guide, he has had to depict a generalised version of the species, albeit with enhanced colour markings. In fairness to the author and artist, the purpose of the field guide is not to present an exact replica of the frog, but to depict and emphasise useful identification characteristics. To this end, Frank has done an admirable job.

Frog body colouration is always a vexed issue with field guides. As frogs change their colour with temperature, age, season and mood, depicting a frog in a single image can be very misleading. Tyler and Knight indicate the range of colour variations or geographic variations that can occur for a few species (mainly those that have distinctive colour forms). I see this as a major short coming in any field guide. Frog colour can change so radically that single depictions of a species can be of limited or no use.

Finally, there are some errors and omissions in this field guide. For example, *Litoria barringtonensis* is described as only occurring around the Barrington Mountain Range when this species occurs much further north along the eastern coast and ranges of New South Wales; in *Litoria nudidigitus*, they report that the call is unknown; this is incorrect and the call is available on commercial CD; the groin colour depicted for *Litoria brevipalmata* is incorrect.

Overall, the field guide is very useful, especially for the general naturalist who needs to make a quick identification of a recently seen frog.

Arthur White

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 21 October, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. MARGARET TURTON

Environmental Consultant

THE FRATERNITY OF MATERNITY – MONITORING A BAT MATERNITY COLONY.

Little is known about the ecology of white-striped freetail-bats (*Tadarida australis*), in Australia, and less about the specific breeding and maternity behaviour of the species. This long-term study is monitoring a maternity colony of white-striped freetail-bats located within a building in Sydney. White-striped freetail-bats usually roost in tree hollows, and this maternity roost is the only known colony of white-striped free-tailed bats located within a building in Australia.
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Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

The LINNEAN SOCIETY OF NEW SOUTH WALES
(in association with **Industry and Investment NSW** and
the **Department of Climate Change, Environment and Water NSW**)

presents

A SYMPOSIUM ON GEODIVERSITY, GEOLOGICAL HERITAGE and GEOTOURISM

Sea Acres Nature Reserve, Port Macquarie NSW
September 6-10, 2010

Preliminary Notice and Call for Expressions of Interest

Geodiversity encompasses the natural variety of geological features including rocks, minerals and fossils, and the landforms and soils derived from these by weathering and erosion. Geodiversity is important in understanding the way in which many of the Earth's systems and processes are interrelated.

Geoheritage describes features of geodiversity that hold special meaning to people, be they individuals, communities or scientific and cultural groups. Such features can be unique or representative, and are usually sufficiently significant to be nominated and conserved on State and Federal heritage registers. Examples include volcanic landscapes of Mt Warning, Kaputar and Warrumbungles National Parks, and the ancient cave system at the Jenolan Karst Conservation Reserve.

Geotourism is a form of special interest ecotourism, based on geology and geomorphology, that developed in Europe from the 1990s onwards. Geotourism will assume growing importance to regional areas as recognition of geodiversity increases to the level of community interest in floral and faunal diversity (which depend to varying extents on the geological environment).

Potential Themes:

1. Geodiversity as a conservation concept

2. Geodiversity and industry

3, Geodiversity in NSW Parks – underpinning our biological diversity

4. Towards consensus in geodiversity policy – a multi-agency approach

5. Geotourism – origins, sustainability, current and future potential

6. Geoheritage – extent, type and significance of NSW geoheritage sites, comparison with other states

7. Geoconservation – past, current and future initiatives

8. Geobotany – using the distribution of plant communities to assist mapping and mineral exploration

Venue:
The Symposium will be held at Sea Acres Nature Reserve near Port Macquarie, which is administered by DECCW. The conference room within the Visitor Centre can hold an audience of 55-60.

Sea Acres Nature Reserve is significant for its littoral rainforest, abundance of wildlife and extensive boardwalk network, and is located approximately 4 kilometres south of the Port Macquarie CBD.

Location:
Port Macquarie is 4.5 hours drive north from Sydney along the F3 Freeway and Pacific Highway, and 7 hours drive south from Brisbane. It is also easily accessible from the New England region via the Oxley Highway. Three XPT trains run daily from Sydney to Port Macquarie, which also has a busy regional airport with regular services provided by all major domestic airlines.

Accommodation:
Port Macquarie boasts a wide range of accommodation options catering to all budgets. All are just a short drive from the Symposium venue.

The cost of accommodation is not included in the registration fee. Accommodation can be booked directly with individual establishments, or through the Port Macquarie Visitor Centre.

Preliminary schedule:
The Symposium will run for five days and include three days of talks and poster presentations, alternating with two full days of field excursions.

The first field excursion will examine the coastal geology and geomorphology of the Port Macquarie region, with attention to the geological features that have been the subject of recent mapping and published studies.

The second field excursion will head inland to examine the landscapes and landforms of the Kempsey area (including the Macleay karst arc) before making its way to South West Rocks where natural and man-made features are providing the basis for geotourism activity. Emphasis on this day will be on land use issues, and the relationship between geodiversity and biodiversity.

Publication:
The Linnean Society of New South Wales invites papers for the Symposium. Manuscripts are to be submitted by September 30, 2010 and will be peer-reviewed by two external referees. Papers will be published in the *Proceedings of the Linnean Society of New South Wales.*

Sponsors:
We are grateful to the **Geological Survey of NSW** (part of Industry and Investment NSW) and the **Department of Environment, Climate Change and Water NSW** who have indicated their willingness to provide funding support to offset costs of the symposium, and to subsidise publication of the symposium proceedings.

The Symposium will be of interest to:

Geologists – interested in unique or representative geological areas and landforms;

Biologists – studying the interaction between floral and faunal communities and their geological habitats;

Policy officers, planners & conservation managers – concerned with land use issues;

Researchers & teachers – involved in geological education;

Geotourism operators & managers – interested in identifying, developing or promoting tourism opportunities;

Local government representatives – aiming to become better informed of geodiversity and related principles;

Representatives of interest groups – including the Karst Management Advisory Committee, and members of the Geological Society of Australia.

Registration costs and deadlines:
Due to the generous support of our sponsors, registration costs will be kept as low as possible to enable a wide variety of participants to attend. The registration fee (yet to be finalised, but likely to be in the vicinity of $160) will cover the cost of lunches at the venue, morning and afternoon refreshments, conference materials, and the full-day field trips (including bus transport and packed lunches) on the Tuesday to the Port Macquarie coastal outcrops, and on the Thursday to the Kempsey-Yessabah-South West Rocks region.

Note that due to the limited capacity of the conference centre at Sea Acres, numbers are likely to be limited to early paid-up registrants.

Indications of interest: (by October 31, 2009)

Please email: ian.percival@industry.nsw.gov.au
to express your interest in attending the symposium and field excursions (definite/ probable/possible), and whether you intend to submit an oral presentation or poster (if so, please indicate tentative titles and in what symposium theme – suggestions for additional themes are welcome).

Based on the level of interest and indications of presentations to be given, we anticipate the First Circular with registration form and provisional program will be distributed in January 2010.

Dr Ian Percival, Geodiversity Symposium Convenor, Linnean Society of NSW

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LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 134 **DECEMBER 2009**

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER
Membership renewal form

TAKING THE PROCEEDINGS OF THE LINNEAN SOCIETY OF NSW FORWARD

As editor of our journal I have been forced to point out to the Council of the Linnean Society of NSW for some time that the journal has been suffering from a decline in both quantity and quality of submitted manuscripts. Each year it has been harder and harder to compile a reasonably complete volume, even with the contributions of manuscripts by councillors and other members of the Society. We are at present running three months behind – that is the volume covered by 2008 subscriptions did not get published until March 2009. Now, at the end of 2009 there are only three manuscripts to hand and it will not be possible to publish volume 131 until July 2010 at the earliest.

Several reasons have been put forward for this decline, but in fact it can be seen to have been slowly developing over the last 50 years as more and more specialist journals have appeared in Australia, especially those published by CSIRO. They have become preferred by researchers who want to reach other specialists within their field. Many general journals have disappeared or have moved away from publication of research papers. Our journal attempts to cover a very wide field – botany, zoology, natural history and earth sciences.

The reason the Linnean Society publishes is of course to disseminate the findings of Australian research. To do this we must get the journal into major universities, museums and other institutions. If we do not do this, authors have little reason to publish in the Proceedings of the Linnean Society of NSW, and universities and granting authorities will give little credit for doing so. Unfortunately this is the current situation.

I had to report to Council recently that not only is this situation getting worse, it has reached a point where, in my opinion, the journal in its present mode is no longer viable. The reason is that when volumes start to come out two years late, the remaining libraries that subscribe will withdraw.

I believe one reason the slow decline has suddenly become a rapid decline is the increasing number of papers being published electronically. Major papers are now being published on the web because the authors can have almost immediate publication, almost unlimited distribution and the ability to use colour. The most prestigious scientific journals now offer both electronic and paper publication, and an increasing number of scientific journals are publishing in electronic form only.

One of the major objections to electronic publication comes from taxonomists because the codes of nomenclature (ICZN and ICBN) do not recognize this means of publication. However this is changing, and a draft revision almost certain to be accepted (by the ICZN at least) will allow electronic publication with certain safeguards.

What can the Linnean Society of NSW contribute to scientific publishing in this new environment? I believe three things. Firstly, an established (since 1875) reputation for quality science. Secondly, we can provide peer review so that readers can be assured published papers have been refereed and have undergone a science based editorial process. This would be an essential contribution to the web because there is so much garbage out there. Thirdly, due to its broad scope which is now shared by few other journals, the Proc Linn Soc NSW can also provides an outlet for cross-disciplinary work and descriptive studies in the natural sciences.

Council has determined therefore that Volumes 131 and 132 will be the final volumes to be printed in the traditional way. The journal will continue, and hopefully gain strength, but the mode of publication will change. We will publish papers on the net when they are accepted by the Editorial Committee. Each year the published papers will be collated into a serial volume and distributed to members of the Society and to institutions on a CD or equivalent.

Because the Society is committed to maximum distribution, it is intended that access to papers on the net will be without charge and available to all. Since the cost of producing a disc is minimal, it is also intended that these will be provided to members as part of the membership fee and to institutions without charge.

Council undertakes to meet all taxonomic requirements of the ICZN and ICBN, and I am confident that should either of these codes decide not to accept electronic publication Council will reconsider its decision.

It is almost certain that, when the ICZN and ICBN accept electronic publication, the essential requirement will be lodgment with an approved archiving service, several of which already exist in the USA. I hope the Linnean Society of NSW will take an active role in encouraging the establishment of such a service in Australia, to ensure freedom of access, security from manipulation of text and merging of archives with new technologies.

With this, we step into a new world of publishing.

Michael L. Augee
Sydney
21 October 2009

SYMPOSIUM ON GEODIVERSITY, GEOLOGICAL HERITAGE and GEOTOURISM

Expressions of interest are still being taken. See our web site: http://linneansocietynsw.org.au

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

PLEASE NOTE change in closing date for applications. It is now the **FIRST OF MARCH**

Application forms for both Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

Members may apply for up to a maximum of $1,500 and non-members, up to $1,000, for both the Betty Mayne and the Joyce Vickery Research Funds.

The date for submission of applications is 1st March, 2010 This date applies to both the Betty Mayne and the Joyce Vickery Research Funds.

Please mail applications to:
The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $1,500 for Members and $1,000 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2010. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,500 for Members and $1,000 for non-members.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1 st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2010. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291, Manly, NSW 1655**

BOOK REVIEWS

WOMBATS - second edition
Barbara Triggs
Australian Natural History Series, CSIRO Publishing
Paperback, 160 pp, $A39.95
ISBN: 9780643096011

All of the books in the 'Australian Natural History Series' are very good. Unlike the internet, they are a sure source of accurate information. They are written by people who have done research with the animals in question and have a thorough knowledge of the scientific literature. Not all of us authors are necessarily great writers, but in these books it is the information that counts. Barbara Triggs is something of an exception. Not only is the content of high quality, but also both 'The Wombat' and 'Wombats' (the current, second edition) are a delight to read. When I got a copy of 'Wombats' to review, I started to glance through it and ended up reading it from start to finish. I thought the introductory 'Evolution and Early History' chapter was particularly good – short, to the point and interesting.

There is a good deal of material here that is unchanged from the first edition, which is fair enough when dealing with basic biology. More recent research has been included, but the main difference between 'The Wombat' and 'Wombats' is, as the name implies, inclusion of the two hairy-nosed species in the 2009 edition. As the author correctly laments, not a lot is known about the two hairy-nosed species, but what information is available is covered in 'Wombats'.

There are a number of useful photographs, mostly retained from the first edition, and some good colour photos. There are a few drawings; different from, but not necessarily better than, those by another illustrator in the first edition.

I have never attempted to hand-rear an orphan wombat, or any other marsupial for that matter. Even so, I was puzzled by some comments in Chapter 8 (Wombats in the Wardrobe) and Appendix 2 (Hand-rearing Orphan Wombats) which appear to encourage more human contact than I would have anticipated. It also seemed odd to note that cows milk was inappropriate on the one hand, but then to give preference for use of a product based on cow's milk as opposed to those (also mentioned) that are formulated for marsupials from scratch. A feature of marsupial and monotreme lactation is that the milk changes in quantity and composition as the young develops. While marsupial substitutes based on cows' milk have the lactose taken out and some adjustments made, the only way they can be made to approximate progressive changes is by changing the concentration. At least one of the milk substitutes comes in staged compositions to approximate natural lactation.

For comparison, I managed to obtain a draft copy of a WIRES training manual 'Rescues, Rehabilitation and Release of Common Wombats'. There are some significant differences, and my prejudice as a biologist is to suggest that anyone attempting to hand-rear a wombat would be well advised to consult the WIRES people or their equivalent in other states.

Otherwise, this is a book well worth owning for anyone interested in wombats. And that should be just about everybody, as these are truly nifty animals.

M.L. Augee
Sydney
Oct 2009

ARACHNIDS by Jan Beccaloni.
Published September 2009 by CSIRO Publishing, Collingwood.
References, Index, Glossary. Hardback, 26 x 20 cm. 320 pages. Price A$69.95
ISBN 978 0 643 09697 4

Chapter 1 Introduction - subtitled Spiders aren't the only arachnids, the author - Jan Beccaloni, curator of Arachnida and Myriapoda at the Natural History Museum, London introduces the reader to a comprehensive review of the class Arachnida. Among a staggering amount of information, we are told that at the time of printing, the approximate number of described species was 98,290 (and growing by the day!).

Chapters 2 to 12 deal with the eleven extant arachnid orders. The marine arachnid order Pycnogonida (sea spiders) has not been included.

Dr Beccaloni brings up to date all that is needed to understand the diversity, anatomy, distribution, habitats, general biology, behaviour as well as life history of the eleven arachnid order.

Each chapter, complete in itself, means that if the reader wants to know about, say Uropygi, all there is to do is turn to page 111 and start learning about the natural history of vinegaroons.

The largest part of the book is shared by the Araneae (60+ pages) and Acari (50+ pages).

The contents of the book is packed with strange facts that would make a trivia night a sensation. Did you know that in Palpigradi, sizes range from the tiny 0.65mm to a giant 2.8mm? or the Ricinulei have a unique feature known as cucullus? The smallest mite in the Acari is smaller than a full stop (0.1mm) while the largest tick can reach 3cm in length after feeding? As for the Amblypygi, there is one species from East Africa with a leg span of 40 cm.

The very limited amount of taxonomic material makes it easy for anyone to understand.

The presentation of the book (font, quality paper, binding) is outstanding. Misprints are few and far between. The photographs are impressive when one realizes that we are dealing with minute animals. As for line drawings, they are very clear and easy to read and comprehend. There is a small picture of a spider at the top centre of every page. Nice touch.

References: A particular useful addition to the bibliography is the inclusion of web addresses, thus allowing the reader to get access to the vast amount of data dealing with the arachnids. A pleasant surprise was to see the web address of the Australasian Arachnological Society.

On a personal note, I would have preferred to see the references dealing with each order at the end of each appropriate chapter, somewhat similar to the set up in Catalogue of the smaller arachnid orders of the world by M.S. Harvey.

While there is a plethora of popular books on spiders, the same cannot be said of the smaller orders. This publication, which rectifies this situation, should be a most welcome addition to the library of people interested in terrestrial invertebrates.

Dr Jan Beccaloni has done an outstanding job with this exciting book.

Coming just before Christmas, this book – at a very affordable price considering the quality of production – would be a perfect gift for the budding arachnologist or for anyone interested in knowing and/or understanding more about the so called "creepy-crawlies".

. JC Herremans

RIVER AND AQUIFER INTERACTION IN THE NAMOI CATCHMENT: a talk by Dr Bryce Kelly.

Dr. Kelly, of the National Centre for Groundwater Research and Management is studying the conected-ness of ground and surface waters so that they may be better managed. The Namoi River Valley is renown for its irrigated cotton crops. Seventy percent of water used is for irrigation. The water may be taken from the surface river or dam storages, or from bores.

How much water can be used? Do we pump it out in one generation? China and California are doing just that and are effectively mining their ground water.

We need to understand the water cycle and how water moves, how surface and ground waters are or are not connected. Not much is known about surface waters, but for groundwater, there is a huge data base from numerous water bores. This data needs to be analysed to give us the big picture and Dr. Kelly is working on it, using three dimensional spatial and temporal analyses.

Rainfall varies and we have wet and dry years. 1921-1946 was a big dry spell. 1946-1976 was a run of wet years and this influenced allocation. This run of wet years was taken as the norm and water was highly over allocated. Floods recharge the ground water and there were big floods in 1971 and 1974. Without these floods, the ground water would decline.

Groundwater is used to irrigate the cotton crop in the Namoi River Valley. As the season progresses, the water level in the bores goes down. Later, when pumping stops, the level will recover, but floods are needed to top up the ground water. The surface water is connected to the ground water by leakage from creeks and streams, from floodways and down hillsides. There may be more than one aquifer and the aquifers may or may not be connected.

The Mooki River is a tributary of the Namoi and Dr. Kelly chose the Mooki and Coxs Creek Catchment to try out his method of using 3-D computer models which integrates all the data. There are two aquifers here, an upper and a lower one. If they are connected, pumping from the lower aquifer would make both aquifers go down. If not connected, then pumping from the lower aquifer would have no effect on the upper one. There is also the Spring Ridge palaeochannel which is now disconnected from the Mooki aquifers. Extraction has caused a big drop in water level when there is no recharge.

Maules Creek is a tributary to theNamoi and the catchment has connected aquifers. There are more sands and gravels at depth, which makes for easier extraction of water, with clay on top A clay layer will seal off an aquifer. The bores take water from the palaeochanels. The levels of the ground water can be seen in the records since 1980. '81, not much change: '82, slight decline: '84, a big flood and levels topped up. '85-6, mostly in balance. '94, an increase in usage: '95, a further decline, 98, another big flood and good recharge. '99, 2000, '01, usage increases, there is good stream flow but local rainfall does not contribute much to recharge. '02 to '04, no stream flow. '05 to '08, aquifers decline all along Maules Creek and the Namoi. Dams in the region are down to 20% of their capacity. Lack of water is becoming critical.

In 2006, a new plan for sharing water came into effect. Allocations were cut back and efficiency programs were implemented –"more crop per drop". The ground water in the Coxs Creek and Mooki River catchments have started to rise in the last couple of years, but the lower Namoi River is still in substantial decline.

A better understanding of these complex systems is needed for management of the limited supplies of water. Currently, surface water is treated in a different way to groundwater, even though they are connected. Floods are not even measured. We need flood holes where flood water may be directed underground to recharge the aquifers. There is a need to protect the environment as well as sustain the rural communities and economy.

Some groundwaters are not being recharged and the water is very old. At Gunnedah, the water is 10,000 years old and in the lower Namoi, it is 20,000 years old. The rate of movement of the water is 10 m per year. When the water is extracted, there is compaction of the loose sediments. Rainfall is not measured where it falls: on the escarpment of the Liverpool Plains. Much has been done to improve efficiency but there is still much more to do. Traditional irrigation saturates the ground down to 5 m, a huge waste. These are some of the problems which must be addressed.

Management of the water resources to make the most of limited supplies is thus very complicated. The methods being developed by Dr. Kelly will be applicable to other catchments, but each catchment will have its own characteristics which must be taken into account.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2010 Annual General Meeting

The 135 Annual General Meeting of the Society will be held at 18:00h on 24 March 2010 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 17:30h.

Four members of Council are due to retire at this AGM:

Robert King	Elizabeth May
Helene Martin	Stefan Rose

and all offer themselves for re-election.

Council recommends the election of Dr David Keith as President of the Society for 2010.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2010.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 4/2 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2010.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

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IN THIS ISSUE

INCLUDED WITH THIS NEWSLETTER
First circular for the symposium on Geodiversity, Geological Heritage and Geotourism
Form for donations to the Scientific Research Funds
Report of the Society's affairs for 2009

NEW MEMBERS

We welcome our new members

Ms Alexandra J.R. Carthey, University of New South Wales. Interests: predation ecology and mammal conservation

Mr, Engelbretsen. Interest: palaeontology

Mr, Danilo Harms, University of Western Australia. Interest: invertebrate taxonomy.

Mr. Floyd J.F. Howard, University of Sydney. Interests: palaeolimnology, physical geography and geography.

Mr. Richard Milner, Australian National University. Interests: behavioral ecology of fiddler crabs

Ms Margaret Turton. Interests: ecology, threatened species and microchiropterans .

Ms Lexie M. Walker, University of Queensland. Interests: marine invertebrates, polychaetes, freshwater invertebrates, Chironomidae.

Mr. Benjamin J.Wegener, of Monash University. Interests,:behavioral and evolutionary ecology

LINNEAN MACLEAY FELLOWSHIP

Dr. Anthony Wright has been re-appointed the Linean Macleay Fellow for 2010. He will continue his study of Silurian graptolites at Spring Creek and Quarry Creek in New South Wales. The detailed stratigraphy and structure has been clarified, and the faunal list will be greatly enlarged. Devonian and Ordovician corals and brachiopods are being studied also.

WILDLIFE PRESERVATION SOCIETY OF AUSTRALIA RESEARCH GRANTS

The WPS is offering research grants to honours and post graduate students at Australian universities. Applicants must be members of the WPS and the research must be relevant to the conservation of Australian wildlife, plants and animals.
For further information and how to apply, go to www.wpsa.org.au.

MORBI MENTALES*:* A Significant and Unknown Part of Carl Linnaeus's Systema Morborum

By Anders Hallengren

Linnaeus is called the Flower King, the man who became universally known for his systematization of botany. It is easy to forget that his immense contribution to the nomenclature and order of known biological data embraced the whole of creation, right down to the world of inorganic minerals. Nature's system, which he attempted to survey and describe, comprised the animal kingdom, and there we are, among the mammals, along with apes and others. The species *Homo sapiens* made its entry into the textbook of natural science. Linnaeus had a keen eye for abnormalities, variations, and metamorphoses, all of which never ceased to astonish him. Darwin, who stood in close touch with the Linnean Society of London, took this pioneer to his heart and studied him diligently.

For Linnaeus, the graduate in medicine, man was the primary object of study. The major part of his life's work may be described as that field of research which comprises all others: the study of the world in which mankind lives. The pinnacle of creation was examined minutely with the same exploratory zest as the earth's vegetation. Attention focuses on the ego itself.

The knowledge of human beings suddenly stands out as an interdisciplinary field of research in which he constantly moves. On his journeys he is interested not least in the people he meets and records their appearance, behaviour, thoughts. He is also interested in their intellectual and spiritual life, perhaps more than in anything else. He develops his attempts to understand the human soul in his lectures, and in private notes. As Freud did, he approaches the fundamentals of the nature of spiritual life by studying their particular afflictions, torments and anguish. Parallel to the classification of the vegetal world, he develops in pamphlets and seminars a system of medical diagnosis that comprised both somatic and psychosomatic disturbances. *Systema naturæ* is complemented by *Systema morborum*, the system of diseases, which he presented in a lecture series at Uppsala University.

In the extensive note book written by Pehr Osbeck (1723-1805), the world traveller, from his student years in 1746-47, now in the collections of the Hagströmer Library at the renowned Karolinska Institutet medical university in Stockholm, we can follow how his professor methodically developed his theory of diseases with particular reference to the fourth class, *morbi mentales*, mental illnesses. This class is subdivided into special orders, just like the flora, the first of which deals with deficiencies in judgement, *morbi judiciales*. Other orders concern imagination (*imaginatio*) and the will / desire (*voluntas*). In their turn, these are divided into sub-groups (*genera*).

A general rule regarding the pathological condition of the judgement is that "ideas do not correspond to the object"; "one is dreaming although one is awake", and "what one thinks, says and does is crazy." First and foremost in this group is *demens* of about ten different kinds. The word, which is Latin, means literally that one is "out of one's mind" or "from one's senses" (*de* "from" and *mens* "mind", "sense"). Among the abominations of dementia is chronic *delirium universale* without a temperature, which means that things appear to be different from what they really are, to wit, "dreadful".

For a natural scientist who was both pious and accustomed to working with exact data, the idea of apprehending nature incorrectly and furthermore in a fearful form must have been a nightmare.

He locates the seat (*sedes mali*) of such disorders in the brain and adds that one commonly says about those patients who are so to speak "not right in the mind" that "not all the screws in their head sit fast" (cf. the informal English "to have a screw loose"). Symptoms of their derangement are uncleanness, only going out in frost and snow, tearing their clothes, and "hundreds" of other whimsical "tricks".

Time and again one realizes how the professor's choice of words and examples keeps his students attentive and cheerful. A great pedagogue and orator is in action, presenting a complex and well-defined system in popular form. He has a great deal to say about the kind of dementia that is much talked about nowadays, senility, and he uses the term that is still valid today, *Dementia senilis*. He takes the opportunity of giving young men a few warnings, such as that heavy drinking in youth can lead to similar consequences, as can too much sexual intercourse. He also mentions in particular a *Dementia ab amore*, an acquired form of insanity, the victims of which are called "love's fools" who, "when they have fallen in love with a girl and then been given the cold shoulder", become crazed, almost like those feeble-minded who can neither understand nor remember, but just fiddle about.

Congenital mental deficiency and incurable feeble-mindedness, *morosis*, are described, as are disturbances in comprehension due to an underdeveloped or malformed brain, all phenomena known to modern medicine. Similarly mental disturbances caused by deficiency diseases in early life. Once again, he directs a reminder to his audience, as well as to himself, when he describes the dementia one can incur from too much studying, *Dementia a studiis nimiis*. The danger here is overwork, not allowing the body and mind peace and quiet.

The result can be that one shuns the company of others to an even greater extent, isolates oneself and indulges in fantasies. This is the fate of those who are too wrapped up in books: isolation and a flight from reality.

Mania is the word that springs to mind here and, sure enough, this is Linnaeus's next group of mental disturbances belonging to the same order. There are manias of many different kinds, including sullen unsociability, which he observes in *solitudinem amantes*, those who love solitude, who "prefer to keep away from the company of others, to be alone and think about all that is bad."

But mania is a serious matter; it stands for "madness" (cf. the English word "maniac"), and here we find inter alia *Mania furiosa*, enraged confusion, which makes the victim dangerous, both to himself and to others, since his judgement is "bewildered". This condition, which can break out in sudden paroxysms, may be hereditary, the lecturer explains (*Mania hereditaria*), or it may be due to the structure of the brain, brain lesions, grave inflammation or fevers. Egocentric hubris and an exaggerated conception of one's own importance are also aspects of insanity. Periodic outbursts of rage may be associated with great physical strength and self-destructive acts. Linnaeus describes a number of manias of different kinds and degrees, among them one that may be connected with melancholy, which, in his terminology, means something like depression.

There are others brought on by psychical stress and overstrained senses such as *Mania pervigilium*, caused by getting too little sleep at night, and the previously mentioned *Mania ab amore*, the strung-up state of the incurably lovesick.

There are no certain remedies for all types of insanity, but refreshing sea bathing is considered beneficial, as are diet, temperance, physical purging, and a good marriage. In certain cases other diseases may effect a cure, perhaps by giving a person something else to think about.

Looking at the next group of afflictions, *Vesania* (insanity) is like jumping out of the frying pan into the fire; in some cases, even worse. It consists of a group of deliria that can find expression in delusions in which the self and the external world seem unreal, hallucinations and a distorted awareness of one's body: "that one seems to do what one is not doing, and to be what one is not". Here we are down in the deepest of hells in the witch's cauldron of diseases. It is difficult to dispel all these illusions, he states, but nowhere else are so many successful treatments described either. There is reason to dwell on these among all the incurable cases.

One man took it into his head that he was dead and lay down in a grave, but a friend who came to visit him and had food with him made him feel better. Can one imagine a more audible cry for help?

Another one thought he was a wine barrel, and lay down in a cellar. We are not told how this ended. One imagined his feet were made of glass and dared not walk, another that his buttocks was made of the same material and that he therefore could not sit down. A baker believed he was made of butter and shrank from fire (that is to say from the oven where he worked...). Linnaeus's next example comes from remarkably long time ago, related by the Greek physician Galenos. It is the story of a man who thought he had grown so huge that he could no longer get through the door. The doctor ordered some men to carry him quickly out into the yard and pointed out to him that he had come out, had he not? The man then sighed that "every artery and bone in his body had been smashed to pieces by the door, and died soon afterwards."

The above attempts to dupe the patient were fatally unsuccessful, but Linnaeus is able to relate of many similar tricks that were rewarded with success. One poor fellow sought help because he thought his nose was larger than his body. The doctor took some ox livers and put them on the man's face, "filed his nose with an iron until it hurt, and then sliced off and threw away piece after piece of the liver, which the patient thought were pieces of his nose. The doctor then bandaged the nose and the man was well." Another, who "thought he had no head, was cured with a hat of lead." A third believed he had a deer's horns. "The doctor put horns on his forehead and then sawed them off", thereby relieving the man of his burden, and he, too, recovered. Another successful cure is mentioned in which the delusion was frogs in the stomach, which were driven out with laxatives and emetics. The doctor smuggled live frogs into the man's excrement and vomit, to his great relief. Then there was the man who believed he had so much urine that he might drown the whole town. A bathing-hut was set on fire and the man was asked to put it out, which he tried to do, but without success: "then he was ashamed, went home and was cured."

In many other cases, on the other hand, faced with the strong forces that are at work, medical science is powerless and the following shows a remarkable gallery of contemporary pictures. Someone fears that Atlas, who bears the world upon his shoulders, will totter and lose his grip; another suffers from the delusion that there are invisible bonds that oblige him to take over this role and he dare not move a hand. "An unmarried woman in this country, who is still alive, believes she is the cause of all accident and everything evil that occurs." An Italian woman is convinced that small fragments of glass and other gewgaws are jewels that have been given her by the king to whom she is engaged. "A nobleman in Stockholm keeps every piece of paper he receives in two bags or in the clothes he is wearing, those he meanwhile says concern the welfare of the state, and those concerning which he will have a decision from Parliament." He also believes he has a letter from a princess, who is to become his consort; "in other respects he is sensible enough."

In this dream world there is a man who thinks he is conducting music the whole time, and another who wanders from town to town begging in vain to be arrested, finally sitting down in a pit, where he dies. Linnaeus quotes an example from his own experience, in which he refers to himself in the third person, the *Arkhiatros Linnaeus*, regarding a man he saw in Leiden who compulsively ran the gauntlet through the city every day crying out oh! oh! oh! But he also warns both his students and himself that a scholar who becomes possessed by his research may approach the boundaries of insanity.

He then takes up a series of special forms of insanity under a number of different names, among them *Vesania matrimonialis,* pathological jealousy in marriage; zooanthropy, imagining that one is an animal, and *Demoniomania* of various kinds, the labyrinths of possession.

We have seen examples of a number of "deliria" under the headings Mania and Vesania, conditions of confusion and fallacy, including *Delirium manicum*, megalomania. In the following section the lecturer deals with deliria that are symptoms of poisoning, a consequence of fevers, heat-stroke, intolerable pain, dangerous bites and stings, physical disease, the prolonged use of alcohol, cannabis etc. Lack of sleep is again mentioned as a danger (it may cause *Delirium pervigilio)*, and a particular *Delirium lethargica* is described, which is the lot of the physically slow and mentally dull.

The last group in the order Derangements in Judgement is by no means the least interesting. Here the subject is *Melancholia*, an affliction that he says is "rather common". One way of declining into the condition may be "that one begins to think incessantly about some object", and this affliction, which may be present in other illnesses, in old age, etc., is difficult to remedy "if it grows too strong".

The signs (*signa*) of this derangement are *tristia* (gloom), *timor* (fear), *taciturnitas* and *torpor* (taciturnity and torpor), *suspicio* (suspicion), *iracundia* (a heated temperament) and wakefulness at night. "The patient is thus always distressed, quickly becomes afraid, even for the slightest reason, is full of suspicion, uncommunicative, rather irascible, unwilling to do anything but desires most of all to be alone and think", receives insufficient nourishment or eats to excess, "neither does he allow his blood to get into good movement with pleasant company which, for such a person, is the best remedy." What is described here has all the symptoms of depression, and the doctor who makes the diagnosis recommends, in addition to pleasant company and a social life, small quantities of alcohol, some opiates, iron tonic, but above all, diet, honest regular exercise and music as remedies.

Diet to which Linnaeus devoted a great deal of work, is especially important, since one of the problems of melancholics is that they not infrequently have "far too large appetites, that they are as gluttonous as dogs." Here we recognize the overweight that depressed people often suffer from. Those who are afflicted by this sombre mood, which also may affect one's sense of reality, often feel an agonizing weight on their chest. Things may appear to be in the wrong proportions. In this group we have *Melancholia ab imaginatione*, "when one allows the imagination to exceed its limits" so that one fancies things of little significance to be important and decisive, worry over what has been and what will come.

One form of melancholy is caused by exhaustion, *Melancholia ab exhausto corpore*, nowadays known as Depression from Exhaustion. This can also be caused by too much travelling, as the present speaker can confirm. Finally, lifting a warning hand, he deals with its opposite: *Melancholia litteratorum*, which can be contracted by authors, those who read too many books and others who live a retiring and sedentary life.

Now a brief look at mental derangements of the second order, imagined illnesses. First among these are the hypochondrias, of which Linnaeus had great experience while he was medical practitioner in the Netherlands. He mentions the unpleasant sensations in the hypochondrium, the tract below the ribs, which have given the affliction its name. Furthermore, *anxietas*, (anxiety) and the unrest in the heart which is common in those who interpret every symptom in the worst possible light, "that even the smallest event or the onset of any disease causes the patient to believe that he is about to die." He recommends once again diet, moderation (temperance) and "regular exercise" and warns against living the life of a recluse.

Then he touches on the group giddiness (*vertigo*), which darkens and disarranges the senses, mostly with physical causes; poisoning, brain damage, vascular changes. He mentions stroke (apoplexy), falling sickness (epilepsy), and many other serious illnesses as a ground, but also cases of exhaustion and general bewilderment, such as the muddled state of the emaciated and the vertigo of the newly married.

The next group of unpleasant syndromes concerns imagined sounds, *Syrigmus*, noise in the ear, either as *Sibilans* (a whistling sound) or as *Tinnitus*, (a ringing sound). A number of causes are given, among them starvation, headaches, ear diseases, a blow to the head, the French disease (*syphilis*), and serious cerebral lesions like those already mentioned. But hypochondriacs, too, have their own impressive tinnitus, *Syrigmus Hypochondriachus*.

The delusions of seeing have a special category of their own called *Phantasma*, which is "when one imagines one see what nevertheless one in actual fact does not see". This belongs to the world of illusions and misinterpretations; ghastly apparitions, when one confuses tree-stumps with creatures on nightly rides in the forest (Linnaeus's Swedish journeys), but also the flash in the eye a box on the ear can give (as in school). Fear of forests can be of a far more serious kind, dealt with under the next heading, *Panphobia,* fear of everything, or, in modern terminology, generalized anxiety (GAD).

The fear-of-the-dark creature that dwells inside us all, may at certain moments be aroused by anything at all. At some time or other, many people have experienced this as — panic. One can even be afraid of one's own fear. Then imagine it as a chronic, aching condition. This is Linnaeus's *Panphobia*, a general fear "of something that, in itself, is just nothing." It may affect soldiers in the field as well as overwrought students, women as well as men, when awake as well as in nightmares. It is difficult to cure, but in time it sometimes disappears.

After the various phenomena connected with sleep disturbances, Linnaeus goes on to all the pathological excesses associated with the will and desire, with *nymphomania* and *satyriasis* as the extremes of sensuality. He then describes with great feeling how, during his years abroad, his heart suffered from homesickness, *Nostalgia* (*nostomania*). Often it is not so severe, he says, but it can be serious, involving fever and ague, as many foreigners have experienced in Holland, where the sickness is "extraordinarily common".

Finally, eating disturbances are thoroughly scrutinized. *Anorexia* (loss of appetite) and *Bulimia* (excessive hunger) have chapters of their own, as have unnatural thirst (including *dipsomania*) and its opposite. Furthermore, aversions are described under the heading *Antipathia*, which is related to earlier passages in the section on phobia. These may be congenital, like the fear of snakes. Sometimes they resemble stress syndromes due to earlier serious experiences (in modern terms PTSD, Post-Traumatic Stress Disorder), like the case of the king who could not bear to see the glitter of a drawn sword. The same is valid of antipathies to certain objects, certain smells, and certain people (*antipathia contra homines*). Linnaeus himself recalls the sound of a certain bell in Leiden, Holland, which for a long time he could not stand hearing. With that, he concludes his exposition of *Morbi mentales*, the psychological afflictions.

The account assuredly bears the mark of his times, a remarkable document, giving a vivid picture of the age. The gentleman who believed he could cause a deluge if he urinated, like a real-life Gargantua, has a counterpart in Ludvig Holberg's comedy *Jeppe of the Hill* (1722), as does the deluded man who imagined that his nose was bigger than himself, and the downcast figure who concluded that he was already dead and without further ado lay down as a corpse (Act II, Scene 3). To be convinced that one's body is made of glass or of butter are delusions associated with the prolific Dutch poet Caspar Van Baerle and his alleged fit of madness in 1623. The professor of medicine at Uppsala University in the 1740s bases his statements on research and examination as well as on hearsay and draws freely on contemporary and older sources for his course of lectures.

Nor was his nosological system, using symptoms as criteria of classification, an original piece of work. To arrange different "species" of diseases in classes, orders, and genera in the same manner as botanists classify plants, was not Linnaeus's invention. Others had done that before him, foremost among them his colleague at Montpellier, the French physician François Boissier de La Croix de Sauvages, with whom Linnaeus exchanged ideas. But the interesting thing is that he was able to name and describe so much that, even today, corresponds with medical terminology, although the classification is different.

What is unparalleled is the wealth of objective observations made at a time when trials for witchcraft were still being held, and Doctor Franz Mesmer, the next generation of physicians, had not yet held Europe spellbound with his magnetic touch.

Anders Hallengren, PhD is a Fellow of the Linnean Society of London and an associate professor in the Dept. of Literature and History of Ideas at Stockholm University. He is currently translating Linnaeus's unpublished lectures into English.

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 21 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. SIMON GRIFFITH

Department of Brain, Behaviour and Evolution
Macquarie University

SEX, COLOUR AND SPECIATION IN AUSTRALIAN GRASS FINCHES

Dr. Giffith and his Avian Behavioral Ecology Group work on zebra finches in the Arid Zone of New South Wales and the long-tailed and Gouldian finches of the Kimberley and the Top End. With these iconic birds, they have been investigating the evolution of colourful plumage and the diversity of mating systems and ultimately, the processes that drive the formation of species.

Wednesday 19 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. ANDREW BEATTIE

Department of Biological Sciences, Macquarie University

A NATURAL HISTORY OF ANTIBIOTICS

Evidence for the antiquity and importance of microbial pathogens as selective agents is found in the proliferation of antimicrobial defences throughout the animal kingdom. Such defences would appear especially critical for the social insects because their colonies are typified by crowding and, often, low genetic variation: ideal conditions for contagious disease. Our research has focused on the role of antimicrobial defences in bees, wasps, ants, termites and thrips and has revealed complex and sophisticated defence systems. Our results suggest that selection by microbial pathogens was critical to the evolution of sociality, perhaps even favouring increase in the size of colonies.

**Wednesday 21 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Prof. MALCOLM WALTER

Australian Centre for Astrobiology, University of New South Wales

Prof, Walter works on the geological evidence of life on Earth, including the earliest convincing evidence of life. He has been funded by NASA in their "exobiology" and "astrobiology" programs, focusing on microbial life in high temperature ecosystems, and the search for life on Mars.

TITLE TO BE ANNOUNCED

Wine and Cheese will be served from 5.30 pm befor each lecture

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 136 **JULY 2010**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new member:
Mr. Daniel B. McDonald, Interests: Plant genetics, biology, ecology.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESEATCH FUND

BARRY, Katherine. Department of Biological Sciences, Macquarie University.
PROJECT: Bacteria in butterflies and bright colouration: does *Wolbachia* infection drive the evolution of brightly coloured sexual signals?
Eurema hecbe is a colourful butterfly of North Queensland and females choose males on the brilliance of their colour, which includes both 'human visible' colour and ultraviolet iridescence. Infection with *Wolbachia* feminises male butterflies. Can the males tell the difference between the real females and the fake 'neo-females? Awarded $1,400

BUBOST, Anne-Laurance. Department of Biological Sciences, Macquarie University.

PROJECT: Development and evolution of cerebral lateralization: fishes as model organisms. Cerebral lateralization partitions the function between the two hemispheres of the brain, e.g. handedness. It is thought to facilitate effectiveness and doing more than one thing at once. Lateralisation varies enormously between species and from one individual to another within a species. Lateralised pigeons are better at finding grain hidden in grit than non-lateralised individuals. It is thought that there may be a cost to lateralisation. Awarded $500.

CARTHEY, Alexander. School of Biological, Environmental and Earth Sciences, University of New South Wales.
PROJECT: The role of naivete in vulnerability to predators: recognition and response in some native mammals.
Olfactory clues, odours, are the main way prey detect predators. Naivete native mammals will be exposed to odours of an introduced predator when feeding to see how long it is before the mammal recognised the danger and stop s feeding. Recognition of the danger is not enough: the vulnerable mammal must develop an anti-predator strategy. Awarded $1,200

CORRELL, Rachel. School of Biological Sciences, Flinders University.
PROJECT: Testing Bergmann's rule in a widespread Australian mammal: geopraphic size variation in *Rattus fuscipes*, the bush rat.
Bergmann's rule, studied elsewhere in the world but not in Australia, considers that size is fundamental to the animal's morphology, physiology, ecology, behavior, evolution and probability of extinction, ie, the size of widespread species shows clinal variation with regard to environmental factors. Limited studies with Australian mammals show some do not follow Bergmann's Rule. Geographic size variation of bush rat will be monitored against environmental factors. Awarded $700

CROOK, Natasha J. School of Environment Sciences and Resource Management, University of New England.
PROJECT: Reduction of road kill in the bare-nosed wombat in the Nowendoc 'hot-spot' .
There have been few studies on the effects of road kills on wildlife populations, but it could be serious and little is known about the ecology of the bare-nosed wombat. This study will investigate the home range and movement patterns of wombats that live near roads in the hot spot. The work will determine whether the wombats will use culverts and other structures to cross the road. Awarded $800.

HARMS, Danilo. School of Animal Biology, University of Western Australia.
PROJECT: Vicariance and origins of diversity in Australian pseudoscorpions, subfamily Pseudotyrannochthoniiae
These small, predatory arthropods belong to one of he oldest terrestrial animal groups. In Australia, they are confined to wet temperate and subtropical forests along the east coast from southern Queensland to Tasmania and to southern forests of Western Australia. Ten species have been described but there are an estimated 40 undescribed new species. Awarded $ 1061.

HEAP, Stephen. Department of Zoology, University of Melbourne.
PROJECT: Factors influencing nest–site establishment in a terrestrial toadlet, *Pseudophryne bibronii*
The toadleta are territorial but little is known about how they establish their territories. It is generally thought that they fight and the better fighter wins the territory, but it is now thought that they fight but give up fighting if the prize is not worth the risk of injury or other costs. Experiments will test different hypotheses. Awarded $500.

HOWARD, Floyd. School of Geosciences, University of Sydney
PROJECT: Aboriginal abandonment of Kangaroo Island.
When Europeans arrived on Kangaroo Island, there were no people there and the wildlife was extraordinarily tame. The discovery of artifacts showed that humans were there once, and the latest date was 4,300 years. Kangaroo Island was cut off from the mainland 9,000 ago, so why and how did they leave the Island? The sediments will be analysed for pollen

and charcoal with the expectation that change(s) will establish the date of depopulation. Awarded $1,200

MILNER, Richard. Research School of Biology, Evolution Ecology and Genetics, Australian National University.
PROJECT: Choosing your enemies based on their friends.
This study will determine whether the occurrence of defensive coalitions of the fiddler crab (*Uca mjoebergi*) influences a floating individual's decision about whom to fight. Specifically, do they take into account the size of a male's neighbour before they initiate a fight with a resident? Awarded $504.

STARRS,. Danswell. Research School of Biology, Australian National University.
PROJECT: Dispersal and survival of freshwater fishes.
Many fish have a bipartite lifestyle in order to access necessary resources and maximise survival. There is a great diversity of breeding strategies in fishes. It was thought that larvae drifted in the current and populations were open. For many fish, this is not so: they settle close to 'home'. This study will label fish in their infancy with radio-isotopes and follow their dispersal. Awarded $1,000

THOMAS, Nanette. Annandale
PROJECT: Molecular and morphological analysis of the Winteraceae.
The taxonomy of the Winteraceae will be studied using molecular and morphological analysis to elucidate generic boundaries. Awarded $610.

TURTON, Margaret. Wentworth Falls.
PROJECT: Monitoring a colony of White-striped free tailed Bats (*Talarida australis*)
In March/April, the juveniles and adults leave the maternity colony, but we don't know where they go. It is assumed that they are nomadic and go to warmer climates, but in Sydney's mild climate, this may not be so. This study will use radio-tracking to determine if they remain in the general area, and when and how they forage. Awarded $1,260.

WEGENER, Benjamin. School of Biological Sciences, Monash Universiy.
PROJECT. Sexual selection in the Southern Bottletail Squid (*Sepiadarium austrinum*)
This study will investigate the role of courtship, allocation of sperm, promiscuity and multiple paternity. Awarded $1,300.

THE FRATERNITY OF THE MATERNITY – MONITORING A BAT MATERNITY COLONY: a talk given by Ms Margaret Turton.

There are about 1100 species of bats in the world and they are important pollinators of flowers and distributors of seeds. Bats are the only nocturnal predators of insects (birds are the daytime predators) and can eat a quarter of their body weight in a night. They tend to live in large colonies which makes them vulnerable. In Israel, fruit bats which lived in caves, along with other insectivorous bats, were eating the crops. The caves were fumigated, exterminating several species of bats. The crops were devastated by insect plagues for years afterwards.

Microbats use echolocation by emitting a sound which bounces back to give them a 'picture' of the terrain and to catch insects. Low frequencies travel further and high flying bats use it, while low flying bats in a cluttered environment use high frequencies. Microbats can live in many different habitats: in disused mines and buildings, in tree hollows and under bark. They may live in extreme environments, such as sea caves on Cape York Peninsula where they have to battle strong winds to reach their roosts.

Each species forages in a different way, e.g., over the canopy, within the canopy, close to the ground. There are 22 species of microbats in Sydney, with some of them rare. The white striped free-tailed bat is the largest of the insectivorous micrbats around Sydney, weighing about 43 grams. It is a high flyer and hard to catch, but is placid when caught.

Lesser long eared bats weigh about 7 grams and will bite if caught. The white striped free-tailed bat is found over most of Australia but is absent over the northern-most part.

In the white striped free-tailed bat, the tail is free from the wing membranes which are stretched between the fingers. There are bumps on the top of the ears which may be sensory, or may be aerodynamic, like bumps on the fluke of the hump back whale. They have thick fur and the white stripe.

Many of the white striped free-tailed bats roost in the old Armory at Olympic Park which was used to store ammunition and explosives. There are four buildings, all well spaced, with earth embankments around them. They get the westerly sun and are a good roost. Others roost in trees and elsewhere. The only known maternity colony is in a building and the Armory is Heritage listed. The bats enter under the roof, but they do not hang upside down: instead, they squeeze in between the bricks and the timbers

Bats may be studied by recording their calls. Video monitoring allows bats to be counted and to see what they are doing. The disadvantage is that nine hours of video recording requires nine hours of watching. Some bats were tagged and monitored. There may be mishaps with equipment, for example, when monitoring white striped free tailed bats, an I-button data logger failed because it was full of mites.

Mating occurs in winter and the young are borne in January. Most bats leave the roost in June-July-August. Most males leave the roost, but there are always some males there, and they may be the younger ones hanging around. We don't know where they go or where the satellite roosts are. Most males reach maturity in 16-20 months and the females in 9 months. There is high fidelity with 60% returning to the same roost next season.

The bats have different calls: a social call, a feeding buzz and loud chittering just before leaving the roost. Pairs of bats leave the roost within seconds and return within 17 seconds of each other. Do they cooperate? They come and go several times during the night. Do they come back to feed the young? This work of monitoring their behaviour is continuing.

AUSTRALIAN NATURE PHOTOGRAPHY: ANZANG SIXTH COLLECTION.
South Australian Museum.
Published in 2009 by CSIRO Publishing, Collingwood, Vic.
Paperback, 144 pages, colour photographs, AU$ 39.95.

This book publishes the collection from the photographic competition and exhibition, Australia, New Zealand, Antarctic and New Guinea (ANZANG), held by the South Australian Museum. The photography is stunning, the ultimate coffee table book. Each photograph represents many hours of patient waiting and many photographs for that one fabulous shot. The photographer has provided a short description of his subject and technical details of how the picture was taken.

The Overall Winner, 2009, is a bushfire scene, with fire fighting aircraft in view. The winner of the portfolio of six pictures includes the book's cover photograph of green luminescent jelly fish.

The section Animal Behaviour contains many striking photographs of animals in action and my favourite is the runner up, a pictures of a large black ant being attacked by many small green ants, each stretching out legs, wings and other appendages, although a Wagtail harassing an Osprey is hard to beat. The Animal Portrait section features insects, birds, reptiles, frogs, sea creatures and a wombat. A group of Apostle Birds and a Masked lapwing with chick are quite endearing.

The winner of the Botanical Subject section, portrait or habitat shot, is a picture of sundews that is quite ethereal. There are flowers and seed pods as would be expected, and a habitat shot of grass tree regrowth after fire, The Underwater section has fish, jelly fish, turtles and squid, but the most unusual is a mouth-breeder fish with a mouth-full of eggs.

The Wilderness Landscape winner is a picture of a spectacular storm cloud deluge. There are grand landscapes, icebergs and reflection from Antarctica, and the most intriguing is what looks like a field of white flowers, but the caption tells us it is spider webs in a swamp. There is a section on Threatened Animals or Plants, which includes a stunning picture of quolls on a lichen encrusted branch. The subject matter in a section on Black and

White Photography is just as excellent. The section on Interpretive Photography has some beautiful pictures because of the unusual lighting. The most unusual is a picture of sunlit raindrops, which was hard to guess before reading the caption.

The section Our impact has some sad scenes and the Junior Photography section has photographs just as excellent and varied, taken by entrants under 18 years of age.

The beauty and variety of nature is a visual treat, and we would not be able to see many of these subjects without spending the many hours that the photographers have spent to get that perfect shot.

Helene Martin

AUSTRALIAN BUSTARD: Australian Natural History Series.
Mark Ziembicki, CSIRO Publishing, Collingwood (February 2010)
Paperback 120 pages, colour photographs, AU$ 39.95
ISBN: 9780643096110

A large, heavy, slow-reproducing, ground-dwelling bird, which can fly great distances but often reluctantly takes to the wing, already stands at a disadvantage with humans. If it also tastes delicious it is seriously disadvantaged. The Australian Bustard, also known as the Plains Turkey (*Ardeotis australis*) is all these, and has suffered heavily since the arrival of Europeans in Australia as a result. It is the heaviest flying bird in Australia. This book presents a synopsis of current and past knowledge of the Australian Bustard, and it is illustrated with a section of 8 pages of colour photographic plates and some black and white photographs throughout the text.

Chapter 1 offers an introduction to the bird along with a brief account of its place in Australia's history and folklore since the arrival of Europeans. In 1770, Banks and Solander were the first Europeans to have recorded seeing an Australian Bustard, and shortly afterwards became some of the first Europeans known to have eaten one. Upon settlement, more of these birds, (abundant and widespread at the time) were noted, and of course more were shot and eaten leading to the beginning of a major species decline. Many place names are named after the Australian Bustard, referencing either the words bustard or turkey (in areas outside the distribution of Brush Turkeys), and the common names of several plants, such as Turkey Bushes (*Eremophila*) on account of the preference of these birds for the fruits of these plants. Chapter 2 places the bird into an Aboriginal context. A selection of Aboriginal names are given, along with a few Dreaming myths. Australian Bustard taboos are covered, in as much as what is publicly known. Totemic relationships and the significance on these for conservation are discussed, along with methods and other aspects of hunting. An intriguing topic arising from this is the use of complex sign languages when hunting; these have been developed among a number of language speaking groups for a variety of purposes, but are important when hunting to avoid spooking prey.

Chapter 3 places the Australian Bustard into a broader context by giving an overview of the taxonomy and key characteristics of bustards (Otitidae), an Old World family with 25 species across 11 genera, with a single species in Australia. The Australian Bustard currently sits in *Ardeotis* with three other species in India, Africa and Arabia; in the past these have been lumped into a single species. The physical characteristics of the Australian Bustard are then covered including size, sexual maturity, plumage, bare parts and vocalisations It is currently unknown as to whether there is a geographic trend in size, given that the Australian Bustard is a species with a wide distribution.

Chapter 4 covers the bird's distribution and various aspects of habitat. The once abundance soon declined in settled areas, mostly the result of hunting. They are now largely absent from much of the south-east and the south-west corner, and are sparsely distributed through much of their southern range. They are also found in southern Papua New Guinea, cut off from the Australian population by rising waters at the end of the last ice age, but were apparently never found in Tasmania. Northern and central Australia have traditionally been considered to be strongholds of the species, but recent atlas results have shown declines in the Northern Territory, especially in the arid southern parts. However, they have increased in some parts of northern Australia, mostly as a result of clearing or creating suitable, if artificial, habitat.

Australian Bustards have a preference for flat open areas, including grassland, open shrubland and open woodlands, and artificial habitats such as croplands and gold courses. In monsoonal northern Australia, grasslands have heavy grass cover early in the Dry, dying off as the dry season progresses. Australian Bustards utilise these grasslands heavily in the early Dry; as the season progresses these open up, and woodlands and watercourses are utilised more. The late Dry is the peek breeding season and males prefer open areas for displaying. Since females prefer cover for raising young, ecotones between woodlands and grasslands, or in arid areas, between grasslands and scrub, or between low chenopod shrubland and tall mulga shrublands are the most sought after areas.

Chapter 5 covers diet and the daily routine. Australian Bustards eat a wide variety of foods, with balance of both animal and plant foods. As with many birds they are active from dawn to the early morning, and from late afternoon through to after sunset. In the monsoonal north, male bustards spend more time foraging in the early dry than later in the season: they need to build up fat reserves early in the season, because during the breeding season in the late Dry they may spend most of their time displaying and may lose considerable weight during this time.

Chapter 6 is tantalisingly titled "Exploding Bustards". In northern Australia, the males gather at leks to display and compete for the attention of females. Leks are referred to as "exploded" when the individual birds within a display area are scattered over wide distances, up to 2km apart. It is not known whether arid zone bustards behave similarly, but is unlikely given spatial and temporal patchiness of habitats and resources. Social hierarchy, lek fidelity, display rituals, mating, next selection and raising young are all covered. Chapter 7 looks at movements which range from sedentary birds in horticultural areas of the north and cleared areas, through migration where resources are seasonally available, through to nomadic movements in arid areas where resource availability is unpredictable (although these may overlay some degree of seasonal movements also). They also move opportunistically in response to fire, and often congregate at these areas to pick up food such as insects. The use of bird atlasing and satellite tracking in studying Australian Bustards' movements is also discussed.

The final chapter outlines threats and conservation. The Australian Bustard suffered heavily from hunting during the early years of the colonies. It is currently listed as Near Threatened nationally, Vulnerable in South Australia and the Northern Territory, Endangered in NSW and Critically Endangered in Victoria. John Gould warned of its decline in 1865, the same year of the last record of this species from my local patch in Sydney's eastern suburbs, and it was protected in NSW under a game protection act the following year. Hunting continued illegally for some time and still occasionally happens. Legal traditional hunting by Aboriginal people still occurs in central and northern Australia. Other pressures which have contributed to their decline include introduced predators such as foxes, habitat alteration, including the spread of woody weeds, pesticide use and altered fire regimes. Conservation measures include a captive breeding programme in Serendip Sanctuary in Victoria, which has had mixed results since its inception in the mid '60s.

A stylistic quibble I have with all of the titles in this series which I have read is that, although there is a comprehensive bibliography at the end of the book, references are not given throughout the text. Another stylistic issue is that common names for species are not capitalised, an increasing trend in journalistic writing; this is of course just a matter of preference, but I prefer my common names to remain as proper nouns. Stylistic quibbles aside, I cannot fault Ziembicki's writing. This would have to be most well-written of all of the titles in this series which I have read. It is not only written in an informative, clear style, but it is entertaining to read. Ziembicki's writing has well placed occasional touches of humour and wry observation. As with others in the series, it is aimed at a broad audience across many levels; it's an informative and entertaining account of an iconic Australian bird and would make a worthy addition to anyone's natural history shelves. I recommend grabbing a copy, sitting back and reading up about the Australian Bustard.

Frank Hemmings

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Prof. MALCOLM WALTER

Australian Centre for Astrobiology, University of New south Wales

EARLY LIFE ON EARTH AND THE SEARCH FOR LIFE ON MARS

The oldest convincing evidence for life on Earth is found in 3.5 billion year old rocks in the Pilbara region of WA. At that time Mars had a clement climate, and could well have harboured similar microbial life. The Pilbara has become a key region for developing exploration strategies for life on Mars. Recent missions to Mars have produced evidence consistent with the view that the planet was once, and may still be, inhabited. The potential significance is profound: at present we have only one sample of life. A second could transform our understanding of biology.

****

Wednesday 22 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. DARREN CURNOE

School of Biological, Earth & Environmental Sciences University of New South Wales

ONCE, WE WERE NOT ALONE

For probably the entire seven million years of our evolution, our species and its ancestors lived side by side with other human-like apes. Yet, today, we find ourselves alone. One way of thinking about this is to compress the human evolutionary story into just one year. We find that we've been alone since about mid-afternoon on the 31st of December. That is, humans have been on our own for less than one half of one percent of our evolutionary history. Barely long enough to even notice. Yet, being alone seems normal to us. Our closest cousins, the Neandertals, disappeared from Europe around 20,000 years ago, and the tiny 'hobbits' of Flores died out even more recently. And in China, my own research shows the persistence of a close relative along side modern humans until perhaps 12,000 years ago. To put these extinctions into perspective: people invented farming and began to establish permanent settlements, the forerunners to our modern cities, from this time onwards. Moreover, it now seems likely that Neandertals may hold the key to the survival of modern humans outside of Africa; our ancestors having interbred with them and inherited various features which ironically may have ensured our survival long after their demise. Perhaps other human species kept us in check, and only with their disappearance did we begin to wreak havoc on the planet? Maybe the extinction prone nature of the human tree is an evolutionary warning to us?

****

**Wednesday 20 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Dr. DUANE HAMACHER

Macquarie University / CSIRO Astronomy and Space Science

EVIDENCE FOR A PUTATIVE IMPACT STRUCTURE IN PALM VALLEY, CENTRAL AUSTRALIA

Evidence is presented supporting the impact origin of a circular structure located in Palm Valley, Central Australia. The ~280 m wide structure was discovered using a combination of Google Maps and a local Arrernte Aboriginal oral tradition regarding a star that fell into a waterhole called Puka in Palm Valley. A survey of the structure in September 2009 collected geophysical data that were later modeled, revealing a bowl-shaped subsurface morphology, as expected for a simple impact crater. The models do not support erosional or volcanic origins. The microstructure of rock samples collected from the site revealed the presence of planar deformation features in the quartz grains, a prime indicator of an impact. Based on the level of erosion and the absence of shatter cones and meteorite fragments, we estimate the structure's age to be in the millions of years, suggesting a coincidental relationship to the Arrernte story.

Wine and cheese will be served from 5.30 pm before each lecture

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 137 **OCTOBER 2010**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members
Dr. Susan Turner. Field of interest, geology / palaeontology.
Mr. Joseph Wright, District Fisheries Officer (NSW Industry and Investment).

DONATIONS TO THE SOCIETY

We have received an anonymous donation of $250 for the Bettye Maye Scientific Research fund. For the Joyce Vickery Scientific Research Fund, total of $1,625 was received from Anonymous, David Colby, Michelle Cotton, Dr. Donald Horning, Dr. Dan Lumney and Dr. A.O. Nicholls.

The Society has also received $25,526 from the estate of the late H.J. Hewson and this amount has been added to the Joyce Vickery Scientific Research Fund.

We thank all our kind donors: these donations are much appreciated.

AWARD FROM THE BETTY MAYNE SCIENTIFIC RESEARCH FUND GRANT
As in 2009, only one application was received for funding support from the Betty Mayne Scientific Research Fund. This trend unfortunately reflects the decreasing numbers of students and staff at universities and other institutions involved in basic research projects in the Earth Sciences that could be supported by grants from the fund.

Applicant: W.B.K. Holmes (Honorary Research Fellow, University of New England)
Title of project: The Middle Triassic Megafossil Flora of the Basin Creek Formation, Nymboida Coal Measures, NSW, Australia.

Synopsis: the project aims to complete the documentation of fossil plants from Nymboida, the richest palaeobotanical site of Triassic age in Australia. So far, Keith Holmes has published eight papers in the *Proceedings of the Linnean Society of New South Wales* describing significant parts of this flora. The funding sought will enable completion of this major project with preparation of one or two further parts, as well as ensuring the curation of previously described material. Awarded $1000.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2010. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 14 November 2010

SEX, COLOUR AND SPECIATION IN AUSTRALIAN GRASS FINCHES: a talk given by Dr. Simon Griffith.

Species are usually thought of as distinct entities and this concept was developed in Europe and America. The birds living close to universities are the ones most studied and field guides usually have one or two pictures to represent the whole species. In the field, across the range of the distribution of a species, things are more complicated. Colour varies quite a bit from one area to another, which may be the result of variation in environmental factors. For example, the amount of calcium in the diet (and hence the environment) may cause differences in colour. The long tailed finch in Australia is an example of colour variation with geographic region: in the Kimberlies, the bird has a yellow bill but in Mt Isa, it is red. This difference is genetic and the birds breed true in captivity. There are three types of long tailed finches across the Top End: the western, the central and the eastern.

The view that the Passerines are monogamous and the paragons of virtue is a particularly Victorian view, but in the 1960's, it was found not to be true. In house sparrows, 13% of the offspring were not fathered by the male feeding them. With fairy wrens in the Canberra Botanic gardens, 76% of the offspring result from unfaithful liaisons. But with silver eyes on Heron Island, there is no cheating, ever, they are always faithful. Infidelity seems to run in families, some more, some less. In peacocks, there is no pair bonding and one male may father 90%of the chicks. How does all this infidelity affect evolution? Infidelity increases the breeding of the more successful males, so over generations, the trait becomes more common.

Colour reflects the health and vigor or the male. It is as if he has enough energy left over from the necessities of daily living to be extravagant. The female selects the most colurful as a sign of the best genetics for her chicks, so that in time, the colours become even more brilliant. She also selects the male the least related to her, but she may also select for a good nest builder or a good provider. Some females may not be good at recognising closely related males, and if she is paired with a related male, then there is much more infidelity. The female has an extraordinary ability to prevent sperm she does not want from fertilising the egg, hence if she does mate with a related male, there is some physiological process that prevents fertilistation.

The Gouldian finch is a very colouful bird, with a green back, mauve breast, yellow belly and blue collar. The head may be yellow, red or black, and the yellow head is quite rare. Breeding shows that these three variations all belong to the one species and the three forms are maintained. Why? If one is more dominant, for example, the red head, it should increase in the population, but the ratio of the types remain the same.

In further breeding experiments, when a red headed female was mated with a black headed male, the offspring did not do well. Only half hatched and only half of those survived to independence, and then they did not survive beyond 60 days. The daughters suffered more than the sons. Finch breeders know this and only pair red-heads with red-heads and black-heads with black-heads. The red-heads are more aggressive and dominant, the black-heads more passive.

When the female is forced to mate with the wrong male, she adjusts the sex ratio very significantly. In this experiment, 80% of the offspring were male. When the right male, the female lays more eggs and they are larger, and the parents look after them better. If the male is wrong, such as a red headed female and black headed male, there are many extra pair matings, but if the male is right, then there are very few extra pair matings. Birds have sperm storage tubules and the sperm can stay viable for up to 15 days. It may be that the birds manipulate this system or it may be at the penetration of the egg that selection operates: we just don't know.

Why are the three types maintained in the same proportions? It may be that the red headed birds are more successful in one environment and the black headed in another type of environment. It may also be historical. About half a million years ago, grass finches were confined to three areas across the Top End: the Kimberleys, Arnhem Land and York Peninsula. They have spread out since this date. Other grass finches besides the Gouldian Finch also show these three centres of distribution: western, central and eastern: the finches are fairly sedentary. This means the red and black headed forms are varieties and on the way to becoming separate species.

BOOK REVIEWS

A GUIDE TO THE KATYDIDS OF AUSTRALIA by David Rentz
CSIRO Publishing, Collingwood, Vic. (June, 2010)
Paperback, 224 pages, Price AU$49.95
ISBN: 9780643095540

David Rentz has for decades been one of the world's leading authorities on katydids. During his illustrious career, and now in his retirement, he has published numerous books of the highest quality on the insect order Orthoptera, that rival any systematic treatment of any group of insects. These books have all been of the most comprehensive nature, inclusive of broad comparative morphological work and behaviour. Without fail all of these books have stood out because of their outstanding illustrations. His current new contribution, 'A Guide to the Katydids of Australia', publishing by CSIRO Publishing, is the next contribution to his 'oeuvre de katydid'.

This book is more designed towards a broader audience than some of Rentz' more conventional taxonomic outputs. Its content, style of writing and extensive photographs, place it well within the market of the naturalist and student. Having said this, every serious katydid worker will also want to have this volume on their shelves. The book is 214 pages and there is hardly a page that is not adorned with a photograph of a katydid in action. For the uninitiated, the book starts out with a brief outline of the classification of the Orthoptera, inclusive of the placement of the Tettigoniidae (katydids), and basic morphology. The author has always provided first-rate observations of the biology of katydids, and in a separate chapter in this book, he provides a summary of life history traits, food preferences and natural enemies. Small chapters follow that focus on sound production and hearing, collection and curation techniques, and katydid conservation. He highlights their vulnerability to extinction, as many katydids are narrowly distributed, and are sometimes found in habitat remnants, such as roadsides, where their host plants can be restricted. Katydids are a potential case study group for examining coextinction risk in places such as southwest Western Australia.

The remainder of the book is a treatment of Australian katydids by subfamily, with 14 subfamilies treated, and the author also includes his own tribal arrangement by subfamily. A quirk of this book is that the subfamily key is at the back of the book, and it may have been just as useful to place it before the subfamilial treatments. However, this is not a fault but a debate about book design. Each subfamily includes a description of key morphological features, biology, biogeography etc, followed by tribal, genus and species group treatments. The species treatments are not comprehensive, but are more of a précis of the better known species. The author states that there are about 1000 species of katydids in Australia, and well over 100 species are treated under a species name or voucher number. I quibble, but it was not apparent how many species were treated, although a comprehensive checklist is provided near the back of the book. From what I observed, nearly all genera and species are also given a common name, and I suspect that some of these are new additions. One wonders how many of them will be taken up by naturalists into the future. Each species is covered by a paragraph or two, covering diagnostics, biology, distribution, and often with a colour field-style photograph.

After the subfamily key and checklist, the book is rounded off with a small literature section, a glossary of morphological and biological terms, two appendices on preservation, and entomological groups and supplies. A five-minute check of the index revealed no errors in pagination. The quality of images is in general first class, and for most entomologists, these animals are revealed for the first time.

This book is essentially a field guide. It would easily sit in the back pocket of your jeans as you wander across the Australian landscape, where you could easily riffle through the images and make a quick species determination. The saturation of habitus images will allow the knowledgeable katydid-ologist to have a good guess as to whether they might have picked up a new species. Writing a book on a group of organisms where the taxonomy still requires a lot of work is a difficult task. David Rentz has achieved this with ease, which is a testament to his vast knowledge, skill and continuing commitment to unraveling this most marvelous of insect taxa. At five cents less than $50 it is commensurate with books of its type in price. I commend this book to you and I am thrilled to see that David Rentz continues on with his invaluable contributions to Australian entomology. Undoubtedly there are more to come.

Gerry Cassis, University of New South Wales

REPTILES OF THE NSW MURRAY CATCHMENT, a guide to their identification ecology and conservation, by Damian Michael and David Lindenmayer.
CSIRO Publishing, Collingwood, Vic. (April 2010).
Paperback, 248 pages. RRP $39.95
ISBN: 9780643098206

Australia is at last catching up with Europe and North America in the diversity of wildlife identification manuals available to the ever-increasing body of ecological scientists, field naturalists, students and conservation-minded public wishing to accurately identify the reptiles (and other biota) that they encounter in the course of their work or recreation.

From a base of occasional national field guides, State field guides are now ubiquitous, and these are in turn being regularly supplemented by more focused regional treatments. This hierarchy of field guides offers many advantages. For example, this book treats 80 of the total Australia reptile fauna of *ca.* 900 described species. Consequently by serving a more restricted area such guides can provide much greater detail per species – more and bigger illustrations, usually photographs of locally-occurring forms of widespread species, more descriptive information on each species (including details on biology, ecology and local occurrence) and more effective identification diagnoses and keys.

All of these advantages are exemplified in "Reptiles of the NSW Murray catchment", covering a geographic area of some 35,500 km^2. Here, each species is treated to a minimum two-page spread, usually with at least two large, full-colour images, and with a detailed distibution map consisting of spot records and general distribution derived from the Atlas of NSW Wildlife (http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp), the "Museum of Australia", the Australian National University and Murray Wildlife Pty Ltd.

The introductory pages contain brief but informative sections on the importance of conserving reptilian diversity, on conserving reptiles on farms and on the climate and vegetation in the region.

Subject categories under each species are ***Identifying features***, ***Total length*** (for larger species, including most snakes) or ***Snout-vent length***, ***Similar species***, ***Life-form***, ***Reproductive mode***, ***Activity***, ***Distribution***, ***Shelter-sites***, ***Vegetation type***, ***Conservation status***, ***Additional notes***, ***Facts*** and ***Management***. Most of these are self-explanatory and highly-informative. Comments under Vegetation type and Management supplement detailed sections on these subjects in the general introduction, with the material on vegetation being especially helpful. The category Facts, on the other hand, contains diverse information on particular taxa without any consistency or comparative content across taxa. This is an observation, not a criticism, though whether some of the facts are the most useful to the users might be debated.

There are no formal keys to identification of all species (probably unnecessary given the information provided in the *Identifying features* and *Similar species* sections of each description), but there are Tables (with thumbnail images) of features distinguishing several groups of skinks - fossorial species and members of the genera *Ctenotus*, *Egernia*, *Liopholis*, *Eulamprus* and *Pseudemoia*.

These tables are followed by two useful Appendices: a table listing the reptiles of the region and their associated vegetation types (the latter as defined, described and illustrated in the introductory section) and a list of common and scientific names of all other plants and animals mentioned in the book.

Criticisms? Few and minor. While distribution within the catchment is given (in words and a map) there is no indication of a taxon's overall range, information that would probably be useful to many of the book's readers who will otherwise have to refer to other books or to a web search for the details. The tabular keys use only common names, requiring cross referencing to the individual descriptions or index for equivalent scientific names if a user is not familiar with a particular common name. As indicated above, if reference to the Museum of Australia is incorrectly intended to refer to the Australian Museum, then it is annoying and has the potential for a reader to confuse it with the National Museum of Australia in Canberra. Conversely, if their "Museum of Australia" is a distinct private entity then its existence is not well known and requires explanation. The specific epithet for the Alpine Water Skink (*Eulamprus kosciuskoi*) is not an "original 'incorrect' spelling" (p. 129) under the rules of nomenclature, and the wording used, though with good intent, confuses the issue.

In summary, the authors state that their book "... aims to help landholders, natural resource managers and interested members of the general public identify any species of reptile encountered within the NSW Murray catchment." They have certainly achieved this aim in a practical and extremely attractive book that carries a strong conservation message and that doubtless will be highly valued by its target audiences. It is a major contribution to the literature on the Australian herpetofauna.

Hal Cogger

INVISIBLE CONNECTIONS Why Migrating Birds Need the Yellow Sea
By P. Battley, B. McCaffery, D. Rogers, J. Hong, N. Moores, J. Lewis and T. Piersma.
Jan van de Kam (Photographs)
CSIRO Publishing April 2010
Paperback 160pp 240 colour photographs, Price AU$49.95
ISBN: 9780643096592

The first migratory wader I ever identified, way back in December 1975, was a Ruddy Turnstone, and I have been captivated by this fascinating group of birds ever since. So I was very pleased indeed to be able to review this book about the East Asian – Australasian Flyway.

The first edition of *Invisible Connections* was published in 2008 by Wetland International with Chinese, Korean and English text. This updated version published by CSIRO is in English only.

There are eight chapters written by an international team of experts from countries along the Flyway, each with four pages of text followed by a host of spectacular photographs. Most of these photographs are by Jan van de Kam, the main moving force behind the production of the book. Much extra information appears in the captions. As a longtime fan of waders, I particularly enjoyed the photos, several of which brought home to me something I had not fully grasped before – the cryptic nature of the breeding plumage of these birds.

The chapters cover shorebird ecology, the East Asian – Australasian Flyway itself, the physical nature of the network of habitats along the Flyway, the pressures on these habitats, especially those from human populations, and the urgency of the need for something to be done to preserve them. The final chapter ends by detailing some signs of hope in this regard.

The focal point of the book is the importance of the Yellow Sea to the Flyway. For migrating waders, it is a "pinch point", so to speak. A high percentage of birds (maybe up to 40% - two million birds) migrating from countries stretching from East Asia to Australasia and Oceania use the Yellow Sea before pushing on to breeding grounds in Siberia and Alaska. For a lot of birds, the post-breeding return journey is not quite so tied to the Yellow Sea but it is still used by something like 20-30% of all waders migrating southwards. For some species, such as the Bar-tailed Godwit, the Yellow Sea holds almost all the Flyway population at some time during the year. For some species of high conservation concern, the Spoon-billed Sandpiper, for example, the Yellow Sea mudflats are even more vital. Yet as the book makes clear, the situation for migrating waders is precarious because 50% of their habitat has been "reclaimed" [my emphasis] in the last two decades. And this does not only affect waders but other waterbirds as well, and also the human fishers who have traditionally harvested the Yellow Sea mudflats.

The book certainly succeeds in its primary aims of illustrating the interconnectedness of the habitats along the Flyway, and the necessity of urgent international co-operation (since no single country hosts the entire life cycle of these species) in combating the threats to the Yellow Sea's ability to support the many species which depend on it. For this reason I recommend *Invisible Connections* to anyone interested in waders, conservation issues, natural history, and so on.

I suspect, however, that the book might need updating before too long. So much research on wader migration patterns is currently being undertaken, such as through the fitting of tiny geolocators to birds of many species, that we are soon going to get an even clearer picture of the strategies used by the migratory waders of the Flyway, and of the prodigious flights of which they are capable.

While I very much enjoyed reading this book, there was one irritation – its shape. Landscape format books do not sit readily on my bookshelves. This is, however, a minor issue. This book is well worth adding to your library.

David Hair
School of Biological, Earth and Environmental Sciences
UNSW

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

P R O G R A M M E

Wednesday 20 October, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. DUANE HAMACHER

Macquarie University / CSIRO Astronomy and Space Science

EVIDENCE FOR A PUTATIVE IMPACT STRUCTURE IN PALM VALLEY, CENTRAL AUSTRALIA

Evidence is presented supporting the impact origin of a circular structure located in Palm Valley, Central Australia. The ~280 m wide structure was discovered using a combination of Google Maps and a local Arrernte Aboriginal oral tradition regarding a star that fell into a waterhole called Puka in Palm Valley. A survey of the structure in September 2009 collected geophysical data that were later modeled, revealing a bowl-shaped subsurface morphology, as expected for a simple impact crater. The models do not support erosional or volcanic origins. The microstructure of rock samples collected from the site revealed the presence of planar deformation features in the quartz grains, a prime indicator of an impact. Based on the level of erosion and the absence of shatter cones and meteorite fragments, we estimate the structure's age to be in the millions of years, suggesting a coincidental relationship to the Arrernte story.

Wine and cheese will be served from 5.30 pm before each lecture

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 138 **DECEMBER 2010**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE

Natural History of the first National Park: a Symposium

OFFICE CHANGE OF ADDRESS

There is a change of address of the Society's office: from 4/2 Gardeners Rd Kingsford to Suite 3, 40 Gardeners Rd. Kingsford

Please note: Only the address of the office has changed. Postal address, phone numbers, e-mail address, and web-site all remain exactly the same as before, and as given above.

NEW MEMBERS

We welcome our new members:
Ms Emma Gorrod of Surry Hills
Mr. Angus Robinson of Pymble.

WHO WAS H.J. HEWSON?

The Society has received $25,526 from the estate of the late H.J. Hewson that has been added to the Joyce Vickery Scientific Research Fund. So who was H.J. Hewson?

Helen Hewson was a botanist interested in the taxonomy of Australian plants. She taught botany at the Australian National University and became associated with ABRS and the *Flora of Australia*, and made a major contribution. She became Director, Flora at ABRS and later, Director of Botany at the Australian National Botanic Gardens. She was a botanical artist and water-colourist, and produced her own scientific botanical illustrations, as well as exhibiting in shows.

Her other love was dog breeding and gained a Dog Judging Diploma and lectured on canine genetics.

We thank you, Helen Hewson, for your most generous donation to the Society.

NATURAL HISTORY OF THE FIRST NATIONAL PARK

The Society will convene a Symposium on the Royal National Park and its surrounding landscapes that will bring together contributions from biologists and earth scientists, geographers, amateur naturalists, historians and sociologists who will present their studies of natural history and human geography in this important area.

See the flyer included with this newsletter for more details and to register expressions of interest.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

Members may apply for up to a maximum of $1,500 and non-members, up to $1,000, for both the Betty Mayne and the Joyce Vickery Research Funds.

The date for submission of applications is 1st March, 201i. This date applies to both the Betty Mayne and the Joyce Vickery Research Funds.

Please mail applications to:
The Secretary, Linnean Society of NSW
PO Box 291
Manly, NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $1,500 for Members and $1,000 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2011. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological sciences which come in the range of interest to the Society.

Individual grants will not normally exceed $1,500 for Members and $1,000 for non-members.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1 st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2011. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291, Manly, NSW 1655**

A NATURAL HISTORY OF ANTIBIOTICS, a talk given by Prof. Andrew Beattie

The evolution of sociability presented Darwin with special difficulties. How could he explain so many individuals that did not reproduce? There were different casts, shared brood care, overlapping generations and overcrowding. Later studies added low genetic diversity, but there is actually more genetic diversity than originally thought. These are the precise conditions which would allow contagious diseases to flourish. Were antibiotics crucial for the evolution of sociability?

Bull ants have special glands on their backs which secrete a fluid that has strong antimicrobial properties. Previously, it had not been know what there glands were for. The antimicrobial system is two tiered: an external antiseptic they smear all over one and other's bodies, and an incredible internal immune system. If infected with E. coli, the ants developed peptides for that strain of E. coli in just two days, which is remarkable.

All ants are highly sociable, but some bees are solitary or semi-sociable, as well as sociable. Semi-sociable bees have about 7-8 bees in the colony, whereas sociable bees have 14 to more than a thousand. Bees are thus good for studying the relationship between antimicrobial activity and colony size.

The antimicrobial is extracted with ethanol, evaporated and then re-suspended at different strengths. The extract is then mixed with golden staph bacteria and the concentration that suppresses growth of the bacteria noted. The weakest antimicrobial was found in the solitary bees: it took the antimicrobial from 40 bees to prevent the growth of the golden staph, whereas it only took 13-28 bees from the highly sociable colonies.

The working hypothesis was that the production of the antimicrobial was linear, i.e., very little was produced in solitary bees, intermediate in semi-sociable bees and high concentrations in the very sociable bees. This turned out not to be so. From a low concentration in the solitary bees, there was a big jump to the semi-sociable bees, i.e. there must be antimicrobials for any kind of sociability. The pathogens are driving evolution.

Cordiceps is a fungal pathogen that infects insects. The fungi associated with bees was isolated and sequenced, and a cordiceps was identified there. When the extract was tested using cordiceps instead of golden staph, antibiotics in the extract challenged the cordiceps. When a colony of semi-sociable bees is infected with cordiceps, the colony increases in size because more bees produce more antibiotics. The antibiotics suppress cordiceps spore germination, but do not kill the hyphae once the fungus has started to grow. Prevention is better than cure.

There are solitary and sociable thrips, and in-betweens which live in curled up leaves (leaf-spinners). Sociable thrips around Alice Springs live in galls on Acacia. These galls are only a few milimetres across and there are 100-200 individuals packed in them. Antimicrobial activity is very strong. In the leaf spinners, there is some antimicrobial activity, but in solitary thrips, there is no activity. The galls are not strictly sociable because they are one mother and all her offspring, but the results are the same. They are all packed in together and genetic diversity is low, hence there is a need for antimicrobials, even though the system is different.

Wasps have the same system, but the antimicrobials are much stronger.

Golden staph was chosen for testing for antimicrobials so that it could be used for bio-prospecting to look for new antibiotics. The new antibiotics being developed are usually similar to the old ones, hence resistance quickly develops. New and different antimicrobials are required. Designer drugs based on what we know have proved disappointing. Bio-prospecting is going on, world wide, and in mining, engineering and many others, not just the pharmaceutical industry. They are all looking to natural history for ideas. Most antibiotics are found in soil microbes, e.g. penicillin. And now antibiotics are found in insects. Thrip antibiotics are now being analysed.

The Aborigines knew about antibiotics in insects. They would take a cloth and throw it on a bull-ant nest, stir up the ants, then take the cloth and wrap it around a wound.

EARLY LIFE ON EARTH AND THE SEARCH FOR LIFE ON MARS: a talk by Prof. Malcolm Walters

Some of the oldest rocks on Earth are found in the Pilbara in northwest Australia, and they are 3.6 billion years old. They are hardly metamorphosed at all, hence the palaeontology is extremely well preserved. By studying this early life, it is hoped that we may get some clues about life on Mars.

Historically, 'canals' were seen on Mars, but they were only seen when conditions were 'just right'. The 'canals' are there because Mars dried up. Mars is smaller than Earth and once water was there. Water is the one prerequisite for life

The Earth is 4.6 billion years old. At 3.8 billion years, there is some chemical suggestion of life in Greenland, but it is doubtful. By 3.5 billion years ago, there is compelling evidence that life existed in the Pilbara. By 2.5 billion years ago, the biochemical system of life today, as seen in the algae, was in existence.

The early environment of Earth had much more carbon dioxide than today and that kept the Earth warm. There was virtually no oxygen in the atmosphere. Photosynthesis had to evolve first to produce the oxygen and it took 2.2 billion years for the oxygen to build up.

There were three early life forms: Archaea, Bacteria and Eukaryotes. Archaea are microbes like bacteria but they have a much simpler structure, with no membrane-enclosed organelles within the cell. Bacteria are more advanced, but do not have a nucleus, and the eukaryotes have a true nucleus and other cell organelles. All macroscopic life on earth, plants and animals, are eukaryotes. Most of the life on earth is microbial, so life elsewhere is likely to be microbial also.

In the tree of life, most of the simplest organisms at the base of the tree are hyperthermal and live at temperatures above 80° C. The maximum temperature known is 122° C in the deep ocean, where the pressure keeps the water liquid at that temperature. These extremophiles have repair systems that operate faster than the degredation of the proteins by heat.

In the Pilbara, hilltops 3.5 billion years ago are silicified. There was much volcanic activity and water from the sea seeped down and came back as hot springs. Mounds of stromatolites grew in them. Life is not there now, but the pattern formed by life is left preserved in the sediment.

White Island in the Bay of Plenty in New Zealand is an active volcano and is like early earth, when there was abundant volcanic activity. There is no visible sign of life there in the volcano. In a stream leading from the volcano, the pH is 0, and the water is more acidic than battery acid. The temperature is 100° C and there is red algae and brown oxidizing bacteria growing in it. The Pilbara was once a volcanic caldera.

The continental shelf has layered rocks that are interpreted as microbial reefs. Cone shaped stromatalite are about a metre across and 50 cm high. In a transect across the continental shelf, there are different shaped stromatolites, from shore to deep water.

The stromatalites in Shark Bay are 400 to 600 years old. In the hot climate there, the high evaporation rate keeps the water very saline and this keeps out the parrot fish and other algal browsers. The stromatolites are formed from layers of algae that trap sediment. The algal communities are very complex, with many types of cyanobacteria (blue-green algae) and bacteria only a small part of the dozens of organisms. Archaea, which usually do not tolerate oxygen, are there too, amongst photosynthetic algae/bacteria. There is signalling between organisms, using proteins. We do not understand the complexity.

Biomarkers are chemical compounds produced by some form of life that can survive a long time and are diagnostic. Biomarkers are found back to 2.7 million years ago. It is likely that life began about 4 billion years ago, for then bombardment of Earth, which would have made it too unstable, had stopped.

There have been forty missions to Mars and about twenty have been successful. It has volcanic craters and the largest caldera in the solar system, about 500 km across. Mars has no magnetic field now, because there is no molten core. It may have had a magnetic field and plate tectonics, once.

All life requires liquid water and we only have one sample of life, that here on Earth. Mars probably had an ocean once, with river valleys leading into it. The atmospheric pressure is just 1% of that on Earth. The latest Phoenix Expedition recorded a maximum temperature of -30°C and a minimum of -70°C. The poles are icy, with both carbon dioxide and water ice, hence there is water at the poles, but less elsewhere.

On Earth, microbes are found down to 2-3 km in the earth. On Antarctica, meteorites from Mars are picked up, and what looks like microbial life similar to that from the Pilbara can be seen, but it has not been substantiated. There are methane rich patches in the atmosphere of Mars, and methane is produced by life and also from volcanic activity. The isotopic composition should distinguish the two, and we await the evidence.

Mars is one third of the size of Earth. Early in its life, it was warm and wet, and had a thick carbon dioxide rich atmosphere. The weathering of the rocks turned them into carbonates and the carbon dioxide in the atmosphere disappeared and the planet cooled. On Venus, carbon dioxide is the main atmospheric gas and the temperature is 700°c.

Why fund space exploration? Eighty percent of the budget goes on aerospace engineering and that crates lots of jobs and keeps aircraft engineering going.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2011 Annual General Meeting

The 136 Annual General Meeting of the Society will be held at 18:00h on 23 March 2011 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 17:30h.

Six members of Council are due to retire at this AGM:

Michele Cotton
Jean Claude Herremans
David Keith
David Murray
Peter Myerscough
Ian Percival

and all offer themselves for re-election.

Council recommends the election of Dr David Keith as President of the Society for 2011.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2011.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2011.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 139 **APRIL 2011**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE

Record of the Annual General Meeting, 16 March, 2011
Form for donation to the Society's scientific research funds

NEW MEMBERS

We welcome our new members:
Miss Sophia Callander, Australian National University. Field of interest: behavioural ecology, evolutionary biology, sensory ecology
Ms Belinda Cooke, Macquarie University. Field of interest: marine invertebrates, interstitial meiofauna.
Ms Kerry L. Gibbons, University of Sydney. Field of interest: systematic botany, plant evolution, historical biogeography, Loganiaceae.
Miss Sarah Maunsell, Griffith University. Field of interest: food webs, rainforest ecology, entomology.
Mr Graham J McLean. Field of interest: Early Cambrian life, paleogeography, marsupial evolution

Mr Bruce R Welch. Field of interest: speleology
Mr Joseph R Wright. Field of interest: marine & freshwater ecology, aquaculture, fisheries resource management

PAYMENT TO THE SOCIETY THROUGH A BANK

If you wish to make a payment to the Society through you bank, here are the details you need to know

BANK : ST GEORGE | BSB : 112 – 879 ACCOUNT # : 466 447 867

It is essential that you then email the Society and tell us about your payment, otherwise we will receive the
money and not know who paid it.

NATURAL HISTORY OF THE FIRST NATIONAL PARK SYMPOSIUM, 29 September to 1 October.

The venue for this symposium is now the Auditorium, Visitor Centre, Kamay Botany Bay National Park. Kurnell.
Abstracts are required by12 August. Instructions about preparation and the form for abstracts may be found on the web-site, http://linneansocietynsw.org.au. Please your abstract by e-mail.

WILDLIFE PRESERVATION SOCIETY RESEARCH GRANTS

The Wildlife Preservation Society of Australia is offering research grants of $1,000 to Honours and Postgraduate Students in Australian Universities for projects that have direct relevance to conservation or Australian wildlife, plant or animal. Applicants must be members of their Society and you may join by going to the web-site www.wpsa.org.au.

The closing date for applications is May 30. For instructions about preparation of applications, consult their web-site. They are rather specific about how you should present your application.

BOOK REVIEWS

A Guide to the Beetles of Australia by George Hangay and Paul Zborowski.
CSIRO Publishing, April 2010
Paperback, 248 pages, Price AU $44.95
ISBN: 9780643094871

It is a formidable undertaking to describe a group of organisms as prolific and diverse as Australian beetles in a compact volume. In their preface, Hangay and Zborowski state their aim as being to assist the reader to recognise most of the beetle families found within the continent. The book begins with a brief general account of beetle biology, followed by a series of chapters dealing in more detail with anatomy, life cycles, diet and adaptations for survival, and an overview of beetle classification. The majority of the work is devoted to individual accounts of 91 beetle families (listed by both scientific and common names), or about 80% of the families known from Australia, some of them broken down by subfamily.

The book is written in a semi-popular style, making it most suitable as an overview of the beetle fauna for the general reader, rather than a reference work for advanced students and researchers. However, anyone with an interest in beetles should enjoy its wealth of fascinating insights into the incredible diversity of beetle morphology, habitats, diets and life histories. In addition to general treatments of each family, typically including morphology, habitats and diet, text boxes highlight intriguing attributes of particular beetle taxa. For example, a box about "nasty customers" describes the global spread and destructive powers of the khapra beetle, and one entitled "extrasensory perception?" describes the role of Johnston's organ in the detection of prey by whirligig beetles.

The book does not contain taxonomic keys, but it does provide a list of the salient morphological characteristics of each family in the form of a series of dot points. Almost every family is illustrated by one or several photographs of adult specimens, which are almost invariably of excellent quality. Most seem to be of live specimens in their natural habitats, though some appear to be dead animals. In a few cases, drawings are provided in lieu of photographs. Technical terms are used widely but are clearly explained in an extensive glossary, and indexes are provided to both scientific and common names. Although the book is likely to be popular with beetle collectors, it does not contain information on techniques of collection and preservation or the permit requirements of Australian states and territories.

Passages in the book clearly highlight our limited knowledge of the Australian beetle fauna, such as the numbers of species that are likely to be undescribed and our ignorance of the larval stages of many beetles – a situation that is unfortunately unlikely to be remedied in the near future given the declining emphasis on taxonomy and research into the life histories and ecology of individual taxa. Disappointingly, the book contains almost no information on beetle conservation, despite the listing of some beetle species as threatened under state and federal legislation.

As is perhaps inevitable when one or two authors cover such a large and diverse fauna, the book contains various technical errors. For example, the accounts of the habitats of aquatic beetle families are somewhat inaccurate. Thus aquatic scirtid larvae are described as living in swamps, slow-flowing or tepid water, and tree holes, although they can commonly be found in cool mountain streams as well. Psephenid larvae, which can sometimes be found in quite polluted urban streams, are described as living only in clean waters. And the authors appear unaware that aquatic ptilodactylid larvae are commonly found in Australia, ascribing aquatic larvae to "some North American species".

Other errors include identical photographs of a moth, described as a beetle mimic, on pages 37 and 127 with captions ascribing the moth to different families. Similarly, photographs of the same red and yellow species of chrysomelid beetle appear on pages 7 and 203 with different genus names, as do photographs of a buprestid beetle, captioned *Curis caloptera* on page 8 but *Selagis caloptera* on page 110. I suspect that specialists on particular families may find many more errors than I have noted. It is not possible to check the original sources of most statements in the book because they are only occasionally referenced, and the total bibliography is only two pages. A few statements are quite perverse, such as the claim on page 34 that phytophagous insects can be regarded as predators. The book would also have benefited from more thorough proof reading and editing as it suffers from frequent errors in grammar and punctuation, and occasional spelling mistakes, including some errors in scientific names and technical terms.

Despite these mostly minor errors, the text is generally fluent and a pleasure to read. Overall, this book is a fascinating, wide-ranging and beautifully illustrated overview of the order, and should play a valuable part in stimulating further collecting and research to extend our knowledge of the Australian beetle fauna.

Gerry Cassis

Parrots of the World, by Joseph M. Forshaw and Frank Knight.
CSIRO Publishing, October 2010. Paperback, 336 pages, 146 Colour Plates, 376 Maps.
ISBN: 9780643100572. Price AU $ 39.95

Although named *Parrots of the World*, this new book is not to be confused with the much larger volume of the same name and by the same author, first published in 1974 and followed by a number of further editions, revisions and reprints. The illustrations in that book were by the already established artist William Cooper, who later executed the splendid paintings for several other authoritative works by Forshaw, including notably the lavish set on the Coraciiform birds of the world. The earlier *Parrots of the World* is highly regarded throughout the world by aviculturists and birdwatchers alike.

I had the pleasure of showing Joe Forshaw his first New Guinea Parrots, including a displaying male Black-capped Lory, and Bill Cooper his first New Guinea birds...

The new CSIRO publication is excellently illustrated by Frank Knight, well-known locally as the illustrator of the later editions of Graham Pizzey's revered Field Guide to Birds of Australia. It is a much more compact volume, strictly a field guide to all the world's parrots, one of the most interesting, spectacular and loved birds families. All 356 of the recognised species, including 10 extinct ones, are treated in the single-opening format, with text and distribution maps on one page, opposite the illustrations. Variations between sexes and races are very well shown : a few polytypic species run to more than a single page, among them the spectacular Eclectus Parrot and the familiar Rainbow Lorikeet, which both occur in Australia, New Guinea and adjacent islands. The Rainbow occurs on probably several hundreds of islands and must be among the most numerous of parrots.

At the other extreme, 2 of the 10 parrot species listed as extinct are Australian : the once locally-common Paradise Parrot of the mainland, and the Norfolk Island Kaka which cannot ever sustained a large population. Although some parrot-fanciers cherish the hope that the Paradise still survives somewhere, it seems certain that like the Tasmanian Tiger, it does not. Several other Australian parrots are threatened or endangered at species level (e.g Night Parrot, Orange-bellied Parrot) or subspecies (e.g western Ground Parrot, Kangaroo Island Glossy Black Cockatoo). Partly because some populations are rare to critically endangered, the distribution maps are colour-coded to indicate subspecies or separate allopatric species in adjacent areas. Red print is reserved in the text for threatened or endangered species.

The Parrots form a large and diverse family, but they all share a number of obviously unique or unusual features. They range in size from the large Neotropical Macaws and Australasian Cockatoos to the Pygmy Parrots of New Guinea and nearby islands from Wallacea to the Solomons, but Australia apparently lacks sufficient suitable habitat for them at present. Many different types occur, but the Australian Faunal Region has by far the greatest genetic diversity. The Neotropical Region supports many species, but of only a few basic types. A single species, a kind of Conure, lived in North America into last century, but disappeared around the same time as the Paradise Parrot. Relatively few species live in Afro-Asia, and there is a small area in and adjacent Wallacea where intermingle Asian types (such as Hanging Parrots) and Australasian ones (Cockatoos). Forshaw sensibly treats the three distinct areas separately, instead of following a traditional (and after all hypothetical) taxonomic order. Although several groups are shared by Australia and New Guinea, often extending to other islands, our Commonwealth has several genera familiar to us but found nowhere else. Rosellas and Parrots of the genera *Polytelis, Barnardius, Neophema, Psephotus* and *Pezophorus* are found nowhere else, as are the Budgerigar and some other monotypic genera.

I found this book excellent of its kind, and I recommend it to anyone who enjoys bird books, field guides or indeed exacting and authoritative books for their own sake. It deserves a worldwide and not a local distribution.

Winston Filewood

Wetlands Habitats. A Practical Guide to Restoration and Management. by Nick Romanowski
CSIRO Publishing, Melbourne. May 2010. Paperback, 216 pages
ISBN 978 064 3096 462, $49.95

In the history of nature conservation wetland birds had a very important role. The use by the millinery trade of egret feathers in vast number in the second half of the nineteenth century generated widespread revulsion at the destruction of birds which it entailed and triggered the formation of the Audobon Society in the USA and what is now the Royal Society for the Protection of Birds in the UK. Some of the earliest nature reserves were wetlands, conserved particularly for birds. The Ramsar convention, one of the first international conservation treaties is aimed at promoting wise use of all wetlands and conservation of the most significant sites. Although the criteria for inclusion on the Ramsar list have been extended to encompass a range of values the initial focus was very strongly on birds and bird habitats and many of the Ramsar sites are recognised for their bird populations. In the United States, Ducks Unlimited has been a major force in wetland conservation since 1930s.

There can be no doubt that wetlands are important for many species of bird, and vast flocks of birds attracted to particular wetlands provide great wildlife spectacles. Without public interest in birds, many more wetlands would have been drained and reclaimed (a weasel word in the context of wetlands as it normally means destroyed).

Nick Romanowski would probably be describe by Sir Humphrey Appleby as 'courageous' for suggesting that 'Birds are an essential component in the ecology of most types of wetland, but it is a mistake to make management decisions purely on the desire to attract them in unnaturally high numbers, as is all too often done.' But I would tend to agree with him. As he emphasises wetlands have value for a great range of biota and perform a large number of ecosystem services. While there will be justification in particular circumstance in managing individual sites for a particular species or service, to elevate this to a general approach to all wetlands is inappropriate. I would add that when it comes to birds, wetlands are important for more than what is generally regarded as 'wetland birds' (ducks, waders, herons, etc) – wetlands also support a diversity of fascinating passerines which are every bit as deserving of conservation concern.

'Wetland Habitats' is a succinct guide to Australian wetlands and to the problems that beset them. The discussion of introduced species, plant and animal, is a particularly valuable feature – and like his comments on birds, the author is not afraid to challenge conventional wisdom. It is also an important contribution to discussion of rehabilitation. For small scale works, this is a useful introduction for individual landholders, but as yet in Australia we have not begun to think about landscape scale rehabilitation – overseas we have seen valiant attempts to rehabilitate systems such as the Florida Everglades and, in Iraq, the Euphrates delta; exercises which will require large amounts of money, expertise and co-ordination. However, as we get more confident of success in small projects we might become more adventurous. Without large investment the prospects for some of our large iconic wetlands are bleak.

Dr. Romanowski is to be congratulated on an extremely thought provoking and attractively produced book.

Paul Adam

Evolution and Biogeography of Australasian Vertebrates
Merrick, J.R., Archer, M., Hickey, G.M. and Lee , M.S.Y. (eds.)
Published by Australasian Scientific Publishers, Oatlands NSW, c 2006
Hardback, $AU230: Paperback, $AU170

The reviews in Australian Studies (June 2007): "An obvious effort has been made to reach a wide audience and the chapters are a pleasure to read. Each of the 38 chapters of Evolution and Biogeography of Australasian Vertebrates is written by a specialist or specialists, and provides a comprehensive review of its topic. An unexpected but valuable and thought-provoking feature is argument concerning the way in which knowledge of biogeography and systematics can inform conservation planning in an age of accelerated extinction of taxa...."

For more favourable reviews of this volume, and for details, go to www.auscipub.com

ONCE WE WERE NOT ALONE: a talk given by Dr. Darren Curnoe

In Darwin's day, only three fossil hominoids were known and there was much debate about how real they were. In his book of 1871, the Decent of Man, only two fossils were mentioned and one of them was a Neanderthal. Since then, the record has been expanded greatly. Neanderthals are now known from 30 localities in Europe and Central Asia.

The earliest hominoids first appeared in the Miocene, which is very recent in the scale of animal evolution. Humans and Chimps shared a common ancestor about 7-8 million years age, according to the fossil record, or 4-8 million years ago, according to the DNA molecular 'clocks', and there is vigorous debate about who is right.

The arguments today are much the same as they were a hundred years ago. There is much debate as to whether the Neanderthals are in direct line of descent to modern Man or a side branch. Did Cro-Magnon Man (an earlier version of modern Man) and the Neanderthals overlap? If they did, then they are not in direct line of descent. The Neanderthals and us share the ancestors *Homo heidelbergensis* and the older *Homo erectus*.

Dating methods have improved greatly since the 1990's and a whole suite of isotopes can push back dating beyond the limits of radiocarbon dating. In the last 10-15 years, DNA sequencing has been used as 'molecular clocks', but as to how reliable are they, that's another story. There has been much more digging and many more fossils have been found. There are anything between one and 35 species, depending on your taxonomy.

The evidence shows that Neanderthals were around in Europe when Modern Man arrived and there is a DNA sequence for seven individuals 25-30,000 years old. The sequences show that some Neanderthals had red hair, like us, but it is not the same gene that is responsible. The DNA sequence largely confirms the fossil record: that the split between the Neanderthals and us occurred about 400-500,000 years ago.

Was there any interbreeding between the Neanderthals and Modern Man? The mitochondrial DNA is a small molecule and it says 'No'. The nuclear DNA is much larger and it says 'Yes'. About 1-4% of the DNA in European Modern Man is of Neanderthal origin. There is no DNA of Neanderthal origin in modern Africans. Neanderthals were not the dumb brutes of popular culture: they were around for hundreds of thousands of years and were well adapted to their environment.

So how many species of Man were there: probably about 30. If someone digs in a new location, they seem to find a new species, probably because there was a whole new set of evolutionary pressures at the new location.

About 1.8 million years ago, there were six species in three genera, some co-existing and some occupying different areas. *Homo erectus* was the first to leave Africa and he reached Georgia, Indonesia and China, but none are known from Europe.

By 1.2 million years ago, there were only three species. The *Australopithecus* group had disappeared, as had *Homo habilis*, but *H. erectus* was still around in Indonesia and east Asia. Six hundred thousand years ago, *Homo heidelbergensis* appeared in Africa and he was a direct ancestor of both the Neanderthals and us. Early modern man, Homo sapiens appeared about 200,000 years ago and existed along with H. *heidelbergensis* and the Neanderthals.

The behaviour of the earliest modern Man was different to ours. The use of ochre started about 100,000 years ago. He migrated out of Africa into the Levant about 100,000 years ago and was interbreeding with the Neanderthals. Where Modern M_Man appeared the others disappeared. This first migration out of Africa did not get far.

Truly Modern man migrated out of Africa 80-30,000 years ago and modern geographic areas were established. In western Europe where Modern Man and Neanderthals overlapped, it appears they did not like each other much. 50,000 years ago, Modern Man was in southeast Asia, Indonesia and Australia. *Homo erectus* disappeared by 20,000 years ago, so we were the only one left, except for the Hobbit on the island of Flores, where it lasted until 13,000 years ago. Flores was always and island even at the height of the glaciation.

Modern Man Australia settled in Australia about 50-60,000 years ago, the Philippines about 60-70,000 years and Malaysia, 45,000 years ago. And *H. erectus* ends about this time. There has not been much work done on this younger period: the older workers were only interested in the really old specimens. Dr. Curnoe is working on Pleistocene sites in mainland China where it looks like there are Modern Man and one or two archaic species. Homo erectus stayed a long time in China, through several very cold periods.

In conclusion, there are at least 24 species in 7 genera in our family tree. The formation of new species was quite rapid and the extinction rate was high. With so much diversity, why did so many experiments fail? Did we push the other species to extinction? We modify the landscape and the population is expanding all the time. When will time be up for our species?

It is said that we are all descended from one 'mitochondrial Eve' and we are all Africans. Eve is not just one woman but a small population of closely related people that left Africa. It used to be thought that there were three waves of migration into Australia, but the DNA sequence shows there was only one and the Aborigines are all the same. The Tasmanian Aborigines are no different. The 'bottleneck' in human evolution refers to the mitochondrial Eve. There is very little genetic diversity in the human population, and the most diversity is found in Africa.

The earliest stone tools in Ethiopia are 2.6 million years old. All species of *Homo* used stone tools. Three and a half million years ago, before there were any *Homo* species, there are bones with cut marks on them, showing that some early hominoid species were using stone tools.

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 20 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

LLINNEAN MACLEAY MEMORIAL LECTURE

Dr. SCOTT MOONEY

School of Biological, Environmental and Earth Sciences, University of New South Wales

Title: **LATE QUATERNARY FIRE REGIMES OF AUSTRALIA: FROM SCIENCE TO POLITICS.**

Abstract
In this talk Scott will describe recently published work which compiled 223 sedimentary charcoal records from Australasia in order to examine the temporal and spatial variability of fire regimes during the last 70,000 years. The resulting composite records demonstrate that fire in Australia predominantly reflects climate, with colder periods characterised by less and warmer intervals by more biomass burning. Notably, there is no distinct change in fire regime corresponding to the arrival of humans in Australia at 50 ± 10 ka and no correlation between archaeological evidence of increased human activity during the past 40 ka and the history of biomass burning. Changes in biomass burning in the last 200 years were however the largest of the last 70,000 years. The implications of this work have been controversial: Scott will conclude the talk with a reconciliation of this work with the contemporary push to incorporate Indigenous perspectives into resource management.

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Wine and cheese will be served from5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 140 **July 2011**

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IN THIS ISSUE

E-MAIL COPY OF THE NEWSLETTER

Would you prefer to receive an e-mail copy of the Newsletter, instead of the paper copy? If so, e-mail me at h.martin@unsw.edu.au and give me your e-mail address.

We will still be printing paper copies of the Newsletter, so if you prefer a paper copy, you need not do anything, and it will come, as usual.

NEW MEMBERS

We welcome our new members:
Ms Penelope Ajani, Macquarie University. Field of interest: marine phytoplankton.
Mr, Nicolas J. Colman, University of Technology, Sydney. Fields of interest: Taxonomy, ecology, scientific writing, fossils

AWARDS FROM THE SCIENTIFIC RESEARCH GRANTS

Betty Mayne Scientific Research Grant

Ms Amy Claire **MACKEN**, Flinders University of South Australia
Project: Long term variation in small mammal communities: the impacts of late Pleistocene climate change and implications for future management of species.
Long-term baseline data is being collected on small mammal occurrences and abundances in the Naracoote region of southeastern South Australia. Turnover and extinction thresholds for small mammal communities and their resilience to past climatic and environmental change will be investigated. Sub-fossil material (~45000 to 740 yrs BP) of possums from deposits within the Wet Cave at Naracoorte Caves has been analysed to determine the relative abundance of various species over time. Five sedimentary units in the Wet Cave appear to correspond to differing climatic and environmental conditions in the past. Recently, 5 new charcoal samples have been acquired and the cost of two radiocarbon dates is requested. Awarded $1,000.

Joyce W. Vickery Scientific Research Fund

Ms Maria G. **ASMYHR**, Macquarie University
Project: Exploring the unknown...Investigating subterranean biodiversity using molecular tools.
Aquifers support unique ecosystems of invertebrate fauna (stygofauna), highly adapted to life under ground and distinct from those found in surface water. There is an urgent need to identify the biodiversity and population levels, and a thorough understanding of the connectivity of the aquifers. Using molecular tools, this project will identify and quantify the stygofaunas from aquifers of different underlying geology. It will investigate the population dynamics and reproduction found among subterranean Copepods. Awarded $1000.

Dr Katherine Louise **BARRY**, Department of Biological Sciences, Macquarie University.
Project: Nutritional ecology of mating and sexual cannibalism in Praying Mantids.
Studies have shown that the quantity of food has an effect on the mating/cannibalistic behavior of the female praying mantiid. If the food quantity given to females is reduced to a half, the rate of cannibalism is increases from 40% to 100%. The effects of quality of the food will be tested with either a high lipid or high protein diet. Awarded $1,000.

Ms Sophia **CALLANDER**, Research School of Biology, Australian National University
Project: Keep your enemies close: can your neighbours affect your attractiveness?
Territorial residents often behave less aggressively to their neighbours than to intruders, a phenomenon called 'dear enemy effect'. This relationship could extend to neighbours actively helping each other to defend against intruders. Defense coalitions have been found amongst rock pipits and fiddler crabs. It is thought that the costs of helping a neighbour defend his territory are less than that of renegotiating boundaries with a successful intruder. Keeping smaller neighbors may also enhance the attractiveness of a larger individual to females. The reasons for these complex behaviour patterns will be investigated in fiddler crabs. Awarded $523.

Ms Belinda **COOKE**, Macquarie University.
Project: Assessing impacts of climate change adaptations on a sandy beach, NSW.

The invertebrate faunas of sandy beaches are ecologically important and support shore birds and surf fishes. These faunas are under threat from climate changes and rising sea levels. This project will (1) determine the spatio-temporal scales across which the diversity of these invertebrates naturally vary, and (2) using this information, design a study that assesses the impact of beach management on these invertebrates. Awarded $800.

Mr. Felipe M. **GAWRYSZEWSKI**, Department of Biological Sciences, Macquarie University.
Project: The unusual camouflage strategy of the Australian crab spider, *Stephnaopis altifrons* (Thomisidae).
This spider is thought to use bits of debris from the environment to enhance its camouflage, unique behaviour in its family. It is a 'sit and wait' predator with the ability to change colour to match the flowers they sit on and prey on the pollinators. This particular species, however, sits on tree trucks to ambush its prey. Bits of bark debris have been observed attached to hairs on the spider, but not all individuals have this form of camouflage. This whole camouflage system will be investigated. Awarded $826.

Ms Kerry L. **GIBBONS**, University of Sydney and National Herbarium of NSW
Project: Molecular phylogenetics and biogeography of *Mitrasacme* and related genera.
Mitrosacme is predominantly an Australian genus of tropical and temperate herbs in the flowering plant family Loganiaceae. The taxonomic concepts within the family are still poorly understood. Molecular studies will clarify some of the issues involved. Awarded $1,322.

Ms Judith A. **KEYSE**, University of Queensland.
Project: Realised population connectivity between marine protected areas in Roviana Lagoon, Solomon Islands.
The University of Queensland has been working in the Solomon Islands on a range of projects, including fostering sustainable marine resource use and assisting local people in setting up marine protected areas (MPA). This program will inform the Roviana people of how well their MPAs are working. The next stage of the program will asses how coral reefs in Roviana Lagoon may be connected by larval dispersal and make recommendations for continued conservation based on these results. Awarded $1,000.

Mr. Kurtis **LINDSAY**, Macquarie University
Project: The feeding behaviour of Sydney's last White-fronted Chats: Does the quantity of insect prey available determine where chats feed in their saltmarsh habitat?
The White-fronted Chat is listed as vulnerable and occurs only in saltmarsh at Towra Point Nature Reserve. Even in this restricted habitat, it is selective about where it feeds. This study of the habitat and the insects and other arthropods on which it feeds will assist wildlife managers in their conservation of the species. Awarded $400.

Ms Penelope J. **MILLS**, School of Biological Sciences, University of Queensland
Project: Systematics of the Australian gall-inducing scale insect group, *Apiomorpha minor*.
Apiomorpha with currently six species is endemic to Australia and both males and females generate galls on their *Eucalyptus* hosts. It also has one of the greatest range of chromosome variation known in animals and some of the species may in fact be crypto-species complexes. These complexes will be investigated using both mitochondrial and nuclear genomes. Awarded $1,000.

Mr. James **O'HANLON**, Macquarie University
Project: The chemical basis of ant attraction and its function as an egg dispersal strategy in Phasmatodea.
Some tree species provide a food reward attached to their seeds to induce ants to pick them up and take them into their nests where the seeds are safe from predation, desiccation and parasitism. This method of dispersal is called Myrmecochory. Remarkably, certain stick insects (phasmids) produce eggs with a fleshy capitulum attached that works in the same way. The chemical signals used by the phasmids to attract ants will be investigated using phylogenetic techniques. Awarded $700.

Mr. Pete **SMISSEN**, Zoology Department, University of Melbourne
Project: Testing processes explaining the phylogeography of the Tree Goanna (*Varanus varius*)
Goanna species are widespread over much of Australia. This project will investigate the probable reasons for distribution of the tree goanna. Being a reptile, it requires warmer temperatures to operate. How did the climatic fluctuations that accompanied the cyclic ice ages affect them? Was their distribution fragmented when they were restricted to warmer places in the ice ages? Then when warmer conditions returned, did the species expand its range? How did these possible times of isolation affect the genetics of the species? This whole topic will be investigated. Awarded $980.

MAWSON 100 YEARS ON

The Royal Society of Tasmania plans to host a Symposium to celebrate the centenary of Dr (later Sir) Douglas Mawson sailing to Antarctica.

The Symposium will be held on 30 November/1 December 2011 in Hobart. Abstracts are required by 1 September 2011.

For more information, the registration form and instructions to authors go to info@rst.org.au.

BOOK REVIEW

Mistletoes of Southern Australia by David M. Watson
CSIRO Publishing, February 2011
Paperback, 200 pages
ISBN: 9780643095939

A comprehensive treatise of Australian mistletoes has remained an empty gap among the extensive collection of botanical literature that is now available. The author, David Watson is a leader in mistletoe research with an extensive list of scientific publications. His enthusiasm for mistletoes is clearly conveyed in this book by way of text, illustrations and photos of personal artifacts. David Watson's 'Mistletoes of Southern Australia' (CSIRO publishing) is the first of its kind that would suit anyone with a botanical interest in Australia and abroad.

David Watson's mission is to bring mistletoes to a wide audience, foster an interest in mistletoes and highlight critical knowledge gaps. The content, layout and illustrations convey this message with ease. The first chapter explains the biology of mistletoes succinctly. Within a short 15 pages the reader is given a wealth of knowledge that articulates current scientific understanding in a digestible manner. However, in saying this, it is more than a gathering of scientific information. This book is written from a natural history perspective that guides the reader visually through this fascinating group of plants.

Chapter 2 provides an account of 46 mistletoe species south of the 26th latitude. This section is excellent. Measuring in at 17 x 24.5 cm it is not really a pocket guide, however it is similar to many botanical field guides and would fit conveniently inside a small backpack, on a coffee table or in the bookshelf. It was pleasing to see the artistic work of Robyn Hulley throughout this book, and especially so in chapter 2. I think the combination of photos and botanical illustrations together will satisfy most, if not all readers of this book.

The remaining chapters give the reader something to chew on. Chapter 3 tackles ecological interactions and their importance in the ecosystem, chapter 4 looks at the cultural significance of mistletoes and chapter 5 deals with management. These chapters provoke the reader to think critically about this group of plants. Overall I commend this book as a very enjoyable and worthwhile read.

Ray A.J. Blick
University of New South Wales

LATE QUATERNARY FIRE REGIMES OF AUATRALIA: FROM SCIENCE TO POLITICS: a talk given to the Society by Dr. Scott Mooney.

Sediments in swamps may be thousands of years old and they are natural archives of the palaeoenvironment. There are other natural archives, e.g. ice cores and tree rings that may be used to build up a picture of the environment and any changes that might have occurred. Scott has been studying the charcoal content in sediments to build up a long-term perspective of fire activity.

With fire activity, we have ideas v. reality. The conventional wisdom was that we are a fire-prone country, but now that we have satellite images of the areas burnt, we can see that we are not very fire prone, compared with some other parts of the world. Estimating fire activity has been a problem, and short term records can be misleading. Satellite images have shown that the methods used before satellites were not very reliable.

During the wet La Nina weather pattern, there is a lot of plant growth and a build up of fuel. Then about ten months after the end of the La Nina event, greater areas are burnt. Thus a bad fire season is a La Nina event, but with a lag of about 10 months before it becomes active.

There has been an intense debate about whether Aboriginal burning caused the changes in the vegetation over the last 50 thousand years or so, or whether its cause was climatic. Scott investigated this dilemma by studying the charcoal content from sediments. If the Aborigines caused vegetation change by burning, then there should be a change in the charcoal content from before they arrived in Australia to after their arrival. There is debate about exactly when they arrived in Australia, and it may have 60 thousand years or earlier, but a change in charcoal should be apparent, if they caused all the burning some say they did. A survey of the charcoal showed remarkably little change from 70 thousand years ago until about 200 years ago, when the charcoal content increased dramatically. And 200 years ago, Europeans arrived in Australia. In recent years, however, there has been a decrease in charcoal, probably because the native vegetation has been considerably fragmented.

The low and fairly consistent charcoal content from about 70 thousand years ago is accompanied by a low and relatively consistent artifact concentration. In the Holocene (the last 10 thousand years), the concentration of artifacts increases, suggesting an increase in the population, but the charcoal content, and hence the amount of burning, does not increase. There are differences between the tropical and subtropical charcoal records, but humans are unlikely to be the cause of that. Other environmental records as failed to show any change about the time of the arrival of the Aborigines. Less charcoal, hence burning in the glacial period is about the only noticeable change. Thus the amount of burning appears to be controlled by the climate, until Europeans arrived.

These results have upset the status quo. Some have advocated a return to Aboriginal practices of burning and some want Aboriginals involved in shaping fire practices. As happens in politics, the messenger gets the blame when the news is unwelcomed.

ABORIGINAL ABANDONMENT OF KANGAROO ISLAND

In 2010, Floyd Howard of the University of Sydney was awarded a grant from the Joyce Vickery Scientific Fund to study the charcoal record from a lagoon on Kangaroo Island. When Europeans arrived, there were no people there and the wildlife was extraordinarily tame. The sparse artifact record suggested that the Aborigines had abandoned the island 2340 years ago. It was hoped that the charcoal record, as a proxy for past fire regimes, would establish when the island became depopulated. Floyd has recently sent in a report of his studies.

The change from a low and stable charcoal signal to a greater and more variable influx of charcoal occurred just prior to the official discovery of the island. This was interpreted as representing a shift in regime from regular and low-intensity Aboriginal burning to a high-intensity, more sporadic regime that represents European fire patterns. This date is much more recent than previously thought and suggests that Aboriginal occupation of the island was probably by seasonal, fleeting visits from the mainland rather than a permanent, remnant population. The cause of the abandonment was suggested to have been the disruption presented by the arrival of whalers and sealers in the region, prior to Kangaroo Island's official discovery.

LINNEAN SOCIETY OF NEW SOUTH WALES

PROGRAMME

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. If the gate is closed when you come to a lecture, just
wait and someone will come and let you in

****

Wednesday 21 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. CHRIS TURNEY

Climate Change Research Centre and School of Biological, Earth and Environmental Sciences University of New South Wales

1912: THE YEAR THE WORLD DISCOVERED ANTARCTICA

Antarctica plays an important role in our climate and Prof Turney will discuss the realization of its scientific importance. This year also marks the centenary of the departure of Dr. (later Sir) Douglas Mawson for Antarctica.

****

Wednesday19 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. IAN PERCIVAL

Principle Research Scientist (Palaeontologist), Geological Survey of NSW.

RECONSTRUCTING THE ORDOVICIAN WORLD

In this presentation, I review the latest research into the Ordovician System that provides insights into how the Ordovician world functioned and what it may have looked like. The past two decades has witnessed a major leap forward in our understanding of the life and times of the Ordovician Period, which extended between

491 and 443 million years ago. During this interval, the greatest expansion in biodiversity in Earth history occurred (known as the Great Ordovician Biodiversification Event, or GOBE). Towards the close of the Ordovician, one of the five big global extinction events took place, significantly depleting biodiversity. The disposition of continents and terranes was markedly different compared to the present, with pronounced faunal endemicity and provincialism the order of the day. It was a world inhabited in places by giant trilobites, with almost no land plants. Volcanoes were widely distributed, and a major meteorite shower impacted the planet. Evidence of icebergs and glaciers indicate that the southern polar icecap covered part of today's Sahara Desert. Work continues to unravel the most likely distribution of land masses. The general position of NSW was facing (as it does today) a vast Palaeo-Pacific Ocean containing scattered tropical islands, but the coastline of the Australian craton was situated between Broken Hill and White Cliffs, offshore to which were deep ocean basins and volcanic island chains.

Biostratigraphic timescales, based on graptolites, conodonts and acritarchs, are now well-established for the entire Ordovician system, and provide a framework for correlation that is amongst the most precise in the Palaeozoic. Combined with SHRIMP high resolution age dating, and isotopic techniques enabling construction of seawater temperature curves that can be precisely matched globally, we now have the ability to reconstruct the Ordovician world, its climate and biota.

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Wine and cheese will be served from 5.30 before each lecture

EVERYONE WELCOME.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 141 **0CT0BER 2011**

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IN THIS ISSUE

E-MAIL COPY OF THE NEWSLETTER

Would you prefer to receive an e-mail copy of the Newsletter, instead of the paper copy? If so, e-mail me at h.martin@unsw.edu.au and give me your e-mail address. If you have already requested an e-mail copy, many thanks.

We will still be printing paper copies of the Newsletter, so if you prefer a paper copy, you need not do anything, and it will come, as usual.

We can also send an e-mail alert a week before a lecture is due. If you would like to be on this list, make sure we have your e-mail address.

NEW MEMBERS: We welcome

Mr. Stephen T. Challoner. Field of interest: Australian flora and fauna, small mammals in the urban environment, aquatic environs and sea grasses.
Dr. Vic Semeniuk. Field of interest: geology, geophysics and geography.
Mr. Robert B. McCormack. Field of interests, Freshwater ecology, freshwater crayfish.
Mr. Giulio Ruiu, University of Sydney. Field of interest: geology, geophysics, geography.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS

The Society has received donations from the following members: Dr. J.M.E. Anderson, Anonymous, Ms Margo Crossley, Dr. Donald S. Horning, Dr. Patricia Hutchings, Dr. Jurgen Kellermann, Dr. Anthony Nicholls, Dr. R.A.L. Osborne, Dr. Brian Reid and Dr. Susan Turner. We thank to our generous donors: it is much appreciated.

THE PROCEEDINGS

Volume 132, issued 30 May 2011, was the final hard copy publications. It was an outstanding copy with ten papers from the symposium on Geodiversity, Geological Heritage and Geotourism. The cover featured beautiful colour photos of opalised fossils from Lightning Ridge, from on of the papers presented at the Symposium. We thank the Editor, Mike Augee for his sterling work.

Volume 133 will be produced electronically. This means that when a paper is accepted for publication, it can be published on line immediately. Papers will be given consecutive page numbers as they are published. Page numbers will stop at 31 December each year, and the papers published in that calendar year will be stored and available as a separate volume. Volume 133 for example will consist of all papers put online before 31 Dec 2011.

Access to papers published by the Society and hosted by eScholarship is available to anyone free-of-charge. Using the "print on demand" facilities of eScholarship, individuals may order single copies of a volume at their own cost, estimated to be somewhere between 20-30 dollars. The Linnean Society will not be printing hardcopies.

Our first paper has just been published on line:

Korovchinsky, NM and Timms, B.V. New species of the genus *Diaphanosoma* Fisher (Crustacea: Cladocera: Sididae from claypans in Western Australia.

You may access it at:
http://escholarship.library.usyd.edu.au/journals/index.php/LIN

MEMBERSHIP FEES FOR 2012

With the change to electronic publication that costs much less than regular paper copy, membership fees do not need to be so high. For 2012, full membership will be $40 (now $60), retired or student, $20 (now $45). And associate members, $10. You will receive a renewal notice with the December newsletter, as usual.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2012. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 14 November 2011

CHANGES TO RULES FOR THE SCIENTIFIC RESEARCH GRANT RULES

For next year, both the Joyce Vickery and Betty Mayne Research Funds will award up to a maximum of $2,500 for members and $1,500 for non-members. The call for applications will be announced in the December newsletter, as usual

REPORTS FROM RECIPIENTS OF THE J. VICKERY AWARDS

Katherine L. Barry investigated the effect of the bacterial endosymbiont *Wolbachia* on reproductive behaviour in the butterfly *Eurema hecabe*. The infection is widespread in butterflies and causes genetic males to develop into viable females, or "she-males'. This disrupts the sex ratio from the ideal of 50-50 and sets the scene for an evolutionary arms race. Can functional males tell the difference between true females and the she-males? Katherine carried out a number of experiments and concluded that it did not make any difference. Either the males cannot tell the difference between the females and she-males, or there is no advantage to being choosy.

Margaret Turton has been studying movement of the White-striped free tailed bat, *Tadarida australis* from a maternity roost. The roost in the old Armory, Sydney Olympic Park, has been monitored from 2005 and Margaret found that the communal roost had a high population from November to April, after which the population decreases as the young become independent. It was not known where they went after leaving the maternity roost.

Radiotracking collars were put on five bats, four females and one juvenile male. They dispersed to satellite roosts in scribbly gum (*Eucalyptus haemastoma*) tree sprout roots that had just the right sized holes. The foraging areas were all within one km of the maternal roosts. They stayed within the area, moving between roosts, until just before the cold and wet weather of winter set in, when they disappeared from the area. It is not known where they go for the winter,

VALE Dr. COURENAY SMITHERS

Courtenay Smithers has been President of the Society and was Editor of the Proceedings for a time and had a distinguished career as an entomologist. He passed away in April, at the age of 86.

Smithers was born in South Africa but the family moved to England when he was in his early teens. He served in the British Army during the war, went to France on D-Day, was taken prisoner and eventually released. After discharge from the Army, he went back to South Africa to study at the University of Pretoria and later at the Rhodes University that was recognised as having one on the best entomology courses in the world.

His first research job involved the Tsetse fly problem of the Zambezi Valley. He moved back to Rhodesia and worked in specialist entomological services. Here he developed his interst in the insect order Psocoptera ('bark lice') that are generally unknown, except for a few domestic pests such as book lice.

Smithers came to Australia in 1960 to become Curator in Entomology at the Australian Museum. At this stage, his job encompassed curation of many other groups, including spiders, centipedes and scorpions. He arrived at a time of expansion and invigoration of the dusty back-room image of the museum collections. He was involved in broad research projects of taxonomy, biogeography, conservation and biogeography. He interacted well with the public and published popular books and scientific articles, as well as research papers.

Retirement in 1980 did not mean inactivity for Smithers, and it was during this period that he was active in the Society. He continued publishing and in all, he published 280 books, chapters in books and articles, with the last manuscript on bee-keeping being sent to the publisher literally days before he passed away. He is survived by his wife Smila and two sons.

VALE DR MARY TINDALE

Mary Tindale died on 31 March 2011, having been a member of the Linnean Society for more than 65 years. Her career was largely at the National Herbarium of NSW, at the Royal Botanic Gardens, Sydney, as botanist, principal research scientist and, after retirement, honorary research associate. For two years she worked at the Royal Botanic Gardens, Kew, England as Australian Botanical Liaison Officer. Her expertise as a systematist was focussed on ferns, *Acacia* and the legume genus *Glycine*. Mary was passionate about opera and ballet and attended an opera performance only a week before her death.

BOOK REVIEW

A BUSH CAPITAL YEAR, A NATURAL HISTORY OF CANBERRA
Ian Fraser and Peter Marsack
CSIRO Publishing February 2011 ISBN: 9780643101555
Paperback 232 pages RRP $49.95

One minor quibble is with the publisher. There may be some arcane reason why the text occasionally goes into italics (though no reason is readily apparent) but it is more unusual when it happens several times in the section on September. This book brings back pleasant memories of the sort of natural history writing that was prevalent in the 1950s, at least in Melbourne. At that time local papers and even the 'Age' often had short essays on nature relevant to the time of the year. Sometimes these would be collated and appear as books – Jack Hyett's 'A Bushman's Year' and later 'A Bushman's Harvest' were typical of the genre.

The present book offers 120 short essays by Ian Fraser arranged appropriately, 10 for each month of the year. While some are about groups of organisms (eg snow country flowers, hunting wasps, mountain grasshoppers) the majority are about particular plants or animals. In the page or two assigned to each, one cannot expect a definitive account of the natural history of any specific organism, but what is given here is an interesting combination of facts coupled with personal observations and philosophy. Each essay commences with a subheading relating it to an identifiable location in the ACT, but as most of the species are broadly distributed this can be seen as no more than setting context for particular aspects discussed. It by no means limits the value of the book since most species are found widely distributed in NSW, Victoria and beyond.

Paintings by Peter Marsack occur throughout the book, not for every species but certainly for the majority. These are not formal biological illustrations and in my view those of the birds are the best. Some of the botanical illustrations give little more than a general idea of the plant but they enhance the book nonetheless. The text abruptly goes into bold, in one case mid-sentence.

Robert J King

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LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 142 **DECEMBER 2011**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Membership renewal form

NEW MEMBERS

We welcome our new members:
Mr. Ralph S. Cartwright. Interests: Australian native plants.
Mr Timothy Baker. Interests: ecological restoration, monitoring changes in vegetation.
Mr Ian Hill
Ms Mélanie Keith
Mr Michael Treanor

MEMBERSHIP RENEWAL

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.

THE PROCEEDINGS PUBLISHED ONLINE

Volume 133 is now complete and includes the following papers:

Korovchinsky, NM and Timms, B.V. New species of the genus *Diaphanosoma* Fisher (Crustacea: Cladocera: Sididae from claypans in Western Australia. Date published, 1 October 11

Sydea, Tahir Salea and Carolin, R.C. A new species of Calandrinia (Portulacaceae) from Northern Territory, Australia. Date published, 10 October11.

Ajani, P., Ingleton, T., Pritchard, T. And Armand, L. Microalgal blooms in the coastal waters of New South Wales, Australia. Date published, 4 November 11.

Strusz, D.L. Silurian brachiopods from the historic Woolshed Creek area, Canberra Australia. Date published, 21 Nov 11.

Timms, B.V. and Lindsay, S. Morphometrics of the resting eggs of the fairy shrimp *Branchinella* in Australia (Anostraca: Thanmnocephalidae. .

You may access them at:
http://escholarship.library.usyd.edu.au/journals/index.php/LIN

E-MAIL COPY OF THE NEWSLETTER

Would you prefer to receive an e-mail copy of the Newsletter, instead of the paper copy? If so, e-mail me at h.martin@unsw.edu.au and give me your e-mail address. If you have already requested an e-mail copy, many thanks.

We will still be printing paper copies of the Newsletter, so if you prefer a paper copy, you need not do anything, and it will come, as usual.

We can also send an e-mail alert a week before a lecture is due. If you would like to be on this list, make sure we have your e-mail address.

If you requested an e-mail copy, but did not receive it, my apologies. I have had e-mail trouble. Please e-mail me again.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for both Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au

Intending applicants please read instructions carefully.
Original plus six (6) copies are required for both the Betty Mayne and Joyce Vickery funds.

Members may apply for up to a maximum of $2,500 and non-members, up to $1,500, for both the Betty Mayne and the Joyce Vickery Research Funds.

The date for submission of applications is 1st March, 2012. This date applies to both the Betty Mayne and the Joyce Vickery Research Funds.

Please mail applications to:
The Secretary, Linnean Society of NSW
PO Box 291, Manly NSW 1655

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

1. The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

2. Applications will be accepted from postgraduate and honours students, amateur or professional geologists, who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2012. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

The Linnean Society of NSW announces the availability of funds from the Joyce W. Vickery Scientific Research Fund to support worthy research in those fields of biological sciences that come in the range of interest to the Society.

Individual grants will not normally exceed $2,500 for Members and $1,500 for non-members.

Applicants need not be graduates; the criteria the Society would use in making grants would include the quality of the project, ability to carry it out, realistic costing, timetable and probability of ultimate publication.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2012. Submit applications to The Secretary, Linnean Society of NSW, PO Box**
291, Manly, NSW 1655

BOOK REVIEW

Stray Feathers
Reflections on the Structure, Behaviour and Evolution of Birds
Penny Olsen and Leo Joseph
CSIRO Publishing, Collingwood
2011
Paperback 288 pp

My old copy of the Oxford English Dictionary defines a vignette as a sketch. Another meaning is "a short, neat description". Such short essays are what this book is mostly composed of: some 150 or so of them, each one or two pages long, organised under various headings, and all illustrating to some degree or other evolutionary adaptations among Australian birds. Headings cover a wide range of anatomical and behavioural adaptations such as bill shape, courtship and parental care. Occasionally there is an "interlude" whereby the authors attempt to draw together the way in which the preceding vignettes illustrate the theme of evolution. Each vignette is accompanied by one or more black and white drawings by various artists, but principally Trisha Wright.

A lot of the information in this book and many of the illustrations were originally meant for inclusion in a volume on birds in the Fauna of Australia series. When this endeavour was at a fairly advanced stage, however, it was overtaken by events such as the publication of the Handbook of Australian, New Zealand and Antarctic Birds (HANZAB), and it was abandoned. But some twenty years later the information was updated and reworked, and, combined with many of the original illustrations, this book is the result.

The aim was not to produce a book for the serious ornithologist (along the lines of HANZAB) but to publish one that might appeal to the amateur birder or to the budding student who might aspire to

do research on Australian birds. Thus the style of writing by two acknowledged experts in their field tends to be engaging and at times almost chatty, with a minimum of jargon and no references within the body of the text. There is, however, a large reference section at the end of the book, which usually gives several sources of background reading related to each vignette.
Will it succeed in its aim? That is not easy to say. I suspect that, at almost $60, the cost will be off-putting for many students, and others. In addition, the authors themselves acknowledge the eclectic nature of the vignettes, and that the coverage of the range of adaptations is far from comprehensive. But there is a lot of very interesting information, and much of it was new to this reviewer. I certainly enjoyed reading the book, but then I am always keen to learn more about Australia's birds, and especially the ways they are adapted to live in this country. One point that is strongly emphasised is the gaps in our knowledge and how much more research there is to be done.
There are not many typos in the text, and more remarkably, it seemed there were few in the extensive reference section. I did notice, however, that the Friths' 2004 book on bowerbirds was referenced in at least three different ways. The captions of the drawings could have been checked a little more closely – "Grey-back Storm-Petrel" and "Red-tailed Frigatebird" are not a good look in a book notable for its assiduous use of the correct English names for Australian birds.
Overall, however, these are only minor blemishes. The book, although relatively expensive, is very readable, even for someone only moderately interested in Australian birds, and contains a wealth of interesting information.

David Hair
School of Biological, Earth and Environmental Sciences UNSW

1912: THE YEAR THE WORLD DISCOVERED ANTARCTICA: a talk given by Prof. Chris Turney.

One hundred years ago, hardly anything was known about Antarctica. The Royal Geographic Society at its congress in 1885 had decided on a push to explore Antarctica, but there was a distraction. In 1892-1893, a decision was made to accept female members. The Fellows were horrified and the decision had to be rescinded and a new President found before they could proceed with business.

Interest in ice ages and polar regions was growing. In 1837, Louis Aggasiz gave a lecture on ice ages. In 1875, James Croll proposed a theory of the effects of the variations of the Earth's orbit on climatic cycles. This theory was not widely accepted, but in 1920, Milankovitch calculated that these orbital variations could produce the ice ages and this is the accepted theory today. In 1896, Svante Arrhenius proposed that the levels of carbon dioxide in the atmosphere could account for the glacial cycles. He calculated that doubling the carbon dioxide in the air would raise the temperature by up to 6 ° C (he called it 'hot-house'). Today, bubbles of air trapped in ice of the glacial age have a lower carbon dioxide content than the interglacial bubbles.

The frozen polar regions were the last frontiers for exploration and the Royal Geographic Society chose Captain Robert F. Scott, a naval officer with no Antarctic experience to lead an expedition in 1901-1904. He went to the Ross Sea, then through the mountains and found a great plateau. He had gone further south than anyone else. Ernest Shackleton was a member of this expedition, his first to Antarctica. Temperature records were about the only science that this expedition achieved.

Scott was keen to return to the Antarctic and organised the expedition of 1912. There were a total of five expeditions to Antarctica in 1912 and it was a race to be first to the south pole. There was a German team funded by a lottery. The leader was a syphilitic drunk. One team member shot at others. The expedition eventually imploded, but the leader wrote a wonderful report when he got back. The facts came out later. There was a Japanese team that called into Sydney on the way down, but no one had heard of them. There was a Norwegian team led by Roald Amudsen who had experience in both the Arctic and Antarctic. Then there was the Australian team led by Douglas Mawson.

Mawson ignored the South Pole: two thirds of his team were scientists. Parties went to different places and the emphasis was on the science. Mawson himself and two others went on a long trek inland. Disaster struck when one man, Ninnis and a sled fell down a crevasse, taking most of the food and gear with him. The other two struggled on, eating dog meat and liver. The second man, Mertz died on the way back. The soles of his feet came off and Mawson had to strap them back on each day. It was not known then that the excess vitamin A in the dog's liver was toxic. He arrived back at the base to see the ship leaving and had to over winter. Fortunately, there was plenty of food there. Hardly anything went wrong for the other parties, so the media was not much interested in them. The Mawson expedition achieved by far the greatest scientific results: his parties had mapped and described a large section of coastline that laid the foundation of Australia's claim to the largest portion of Antarctica.

Scott made it to the South Pole, only to find the Norwegian flag flying there: Amundsen had beaten him to the pole. All of his party died on the way back. Other parties that did not accompany Scott made some significant discoveries. The meteorologist George Simpson had measured climatic factors and discovered the connection between Antarctica and the rest of the world. When the pressure is negative over Antarctic, it is positive over northern Australia and vice versa. They had also discovered fossil leaves –*Glossopteris* – and coal, and this suggested that Antarctica was once ice free. How could this be? The first ideas of continental drift were proposed in 1912.

The Germans had measured salinity and studied oceanic circulation. When ice is formed, the seawater becomes more saline and drops to the bottom of the ocean and flows north. When the westerly winds that encircle Antarctica push southwards under warmer conditions, they draw up deep water that is carbon rich.

There is little doubt that the planet is gradually getting warmer, but how much warming is patchy. There is strong warming in the high latitudes. The Antarctic Peninsula has warmed by 2.5°C since the 1950's. The South Georgia glaciers are retreating at an alarming rate: 1 m per day. The sealers had brought rats to the island, but they were restricted to the peninsulas where the sealers had their camps, by the glaciers. Now that the glaciers are retreating, the rats are invading the island, with devastating effects on the penguin colonies. The penguins have no knowledge or defense against the rats. And there are many more examples, but time ran out.

Finally, Chris showed us "proof" of global warming. It was a picture of a clothes line with 8-10 women's knickers, styles arranged from the ankle-length frilly sort, each one getting smaller and smaller, down to the modern G-string!!! We all enjoyed the lecture immensely.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2012 Annual General Meeting

The 137 Annual General Meeting of the Society will be held at 18:00h on 21 March 2012 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 17:30.

Five members of Council are due to retire at this AGM:

John Barkas
Michael Gray
John Pickett
Helen Smith
Karen Wilson

and all offer themselves for re-election.

Council recommends the election of Dr Michael Gray as President of the Society for 2012.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2012.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2012.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 143 **APRIL 2012**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE

Record of the Annual General Meeting, 21 March 2012
Form for donations to the Society's research funds

NEW MEMBERS

Prof. Jeremy J Bruhl, University of New England. Fields of interest: plant systematics.
Miss Siobhan Dennison, Macquarie University. Fields of interest: molecular ecology, conservation genetics, phylogeography.
Mr. Virgilio C Linis, University of New England. Fields of interest: bryology and plant systematics.
Mr. Andrew D. Letten, University of New South Wales. Field of interest, ecology.
Prof. David J Mabberley, Royal Botanic Gardens Sydney.

Ms Chrissie Prychid, University of New England. Fields of interest: plant evolutionary biology, systematic biology, plant cellular ultrastructure and biochemistry.
Miss Helen M Smith, University of Sydney. Fields of interest: rodent ecology and conservation.

E-MAIL COPY OF THE NEWSLETTER

Would you prefer to receive an e-mail copy of the Newsletter, instead of the paper copy? If so, e-mail me at h.martin@unsw.edu.au and give me your e-mail address. If you have already requested an e-mail copy, many thanks.

We will still be printing paper copies of the Newsletter, so if you prefer a paper copy, you need not do anything, and it will come, as usual.

We can also send an e-mail alert a week before a lecture is due. If you would like to be on this list, make sure we have your e-mail address.

CD OF THE PROCEEDINGS

Please notify the Office if you want a CD of the Proceedings. The CD will only be mailed out, free, to members who request it. All papers are now available free for download from http://escholarship.library.usyd.edu.au/journals/index.php/LIN

BEQUEST FROM THE ESTATE OF JOHN NOBLE

The Society has received a bequest of $50,120 from the estate of John Noble for research in Arachnology. We thank our kind donor for his generosity.

WHO WAS JOHN NOBLE?

John Noble was a mechanical engineer who saw the need to protect and manage bushland long before it became fashionable or required by law. He was a pioneer in bush regeneration and inspired others in the Beecroft and Cheltenham community. He began the regeneration of the native understorey of Observatory Park at the intersection of Beecroft and Pennant Hills Road and it was through his efforts that that the NSW Scientific Committee of the Royal Botanic Gardens Sydney recognised Observatory Park as an important remnant of the Blue gum high forest. Hornsby Shire Council subsequently published his book "Red Hill Observatory Park, its history and regeneration". Many of his achievements were small but became significant over time.

He was always a keen photographer and developed an interest in spiders using macro photography. He developed an ongoing relationship with the Australian Museum and they made him an Associate. The Museum has a full collection of his photographs and he has been credited with the identification of new species. He was instrumental in the formation of the Civic Trust in 1994 and ensured that it has a strong environmental focus. John was made a life member of the Trust in recognitions of his contribution to the environment. He lived to the age of 96.

BOOK REVIEWS

BURKE & WILLS – THE SCIENTIFIC LEGACY OF THE VICTORIAN EXPLORING EXPEDITION

Edited by E B Joyce and D A McCann
Published by CSIRO Publishing, November 2011
Hardback, 368 pages. Price AU $59.95 ISBN 9780643103320

Robert O'Hara Burke and William Wills are credited with making the first exploration to the heartland of Australia from south to north, but they both died in the process. As McCann and Joyce write - the mission as a whole can be regarded 'as a complete debacle from beginning to end'. In film and literature the explorers are seen as complete failures: 'ill-organised, inefficient and unimaginative'. Burke in particular is described as 'archetypically paternalistic, stubborn, eccentric, obsessed, lovesick, unintelligent and stupid'. As the tragic events unfolded it was the personal story of the two leaders that caused the public sensation in Melbourne in 1861, and in the press and notably in the Royal Commission the scientific outcomes were largely ignored. Surprisingly that was to remain the case for 150 years. As the Vice-President of the Royal Society of Victoria and Chair of the Burke and Wills Commemoration Committee writes in the forward to this book, 'The scientific observations and findings of the expedition were not published at the time. It is even more remarkable that, despite the extensive literature on Burke and Wills, the scientific intent and achievements of the expedition seem to have been largely overlooked .....'. We should all be indebted to the editors and publishers of the present handsome volume for correcting this oversight. The book tells the story of the science of the expedition including the background to the formation of the Victorian Exploring Expedition and the selection of the participants. It ranges over the entire gamut of natural history including geology, botany, zoology, hydrology, meteorology and anthropology. The extensive chapter on the botanical legacy of the expedition by Linden Gillbank gives an excellent overview of the way in which collections made by such expeditions contributed to the broader understanding of the Australian flora, and to some extent the other chapters do likewise for their respective subject areas. Despite the large number of authors involved the book presents and reads as a single volume: this is no mean achievement and the editors are to be congratulated. Their final chapter (Conclusion: rewriting history) is an elegant synopsis and casts a new and positive view on the outcomes of the original expedition. The appendices are particularly useful giving a timeline of the principal events, a full list of the expedition personnel, biographies of the principal scientists, and a facsimile of the instructions to the leader and the scientific officers from the Exploration Committee of the Royal Society of Victoria in August 1860. There is an especially enlightening appendix on the art of the expedition by Elisabeth Nimitz, which as in the case of the discipline chapters pays attention to broader aspects. The placement of maps and the artworks and scientific drawings of Ludwig Becker, artist and scientist of the expedition, at relevant places in the text is welcomed.

I highly recommend this book, which places a new and scientific perspective on one of the great stories of Australian history.

R J King

PICRTURES OF TIME BENEATH

Science Heritage and the Uses of the Deep Past
Author: Kirsty Douglas
CSIRO Publishing, April 2010
Paperback, 224 pages, Price $89.95.
ISBN 9780643097049

Kirsty Douglas first explored these themes for a doctorate in History. She has selected three outstanding geological sites and traces their history from discovery to heritage listing. The history of geological dogma is intricately woven into the story of each site. The public took a keen interest in the discoveries, thanks to the press of the day. The result is a fascination account of the development of scientific concepts and the popular perception of the day, leading up to the appreciation of geological heritage.

The earliest settlers viewed Australia as the last of the lands to emerge from the biblical flood and this accounted for the 'primitive' flora and fauna. With the arrival of scientists trained in Europe, a more rigorous approach emerged.

The first site selected is Hallett Cove, south of Adelaide. About 1875, Ralph Tate, a geologist discovered glacially striated rock and pavement at Hallett Cove, causing much controversy. The scientific world was coming to accept a past ice age in the northern hemisphere, but the mechanism was still hotly debated. Controversy raged once again when it became clear that the Hallett Cove glaciation was older than that of the northern hemisphere (Pleistocene).

There are six distinct geological events or 'panels' displayed at Hallett Cove: 1). A tidal continental shelf about 550 million years old. Life had not yet colonised the land but algae and jellyfish-like organisms appeared in the sea. 2). Eroded remains of a once colossal mountain range 480 million years old. The oceans contained trilobites, jellyfish, molluscs and sponges at this time. 3). An unconformity that defines the base of a broad palaeovalley, representing more than 200 million years of missing sediments. 4). Glacial sediments that filled the palaeovalley and are 280 million years old (the Permian glaciation). The glaciers gouged and scratched the basement rocks. 5). Another unconformity above the glacial sediments and another palaeovalley, representing another 200 million years of missing sediments. 6). Pliocene (4 millioon years old) sediments fill the palaeovalley and Pleistocene sea level fluctuations with the final rise in levels about 11 500 years ago, forming wave-cut platforms and exposing Permian glacial erratics.

The public at large appreciated Hallett Cove as a geological treasure and it was well known internationally. In the 1950's, new planning laws were introduced and Hallett Cove changed from rural to residential zoning. This passed unnoticed until developers' plans for housing became public. Then followed a twenty-year battle to have the site conserved. Thankfully, the conservationists were successful and Hallett Cove now has world heritage listing.

In 1892, a well-sinker came to Adelaide with fossil bones of a giant mammal obtained from Lake Callabona between Lake Eyre and Lake Frome. They were bones of a Diprotodon that was known from discoveries in Wellington Caves in 1829. The parstorlists disputed the well-sinker's claim to have discovered the site, for they had known of it and in any case, a nameless Aborigine had shown them the bones and the site.

The public became excited over fossil discoveries and viewed them in the same light as mineral wealth. A collecting trip was organised but no one had any expertise in collecting fossils and the results were disappointing. To add to all the difficulties of working in such a remote locality, exposure of the bone relied on the last time the lake flooded, and exposed bones were just as likely to be covered up by sediments. The bones were salt affected which made them fragile. A whole skeleton of a Diprotodon was assembled from plaster casts of the fragile bones.

After the turn of the century, there was little interest in Lake Callabonna until the 1950's when an American team came looking for Tertiary mammals. One, Dick Tedford was excited by Lake Callabonna and returned to study it in depth. There has been little interest since Tedford finished his studies. Lake Callabonna was declared a reserve in 1901.

In the 1960's Jim Bowler started studies on the Willandra Lakes system in western New South Wales. These dry lakes have lunettes, always on the northeast side. At Lake Mungo, he discovered bones of a modern human that had been cremated and were being exposed by erosion, and were dated to 30,000 years old. Another skeleton showing signs of ritual burial was found and dated to 35-40,000 years, the limits of carbon dating. These dates were not believed at the time. Freshwater mussels and fish showed that the ancient lakes were fresh water at that time.

The history of the landscape, including the feature known as Walls of China makes fascinating reading. Study of the site required sensitivity to Aboriginal feelings, and today the area is a World Heritage listed park. The history of the Aborigines, as far as is known is outlined. Three Aboriginal groups are involved in the management of the park.

The style is discursive, with 'poetic resonances' (the author's words) but it does portray past times of culture, discovery and the evolution of scientific thought, as well as the history of the landscape.

Helene Martin

RECONSTRUCTING THE ORDOVICIAN WORLD: a talk by Dr. Ian Percival.

Since 1997, study of the biota, palaeoclimate and palaeogeography of the Ordovician Period (which extended between 491 and 443 million years ago) has been the focus of two global research projects – IGCP 410 and IGCP 503 (with combined output of nearly a thousand scientific papers) – that aimed to explain the rise and subsequent collapse in biodiversity over this time. During much of the Ordovician, the greatest expansion in biodiversity in Earth history occurred (known as the Great Ordovician Biodiversification Event, or GOBE). However, towards the close of the period, one of the five major global extinction events took place, significantly depleting biodiversity.

The biota of the Ordovician were very different to that of today. Evidence for primitive land plants now extends back into the early Middle Ordovician, but they only started to become moderately common in the Late Ordovician. Carbon dioxide concentration in the air was, as a result, much greater (8-14x generally, and up to 22x present atmospheric levels) than at present, leading to the persistence of greenhouse conditions globally. No insects are known. Ordovician vertebrates are very poorly represented in the fossil record, with primitive jawless fish known from only a few localities from the Middle Ordovician. Invertebrates dominated the Ordovician oceans, levels of which were the highest known in the Phanerozoic due to the greenhouse climate. This caused inundation of many continents, with extensive shallow seas covering much of the interior of North America. The disposition of continents and terranes varied markedly from the familiar situation today. Australia at this time lay within the tropics, between the equator and approximately 20 degrees north, with the entire eastern third of the present continent yet to be accreted to the largely emergent Precambrian cratons comprising South Australia, western Queensland, the Northern Territory and Western Australia. For much of the Ordovician the sea temperature was considerably warmer than currently, based on oxygen isotope data derived from conodonts (teeth-like microfossil mouthparts of an extinct group of protochordates) that suggest an average surface temperature in the tropics of close to 40 degrees at the beginning of the Ordovician. Towards the end of the period, however, a series of glaciation events (possibly commencing as early as the middle Darriwilian, towards the end of the Middle Ordovician) had lowered this equatorial surface sea temperature to an estimated 23 degrees. These increasingly severe ice ages were largely confined to high latitudes, but their effects can be recognised and correlated globally by study of carbon isotopic composition of seawater (using calcium carbonate in limestone as a proxy). The South Pole was located in what is now the western Sahara Desert, with a polar icecap extending towards the Iberian Peninsula, then situated at about 80 degrees south.

Cold water was apparently no impediment to abundance, diversity and size of marine organisms in the Ordovician until severe icehouse conditions affected the planet in the final two million years of the period, contributing to widespread extinctions. In the Iberian Peninsula for example, giant worm trails in Early Ordovician quartzites are indicative of a thriving ichnofauna. Middle Ordovician trilobites in the Arouca area of Portugal attain some of the largest dimensions (length up to 0.86 m) known for these extinct marine arthropods. But even in this region, a brief interglacial midway through the Late Ordovician allowed cool-water limestone deposition, with abundant bryozoans and echinoderms populating the sea.

Ian Percival

PROGRAMME

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. If the gate is closed when you come to a lecture, just wait and someone will come and let you in

****

Wednesday 18 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Mr. MATTHEW BULBERT
School of Biological Sciences, Macquarie University

ASSASSIN BUGS: THE MASTERS OF DISGUISE AND PREDATORY DECEPTION

Having around 7000 described species, the Assassin Bugs (Hemiptera: Reduviidae) are the second most speciose group of true bugs after plant bugs (Hemiptera: Miridae). All assassin bugs except triatomine are predaceous. As a group, they employ an incredible repertoire or predatory strategies. These range from simple sit-and-wait predators to species that use elaborate mechanisms such as sticky traps, vibratory luring and even tool use. This talk will outline these predatory strategies, culminating with my recent work on the Feather-legged Assassin bug, a predator that uses a strategy that is unprecedented in the animal world.

****

Wednesday 23 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. PAUL LENNOX
School of Biological, Earth and Environmental Sciences, University of NSW

SOUTH AMERICA – THE GEOLOGY AND MUCH MORE...

Southern South America conjures up images of an exotic landscape with a unique Spanish-influenced history and more recently deadly political dictatorships. Our two months visit to southern South America was preceded by Spanish lessons at Sydney University and shots for lots of exotic diseases. In this talk I want to take you to some wonderful places and talk about the influence of geology on the countries fortunes, show you some of their iconic sites and introduce their incredibly hardy peoples. Our guides in Peru made us aware of the Moche people who occupied the coast of Peru for four hundred years. We visited the deepest canyon (4 km) in the world with its Inca terracing, condors and numerous Catholic festivals. Chile has the world's driest desert, site of the highest magnitude earthquake ever recorded (M 9.5), deepest (850m) open pit copper mine and is glaciated at its southern end. Bolivia boasts the largest salt lake in the world, highest navigable lake in the world, huge lithium resources and the amazing Tiwanaku peoples. Futbol is incredibly pervasive everywhere. We have the Red Cross and the Chilean military to thank for letting us "escape" the January blockade of Magallanes province. I hope to inspire you to visit South America as it is truly fascinating historically, culturally and geologically.

****

Wednesday 18 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. MIKE ARCHER
School of Biological, Earth and Environmental Sciences, University of NSW

OVERVIEW OF EARLY MAMMAL EVOLUTION, THE WHAT, WHEN, WHERE AND WHY

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Wine and cheese will be served from 5.30 pm before each lecture.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 144 **JULY 2012**

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IN THIS ISSUE

NEW MEMBER

We welcome our new member:
Dr Kirtsten J. Davies: field of interest, ethnoecology

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Would you prefer to receive an e-mail copy of the Newsletter, instead of the paper copy? If so, e-mail me at h.martin@unsw.edu.au and give me your e-mail address. If you have already requested an e-mail copy, many thanks.

We will still be printing paper copies of the Newsletter, so if you prefer a paper copy, you need not do anything, and it will come, as usual.

We can also send an e-mail alert a week before a lecture is due. If you would like to be on this list, make sure we have your e-mail address.

AWARDS FROM THE SCIENTIFIC RESEARCH FUNDS

Betty Mayne Scientific Research Fund

COUZENS, Aidan, School of Biological Sciences, Flinders University.
Project: Using micro-computer tomography (mCT) to reveal molar enamel patterning in extinct Australian marsupial herbivores.
Using this method, the 3D distribution of enamel in a tooth can be examined. The enamel cap over a tooth forms the wearing surface and the project seeks to clarify whether there is an association between thicker enamel and zones of wear. There is evidence that the enamel on the teeth of marsupial herbivores has become thicker in the last 15 million years and this has ramifications for the diet, the environment and climatic change. Awarded $1.500.

NGUYEN, Jacqueline: School of Biological, earth and Environmental Sciences, University of NSW.
Project: Evolution of fossil and modern birds of Australia.
Songbirds (basal passerines) are endemic to Australia and New Zealand and are represented by fossils from Riversleigh Qld and St Bathans NZ. There are over 500 undocumeted specimens from Riversleigh, and this project will describe them and determine from modern representatives of Australasian passerine families a phylogenetic framework against which the systematic placement of the fossil taxa can be tested. Awarded $908.

Joyce Vickery Scientific Research Fund

AJANI, Penelope, Department of Biological Sciences, Macquarie University.
Project: Microalgal biodiversity in the coastal waters of NSW.
Species of the cosmopolitan diatom genus *Psuedo-nitzschia* have been implicated in biotoxic episodes in NSW oyster-growing estuaries. The toxicology and taxonomy of individual species remains unclear and this project aims to resolve these problems so that a rapid assessment tool for future monitoring may be developed. Awarded $1000.

BARRY, Dr Katherine L., Department of Biological Sciences, Macquarie University
Project: Sexual cannibalism, female deception and the evolution of male mate choice.
Female sex pheromones lure males intent on mating, but do poorly-fed females of the cannibalistic preying mantis use these signals to lure males to boost her nutrition? How do males choose a female when he is likely to be eaten? And what strategies do the males use after copulation in an attempt to survive? These questions will be investigated. Awarded 1400.

DEAUX, ELOISE C., Department of Biological Sciences, Macquarie University
Project: The form and function of Dingo vocalisations.
An old study suggests that dingoes have three main classes of vocalisations: howl, howl-bark and bark, whereas other dog species have between 10-12 basic calls. It is thought that the more social the species, the more vocalisations there are. Dingoes share many traits with other dog species, so this project will study the dingo vocalisations and a more complex system is expected. Awarded $700.

DELGADO-VELEZ, Carlos, Institute for Conservation Biology and Environmental Management, Wollongong University
Project: Bird-parasite interactions along a gradient of urbanisation.
Some native species adapt to an urban environment while others do not. Stress levels influence the parasite load. This project will determine the chronic stress level by assessing crucial hormones in faeces and see if it correlates with the degree of urbanisation. Awarded $700.

DENNISON, Siobhan. Department of Biological Sciences, Macqurie University
Project: Mating system and avoidance of inbreeding in the social Great Desert Skink.
The Great Desert Skink cooperatively constructs extensive burrow systems in which it and close kin live. This level of cooperation and parental care is unknown amongst other reptiles. Little is known about the population and group dynamics within the species. This project will study the mating system to find out how they avoid inbreeding. Awarded $1400.

FABRICANT, Scott A. Department of Biological Sciences, Macquarie University.
Project: Predator perception of colour patterns in the Hibiscus Harlequin bug (*Tectocoris diopthalamus*)
The Hibiscus Harlequin bug is bright iridescent blue and orange, a warning that it is probably distasteful to predators, and there is a high degree of variability. But the colours we see are not necessarily the colours that a predator may see. To a predator that is unable to see reds, it may be inconspicuous. To birds capable of seeing ultraviolet and all the colours, it should be conspicuous. To insect predators such as wasps and assassin bugs that have a UV-blue-green vision system and lacking a red receptor, it should be inconspicuous. Brightness and contrast have a role also. These visual systems will be investigated in an attempt to explain the variability in colour in the Hibiscus Harlequin bug. Awarded $1100.

KOHLI, Gurject Singh, School of Biotechnology and Biomolecular Science, University of NSW
Project: The genus *Gambierdiscus* (Dinoflagellata) in NSW.
This genus is usually found attached to sea grass, macroalgae, sand and coral rubble, but it can also occur in the plankton. There are currently eleven species. They produce toxins that are concentrated in filter feeders and up the food chain. Ciguatera fish poisoning, caused by *Gambierdiscus*, is the most common seafood related disease worldwide. It is a tropical disease, but Ciguatera was found for the first time in southern NSW waters, reported in 2010. With global warming, it could become more common in NSW. This project will study the genus in NSW waters. Awarded $500.

LETTEN, Andrew D., School of Biological, Environmental and Earth Sciences, University of New South Wales.
Project: How does fine-scale climate variability influence patterns of plant community diversity?
Most studies of the influence of climate change and biodiversity focus on shifts in mean climate variables, rather than elevated variability about the mean and increased extreme weather events. The influence of this increased variability on plant communities in the Wollomi and Yengo National Parks will be studied. Awarded $1200.

McCURRY, Matthew R. Monash University.
Project: Morphological convergence in tooth morphology during terrestrial-marine transitions
Similar types of dentition are found in unrelated groups that have similar diets. The terrestrial and marine environments differ in physical characteristics and prey items, and their influence through evolution on the tooth morphology on members of the one group will be studies. Awarded $500.

PRYCHID, Chrissie, University of New England
Project: Floral development of the Roundhead Bristle Rush (*Chorizandra sphaerocephala*, Mapanioideae)
The flowers of the Mapanioideae differ from the expected standard of the monocot flower. The complete ontogenetic series of the development of the floral structures will be studied and will decipher the morphological character homology of the reproductive structure. Awarded $1500.

RENDON-CASTANEDA, Dalila A., Australian Cotton Research Institute, Narrabri
Project: Predator/prey interactions between the wolf spider and different life stages of the cotton Bollworm, *Helicoverpa armigera*.
Genetically modified cotton contains a bacterial gene that produces Bt toxins that should contain the pest larvae of the bollworm. However, the genetic makeup of field populations of bollworm has the potential to confer resistance to Bt toxins. A variety of agricultural practices may be adopted to combat the build-up of a resistant population. Minimum tillage encourages an increase in the predator wolf spider population. Tests

will be done to establish at which stage of larvae/pupae predation of wolf spiders is most effective. Awarded $700.

SMITH, Helen M. University of Sydney
Project: Wildlife responses to Black Rat invasion the Sydney Harbour National Park
Ecosystems with intact faunal assemblages are more resistant to invasion of exotics than disturbed ones. Fragmented ecosystems, as occurs in cities are most vulnerable to invasion. The impact of black rat invasion on the native fauna will be assessed. Large scale eradication of the rats have had mixed results with re-invasion a major problem. Awarded $800.

STARRS, Danswell. Australian National University.
Project: Does nocturnal egg predation exert early mortality in nest guarding fish?
There is a very high mortality rate in the early stages of the life history of fish. Fish produce millions of eggs but very few are added to the adult population. Predation causes high losses in early larval stages, decreasing in later larval stages. The extent of loss due to egg predation is not well known. This project will assess the survival of eggs of the nest-guarding Southern purple spotted gudgeon in the face of predation by the invasive Oriental weatherloach. Awarded $700.

BOOK REVIEW

Australian High Country Owls by Jerry Olsen
CSIRO Publishing, Collingwood, November 2011
Paperback, 376 pages, AU$ 69.95
ISBN: 9780643097056

As an Australian birder, it has stuck me that I have seen more owls and seen those far more easily overseas than here in Australia. Jerry Olsen's comments echo this: not only is owl diversity higher in some other regions, but in many places owls are more visible, and hence more easily studied, so far less is comparatively known about Australian Owls. While Australia has only two genera, *Tyto* and *Ninox*, it lies within a centre of diversity for both. This book consolidates Olsen's own research, primarily around Canberra, but also focuses on wider studies of Australian owls, with some comparisons with other species, primarily from North America, which aim to give us some insights into aspects of the biology of Australian owl species.

The introductory section discusses the definitive features of owls, (including both families - Tytonidae and Strigidae), of *Ninox* species and of Southern Boobooks. All these entities are taxonomically delineated, but the taxonomy of owls in Australia can be contentious. Christidis & Boles (2008) consider Southern Boobook (as *Ninox boobook*) to encompass all races found in New Zealand, Australia (including Tasmania) and the extinct Lord Howe Island and Norfolk Island races; this is in contradistinction to various authors who have previously considered the New Zealand *novaezealandiae* to be a distinct species, and for the Tasmanian taxon *leucopsis* to belong either with *novaezealandiae* and the Tasman island forms, or as a distinct species. Both the Sooty Owl and Masked Owl have also been interpreted in varying degrees of speciation. While Olsen follows the official Australian list of Christidis & Boles (2008) in the species accounts in the first appendix, he notes these differing taxonomic opinions throughout the book.

The next section on studying owls begins with a chapter on the early history of owl research in Australia, followed with more detail given into methods of how researchers study owls. Those studying owls in Australia often do not see owls during their surveys, and most owls are detected by calls. Telemetry (radio tracking) is often used to study owl's movements, and thereby revealing their territories and home ranges; in order to do this, the owl must be caught, and there is a chapter covering catching owls and the various traps and methods used.

The following section is concerned with diet and hunting methods of medium sized owls, both for summer and winter. Juveniles of the Southern Boobook take only invertebrate prey but adults will take small vertebrates including birds. The North American Northern Hawk-Owl and Long-eared Owl, of similar size to the Southern Boobooks, have different hunting strategies and preferences. Our largest owl, the Powerful Owl, prefers medium sized arboreal mammals. In Powerful Owls, the male is bigger than the female, in contrast to most other owls. Olson also contrasts the great Grey Owl and versatile Great Horned Owl with Powerful Owl and offers some interesting points based on the relationship between wing shape, habitat and habits.

The section on breeding is the longest, and various chapters cover all stages from pre-breeding behaviour to fledging. Olsen's own research into Southern Boobooks (and occasionally Powerful Owls) in the Canberra area plays a large part here, often shedding light on aspects of the owl's behaviour that was otherwise unknown. For instance, he uncovered the fact that what had assumed to be paired Southern Boobooks duetting to each other was mostly two (or more) birds engaged in territorial duels. Timing of breeding, variation in calling patterns, territorial borders and female desertion (where males take over parenting responsibilities of fledglings and females leave the breeding area or 'turn off') are just some of the topics discussed. Population dynamics and the concept of limiting factors are also investigated, with comparative chapters on predator/prey dynamics in Snowy and Tawny Owls.

Owl conservation is the subject of the next section, with chapters on conservation of Australian owls and conservation techniques, case studies of issues facing conservation of owls in North America (Burrowing and Spotted Owls). There is also a chapter on the Little Owl, introduced in the United Kingdom and New Zealand, where Olsen poses the question "do Little Owls compete with Southern Boobooks in New Zealand?" (a hesitant 'yes' is suggested but more questions than than answers are raised) and touches lightly upon the issue of feral species which are endangered in their home range.

The last section, 'Wallacea', looks into owls in the biogeographic interzone region of the same name, which bridges Asia and Australasia. Other than the introductory chapter, this is more specifically about Sumba, an Indonesian island in the region where Olsen has worked and where a new species of *Ninox* was recently confirmed, with some believing it to be a Scops Owl of the genus *Otus*. Sumba has an interesting mix of owls similar to Australia although with a number of endemics (subject to taxonomic viewpoint for some taxa). Island endemicity is a feature of both *Ninox* and *Tyto* species (again somewhat depending on taxonomic interpretation), which brings other conservation issues to the fore, especially in the light of cultural attitudes and practices that involve persecution of these birds.

The first appendix lists accounts of each species in Australia, with distribution maps, and entries on a wide range of aspects for each species in Australia, including Christmas Island. The taxonomy follows the official Australian list of Christidis & Boles (2008) but the taxonomy of the subspecies is complex. A second appendix offers information on the rehabilitation of Australian owls that would come in handy for anybody faced with this task.

The book covers a lot of ground and I, who didn't really know much about owls am left better informed for having read it. The information is generally covered well. Some chapters give greater depth to narrower topics whilst others consolidate a broad topic and coverage is correspondingly thinner; here you may be left feeling a little hungry for more detail. While the arrangement of the sections is logical and much thought has gone into the sequence of chapters and ideas throughout the book, the flow of ideas and chapters seems at times to be a little disjointed. At the end of the section on Wallacea, the final chapter, entitled 'Eviction', gives an insight into pressure faced by Southern Boobooks in Canberra as a result of habitat degradation; while it is presented as a perspective on similar conservation issues faced by Sumba owls, it nevertheless seems awkwardly placed. Conversely, the section on breeding flowed well, not surprising given that the chapters reflected a temporal perspective of the breeding cycle.

However, when Olsen is writing about his field studies in Canberra he is particularly captivating and seems to be at his best. I'm probably being a little anthropomorphic but personally I found the most enthralling chapters to include those which dealt with some patterns of individuals' behaviour, such as the poignant 'a lovers' triangle' and 'fledgling behaviour', where a clutch of fledglings wander into a neighbour's territory and are ultimately fed by those neighbours while their parents watch on from the territorial border. Overall Australian High Country Owls is a great source of information; while it has its greatest appeal to those with a specific interest in owls or nocturnal birds, it is a worthy addition to any birder or natural historian's bookshelf.

Frank Hemmings

ASSASSIN BUGS: THE MASTERS OF DISGUISE AND PREDATORY DECEPTION: a talk given by Matthew Bulbert.

Bugs are defined by their mouthparts and most are plant eaters. About 7,000 species of assassin bugs have been described and they are unusual in that they catch and eat live prey. Only one species in the assassin bug family does not eat live prey and it feeds on blood. It is found in the southern US and is known as the Kissing bug. It feeds mainly on animals, but will suck blood from humans and may transmit Chagus disease that is found mainly in low socio-economic rural areas.

Catching prey is not easy for a predator and they adopt various strategies to catch prey. Assassin bugs (and other predators) may adopt the ambush and active pursuit strategy. Some assassin bugs have specialised hairs and secretions that cement bits and pieces to their back to act as camouflage. They may carry the dead bodies of their prey for camouflage. These ambush assassin bugs eat ants and termites.

The lurers and active hunter assassin bugs are specialists in spiders. They will pluck the web until the spider comes over. If the spider does not respond, they pluck the web, stop and move in a bit, then pluck the web, repeating the moves until they reach the spider. It may take up to four hours.

The lurers and trappers may smell good and have sticky traps. The remarkable feather-legged assassin bugs, of Africa, Southeast Asia and Australia belong to this category. They are found mainly on tree trunks, especially ones with flaky bark. Their back legs have long hairs and look like a bottlebrush. Glands at the bottom of the hairs secret substances that may paralyse the prey. The feather legged assassin bugs eat ants that may be much bigger than the bug, and this could be costly. How do they do it?

The assassin bug waves its feathered leg at anything that passes by. It even waves it at Matt. Most of the passers by just ignore it and only ants respond. If an ant comes over and grabs the leg, it whips around and stabs the ant. It always waits to be attacked first. That way, the ant is busy and the position exposes a vulnerable spot at the back of the head, where the assassin bug stabs it. The ant may be much bigger than the bug, and if the bug cannot find the right spot, it may ride on the back of the ant until it does. It is the only known predator that waits to be attacked first.

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SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. If the gate is closed when you come to a lecture, just wait and someone will come and let you in

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Wednesday 18 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd

Prof. MIKE ARCHER
School of Biological, Earth and Environmental Sciences, University of NSW

OVERVIEW OF EARLY MAMMAL EVOLUTION, THE WHAT, WHEN, WHERE AND WHY

There is an extraordinary diversity of pre-Cenozoic mammals, many in rich early Cretateous depoaits in China. They were living with the dinosaurs and some were known to eat dinosaurs. This was long before the meteor landed 65 million years ago and took out the big guys.

****

Wednesday 19 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof. BRETT NEILAN
School of Biological, Earth and Environmental Sciences, University of NSW

THE EVOLUTION OF MICROBIAL TOXINS AS A BLUEPRINT FOR DRUG DISCOVERY

In many aquatic ecosystems world-wide, including drinking water supplies, cyanobacteria (blue-green algae) can proliferate into so-called "harmful algal blooms". Members of this bacterial phylum have been evolving on Earth for around 3 billion years and can produce an unparalleled array of bioactive secondary metabolites, some of which are potent toxins. The past ten years has witnessed major advances in our understanding of the genetic basis for toxin production by a number of groups of cyanobacteria. Understanding the role of these toxins in the producing microorganisms and the responses of their genes to a changing climate may suggest the means for controlling toxic bloom events in water supplies. The information gained from the discovery of these toxin biosynthetic pathways has enabled the genetic screening of various environments for drinking water quality management. In addition, the information gained from studying the toxins has also provided the information needed to screen other environments for new drugs. This seminar addresses the evolutionary history of one of the oldest life forms on Earth, the molecular genetics underlying bacterial toxin production, and the exploitation of microbes for pharmacy.

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Wine and cheese will be served from 5.30 pm before each lecture.

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 145 **OCTOBER 2012**

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IN THIS ISSUE

DONATIONS TO THE RESEARCH FUNDS

A total of $52,510 has been donated to the research funds. Our kind donors are Dr. Jennifer Anderson, two anonymous donors, Mr. Doug Benson, Mr. D.J. Cole, Dr. J.W. McGarity, Dr. A.O. Nicholls, the late John F. Noble, Dr. R.A.L. Osborne and W. Semple. This list includes the bequest of $50,000 from the late John Noble.
We thank our most generous donors: their gifts are appreciated.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2013. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 14 November, 2012

SYMPOSIUM ON JENOLAN CAVES

Jenolan Caves have been reserved since 1867 and are internationally renown. The Reserve is listed on the State Heritage Register and is part of the Greater Blue Mountains World Heritage Area. The symposium is sponsored by the Linnean Society oF NSW and the Australian Speleological Federation Inc., and supported by the NSW Office of Environment and Heritage and the Jenolan Caves Reserve Trust.

The symposium will aim to present the accumulated scientific knowledge about all aspects of the karst and its caves, the environment and the flora and fauna of the region. Publications of scientific papers in journals and a guide book suitable for the general pubic, summarising the science of the caves will result from the symposium.
The symposium will be held on 23 and 24 May, 2013, at Caves House, Jenolan Caves. There will be short field trips in the early morning and evening. Accommodation will be needed, and accommodation to suit all budgets is available at Jenolan Caves reserve.
More information is available on the Society's web site and will be provided in the December Newsletter.

ONLINE PUBLICATIONS OF THE PROCEEDINGS

Articles and the papers from two symposia have been published on line and may be accessed free of charge by anyone at the website
http://ojs-prod.library.usyd.edu.au/index.php/LIN
At the end of the year, Volume 134 will be finalised and single copies may be printed if ordered.

Articles

Etymology of the Dragonflies (Insecta: Odonata) named by R.J. Tillyard, F.R.S.
Ian D Endersby
Etymology of the Dragonflies (Insecta: Odonata) named by R.J. Tillyard - Corrigendum
Ian D. Endersby
New Information on *Culmacanthus* (Acanthodii: Diplacanthiformes) from the ?Early–Middle Devonian of Southeastern Australia
Carole J. Burrow, Gavin C Young

Symposium - Wildlife Conservancy's sanctuary at Scotia, far western New South Wales (13 July 2011)

The Scotia Science Symposium 2011
Matt W. Hayward, David A. Keith
Are Native Dung Beetle Species Following Mammals in the Critical Weight Range towards Extinction?

Nicole Coggan
Soil Disturbance by Invertebrates in a Semi-arid Eucalypt Woodland: Effects of Grazing Exclusion, Faunal Reintroductions, Landscape and Patch Characteristics
David J. Eldridge, Niki Huang, Jocelyn Bentley, Matthew W. Hayward
How Might Terrestrial Arthropod Assemblages Have Changed After the Dramatic Decline of Critical Weight Range (CWR) Mammals in Australia? Using Reintroductions at Scotia Sanctuary as a Model for Pre-European Ecosystems
Heloise Gibb
Reintroduction of Bridled Nailtail Wallabies Beyond Fences at Scotia Sanctuary – Phase 1
Matt W. Hayward
The Influence of Fire, Herbivores and Rainfall on Vegetation Dynamics in the Mallee: a Long-term Experiment
David A. Keith, Mark G. Tozer
The Pastoral History, Biological and Cultural Significance of the Scotia Country, far Western New South Wales
Martin Westbrooke

Symposium on Natural History of Royal National Park

Strong beginnings to a bright future: Natural history in the Royal National Park and the need to better integrate research into park management.
Michael B. Treanor
Royal National Park – Lessons for the Future from the Past
P. Adam
Soil erosion following wildfire in Royal National Park, NSW.
Glenn Atkinson
The Aboriginal Prehistory and Archaeology of Royal National Park and Environs: A Review
Val Attenbrow
The Holocene History of the Vegetation and the Environment of Jibbon Swamp, Royal National Park, New South Wales
Jane M. Chalson, Helene A. Martin
Developing an Interactive Plant Identification Tool for the Royal National Park
Rhonda Daniels
Population Ecology of Waratahs, Telopea speciosissima (Proteaceae): Implications for Management of Fire-prone Habitats
Andrew J. Denham, Tony D. Auld
Visitor Attitudes and Erosional Impacts on the Coast Walk, Royal National Park
Deirdre Dragovich, Sunil Bajpai
What Role Does Ecological Research Play in Managing Biodiversity in Protected Areas? Australia's Oldest National Park as a Case Study
Ross L. Goldingay
Visitors' Knowledge of the Broad-headed Snake in Royal National Park
Ian F. Hayes
Spatial Analysis of Risks Posed by Root Rot Pathogen, Phytophthora cinnamomi:Implications for Disease Management
David A. Keith, Keith L. McDougall, Christopher C. Simpson, Julian L. Walsh
Vegetation Dynamics in Coastal Heathlands of the Sydney Basin
David A. Keith, Mark G. Tozer
First Record of Hemiboeckella searli Sars, 1912 (Calanoida: Centropagidae) in New South Wales
Tsuyoshi Kobayashi, Ian A. E. Bayly, Simon J. Hunter, Stephen J. Jacobs, Michael B.

Traynor
Is an Island Reserve Enough? The Decline and Fall of the White-fronted Chat (Aves: Meliphagidae) in Southern Sydney
Richard E. Major, J. L. T. Sladek
Vertebrate Fauna: a Survey of Australia's Oldest National Park and Adjoining Reserves
Martin Schulz, Elizabeth Magarey
Population Dynamics of Xanthorrhoea resinosa Pers. Over Two Decades: Implications for Fire Management
Mark G. Tozer, David A. Keith

BOOK REVIEW

Frozen in Time: Prehistoric Life in Antarctica, by Jeffery A. Stillwell and John A, Long
CSIRO Publishing, Collingwood Vic., October 2011.
Hardback, 248 pages, AU $69.95
ISBN: 9780643096356

In 1897 an exasperated John Campbell, Duke of Argyll, declared in London, a 'very large area of the surface of our small planet is still almost unknown to us. That it should be so seems almost a reproach to our civilisation.' Atlases at the turn of the century only hinted at what lay at the southern end of the world. Almost everything south of 50° was described as an Unexplored Region and the vast space left embarrassingly empty. Since this time there has been an incredible expansion in knowledge. What was once thought to be white space has now been shown to be a great continent.

Antarctica is on a scale hard to grasp: at over fourteen million square kilometres, it is second only to Russia in coverage of the Earth's surface and bigger than all the countries of Europe combined. It is the world's highest continent, with an average altitude of 2300 metres. It contains more than seventy per cent of the world's freshwater, locked up as thirty million cubic kilometres of snow and ice—which, if melted, would raise the planet's seas by an estimated sixty-five metres. The bitterly cold air on its upper surface contains virtually no moisture, making the Antarctic interior the world's largest desert, while the wildlife along its fringes is some of the most diverse on the planet. Crucially though, rocks that make up the rest of the continent – most of it buried under ancient snowfall – span almost the entire age of the Earth. And it's what lies within these rocks that forms the focus of Frozen in Time: Prehistoric Life in Antarctica.

The authors Jeffrey Stilwell and John Long had done a magnificent job bringing together a vast amount of information from widely disparate sources to tell the fascinating story of the evolutionary history of Antarctica and its global importance. The authors have a wealth of experience working in the Antarctic, scientifically exploring this great continent. Lavishly illustrated in colour, Frozen in Time starts with a summary of the history and scientific discovery of the south and then takes the reader through the different geological eras, commencing with the origins of life during the Cambrian some 540 million years ago through to the ecosystems found there today. Through the fossils that have been unearthed in different formations, we learn of a landscape that has experienced sweeping changes: from almost tropical, balmy conditions through to the glacial conditions of today. Over time, Antarctica's biodiversity has waxed and waned as the continent migrated across the planet's surface, experiencing widely changing carbon dioxide levels and climate. What comes across so clearly is just how much more remains to be discovered. It's an incredibly exciting time to be working in Antarctica.

Frozen in Time admirably captures the latest thinking of Antarctica's role in the evolutionary history of the world and explains it all in an admirably accessible manner, managing to successfully negotiate the competing demands of lay readers, students and academics. The book is fully referenced and yet the authors have managed to skillfully integrate key citations into the text without breaking the flow. The book is very well written and beautifully presented, making it wonderfully accessible. An impressive blend of the history of scientific exploration in Antarctica coupled with recent discoveries makes Frozen in Time a tremendously desirable book. I can't recommend it highly enough for anyone interested in the evolutionary history of Antarctica and the scientific work undertaken in this most extreme of environments.

Chris Turney

Editor's note: Last year, Professor Chris Turney gave us a talk entitled '1912: The Year the World Discovered Antarctica'. The story of the politics and rivalry of the race to be the first to reach the South Pole was highly entertaining. He also discussed the important scientific discoveries. His book of the same name, '1912: The Year The World Discovered Antarctica' has now been published (Text Publishing, Melbourne, ISBN: 978192ng 1922725).

SOUTH AMERICA – THE GEOLOGY AND MUCH MORE.... A talk by Dr. Paul Lennox

Dr. Lennox and his wife made a trip to South America combining geology with tourism. To give us a better appreciation of the South American countries, he compared them with Australia: they are also relatively young. Only Brazil is larger and Peru, Bolivia, Chile and Argentina are considerably smaller. Australia has the highest gross national income (GNI) per person and Peru has almost as much, but Bolivia, Chile and Argentina have considerably less. Bolivia, the poorest, has about one-eighth the GNI of Australia. They are all staunchly Catholic countries and there are frequent festivals and carnivals.

The whole of the west coat of South America is a subduction zone where the South American Plate over-rides oceanic plates and the tectonics are fast. There are four areas of volcanoes down the length of the Andes, and this is related to the manner of subduction. If the oceanic plate goes down steeply, then volcanoes are produced, but if the plate goes down at a shallow angle, then there are no volcanoes. There are thus sections of the Andes where there are many volcanoes and other sections where there are few or none. Earthquakes are common, both at shallow and deeper depths. All this tectonic activity makes the Andes sound like a dangerous place, but it is the reason why the region is so rich in mineral resources.

The tourist highlights also provided much geological interest. Colca Canyon in Peru is four km deep and the world's deepest canyon. The Incas terraced and irrigated the slopes for crops. Thick young sediments accumulated from the uplift of the Andes are now being eroded. Cuzco was the Inca capital and is the starting place for a trip to Machu Picchu. The buildings were built from granite quarried on the site and the fit of the blocks is amazing. If there has been any failure, it is because of soil subsidence, not poor workmanship. The buildings have withstood 500 years of earthquakes. Layered soil/sand/gravel under the main site controlled groundwater flow. There are Inca buildings in towns all around the area and not just at Machu Picchu. The Incas terraced the slopes below the site to grow crops.

The Uyuni Salt Lake in Bolivia has a salt crust up to 10 m thick that sits on a lake of brine rich in lithium. The salt is harvested and the lithium, a valuable mineral is being extracted from the brine. Volcanic cones poke through the salt crust, forming islands that support cactus vegetation that grows at the rate of 1 cm per year. There is even a hotel built of salt blocks. The Atacama Desert is the driest place in the world and has salt lakes where flamingos breed and volcanic landscapes that look more like the Moon, aptly named the Valley of the Moon. It is rich in resources, especially nitrates and copper and there are numerous abandoned holes and old mining towns. Further south, on the coast, Valparaiso was the port for the gold rush days in the 1800's. Continuing south of Santiago, there is a string of volcanoes that erupt every few years. In one eruption of the Villarrica volcano in 1971, a lava flow 4 km wide cooked everything in its path. These eruptions usually spew out ash that blankets the surrounding countryside, increasing soil fertility. There is a very real threat of tsunamis along the coast and evacuation routes are posted in the streets of the nearby towns.

The easterly movement of the Antarctic plate has bent the southern-most end of the Andes sideways, giving the end of South America its characteristic curve. A dome-shaped intrusion uplifted the Torres del Paine region in Patagonia. Torres del Paine has been shaped by glacial erosion of the Patagonian ice sheet of the last ice age. Today, it has spectacular peaks, spires, glaciers and brilliantly coloured lakes. When attempting to leave Patagonia, they were caught up in some political unrest and the airport was closed. It was soon re-opened to get out the foreign tourists. The Lennox's were relieved to leave, having no wish to be caught in what looked like the start of a South American revolution.

Dr. Lennox sees a bright future for all the countries. The people are resilient and energetic and the countries are resource rich and developing rapidly. He sees Brazil as comparable to Russia, India and China in the years to come.

LINNEAN SOCIETY OF NEW SOUTH WALES

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Wednesday 24 October, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd

Mr. DAVID EDWARDS

School of Biological, Environmental and Earth Sciences University of NSW

MUCKING ABOUT IN BOATS OR MUCKING UP THE RIVER?

Bank erosion and boat wakes on the lower Hawkesbury River

A variety of research has clearly demonstrated the impact of boat wakes from large commercial vessels on bank erosion. However the erosive role of wakes from recreational vessels is much more ambiguous. Studies from the 1960's and 70's suggested that wakes from recreational boating activity were less important than natural wind waves, but recent changes in styles of boating activity and overall boating numbers suggests that boat wakes may now represent a significant cause of bank erosion.

This seminar outlines research over several years that has investigated the impact of boat wakes on estuarine reaches of the Hawkesbury River as well as the potential issues and conflicts between various user groups on the river. A range of potential mitigation and management measures that may be utilised are also discussed

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Wine and cheese will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 146 DECEMBER 2012

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Membership renewal form

NEW MEMBERS

We welcome our new member:
Mr. Rolf Rebner of Coolatai. Fields of interest: botany, paleontology, geology (wide interest).

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.

CD OF THE *PROCEEDINGS*

A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

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CALL FOR PAPERS

The Linnean Society of NSW and the Australian Speleological Federation are hosting a

SYMPOSIUM ON JENOLAN CAVES

To be held at Jenolan Caves 22-25 May 2013

(Presentations 23 and 24 May)

Papers are invited specifically on Jenolan Caves or any cave-related research that might be applicable to Jenolan Caves.

People interested in presenting a spoken or poster paper should send a proposed title to Mike Augee as soon as possible, but no later than 1 February 2013.

People wishing to attend, whether they plan to present a paper or not, should reply to M. Augee by 1 January 2013 to be on the mailing list for further information.

M.L. Augee
fossil@well-com.net.au
89 Caves Road
Wellington NSW 2820
02 6845 4294

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NEW MICROBIOLOGY RESEACH FUND

The Society has now made available a new research fund, the William Macleay Microbiology Research Fund. The rules are listed in 'Applications for grants… ' (below) and are generally similar to those of the Joyce Vickery Scientific research Fund, with the exception that the grant is for microbiology.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au

Intending applicants please read instructions carefully. Original plus six (6) copies are required for all of funds.

The date for submission of applications for all the funds is 1st March, 2013.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to $2,300 is available to members of the Linnean Society of New South Wales and $1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March, 2013. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of geology.

Applications will be accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth Sciences.

3. Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

4. In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

5. Applicants need not be members of the Society, although all other things being equal, members will be given preference.

6. Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

7. The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

8. Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

9. Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

10. The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2013. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed $2,500 for Members of the Linnean Society of New South Wales and $1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March, 2013. Submit applications to The Secretary, Linnean Society of NSW, PO Box 291 Manly, NSW 1655**

THE OVERVIEW Of EARLY MAMMAL EVOLUTION: THE WHAT, THE WHEN AND THE WHY – a talk by Prof. Mike Archer.

Back in the Permian (about 290 million years ago), there were two main groups of reptiles, the Synapsids and the Sauropsids. There were also the turtles, but we don't know where they fit into this scheme of things. The mammals are descended from the synapsids and the dinosaurs are sauropsids, so we are not descended from dinosaurs, though we may well have had a common ancestor.
The Permian was cold and the 'why' of becoming mammalian comes down to temperature regulation. Animals that could warm up faster and remain warm had an advantage over the slower cold-blooded ones. The synapsids had some means of keeping warm: one group had vascular sails on their backs that were good for warming up when basking in the sun. The mammal–like reptiles were good at keeping warm and were the dominant group. Some of them grew to a large size. At this time, the synapsids were the fearsome carnivores, not the sauropsids.
It seems major evolutionary leaps are always made by the carnivores. Herbivores just munch away mindlessly at the vegetation while the carnivores have to be smart to catch dinner ('Archers's –be it ever so humble – law of Evolutionary Leaps'). At this point, Prof. Archer warned that vegans and vegetarians should take note! The fearsome synapsids were clearly headed for global dominance. The Permian was followed by the Triassic and a warmer climate: it was 10° hotter. Now, being warm-blooded became a liability and the cold-blooded sauropsids had the upper hand, becoming the large dinosaurs. The synapsids coped with this change in two ways: they became smaller and nocturnal, becoming active at night when it was cooler. By the mid Triassic, the synapsids included tiny mammals.

Mesozoic mammals in the fossil record had been overlooked because everyone was looking for the big dinosaurs. Now when they go back and sift through the spoil where the large dinosaurs occur, they find plenty of small mammals: shrew-like creatures, some even the size of a paper clip, to animals the size of a Tasmanian devil that ate small dinosaurs. They occupied all the habitats that mammals occupy today. There were diggers, burrowers, swimmers, gliders. wombat-like creatures, squirrel-like and rodent-like early mammals. Many of these early mammals were found in China where volcanic ash had settled in a lake and effected amazing preservation. At the end of the Mesozoic, when the asteroid hit the earth and wiped out the dinosaurs, it only knocked out some of the early mammals.
There are a number of key anatomical features that differentiate the synapsids and mammals from the sauropsids and reptiles:

- The synapsids have soft, glandular skin with soft hair. They have sweat glands and mammary glands because of soft skin. The soft skin allows nuanced facial expressions that are important for socialisation.
- Mammals and birds have a 4-chambered heart and double circulation. One side of the heart receives deoxygenated blood from the body and pumps it to the lungs where it is re-oxygenated and comes back to the other side of the heart to be pumped back to the body: a very efficient system. Reptiles haves a 3-chambered heart with a single ventricle. Deoxygenated blood is pumped to the lungs from the ventricle and returns to the same ventricle to be pumped to the body. There is thus mixing of the de- and re- oxygenated blood: not as efficient as the double circulation.

The red blood cells of birds and reptiles have a nucleus whereas the red blood cells of mammals have lost their nucleus, presumably so that more oxygen can be packed into the cell.

- Mammals have complicated noses with water recovery structures in the nasal region: a necessity for rapid, hot breathing. Running takes less energy in mammals than in reptiles with their legs out the side of the body.
- Mammals have feet with short toes underneath the body: more efficient than feet with long toes out the side of the body.
- The rib cage shows whether a diaphragm was present or not. Ribs stop at diaphragm if present and extend all along the backbone if not. A diaphragm implies a more rapid and regulated breathing and a higher metabolic rate.
- Evolution of a 'false palate' that divides off the airway from the food pathway. A cleft palate is an incomplete false palate.
- Dental evolution is very complex and is all about blades that meet and cut. A crocodile has teeth that alternate and don't meet. Grinding teeth sharpens them.
- Chewing muscles have become bigger and there are more of them.
- Facial muscles have become more complex and are important for social signalling (smiles, snarls etc., cheek pouches for storing food) and sucking milk.
- Strengthening the jaw to withstand stress. A number of equivalent bones in reptiles are fused to make mammalian jaws.
- More complex middle ear for more acute hearing and better pitch direction. Reptiles only have the stapes in their middle ear. Two small bones used in the articulation of the reptilian jaw have been co-opted to be the mallus and incus, forming a chain of three bones in the mammalian inner ear. Creationist say that could not happen because the animal could not chew while the bones are being reorganised. Bandicoots show how it is done. Baby bandicoots are borne very undeveloped and use a reptilian jaw to grab onto the teat in the mother's pouch. When they open their mouth to let go of the teat some time later, at a fully developed stage, they use a mammalian jaw.
- Mammals cannot excrete uric acid and their kidney structure allows them to produce hypertonic urine
- Warm-blooded mammals carry their testes in external pouches where it is cooler. The engines of reptiles run cooler, so their testes can function inside of their body.
- Mammals produce milk, an ideal food for their young.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2013 Annual General Meeting

The 138 Annual General Meeting of the Society will be held at 18:00h on 20 March 2013 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the council of the Society for wine and light refreshments from 17:30.

Four members of Council are due to retire at this AGM:

Emma Gorrod
Robert King
Helene Martin
Bruce Welch

and all offer themselves for re-election.

Council recommends the election of Dr Michael Gray as President of the Society for 2013.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2013.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2013.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 147 APRIL 2013

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Record of the Annual general Meeting, 20 March 2013
Form for donation to the Society's research funds
Registration form for Jenolan Caves Symposium
Program for Jenolan Caves Symposium

NEW MEMBERS

We welcome our new members:

Miss Linda H. Armbrecht, Macquarie University. Interests: Phytoplankton taxonomy/biodiversity, biological oceanography

Ms Jenny L. Giles, University of Queensland. Interests: Chondrichthytes biogerograpphy, phylogerography, systematics, fisheries, trade in shark/ray parts, primarily fins.

Mr. David McElroy, Sydney University. Interests: Ecology, pollution, human impacts.

Ms Haley Mills, Sydney University. Interests: Invasive species, zoology, behavioural interactions, ecology

Ms Anna Namyatova, University of NSW. Interests: Entomology, Heteroptera systematics

Ms Katie O'Dwyer, Otgo University. Interests, Ecology and evolution of trematode parasites and their snail hosts
Ms Alannah K Pearson, Australian National University. Interests: Palaeoanthropology, biological anthropology
Ms Sarah K. Pearson, Flinders University. Interests: Conservation genetics, animal sociality, molecular ecology
Ms Jennifer Sanger, University of Tasmania. Interests: Plant ecology, rainforest ecosystems, orchids, global change ecology
Mr. William Sowerby, Monash University. Interests: Evolutionary ecology, behavioural ecology, sexual selection, biology
Ms Margaret I. Stimpson. Interests: Anatomy, ecology and taxonomy of *Banksia spinulasa* and all things Proteacese
Dr. Kate Umbers, Macquarie University. Interests: Animal behaviour, evolution of coloration, population genetics, paternity, evolution of signaling

REGISTRATION FOR JENOLAN CAVES SYMPOSIUM

The Jenolan Caves Symposium will be held on Thursday 23rd and Friday 24th of May, 2013, at the Kanangra-Boyd Room, Caves House. The program and a form for registration for the Jenolan Caves Symposium is included with this newsletter. Or go to the website http://linneansocietynsw.org.au

PLANTS OF MAGNETIC ISLAND

The third edition of Plants of Magnetic Island by Betsy Jackes is now available online, or a hard copy can be ordered. Go to the website http://alumni.jcu.edu.au/netcommunity/PlantsOfMagIs3rdEdition

THE EVOLUTION OF MICROBIAL TOXINS AS A BLUEPRINT FOR DRUG DISCOVERY: a talk given to the Society by Prof. Brett Neilan.

The environment dictates the type of microbial organisms living in it but the identification of the bacterial organisms is only achieved at the molecular level. There are 30-40 different branches of the bacterial kingdom. Many of the bacteria cannot be cultured, so cannot be studied by conventional means.

Cyanobacteria ("blue-green algae") are the oldest form of life known and have been on earth for 2-3 billion years. The laminated stromatolites of Shark Bay are made of Cyanobacteria that have hardly changed through their long history. There are laminated microbial mats in hypersaline environments in Yellowstone National Park. Many Cyanobacteria are filamentous and some are unicellular, but they all function in the same way. They have a mucilaginous gel that traps sediment and the laminations consist of alternate layers of algal cells and sediment. The Cyanobacteria have a blue=green chlorophyll, different to the chlorophyll found in the plant kingdom.

In Antarctica, meltwater ponds have a great diversity of Cyanobacteria. "Mermaid's hair" is a filamentous epiphytic form found growing on sea grasses and large masses may break free. It produces a dermotoxin that would make you scratch. The roots of cycads contain the cyanobacterium *Nostoc* that produces the chemical DMAA, a small molecule that induces a neurological response like Parkinsons disease. DMAA is found in the fruits of the cycad, and when fruit bats eat the fruits and natives eat the fruit bats, then they suffer the neurological symptoms. Cyanobacteria are widespread, and so is DMAA. Ascidians have a cyanobacterium that produces a toxin used as an anti-cancer drug.

There are more than 800 toxins produced by cyanobacteria and they have the potential for drug use. Actinomycetes (Actinobacte\ria) also produces a lot of toxins and one, *Streptomyces* is used for drugs. The Actinomycetes have a filamentous structure and produce many spores for distribution. Some cyanobacteria produce spores or heterocycts that are used for nitrogen fixation e.g., *Nostoc*. Some cyanobacteria are used for food production in China.

Fifty years ago, when water quality was poor, dirt in the pipes was blamed and the solution was an engineering one. Now, microbial films are recognised, using a microscope. If toxins are present, the genes responsible for their production can be identified. The toxins may be classified as liver toxins, neurotoxins or cytotoxins and Australia has all of them. *Mycrocystis* may cause liver damage, but most people do not die from it. Small children and animals are the most vulnerable. In China, where there is a high rate of hepatitis, the people are more vulnerable, for mycrocystin promotes tumour growth, i.e., liver cancer.

The question is: why does *Mycrocystis* produce this toxin? There were no livers around many millions of years ago when these cyanobacteria evolved. There have been big blooms of cyanobacteria in Lake Burragorang but toxins were not present. The genes for toxin production may be present but they are not functioning. The genes get switched on by a high light intensity and with a greater production of the toxin, it moves out into the water. In farm land, the river banks are largely cleared so that the light intensity is high.

Cells of *Microcystis* have hairlike appendages that take up nutrients and may connect with other cells of *Microcystis* and exchange DNA. In this way, non toxic cells may become toxic. *Cylindrospermopsis* produces a potent liver toxin. Saxitoxin, produced by *Anabena socialis* is the No.2 chemical weapon (ricin is No.1). The production of saxitoxin is regulated by the salinity in Australia and by pollutants in Brazil.

Now that we have all this information about natural toxins/drugs, we need to design non-natural versions or the source will soon be extinct. Taxal used to treat breast cancer comes from the yew tree that in now nearly extinct. The Australian Aborigines use a bark that contains penicillin to prevent infections. Many herbal remedies result from an endophyte in the plant. Now that we have isolated the genes responsible, we can use them for drug production. With stress, such as too much light, some of the products of photosynthesis get diverted into toxins.

MUCKING ABOUT IN BOATS OR MUCKING UP THE RIVER? A talk given by Mr David Edwards

Erosion of riverbanks upsets the landholders because they loose land. Boat users are offended if they are accused of causing the erosion: they blame it on waves created by the wind. Research has clearly demonstrate that large commercial vessels have an impact on river banks, but studies in the '60s and '70s suggested that the wakes from recreational boating activity were less important than waves created by wind. Recent changes in styles of boating activity and overall numbers may now represent a significant cause of bank erosion.

Fast ferries spurred work on bank erosion in the Swan River, Western Australia and in New Zealand. Slow boats create transverse waves. Fast boats create divergent waves and the faster the boat, the bigger the waves. As a boat passes, the second or third wave is the biggest. Are recreational boats an issue? Boat registrations have increased almost linearly, with a drop last year, probably due to the global downturn. Wind may generate large waves if blowing along a straight stretch of river.

Near Wisemans Ferry, where jet-ski activity goes on all the year, there is undercutting and one land owner has lost about 5 m of land. There is very little boating on the Colo River, and very little bank erosion: it is used as the control site. At Sackville, there is a caravan park and lots of boating activity. The diurnal tide range will also affect the rate of erosion. Summer is the peak boating period and winter is much quieter.

To measure erosion, plaster and resin erosion meters (PEM) that dissolve according to the amount of wave action were deployed at two levels on the bank: low and mid tide where they are underwater for a long or short time (respectively), and left for 10 or 11 days. At Bathurst Reach and Lower Portland, there was not much change from peak to quiet times. Wind waves make no difference and boat waves cause limited erosion. Measurements on a weekly time scale do show a difference: there is much more erosion on the weekends when there is more boating activity than on weekdays.

Another way of measuring erosion is to put pins a half meter long into the bank with only 10 cm sticking out then go back at intervals and measure the length sticking out. At Bathurst Reach, the erosion pins show that erosion over the summer weekends and Christmas was phenomenal. The base is eroded away and then the bank collapses. Unusually high tides and heavy rain lead to more bank collapses.

Resistance of the bank to erosion depends on the type of bank: soil and sand are very easily eroded but rock is very resistant. A rock bank can reflect the wave back, and if the other side of the river is soft sediment, it can suffer erosion from the original boat wave and the reflected wave as well. At Bathurst Reach, there is fine hard clay at the back of the bank, and when this is eroded away, it undercuts the bank and then the sandy layer above collapses. If the bank is all sand, it just all collapses.

The type of activity influences the amount of erosion. Fast boats and water skiers that are planing create the smallest waves. Slow heavy boats create much larger waves. Transitions speeds from fast to slow create the most problems. Towing inflatables produces big waves. There are different activities going on at the various locations along the river.

What can be done about it? Limiting some activities is considered the soft option. Establishing reed beds along the banks reduces waves and they can work. The land holders think vegetation causes bank erosion: they see the tree fall over but they do not see that the bank it is growing on has been undercut. With so many interested parties and such a complex situation, the solution to the problems are, well, problematic.

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 17 April, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. MARK P. TAYLOR

Professor of Environmental Science, Faculty of Science, Macquarie University

LEAD: THE LEGACY THAT KEEPS ON GIVING

This talk will cover some of the issues, cases and on going challenges Australia faces in relation to environmental lead contamination. While one might have thought the 'lead issue' was all but over following the removal of lead from petrol and paint, nothing could be further from the truth. The likely lowering of acceptable blood lead exposures has raised the bar with respect to the management and response to lead incidents. However, these are not isolated issues as there remains a multitude of historic, ongoing and potential future examples of where either our knowledge is inadequate or the authorities care too little to take effective action. While environmental lead exposure is the primary topic of the talk, other relevant pollutants will be considered. The general two paradigms reign supreme: (i) no data no problem; (ii) the solution to pollution is dilution.

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Wednesday 15 May, at 6 pm, in the Classroom, Royal Botanic Gardens. Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr MIKE LETNIC

School of Biological, Environmental and Earth Sciences, University of New South Wales

KEYSTONE EFFECTS OF AUSTRALIA'S TOP PREDATOR: FOCUS ON THE DINGO

Top predators often have positive effects on biological diversity owing to their key functional roles in regulating trophic cascades and other ecological processes. Their loss has been identified as a major factor contributing to the decline of biodiversity in both aquatic and terrestrial systems. Consequently, restoring and maintaining the ecological function of top-order predators is a critical global imperative. The dingo is Australia's largest terrestrial predator. Their status is ambiguous owing to their relatively recent arrival on the continent, the damage they cause to livestock and their role as ecosystem architects. In this talk I will discuss the status and ecological role of dingoes, focusing particularly, on the strong regulatory effects they have on Australian ecosystems. A large body of research now indicates that dingoes regulate ecological cascades, particularly in arid Australia, and that the removal of dingoes results in an increase in the abundances and impacts of herbivores and an invasive mesopredator, the red fox. The loss of dingoes has been linked to widespread losses of small and medium-sized native mammals and the depletion of plant biomass due to the effects of irrupting herbivore populations and increased predation rates by red foxes

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Wednesday 24 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/PROF. MIKE MANEFIELD

School of Biotechnology and Biomolecular Sciences, University of New South Wales

MICROBES MOVING MOUNTAINS

Unicellular organisms belonging to the bacterial and archaeal domains of life are influential in ways that most people never imagine. They are the oldest and most abundant inhabitants of the Earth and have been influencing the biogeochemistry of the planet long before heavy handed humans got in on the game. In this presentation three examples will be given of how the activity of microbes can be exploited to ameliorate some of the negative environmental impacts of human activity. The first example will discuss the ability of bacteria to break down common groundwater pollutants such as those under the Botany Industrial Park, Sydney. The second example will detail the ability of archaea to generate natural gas from renewable feedstock such as food waste, as illustrated by the EarthPower facility in Camellia, Sydney. The third example will describe the inner workings of a sewage treatment plant the likes upon which human civilisation is dependent, using a facility in St Mary's, Sydney. The overall goal of the presentation is to communicate the importance and utility of microbes (and microbiologists!) for continuing human occupancy of the planet.

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Wednesday 18 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

To be announced

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Wednesday 23 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. DAVID J. MABBERLEY

Executive Director, the Royal Botanic Gardens and Domain Trust

THE STORY OF THE APPLE

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Drinks will be served from 5.30 pm
EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 148 **JULY 2013**

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IN THIS ISSUE

NEW MEMBER

We welcome our new member:
Mr. Fernando Soley of San Jose, Costa Rica.

GIFT IN MEMORY OF SURREY JACOBS

Mrs Betty Jacobs has made a gift to the Joyce Vickery Scientific Research Fund, in memory of her late husband Dr Surrey Jacobs.

Surrey Jacobs had a long career as a botanist at the National Herbarium of New South Wales in Sydney. He was a grass specialist but worked on the systematics of other groups of plants as well. In a collaborative research project on the taxonomic significance of the variations in photosynthesis, he successfully took the experiments into the field and it proved to be a break though. The actual behaviour of the plants in the field bore scant resemblance to previous results from studies in controlled environments.

He worked on many different projects, one of them being completing the projects started by Dr. Joyce Vickery, after her death. He and a colleague worked on the first census of plants in New South Wales. His greatest impact was probably his work on water plants. In recognition of this, he received the T. Wayne Miller Distinguished Services Award from the international Aquatic Plant Management Society. He was posthumously made a member of the International WaterLily and Water Garden Society. He advised on wetland plant management and provided forensic advice to police. Surrey has authored or co-authored over 60 publications, including a range of semi-popular books.

From Wilson, K.L. (2011). Surrey Wilfred Laurence Jacobs 1946-2009, *Telopea* 13(1-3) 13-21.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS are, in total, $8,385.

Donations to the Joyce Vickery Scientific Research fund were received from Dr. J.M.E. Anderson, two Anonymous, Prof. Bruce A. Auld, Ian Endersby, Dr. Michael J. Engelbretsen, Dr. Donald S. Horning, Prof. Betsey Jackes, Mrs Betty Jacobs, Prof. David Keith, Prof. Ian A. McDougall, Dr. A.O. Nicholls, Prof. L. Selwood, W.S. Semple, Mrs Karen Wilson and Dr. J.N. Yates.
Donations for the Betty Mayne Research fund for Earth Sciences were received from Dr. R.A.L. Osborne, and Dr. Lawrence Sherwin

We thank our most generous donors. The Research Grants awarded to students do more than provide financial assistance. Research workers must be skilled in the art of writing applications for grants that are highly competitive. Applying for grants from the Linnean Society is good practice for students, and if awarded a grant, it is a moral booster and something they can add to their CV.

All donations and gifts to the Scientific Research Funds are fully tax deductible.

GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

INAUGURAL AWARDS FROM THE Sir WILLIAM MACLEAY MICROBIOLOGY FUND

ARMBRECHT, Linda H. Macquarie University.
Project: Phytoplankton characteristics and related biochemical processes in a biological hotspot: Solitary Islands Marine Park
Marine phytoplankton accounts for about half of the annual net global primary production and plays a key role in biochemical cycles. In the light of climate change and changes in the temperature of currents, changes in phytoplankton are expected. Already, there is a long term decline in silica in the east Australian coastal waters and an earlier onset of the spring diatom bloom. Aim: to conduct a monthly 1-year survey of the phytoplankton and ecologically important factors in this hotspot and investigate the biochemical processes such as carbon, nitrogen and silica drawdown and export. Awarded $1,552 (part funded from the J. Vickery Scientific Research Fund).

VARDEH, David. School of Biotechnology and Biomolecular Sciences, University of NSW.
Project: Microbial composition of extant Australian stromatalites from different geochemical settings.
In the development of a stromatolite, phototrophic cyanobacteria settle on a substrate. Through filaments and production of Extracelluar Polymeric Substances, cyanobacteria create the foundation for biofilm development by providing microniches in which other microbes can find favourable conditions in terms of light, oxygen availability and pH. Stromatolites in Hamelin Pool in Western Australia are well known, but other stromatolites have been discovered in Australia in very different environments, and these have not been studied. Other stromatolites that will be studied are as follows:
Jenolan and Wombeyan Caves: Microbial speleotherms in semi-open Nettle cave in Jenolan and Victoria Arch at Wombeyan have filamentous cyanobacteria in the outer layers but the microbial content has not been

assessed. The environment in the caves is so different to that in the marine environment that a different microbial content is expected.
Magnetic Island: Initial tests in non-laminated stromatolites in an intertidal, normal salinity marine setting suggest a complex microbial community with phototrophs near the surface and heterotrophs at depth.
Marion Lake, a shallow ephemeral lake at the tip of Yorke Peninsular SA is fed by groundwater. Laminations are very fine and remains of filamentous cyanobacteria have been described.
Two shallow lakes in the Coorong Lagoon SA regularly dry out and thus salinity fluctuates. Three growth forms have been discerned here.
Lake Hawdon in the southeast of SA is fed by groundwater and dries out regularly. The protective mechanisms of microbes against seasonal desiccation are unknown.
It will be interesting to determine how related to each other the microbial communities are, given the isolation of some of the sites. There is a highly debated hypothesis that 'everything is everywhere' and all microbes are able to disperse freely around the globe, given a suitable environment. Awarded $1,198.

INAUGURAL AWARD FROM THE JOHN NOBLE FUND FOR INVERTEBRATE RESEARCH.

O'DWYER, Katie, Dept. Zoology, University of Otago
Project: Matching host-parasite biogeographical patterns: a comparative study of marine snails and their trematode parasites.
Trematodes are flatworms with a complex life cycle. Juvenile stages infect snails and they eventually end up infecting fish or bird hosts. The distribution of host and parasite are not necessarily the same. The Australian littorinid snail *Austrolittorina unifasciata* is similar to the New Zealand *A. antipodium*. There is little genetic structuring in the New Zealand snail, suggesting adequate dispersal. In Australia, an east-west biogeographic divide around Wilson's Promontory, corresponding to the Pleistocene land bridge to Tasmania, has been found for a number of marine organisms. This study will sample host-parasite across west to eastern Australia and incorporate it with the New Zealand study to determine dispersal patterns in host and parasite. There are a number of other factors that could influence distributions as well as the mobility of the bird host. Awarded $1,400.

AWARDS FROM THE JOYCE VICKERY SCIENTIFIC RESERCH FUND

BASS, Nathan, Department Biological Sciences, Macquarie University.
Project: Social preferences and individual recognition in adult Port Jackson sharks.
The hypotheses that sociability will be influenced by size and familiarity and not sex and genetics will be tested by experiments in a semi-wild environment. Whether Port Jackson sharks can recognise individuals will be tested also. The behaviour and sociability is important for conservation management. Awarded $1,000.

GILES, Jenny L. School of Biological Science, University of Queensland.
Project: Increased representation of rare tropical chondrichthyan faunas in shark fin identification methods, The identification of severed shark fins at any point in harvest or trade depends upon a comprehensive reference collection. Both fin morphology and DNA may be used to identify the fin. An unusual illegal harvest of shark and ray fins has been seized in Darwin and there is an opportunity to sample it and expand the reference collection.
Awarded $1,200.

MARCUS, Lara, University of Tasmania.
Project: Environmental and biological factors driving whale shark occurrence on Ningaloo Reef.
It is generally believed that whale sharks are plankton feeders, but a biochemical approach suggests they also consume deep-water fish. The biochemical approach identifies signature fatty acids and stable isotopes. Using the "you are what you eat" approach, the method can distinguish krill from benthic invertebrates from fish. This project will determine the diet and foraging range of whale sharks at Ningaloo Reef. Whale shark numbers have fallen and this study will assist conservation management. Awarded $500.

MASON, Robert A.B. University of Queensland.

Project: Does ocean acidification enhance coral beaching, and if so, why?
Coral bleaching occurs when the symbiotic dinoflagellate algae are expelled from the coral. Bleaching is triggered by higher than average temperatures and high light intensity. Experimental corals in seawater with enhanced acidification and higher temperatures were paler in colour, and this was interpreted to indicate that acidification exacerbates bleaching, but this is controversial. Experiments with corals in higher temperatures, with and without acidification, will measure the photosynthetic activity of the algal content. If acidification does make a difference, the physiological causes will be investigated. Awarded $1,000.

McELROY, David J. University of Sydney.
Project: Determining the effects of contaminant-based disturbances on succession ecology using marine biofilms and invertebrates
Runoff from the land increases contaminants in coastal waters. Species exhibit different tolerances to heavy metals. Experiments will assess the effect of copper contamination on marine biofilms, the relationship between biofilms and microalgae and indirect influence on invertebrate settlement. Awarded $1,500.

MUNROE Samantha E.M., James Cook University.
Project: Migratory and dietary selection patterns of the sharpnose shark *Rhizoprionodon taylori* in coastal environments using stable isotopes.
It is important to understand the effects sharks have on the marine ecosystems, specifically resource use and diet and haw changes in the environment will impact on the population. Their inshore habitats in bays of northern Australia and migratory patterns will be defined. Diet (pelagic or benthic) will be determined using stable isotopes of carbon and nitrogen in muscle and blood. The results will determine the vulnerability to environmental change. Awarded $750.

PEARSON, Sarah K. Flinders University.
Project: Using molecular methods to investigate parasites within a social host (gidgee skink).
Molecular methods will be used to detect the presence of parasites and to determine the level of parasite infection. It will test the prediction that hosts with higher immune gene diversity are less parasitised than ones with lower immune gene diversity. Living in social groups may allow increased spread of disease, hence social species may require a better immune system. Awarded $1,000.

SANGER, Jennifer C. University of Tasmania
Project: Epiphyte diversity over varying spacial scales in three climatic zones in Australia
Epiphytes are plants that grow on other plants using them for support. They are a highly diverse group of flowering plants, ferns, mosses and liverworts. With no direct contact with the ground, they rely on rain, fog and mist for moisture and are confined to the humid rainforests. Epiphytes play an important role in the rainforest by capturing and storing moisture and atmospheric nutrients. This project will investigate epiphyte communities and their habitats in tropical, subtropical and temperate rainforests. The results could be used to model likely changes that will occur with climatic change. Awarded $1,750

SOWERBY, William G., Monash University.
Project: The role of polymorphism in maintaining population variability
The different colours that may be seen in a species, the cichlid fish 'red devil' in this case, is a polymorphic trait. Colour is easily seen and it may be linked to other characteristics. Recently, behavioural responses have been recognised as important to evolution. Theory suggests that behaviours remain constant through time and environmental context and are not flexible, and any variation is just noise about a mean. The hypothesis that body morph colour of these fish will be linked with aspects of their physiology and behaviour, and will be subjected to different selection pressures will be tested with experiments. Awarded $500.

UMBERS, Kate. Department of Biological Sciences, Macquarie University.
Project: Warning coloration and startle display in a colourful katydid
Acripeza reticulata has a red and blue startle display when disturbed. The little crow is the most likely predator but the display has been little studied. A liquid oozes out of the abdomen and the katydid may vomit also. This project will quantify the behaviour and colour of the startle display and determine what kinds of stimuli trigger the display. Awarded $1,000.

VOGEL, Sandra, School of BEES, University of NSW.
Project: Making healthy chicks – an immunogenetic marker to augment population genetic studies of Little Penguins.
The little penguin populations have been declining and the Manly population is listed as endangered. Human interference has had much to do with it, but natural factors, e.g. sea temperature, food availability may have an impact, especially if accompanied by novel parasites and pathogens. This study aims to gather genetic data and demographic estimations of the populations and use the information to construct a population viability analysis. A similar study in WA has shown significant population structuring and unexpected dispersal along the WA coast. Genetic analysis will show if individuals prefer to mate with the same or different immunogenetic markers. Awarded $1,000.

THE NATURAL HISTORY OF SYDNEY
Editors Daniel Lumney, Pat Hutchings and Dieter Hochnuli
Royal Zoological Society of New South Wales, September 2010
Soft cover, 438 pages
ISBN 978 0 9803272 3 6

There are over 30 chapters, each written by a well-known authority in the field. The topics cover the study of natural history, frogs, molluscs, vertebrates, marine fishes, reptiles, cicadas, changes in bird populations, yuppie bandicoots and more. There are chapters on regional areas and their particular wildlife: Narrabeen Lagoon Catchment, Ku-ring-gai council area, Campbelltown's koalas, Wolli Valley, the Sydney Metropolitan Catchment Management Authority, western Botany Bay. There are chapters on Aboriginal fishhooks and Aboriginal art in the Blue Mountains.

This book will appeal to those who value the remnants of the natural world in the urbanised landscape. It would be ideal for local and school libraries.

Books can be obtained from the royal Zoological Society of NSW, PO Box 20, Mosman NSW 2088, e-mail, office@rzsnsw.org.au, web site, rzsnsw.org.au. For price, contact Ms Hayley Bates at the Executive Office, phone O2 9969 3736, Tuesdays 10 am to 5pm.

LEAD: THE LEGACY THAT KEEPS ON GIVING, a talk given by Prof. Mark Taylor.

Prof. Taylor was introduced to the pollution problem in Australia in Mr. Isa. The mine is upstream of the town water supply and the water from the sewerage treatment facility was discharged into the creek downstream of the town, only to be later recycled, unless the dam overflowed which happened about once every 37 years. He discovered that lead and other pollutants were not being studied in Australia and nothing was known about them. The corporate interests dismissed the problem as natural: lead was there in the soil anyway, and they were not interested.

Now Prof. Taylor has a team of students working on environmental pollution. The historic aspects of lead pollution are being studied using mosses from herbarium collections. The mosses collect dust from the air and a hundred-year record of lead pollution should be obtained. Pollution from mining activities in the Hunter region is being studied using the wine produced there. Dust from mining may settle on grass in the paddocks, cows eat the grass and can suffer lead poisoning. Pollution released by bushfires is also being studied.

Lead is not the only pollutant released from mines and smelters. Arsenic, cadmium, chromium and sulphur dioxide are also released in smaller quantities, but even less is known about them. Mt Isa, a mining and smelting town is a very big emitter of 1600 kg of lead per year. Pt. Pirie, a smelting town emits less, about 44 kg per year and Broken Hill, a mining town has about 6 kg per year.

Mining and smelting are not the only sources of lead pollution: lead from petrol, old paints, and lead solder may be just as much a hazard. This is particularly so in the older inner suburbs where the houses have been renovated and the old lead paint removed. Brick houses near busy highways that have not been painted may have lead on the walls from lead in petrol that equals the concentration found in Mt Isa. Even though lead has been removed from petrol, the lead previously deposited remains there. The concentration of lead decreases with distance from the highway so that it is much lower 100 m from the highway.

There is no safe level of lead pollution. Particulate matter is bad because it is breathed in and absorbed by the lungs. The fine particulate matter is the worst and at Mt. Isa and Pt. Pirie, the fine particulate matter is the largest fraction of the emissions. Lead is particularly toxic to children because lead interferes with the development of their nervous systems. Exposure to lead leads to a lowered IQ and learning and behavioral difficulties. IQ is lowered the most with exposure to the lowest levels of lead and arsenic, and the effects never go away. This is a big loss to society: it loses the high IQ individuals and the need for remedial teaching and training to the low IQ children is a cost burden.

Lead will accumulate in the milk teeth of children. A study in Cincinnati of six year olds with a high lead content in their teeth found that they were prone to poor concentration, hyperactivity, a short attention span, frustration and compulsive behaviour: all symptoms of ADHD. As nineteen year olds, there was a high arrest rate amongst these individuals. A New Zealand study of lead in the dentine in children's teeth, derived from lead in petrol, found an increase assault rate 22 years later. A study in Earlwood, Sydney, where lead was removed from petrol between 1980 and 1990 found that as the lead concentration in the environment decreased gradually during the next 20 years, and so did the assault rate: the two graphs were parallel. Mt Isa is a violent town with a crime rate 700 times the Queensland average.

The health of adults is badly affected as well. Lead is rather like calcium in the body and interferes with a variety of body processes and is toxic to many organs and tissues, including the heart, bones, intestines, kidneys, reproductive and nervous systems.

High lead concentrations may be found in Boolaroo, North of Lake Macquarie, once the home of a lead/zinc smelter and Pt Kembla, a large industrial complex including a copper smelter. In Sydney, the City of Sydney, Rozelle and Lane Cove are also heavily polluted. Balmain and other areas to do with boats are heavily polluted from paint. Older areas with old houses are most likely to be affected. One back yard may be heavily polluted, the neighbour relatively free of pollution. The history of house renovation and distance from a busy highway are important factors. If doubtful, home veggie gardeners should have their soil tested. Vegetables grown in raised garden beds in clean soil brought in to the site are safe to eat.

The mining company in Mt Isa monitors pollution for licensing purposes. The EPA also monitors pollution but the results are not necessarily the same. If pollution is monitored on one day in the week and then averaged for the month, it does not look too bad, but this does not reflect what really happens. Hourly readings show times of no pollution and also very high spikes of pollution. The stacks of the smelter are on the edge of the town and the wind may blow the emissions over the town for an hour or two then blow them in the opposite direction. High emissions for short periods of time will do the damage.

Isotopes in the surface soil, aerosols over the town and wipes taken from in houses were measured and compared with the isotopes in the sub-soil to test if the lead pollution is all natural in Mt. Isa. The results showed clearly that the sub-soil was quite different to all the others: the pollution is not at all natural.

In Broken Hill, the lead/zinc ore was mined and sent for smelting by rail to Pt. Pirie. The ore was transported in uncovered wagons until 1996 when covers were introduced. Dust from spilt ore was blown all over the town and all along the track to Pt. Pirie. Broken Hill is highly polluted. Cockburn, a small town 70 km to the west and on the rail line, is just as polluted. The ore body comes to the surface at Broken Hill, so natural pollution can be expected. Isotopes showed that the lead was 50/50 natural/man induced pollution.

Pt. Pirie has had smelting for nearly 100 years hence a lot of its pollution problem is "inherited". Official data of pollution does not follow the blood level data. When the problem is detected, children are treated and the blood levels gradually reduce. Official data only reports the blood levels at he end of the year, no matter how long the child has been treated. 25% of the children have blood lead problems. Hand wipes taken before and after 20 mins of play in the playground show very high levels of pollution were collected by the child. Playgrounds are cleaned, but it only take the wind to stir up the dust to contaminate it again. The drinking water comes from a catchment that has the train line through it.

Much of the monitoring comes from industry and the government uses it for regulation. There is a conflict of interest here. Average the results over a year and they look good: it suits industry. The real story is much more complex and serious. Arsenic and sulphur dioxide emissions have slipped under the radar. There is little interest in doing more about the pollution problem.

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 24 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/PROF. MIKE MANEFIELD

School of Biotechnology and Biomolecular Sciences, University of New South Wales

MICROBES MOVING MOUNTAINS

Unicellular organisms belonging to the bacterial and archaeal domains of life are influential in ways that most people never imagine. They are the oldest and most abundant inhabitants of the Earth and have been influencing the biogeochemistry of the planet long before heavy handed humans got in on the game. In this presentation three examples will be given of how the activity of microbes can be exploited to ameliorate some of the negative environmental impacts of human activity. The first example will discuss the ability of bacteria to break down common groundwater pollutants such as those under the Botany Industrial Park, Sydney. The second example will detail the ability of archaea to generate natural gas from renewable feedstock such as food waste, as illustrated by the EarthPower facility in Camellia, Sydney. The third example will describe the inner workings of a sewage treatment plant the likes upon which human civilisation is dependent, using a facility in St Mary's, Sydney. The overall goal of the presentation is to communicate the importance and utility of microbes (and microbiologists!) for continuing human occupancy of the planet.

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Wednesday 23 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

PROF. DAVID J. MABBERLEY

Executive Director, the Royal Botanic Gardens and Domain Trust

THE STORY OF THE APPLE

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Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 149 **OCTOBER 2013**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE

Field Guide to Royal National Park: Book launch and special offer to Members flyer

NEW MEMBER. We welcome Dr. Stephen B. Johnson of the Department of Agriculture. His fields of interest are weed/plant ecology, weed risk management, interface of legislation and management of weeds, policy and management of conflict (commercial) species.

CHANGE TO PROGRAM

Prof. David Mabberly is unable to give the talk on "The story of the Apple" as previously advertised. Instead, Dr. Peter Weston will talk on "The Flora and vegetation of Southern Africa". See the Program for further details.

BOOK LAUNCH AND SPECIAL OFFER TO MEMBERS

The Society has produced *Field Guide to Royal National Park*, edited by R.J. King, covering all aspects of Natural History. The book will be launched on 11 December. See the enclosed flyer for details. A special price of $10 is offered to Members.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2014. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 15 November, 2013

REVIEW OF AUSTRALIAN CICADAS

The monograph *A review of the genera of Australian cicadas (Hemiptera: Cicadoidea)* is now available on-line at http://mapress.com/zootaxa/2012/f/zt03287p262

REPORTS FROM RECIPIENTS OF RESEARCH GRANTS

It is a condition of a research grant that the recipient sends the Society a report of the work done. These are some of the reports.

From **MARIA GULBRANDSEN ASMYHR**, Macquarie University. Exploring the unknown: investigating subterranean biodiversity using molecular tools.

Assessing the biodiversity of the stygofauna hidden in aquifers has its difficulties because of short-range endemism, high levels of cryptic species and lack of formal taxonomic descriptions. The potential of DNA barcoding for rapid biodiversity assessment has been tested. Success was limited using the standard 'universal' and more taxon specific primers for PCR amplification and there were high levels of variability. It will require development of a multiprimer and multigene for DNA barcoding to rapidly assess the biodiversity of the subterranean aquatic ecosystems.

Maria G. Asmyhr and Steven J.B. Cooper (2012). Difficulties barcoding in the dark: the case of crustacean stygofauna from eastern Australia. Invertebrate Systematics 26, 583-591.

From **DR KATHERINE L. BARRY**: Nutritional ecology of mating and sexual cannibalism in Praying Mantids.

Experiments with either a high lipid or high protein diet have shown that females on the high protein diet produce more than twice the number of eggs and attract many more males than those on the high lipid diet. The lipid/protein content of the female body and the eggs are directly related to the dietary intake. There was no significant difference in any other mating behaviour, including cannibalism. The results suggest that diet affects the female pheromone production.

Katherine L. Barry and Shaun M. Wilder (2012). Macronutrient intake affects reproduction of a predatory insect. Oikos, EV1-EV7, 583-589.

From **DEBORAH S. BOWER**: Impacts of salinity on the development of freshwater turtles.

The development of reptilian eggs that incubate in contact with soil and water are reliant on the water quality. Experiments with freshwater turtle eggs subjected to variable salinities have shown that increased salinity inhibits water uptake and the hatchlings are significantly smaller with an increased death rate. The effects of higher salinities on the incubation of the turtle eggs mirror those from turtles incubated in drier media. Increase salinization of the land has the potential is reduce hatching success of reptilian eggs.

Debora S. Bower, Kate M. Hodges and Arthur George (2012). Salinity of incubation media influences embryonic development of a freshwater turtle. Journal of Comparative Physiology B. Published online 02 August 2012.

From **SOPHIA CALLANDER**, Australian National University. Social networks: experimental evidence that courting neighbours affect male attractiveness.

If female mate choice is based on short-term comparison of locally available mates, the attractiveness of the same male might increase when he displays alongside less rather than more attractive competitors. We used robotic models to test whether the number of females that a male fiddler crab, *Uca mjoebergi* attracts depends on the size of his neighbours. Generally, the larger males are more attractive to females and are more likely to win male-to-male fights. Larger males can also influence who their territorial neighbours are because they can assist smaller neighbours to repel intruders. We found that males are more likely to attract females if they court alongside of smaller males, an added benefit of defending his smaller neighbours.

From **BELINDA COOKE**, Macquarie University. Meiofaunal presence in relation to the geomorphology of an exposed sandy beach.

The intertidal zone is densely populated with a great diversity of invertebrates that provide an important food source for surf fishes and shorebirds. Samples were collected along transects to cover all facets of the beach and at two times, mid tide and low tide, and on two consecutive days and two consecutive years.

A total of 18 taxonomic groups were identified: the most dominant groups were Copepods (Harpacticoides), Platyhelminthes (Turbellaria) and Nematoda. Meiofauna decreased in density and diversity up the beach, with distance from the sea. The sandy beach environment is highly dynamic, with environmental change occurring at many time scales due to the influence of tides, temperature, wind and waves. These studies have relevance for beach management and development.

From **ENDYMION COOPER**, University of Sydney. Systematics of the Lepidoziaceae: understanding relationships, biogeography and morphological evolution of this hyper-diverse family of hepatics,

Molecular phylogenetics methods were used to estimate the time of divergence of this family of leafy liverworts. The first divergence of the family is estimated to be in the Early Cretaceous with subsequent establishment of the main lineages within the family in the late Cretaceous with diversification in the Cenozoic. Other families of liverworts gave similar results. The liverworts may be the living relatives of one of the earliest groups of land plants, but much of the extant diversity has evolved in the Cenozoic period.

Endymion Cooper (2013) Notes on early land plants today: 37, towards a stable, informative classification of the Lepidoziaceae (Marchantiophyta). Phytotaxa 97(2), 44-51.

From **ELOISE DEAUX**, Macquarie University. The form and function of dingo vocalisation

An older study had suggested that dingoes had three main classes of vocalisation, whereas other dog species have 10 to 12 basic calls. In this project, dingo behaviour could be grouped into 11 categories, and sound classification resulted in 11 sound categories. 'Woofs and barks' appear to serve as warnings and/or threats. 'Growls and snarls' are threat signals associated with aggressive and dominance displays. 'Bark-howls' are produced when the signaller notices a disturbance in the environment and seems to serve as a warning to other individuals. Howling seems to be associated with identity and it tends to stimulate reply from other individuals. Howls seem to function as group reinforcers. 'Whines' and 'whimpers' are most often associated with distress, anxiety and nervousness. They were heard most often during social interactions and some are associated with submissive postures. Yelps are associated with submissive displays and as a consequence of receiving pain. Dingoes may also use a mixture of different sounds. Their vocalisations coupled with visual cues suggest a complex communication system.

From **CARLOS DELGARDO-VELEZ**: Bird-parasite interactions along a gradient of urbanisation.

Urbanisation is thought to be stressful for birds and stress levels influence the parasite load. Results have shown that urbanisation effects on parasitism may be site- and species – specific. Some birds adapt to the urban environment and some don't. This study is still in progress.

From **JUDE KEYSE**, Queensland University. Assessment of the genetic connections between marine protected areas in Roviana Lagoon, Solomon Islands.

This project aims to inform the people of Roviana the value of their marine protected areas and how well their conservation strategies are working. Keyse focused on the giant clam, *Tridacna maxima* and *T. crocea* because they are important economically for the aquarium trade. Samples from Roviana Lagoon were supplemented with samples from Marova Lagoon, 100 km away, and these western Solomon Islands populations were compared with the populations in two sites in Papua New Guinea, three sites in the Great Barrier Reef/Coral sea and one in Western Australia. A new species, *Tridacna* sp. was discovered in western Solomon islands.

It was found there is widespread connectivity regionally for *T. maxima* and *T.* sp., with the exception of a deep divide between the east and west coasts of Australia, and this fits well with the pattern of ocean currents. *T. crocea*, however is different, with less connectivity between the populations of the Coral Sea, suggesting that they may rely more on self recruitment.

From **PENELOPE MILLS**, University of Queensland Systematics of the Australian gall-inducing scale insect species group *Apiomorpha minor*.

Field trips to collect the insects have been completed. This study now has 52 females and 10 males from the east coastal strip of NSW and Victoria. The results of DNA analyses are being assessed and material for chromosome study is being prepared. This group has one of the greatest range of chromosome variation known in animals.

From **JAMES O'HANLON**. Macquarie University. The chemical basis of ant attraction and its function as an egg dispersal strategy in Phasmatodes,

In order to disperse their seeds, some tree species have evolved a symbiotic relationship with ants. By providing a food reward attached to their seeds, plants induce ants to pick up their seeds and carry them into their nests where they are safe from predation, desiccation and parasitism. What is more incredible is that certain stick insects lay eggs with a fleshy capitulum attached that works in the same way to induce ants to pick up their eggs and take them into their nests. This structure is unique to stick and leaf insects in the order Phasmatodes.

The phylogeny shows that the capitulum has arisen and been lost many times. Interaction with ants has only been observed in a few species, and these species are distributed globally. Experiments showed that the capitulum could be detached from the egg and attached to a benign object that the ants then took into their nests. However, many species did not elicit a response from ants whether they had a capitulum or not.

Work continues to identify the attractive compounds in the eggs and determine if they are the same or different to those found in the reward attached to seeds.

MICROBES MOVING MOUNTAINS, a talk by A/Prof Mike Manefield.

The Tree of life has been updated. Instead of the old plants, animals and bacteria kingdoms, a small branch of Eucaryotes contains all the plants and animals. Archaea forms a central branch.

Archaea look like bacteria but their biochemistry is very different and they are more like us. The third branch, bacteria, is the largest branch of all. Of all the cells in our body, only 10% are eucaryotes and other 90% are bacterial. Mitochondria are ancient bacteria and are found in all eukaryote cells. They harvest energy by transferring electrons from glucose to carbon dioxide and water. Microbes can do this in a great variety of ways.

Prof Manefield took us on a tour of places where microbes are working for us. The first was St Marys Waste Water Treatment Plant. A series of bioreactors that look like swimming pools receive the waste water, or sewerage and the sludge is activated with a microbial culture. The microbes break down the sludge to carbon dioxide and water.

Microbes are very social and single cells on their own will not do anything. They send out signal molecules and flock together, produce extracellular substances and form a biofilm or slimy layer. When clumped together and the signal molecule is strong enough, they get to work, and in this case, break down the sewerage and purify the water. The water can then be returned to the streams and the spent flocculated material is eventually processed into fertiliser.

The microbes need a little help to get going. Chitin in the form of crab shells that are a waste product of sea food industry are added with the microbial culture. The chitin becomes scratched and pitted and the signal molecule sticks to it and thus ensures successful treatment. Civilization as we know it in the cities depends upon these microbes doing their job.

The next stop was the Biogas Reactor at Camellia near the Rosehill Racecourse. Here, waste food is milled and microbes digest it to produce biogas or methane that then produces electricity. The engineers had worked out the process but they had no idea what was going on. Prof. Manefield was humbled and felt unnecessary.

Archaea work in an anaerobic environment to produce methane and they can harvest their electrons necessary for energy from a wide variety of sources. Different ones can reduce nitrates, iron, sulphur and many more. The electrons flow in an 'organic circuit board' and produces ATP that transfers the energy off to where it is needed.

It has been found that synthetic organic phenazine, a histology stain, increases methane production. Crystals of phenazine have microbial cells clustered around them and probably act as a recipient and donor, hence facilitate electron flow. Crystal formation becomes nucleated on organic matter. The microbes transform the food waste into methane.

The third stop was the Botany Industrial Park where organochlorides are a problem. The site, currently used by Orica has been in use for a long time. Chloroform is used industrially and is very useful but disposal is a problem. Organochlorides are very toxic and exposure even in low concentrations over a long time is hazardous. A spill slowly works it way into the ground water and it can take hundreds of years to clear up. Steam cleaning the ground water is very expensive. Activated iron barriers can contain a spill, but they have to be replaced at intervals. Microbes can break down organoclhlorides and do it better. The problem is how to employ them on an industrial scale for bioremediation.

The microbes that will do the job are found in the environment. They are identified and tested to find out which ones will do the job. The selected microbe(s) are then bred up in quantity. Bore water is pumped out into a tank and the microbial culture plus what is necessary to get them working is mixed in with the water that is then pumped back underground. Tests have shown that the water is cleaned up in about two months.

The bioremediation process still requires work. The microbes that clean up organochlorides do not tackle the other pollutants so other microbes have to be found. Hydrology of the ground water is very complicated and movement is very slow. Bores only a hundred meters apart may have water with different pollutants. When the microbial cultures are put back underground, they may stay around that bore and only clean up the water in the immediate vicinity. Although microbes can do the job, how best to use them in bioremediation is yet to be found.

KEYSSTONE EFFECTS OF AUSTRALIA'S TOP PREDATORS: FOCUS ON THE DINGO - a talk given by Dr. Mile Letnic.

All species interact with other species through processes such as competition for food and space, predation and mutualism. A predator has a direct effect on a herbivore and herbivores have a direct effect on the vegetation. Indirectly, the predator has an effect on the vegetation, through the herbivore. A keystone species has strong interactions with other species that are disproportionate to their abundance. So how does the dingo, Australia's largest predator interact with other species in the environment.

The dingo (*Canis lupus dingo*) is descended from a primitive domestic dog that is descended from the Asian wolf. It arrived in Australia about 3,500-5,000 years ago. Prior to its arrival, thylacines and devils were the main predators, and the arrival of the dingo coincided with the extinction of the thylacines on the Australian mainland. The Tasmanian thylacine was larger than the dingo and this presented a dilemma: predators will readily kill other smaller predators but they rarely kill larger predators. However, fossil skulls of the thylacine found on the mainland, especially from caves on the Nullabor showed that mainland thylacines were smaller than their Tasmanian cousins and females were considerable smaller than the males, and hence more vulnerable to attack.

Dingoes will attack livestock and are controlled with 1080 poison, traps and shooting. Exclusion fences attempt to keep dingoes out. Control is necessary or there would not be a sheep industry. Dingoes readily hybridise with domestic dogs, especially in southeastern Australia so that we have difficulty determining what a purebred dingo is like. Museum specimens from the time of first settlement show a wide variation of colours, from light to dark and even brindle (like an Alsation). The dingo is known under other names: native dog, warrigal (the Aboriginal name) and wild dog. When a cull is necessary, the name 'wild dog' is preferred: it somehow does not sound so bad.

Study sites with and without dingo control are compared. Red kangaroos, emus and foxes are more abundant in the absence of dingoes. Rabbits are more abundant in the presence of dingoes. The persistence of small marsupials and native rodents relies on the presence of dingoes that keep fox numbers low. There is a size effect here: large predators (the dingo) eat the large herbivores (kangaroo and emu) and actively seek out and kill the medium sized predators (foxes and cats) that would eat the small mammals. With fewer large herbivores, more grass can grow.

The dingo-proof fence runs from the cliffs on the Nullabor Plain through South Australia to the New South Wales Border and then north before turning easterly, enclosing most of southern Queensland and southeast Australia. Its effectiveness relies on maintenance: holes and washouts along creek lines after heavy rains must be repaired. Work on the dingo-proof fence is a hard and lonely life and fewer are willing to take it up. Nevertheless, a satellite photo of the fence along the SA-NSW border shows a marked difference in the vegetation on either side of the fence. In this area, the hop bush, a native, will take over the area and become a woody weed if left unchecked. Inside the dingo-proof fence, with rare dingoes, lots of foxes and few small mammals, the hop bush proliferates. Outside the dingo-proof fence, with dingoes present, few foxes and more small mammals that eat the hop bush seedlings, the hop bush cover is much reduced.

An experimental area 36 km^2 in area in the arid zone was enclosed in a dingo-proof fence to test if the reintroduction of the dingo would suppress foxes and indirectly benefit small mammals. The experiment is working as hoped. The effects of dingo control in forests were observed in baited and non-baited areas. Areas without baiting had a more diverse and thicker grass and shrub layer, since wallaby numbers were kept in check.

It is tempting to think the reintroduction of dingoes may be the solution to some conservation problems, but it is not a silver bullet. Dingoes induce community-wide changes and there is strong evidence that they can structure ecosystems and have positive ecological effects on taxa of conservation concern. Can we harness the positive ecological effects of dingoes and minimise their impacts on livestock? The farmers with their ingrained antipathy to dingoes will take some convincing.

LINNEAN SOCIETY OF NEW SOUTH WALES

SECURITY HAS BEEN INCREASED at the Botanic Gardens: there is now a locked gate between the carpark and the Classroom. When you come to a lecture, just

WAIT AND SOMEONE WILL COME AND LET YOU IN.

PROGRAMME

Wednesday 23 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr PETER WESTON

Senior Principal Research Scientist, National Herbarium of New South Wales

VEGETATION AND FLORA OF SOUTHERN AFRICA

The terrestrial plant communities of southern Africa are often each allocated to one of ten biomes: desert, strandveld, succulent karoo, nama karoo, fynbos, coastal forest, afrotemperate forest, thicket, savanna and grassland. I will illustrate these biomes with photographs of landscapes, plants and some animals, mostly taken on the Foundation and Friends of the Botanic Gardens' tour to Namibia and South Africa, in August-September 2012, on which I was the botanical guide and several Linnean Society members were paying customers. I will focus on environmental attributes of each biome, dominant plant taxa, and species of particular biological and horticultural interest.

****

Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 150 **DECEMBER 2013**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Membership renewal form

NEW MEMBER: We welcome Mr Peter Olde whose main interest is the genus *Grevillea*

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.

A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

AWARD TO DAVID KEITH

Congratulations to Professor David Keith - winner of the 2013 Australian Ecology Research Award. The award recognises David Keith's outstanding contributions in providing a strong scientific foundation for the conservation of biodiversity.

THANKS TO STEFAN ROSE

Stefan has been a Council Member of the Society for a long time, and set up and maintained the web site Our thanks to your generosity, Stefan.

NEW BOOK: *Conservationists: Greening Modern Sydney*, by Peggy James. Australian Scholarly Publication

The book is a history of the Sydney conservation movement spanning the years from around 1900 to the 1960s. It focuses on the network and lives of a number of key conservationists in Sydney, such as David Stead, Marie Byles, Myles Dunphy, Thistle Harris, and Annie Wyatt. It covers the development of groups like the Wildlife Preservation Society and Nature Conservation Council, and the creation and conservation of various parklands in the Sydney region. The book notes the conservation contribution of early Linnean Society members such as Walter Froggatt, Joseph Maiden and Alexander Hamilton.

For further information, phone 03 9329 6963 or visit the website aspic@ozemail.com.au

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au

Intending applicants please read instructions carefully and submit your signed application by email to linnsoc@iinet.net.au

The date for submission of applications for all the funds is 1st March, 2014.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to $2,300 is available to members of the Linnean Society of New South Wales and $1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2014.** Submit your signed application by email to linnsoc@iinet.net.au

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of the earth sciences.

Applications will be accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth Sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members will be given preference.

Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2014.** Submit your signed application by email to linnsoc@iinet.net.au

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- Realistic costing and timetable
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed $2,500 for Members of the Linnean Society of New South Wales and $1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

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Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

An application form may be obtained from the website or from the Secretary of the Society. The application may contain no more than three (3) pages of additional information plus references.

The Society's decisions are final and no correspondence will be entered into about the results.

Closing date is **1 March, 2014.** Submit your signed application by email to linnsoc@iinet.net.au

KEYSTONE EFFECTS OF AUSTRALIA'S TOP PREDATORS: FOCUS ON THE DINGO - a talk given by Dr. Mile Letnic.

All species interact with other species through processes such as competition for food and space, predation and mutualism. A predator has a direct effect on a herbivore and herbivores have a direct effect on the vegetation. Indirectly, the predator has an effect on the vegetation, through the herbivore. A keystone species has strong interactions with other species that are disproportionate to their abundance. So how does the dingo, Australia's largest predator interact with other species in the environment.

The dingo (*Canis lupus dingo*) is descended from a primitive domestic dog that is descended from the Asian wolf. It arrived in Australia about 3,500-5,000 years ago. Prior to its arrival, thylacines and devils were the main predators, and the arrival of the dingo coincided with the extinction of the thylacines on the Australian mainland. The Tasmanian thylacine was larger than the dingo and this presented a dilemma: predators will readily kill other smaller predators but they rarely kill larger predators. However, fossil skulls of the thylacine found on the mainland, especially from caves on the Nullabor showed that mainland thylacines were smaller than their Tasmanian cousinsand females were considerable smaller than the males, and hence more vulnerable to attack.

Dingoes will attack livestock and are controlled with 1080 poison, traps and shooting. Exclusion fences attempt to keep dingoes out. Control is necessary or there would not be a sheep industry. Dingoes readily hybridise with domestic dogs, especially in southeastern Australia so that we have difficulty determining what a purebred dingo is like. Museum specimens from the time of first settlement show a wide variation of colours, from light to dark and even brindle (like an Alsation). The dingo is known under other names: native dog, warrigal (the Aboriginal name) and wild dog. When a cull is necessary, the name 'wild dog' is preferred: it somehow does not sound so bad.

Study sites with and without dingo control are compared. Red kangaroos, emus and foxes are more abundant in the absence of dingoes. Rabbits are more abundant in the presence of dingoes. The persistence of small marsupials and native rodents relies on the presence of dingoes that keep fox numbers low. There is a size effect here: large predators (the dingo) eat the large herbivores (kangaroo and emu) and actively seek out and kill the medium sized predators (foxes and cats) that would eat the small mammals. With fewer large herbivores, more grass can grow.

The dingo-proof fence runs from the cliffs on the Nullabor Plain through South Australia to the New South Wales Border and then north before turning easterly, enclosing most of southern Queensland and southeast Australia. Its effectiveness relies on maintenance: holes and washouts along creek lines after heavy rains must be repaired. Work on the dingo-proof fence is a hard and lonely life and fewer are willing to take it up. Nevertheless, a satellite photo of the fence along the SA-NSW border shows a marked difference in the vegetation on either side of the fence. In this area, the hop bush, a native, will take over the area and become a woody weed if left unchecked. Inside the dingo-proof fence, with rare dingoes, lots of foxes and few small mammals, the hop bush proliferates. Outside the dingo-proof fence, with dingoes present, few foxes and more small mammals that eat the hop bush seedlings, the hop bush cover is much reduced.

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VEGETATION AND FLORA OF SOUTH AFRICA: a talk given by Dr Peter Weston

Dr Weston was the botanical guide on a tour to Namibia and South Africa sponsored by the Foundation and Friends of the Botanic Gardens. Throughout his talk, Dr Weston showed beautiful photos of the flowers encountered. Endemism is high and many of the species are found nowhere else. We recognised some of our garden plants growing in the wild in South Africa

The South African coastal areas have a Mediterranean climate with dry summers and rain in the winter. The high escarpment of the Drakensberg Mountains runs parallel to the east coast and here, the mountain climate has a summer rainfall. The Namib Desert along the west coast relies on fog rather than rain. Here, the coastal region is drier than further inland on the uplands, and that is the reverse of most deserts. The vegetation largely follows these climatic zones.

Welwitschia in the Namib Desert is the weirdest plant and has been described as an unmade bed. It has two long strap-like leaves on either sides of the short stem and the ends become shredded with wear and tear, but they keep growing from the central part that joins the stem. The plants cluster along dry streams and the taproot goes down to permanent water. They have male and female plants that bear cones in the centre of the plant.

In the upland part of the Namib, savannah receives about 200 mm of rainfall a year. Many plants are spiny. What used to be called *Acacia*, until taxonomists put South African species into other genera, has thorns. There are spiny grasses, spiny cucurbits and a spiny *Geranium*. There are succulents as well and a succulent *Euphorbia* is very common.

The Karoo many spiny and succulent plants also. The daisy family is very common and includes a succulent daisy shrub. *Gazania* species may form colourful masses and the bitou bush, a weed here is at home in the Karoo. The succulent *Euphorbia* is common and there is a great diversity of other succulent in the families Aizoaceae (pigface) and Crassulaceae. There are many geophytes that have bulbs, tubers or corms for survival over the dry period and some of these are common garden plants. *Oxalis* has large flowers and comes in pinks and yellows. A species of Scrophulariaceae s has oil nectaries instead of the usual sugar nectaries and is pollinated by bees that collect the oil.

The fynbos or Cape shrubland covers the southwesern and central coastal region and Table Mountain is a well-known landmark in this region. The fynbos is restricted to the Table Mountain Sandstone that is remarkably like the Hawkesbury Sandstone. Proteaceae, Ericaceae and Restionaceae are the three most common families in the fynbos. The endemic family Bruniaceae, Asteraceae (different species to those in the Karoo), Boraginaceae a *Geranium* and *Widringtonia*, a cypress pine are found there also. There are many species of *Protea* and other genera in the Proteaceae and bird pollination is common. The long tubular corollas of the *Erica* species are also adapted for bird pollination. One of the few Myrtaceae in South Africa, *Metrosideros* and Scrophulariaceae, Campanulaceae. *Oxalis*, *Lachenalia*, *Iris*, *Watsonia* and orchids are part of the rich flora of the fynbos.

In tropical savannah, the family Fabiaceae is common and includes '*Acacia*' shrubs and trees, *Cassia*, a tree wisteria and *Bauhinia*-like species in thickets and a variety of grass species. Montane grasslands above 1500 m are subalpine and as well as the grasses, there are herbaceous daisies, Scrophulariaceae, amaryloides and other geophpytes. Our common garden plants the jade plant, *Agapanthus* and *Plumbago* are found here, and the *Plumbago* is eaten by elephants. In subtropical forests, species of *Podocarpus*, one with orange and another with white seeds are present. Cunoniaceae, rather like our Christmas bush is found in these forests.

Southern Africa diverged from Gondwana some 150 million years ago and became connected to tropical Africa 105 million years ago. It has been isolated for a very long time and has become connected to Europe in relatively recent times. This history poses a dilemma for botanists. Proteaceae, Ericaceae, Restionaceae, are but a few of the families common in both South Africa and Australia and molecular genetics has shown up many other close connections, yet geological separation of the two predates the evolution of these families. This early separation rules out vicariance, where one large distribution of a population is split into two, as an explanation of the similarities of the flora. This leaves long distance dispersal as the other likely explanation, but it is not known how this would have happened. Africa and Australia would have been closer than they are today for some time after separation. We may postulate violent storms as a means of dispersing seeds much further than normal, but dispersal is just the start. The seeds must land in some place suitable for growth. And so the dilemma continues.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2014 Annual General Meeting

The 139 Annual General Meeting of the Society will be held at 18:00 on 19 March 2014 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17:30.

Six members of Council are due to retire at this AGM:

Michele Cotton
Jean Claude Herremans
David Keith
David Murray
Peter Myerscough
Ian Percival

and all offer themselves for re-election.

Council recommends the election of Prof Robert King as President of the Society for 2014.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2014.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Ordinary Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2014.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 151 **APRIL 2014**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE

Record of Annual General Meeting, 19 March 2014
Form for donation to Scientific Research Funds

NEW MEMBERS

We welcome our new members:

Miss Marissa **Betts**, Macquarie University. Fields of interest: Biostratigraphy, early Cambrian carbonate sedimentology and stratigraphy.

Miss Sarah M. **Jaquet**, Macquarie University. Fields of interest: Palaeontology (Cambrian stratigraphy and taxa), systematic descriptions of molluscan groups.

Ms. Michaela **Larsson**, University of Technology. Fields of interest: Microbiology, ecology, harmful algal blooms, macroalgae, toxin production.

Ms. Rachel **Levin**, University of New South Wales. Fields of interest: Biology, microbiology, molecular biology, genetic engineering.

Mr. Kenneth R **Mills**. Fields of interest: Plant ecology and systematics.

Mr. Matthew **Pearson**. Fields of interest: Plant ecology, adaption, reproductive biology and taxonomy of aquatic and arid vegetation.

Ms. Purnika D. **Ranasinghe**, Queensland University of Technology. Fields of interest: Microbial ecology in environmental systems (insect gut), wastewater and soil, application of advanced molecular techniques

Mrs. Georgina **Roberts**, Latrobe University. Fields of interest: Bioarchaeology, stable isotope analysis, zooarchaeology, biological anthropology.

PAPERS PUBLISHED ONLINE IN VOLUME 135 OF THE PROCEEDINGS

Strusz, D. Silurian brachiopods from the Cappanana Formationn, east of Cooma, southern New South Wales (pp 1-17).

Smith, H. The genus Toxopsoides (Araneae: Desidae): New records and species from Australia (pp 19-43).

Timms, B.V., Morton J., and Green, K. Temporal changes in macroinvertebrate fauna of two glacial lakes Cootapatamba and Albina, Snowy Mountains, New South Wales (pp 45-54)

Holmes, W.K.B. and Anderson, H.M. The Middle Triassic megafossil flora of the Basin Creek flora Nymboidia Coal Measures, New South Wales, Australia. Part 9. The genera *Heidiphpyllum, Voltziopsis, Rissikia* and the affiliated cones, and *Yabeiella* (pp 55-76).

The *Proceedings* is published on line and may be accessed free of charge by anyone, at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

FIELD GUIDE TO ROYAL NATIONAL PARK

We have had many compliments about the new Field Guide to Royal National Park. *The Shire Life* that circulates in the Sutherland area said of the field guide, "A quite brilliant book has appeared". There is now a campaign to have World Heritage listing for the Royal National Park. The field guide was written without knowledge of this campaign, but it will certainly help the cause.

Bob Brown, the former leader of the Greens, strongly supports world heritage listing of the Royal National Park. He sends thanks for "the quite brilliant, brilliant Field Guide –it is just lovely. I wish Bass Strait wasn't so in the way".

Bob Brown has published a number of books on conservation and Tasmania's spectacular wilderness places.

AWARDS FROM THE SCIENTIFIC RESEARCH FUNDS

THE Sir WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

RANASINGHE, Purnika L., Queensland University of Technology.
Project: Analysis of bacterial diversity, abundance and dynamic response to environmental challenge in an insect microbiome using 'next generation' sequencing and data visualisation
Lepidopteran species have communities of micro-organisms in their gut that are important in the insect biology. The composition, ecology and functional responses are poorly understood. Molecular analysis has allowed identification of multiple microbes with previously unexplained communities. The diamond-back moth (DBM) is a pest of brassicas and has evolved resistance to many insecticides. Two molecular methods of analyses have established an initial base line of the presence of microbial phyla and differences between two populations, one on cabbage and the other on broccoli. The 'next generation' sequencing is able to establish generic identity. Experiments raising DBM larvae on cabbage for three generations then switching onto the broccoli for three generations shows that the microbial communities in the gut change to those resembling the ones in larvae permanently reared on broccoli. Similarly, those changed from broccoli to cabbage have changed microbial communities. This project will use next generation sequencing to follow the changes in the microbial populations during the change over. Awarded $2,000.

AWARDS FROM THE BETTY MAYNE RESEARCH FUND FOR EARTH SCIENCES

MARISSA, Betts, Macquarie University
Project: Fossils, rocks and Cambrian clocks: a multi-proxy approach to establish stage subdivision for the early Cambrian of Australia
Early Cambrian biostratigraphic schemes currently in use for Australia are out of date and overdue for re-evaluation. Paucity of trilobites in Australian rocks of this interval means that other methods of correlation must be utilised. These include zonations based on small shelly fossils (SSFs), combined with lithostratigraphic correlation and matching of curves based on carbon and oxygen isotopes. The biostratigraphic aspects of the project have been completed, and the lithostratigraphic work (including section sampling and thin section preparation) is well under way. Suitable horizons (i.e. those without significant diagenetic alteration) in the measured sections will then be sampled for stable isotope analysis in order to prepare isotope curves for comparison and correlation with global patterns of isotopic variation. Awarded $1,400

JACQUET, Sarah, Macquarie University
Project: Molluscan fauna from the Middle Cambrian Monastery Creek Phosphorite Member, Queensland
The Middle Cambrian Monastery Creek Phosphorite Member (MCPM), a 15-20 m thick phosphatic limestone, is exposed c.140 km SE of Mt. Isa, in western Queensland. This unit yields diverse and exquisitely preserved three-dimensional fossils – the result of phosphate impregnation that produces an extremely fine replication of body structures. The project aims to (1) document the micromolluscan fauna of the MCPM and (2) investigate the embryological development, anatomy, preservation and body plan evolution of ancestral molluscs using scanning electron microscopy, Synchrotron Radiation X-ray Tomographic Microscopy (SRXTM) and/or Micro-Computed Tomography. These techniques will provide a 3-dimensional visualization of previously inaccessible internal cellular features in ancient fossils, potentially answering a number of significant questions concerning developmental processes and evolution of body plans in early molluscs. Awarded $1,160.

GARRATT, Dr Mike, honorary associate, University of Wollongong
Project: Unlocking the origins of the early land vascular plant story in Australia
The project aims to document the occurrences and determine the age of the pre-*Baragwanathia* flora at Yea, Victoria. The sudden appearance in Late Silurian strata of *Baragwanathia* up to 45 cm long displaying well-developed leaves and sporangia buds at this site is baffling – there must be earlier plants ancestral to this flora preserved in the 1300 m rock section beneath the *Baragwanathia* level. Some tantalising evidence of more primitive plants has recently been found in these rocks. Awarded $840.

THE JOHN NOBLE FUND FOR INVERTEBRATE RESEARCH

FABRICANT, Dr Scott, Macquarie University
Project: Evolution of colour change and thermoregulation in *Kosiuscola* grasshoppers.
The chameleon grasshopper (*Kosiuscola trisinis)* of the Australian Alps, including Tasmania, is unique among the acidid grasshoppers: it changes colour with temperature. It is black when cold and bright turquoise when hot. Thinner patches of cuticle (Stifer patches) and colour granules that can be rearranged according to temperature are features of the cuticule that can assist in thermoregulation in grasshoppers. Only the males show this change, but males and females have the same intracellular structure. There are four species in the genus, arranged according to altitude. Only *K. tisinis* shows this colour change. This project will use electron microscopy images of the cuticle and epidermal cells of all for species to determine how the structure relates to thermoregulation. Awarded $1.400

THE JOYCE VICKERY SCIENTIFIC RESEARCH FUND

BARRY, Dr Katherine L., Macquarie University.
Project: Cryptic male choice in a sexually cannibalistic praying mantid
In the praying mantid, the female is known to mate many times. Males are known to be able to adjust their ejaculate if in competition with other males in an attempt to gain an advantage. Female quality is known to be significant, i.e. do males adjust ejaculate according to the condition of the female, i.e. ejaculate more sperm if the female is in good condition with a larger number of eggs. Mating experiments with well fed and not so well fed females will be followed to assess the number of sperm in the ejaculate and number and condition of the offspring. Awarded $1,400.

BOAST, Dr Alexander P., University of Adelaide
Project: Ancient DNA and coprolite analysis of the Kakapo
The once widespread kakapo of New Zealand is now reduced to a few small populations, but there are abundant skins, skeletal material and coprolites in collections. This project will focus on the coprolites to investigate genetic diversity, diet and the parasite community over the last 3,000 years. Awarded $1,200

BOISSEAU, Romain, P.G.E., University of Sydney
Project: Investigating the mechanism through which cannibalised males inhibit female remating in the Australian redback spider, *Latrodectos hasselti*
Some traits are costly, in terms of Darwinian "struggle for survival" but favourable for reproductive success. Cannibalism of the male must be an extreme example. In the redback spider, the male "somersaults" to a position that facilitates being eaten during copulation. This allows longer copulation and somehow reduces subsequent female receptivity, thus reducing sperm completion. Other cannibalistic spiders also show this reduced receptivity, but little is know about it. Experiments with mating trials will investigate the nature and mechanism of this reduced receptivity. Awarded $600.

BOND, Peter, University of Queensland
Project: Marine debris ruins inshore environments
Pollution of plastic items has a widespread detrimental environmental impact. The broken-down fragments are of particular concern because they can be ingested by marine life. Further breakdown in the gut may release toxic substances. Fish, concentrating on the hardyhead will be sampled from inshore environments of north Stradbroke Island. Growth parameters, reproduction, diets and habitat will be assessed, as little is known of these factors for most species. Contents of the gut will be analysed to see what they have been eating. Samples of intestine will be analysed for mercury and arsenic. Polluted and pristine environments will be compared. This work will be crucial for fisheries management. Hardyheads are used for bait and are an important part of the diet of commercial fish species. The results will be communicated to the North Stradbroke communities. Awarded $1.400.

GEARY, William L, Deakin University
Project: Fire and the drivers of predator interactions in a semi-arid mallee environment.
Fire drives habitat succession and is an important agent of ecosystem structure and function. The predator guild is also an important agent. Top predators (dogs/dingos) suppress smaller predators (foxes, cats) and large herbivores (kangaroos). In the absence of the large predators, the native fauna is known to suffer because of the prevalence of foxes. Some predators take advantage of a post fire landscape and increase prey consumption along the burnt/unburnt ecotone. These complex relationships will be investigated in the Victorian mallee region using four survey methods: camera trapping, scat surveys, track surveys and unmanned aerial vehicles (UAVs) to obtain a more accurate assessment of the community dynamics. The use of UAVs has the potential to revolutionise landscape ecology. Awarded $1.000.

LEVIN, Rachel, University of New South Wales
Project: Comparative transcriptomics and genetic engineering of *Symbiodinium* as a strategy to reduce coral bleaching due to Anthropogenetic warming
Rising temperatures induce expulsion of the endosymbiont *Symbiodinium* leading to coral bleaching. This project plans to identify the genes responsible for the heat stress response. Through genetic engineering, it is hoped to increase the thermal tolerance of *Symbiodinium.* With a more robust heat tolerance, there is the potential to reduce coral bleaching. Funds are requested for access to the High Resolution Confocal and Spectral Imaging Facility and the Flow Cytometry Facility to do this work. Awarded $ 1,800.

O'HANLON, Dr James, Macquarie University.
Project: Chemical basis of ant attraction and its function as an egg dispersal strategy in Phasmatodea
Some plant seeds have a fleshy, food reward appendage that attracts ants that then transport them to their nests, hence effecting dispersal. Some Phasmids (stick insects) have eggs with a similar attractant and the ants take them to their nests for safe-keeping. Five major chemical components of the ant attractant have been identified. Experiments will be done to determine which one(s) attract ants. These experiments have been done on plant seeds and the results will be compared with those from plants to determine if phasmids use the same chemicals or if they have evolved different attractants. Phasmids already resemble plants (sticks). Could this be another example of convergent evolution? Awarded $650.

ROBERTS, Georgina, Latrobe University
Project: Long-term adaptability of *Vombatus ursinus* (common wombat) in southwestern Tasmania – an investigation using stable isotope analysis in the archaeological record.
Bone collection from caves range in age from ~ 35,000 to 11,000 years BP. Wombats made up about 30% of the diet of the Aborigines (Bennetts wallaby made up 70%). Stable isotope analysis of tooth enamel uses the ratio of stable oxygen to stable carbon isotopes that can be related to the environment where the enamel was formed. Sequential analysis can reveal events within the lifetime of the individual (seasonal patterns, migration, weaning events), based on known growth rates of the teeth. Wombats have rootless teeth that grow continuously, allowing preservation of a high-resolution record of the stable isotopes. This project will use high-resolution sequential analysis to derive local climate in the last two years of the individual's life and hence climatic change from 35,000 - 11,000 years (through the last glacial period). The stable isotopes can also indicate changes in diet and hence changes in the vegetation.. Awarded $2,400.

SOLEY, Dr Fernando, Macquarie University
Project: Predator-prey interactions between an araneophagic assassin bug (*Stenolemus giraffa*; Hemiptera: Reduviidae) and a theridiid spider (Parasteatoda sp)
The best known predators of spiders are other spiders. Some even prey on spiders in webs. Some assassin bugs also prey on web-building spiders. How do they do it? Some produce vibrations that mimic prey caught in the web to lure the spider to the edge of the web and some use stealth to catch the spider. The spider species differ in their response to web invasion and some even counter attack. Reports of experiments done with different assassin bugs and different spider species are not comparable. It is thought that the nature of the web influences strategies, e.g. assassin bugs lure spiders with dense webs out to the edge. Further observations in the Kinberleys are required. Awarded $750.

BOOK REVIEW

Alexander Macleay – from Scotland to Sydney by Dr. Derelie Ann Cherry
Published in 2012 by Paradise Publishers
147 Cherry Lane, Kulnura, NSW 2250 Australia
www.alexandermacleay.com

We all know of Macleay Street in central Sydney and the Macleay River and district on the mid-north coast of New South Wales – but who was Macleay? Now we know! Dr Derelie Cherry has spent years researching and recently published the first detailed biography of Alexander Macleay. This beautifully prepared and presented book with numerous references details the life of a remarkable man who had a wide influence on the political, social and scientific structure of early Australia and helped to elevate our country from a penal settlement to a successful colony within the British Empire. The book is enlivened by old illustrations, photographs (many taken by Derelie) and by numerous quotes from letters written by Alexander Macleay's eldest daughter Fanny to her brother William.

Alexander Macleay was born in 1767 and spent his early years in the Caithness district of northern Scotland where he commenced his life-long interest in and desire to collect insects. In 1786 he moved to London and began work in the wine industry. In 1795 he joined the Public Service where he rose to become Secretary of the Transport Board and held that position until 1817 when it was disbanded and he was placed on a small pension. In 1791 he had married Elizabeth. Over the years they produced 17 children but due to the high infant mortality rates of the times only 10 survived to adulthood.

Alexander became a Fellow of the Linnean Society in 1794 and held the position of secretary for 27 years without any financial consideration. In 1809 he was elected a Fellow of the Royal Society and in 1824 became a member of the Council. His passion for acquiring insects grew and by 1825 his collections were considered to be one of the finest in private ownership in England. He purchased a number of other collections including the Australian specimens that Captain Cook had given to Sir Ashton Lever. He made many useful contacts including the botanist Joseph Banks. To avoid the summer heat, dust and pollution of London the family escaped when possible to a country residence, Tilbuster House in Surrey. It was here that Alexander developed a notable garden and introduced into cultivation many new plants from overseas. During this period the growing family was suffering severe financial problems and when offered the position of Colonial Secretary in the expanding colony of NSW, Alexander accepted. He arrived in Sydney in 1826 with his wife and six daughters. Sir Ralph Darling had been appointed the new Governor in 1825 following the political, social and administrative problems arising during the time of previous Governor, Thomas Brisbane and from the controversial reports of Commissioner Bigge. There was a good relationship and respect between Governor Darling and his Colonial Secretary Macleay who had been acquainted in England and held similar conservative political views.. At the time the colony was a mixture of convicts, emancipists and free settlers. The population of Sydney numbered 12,000 and a total of 37,000 in the Colony; 2/3 were either convicts or of convict origin.

Along with other colonists Macleay was keen to acquire by grant or purchase as much land as possible and later held huge stock runs on the coast south of Sydney, on the southern tablelands and west along the Murrumbidgee River. However following droughts and low prices Fanny wrote in frustration to her brother, 'the farming concerns take the money we really require to live respectably'. Alexander was able to avoid bankruptcy in the 1840's when his son William took over his financial affairs, moved into Elizabeth Bay House and moved his father to Brownlow Hill at Camden.

Governor Darling was replaced in 1831 by a new Governor, Richard Bourke. Alexander Macleay had many conflicts of opinions with the new Governor on the rights of ex-convicts and free immigrants and other proposed social and legal changes and was continually criticised with scathing comments in some of the expanding Press. In 1837 Macleay was controversially removed from the office of Colonial Secretary. Despite deteriorating health and personal financial problems he persevered and stayed on in Australia to contribute to the development of the colony. In 1843 he was elected to the Legislative Council and became the first Speaker. He retained his seat until his death in 1848.

With my own deep love for natural science subjects I was engrossed in the sections of the book dealing with Alexander Macleay's life-long interests in entomology and botany. After becoming secretary of the Linnaean Society in London in 1798 Macleay had many contacts with international experts with interests in plants and botanical discoveries from around the world. Hence he was in a position to procure or swap many new plants that he desired - including Chinese Wisteria which he presented for propagation in England in 1819. The extensive gardens at Tilbuster Lodge in Surrey were developed to include a great variety of plants - especially roses. On being appointed Colonial Secretary in the Colony of New South Wales Macleay took with him numerous plants that he knew would travel well and adapt to the new environment. During his 22 years in the colony Macleay was actively involved with the Botanic Gardens which had been established in1816 under Governor Macquarie. An 1827 register of cultivated plants in the Sydney Botanic Gardens notes many which had been introduced by Macleay. As well as wisteria, he introduced jacaranda from South America and also the port wine magnolia. The development of the gardens in the 54 acres (22 hectares) around his now Heritage listed Elizabeth Bay House was commenced soon after the land grant in October 1826 although construction of the house only began in 1835. Fanny Macleay and her father spent much time identifying new plants being discovered in the Colony. (Derelie's book includes two exquisite paintings by Fanny pp 197 and 301) of collections of native and introduced flowers). In 1841 the famous visiting British botanist Dr J.D. Hooker reflected that 'Macleay's gardens proved a botanist's paradise'. Sadly those trees and gardens are now long gone - Heritage Listed Elizabeth Bay House today stands isolated in a jungle of concrete and glass high-rise buildings.

Alexander Macleay's eldest son, William Sharp Macleay was involved in government administration, including to France and Cuba. He inherited his father's entomological interests and passed most of his early collections to his father. On his return from Cuba in 1836 he was elected to the councils of both the Linnean and Zoological Societies. In 1839 he sailed with his cousins William Macleay and John Macleay to NSW. Here in Sydney he had a close association with the Australian Museum. William who had taken-up a large property on the lower Murrumbidgee River was appointment to the Legislative Council in 1855 and then moved back to Sydney where he commenced an active interest in natural history. William Sharp had always been a close guide and mentor to his cousin. William soon built-up a large collection of diverse material. He was a trustee of the Australian Museum for 26 years and helped with the formation of the Entomological Society and the Linnean Society of NSW in 1874. Alexander Macleay's collections, on his death, passed through his son William Sharp Macleay to William and became part of the vast collections bequeathed to the University of Sydney to become part of the Macleay Museum.

For me, Alexander Macleay will be best remembered for his contributions to the development of the Government Gardens (now the Royal Botanic Gardens, Sydney; the establishment of the first museum in Sydney, now the Australian Museum (incidentally with my Gt,Gt,Gt Uncle William Holmes as first Curator) and the first public library - now the State Library of NSW.

As the first biography of Alexander Macleay, a remarkable man in our history and his family's involvement with our Society this detailed and beautiful book should be a "must read" for all our present day members.

Keith Holmes, February 2014

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 23 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/PROF. JUSTIN SEYMOUR

Future Fellow, Plant Functional Biology and Climate Change, University of Technology

MARINE MICROBIAL ECOLOGY: FROM DROPS OF SEAWATER TO OCEAN BASINS

Microorganisms form the foundation of the marine food-web and are the engine-room for the ocean's major biogeochemical cycles. Consequently, the composition and function of these microbial communities strongly influence the productivity of fisheries and governs the ocean to atmosphere exchange of climatically important gases. The ecological and biogeographical dynamics of these important marine microbial populations are controlled by diverse biotic and abiotic process operating over a continuum of spatiotemporal scales. Our work has shown that large-scale oceanographic features including currents, eddies and up-welling events influence the composition and function of microbial assemblages across regional scales. At these large-scales, recurring biogeographic trends in community-level characteristics are linked to specific physical and biological characteristics of the environment. However, from the perspective of an individual microbe, large-scale environmental gradients and seasonal cycles are inconsequential. The world of a microbial cell is defined within a fraction a single drop of seawater. Surprisingly, at this microbial scale physical and chemical gradients are often more pronounced than over regional scales. Our work has demonstrated that the behavior of marine microbes is well adapted to exploit this patchy microscale seascape and that this leads to microenvironmental partitioning of microbial communities and enhanced rates of chemical cycling in the ocean. Our new insights into the environmental processes shaping the composition, function and diversity of marine microbes, at both the very small scales of microbial interactions and the larger scales of oceanographic processes, is fundamentally important for ultimately understanding the over-all function of the ocean, both now and in a climate change influenced future.

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Wednesday 21 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/PROF ANGELA MOLES

School of Biological, Earth and environmental Sciences, University of New South Wales

RAPID EVOLUTION IN INTRODUCED SPECIES: WILL WEEDS IN NEW ZEALAND AND AUSTRALIA EVENTUALLY BE ACCEPTED AS UNIQUE NATIVE TAXA?

Introducing species to a new environment creates excellent conditions for evolution. The species is released from its native enemies. It is also exposed to a new suite of biotic pressures from herbivores, pollinators, pathogens and competitors, and a new suite of abiotic pressures such as different rainfall, temperature, disturbance regime, soil fertility. Our work with herbarium specimens collected over the last 150 years has shown that 65% of the short-lived, sexually reproducing plant species introduced to Australia and 33% of the species introduced to New Zealand have undergone significant morphological change in at least one trait since their introduction. Glasshouse experiments suggest that differences between source and introduced populations are retained when they are grown in common conditions. As gene flow between introduced populations and their source populations is extremely limited, it seems inevitable that introduced species will eventually evolve to become unique new taxa. At this point, we will have to decide whether to accept them as new native species, or try to exterminate them. While most ecologists don't like the idea yet, I think acceptance of introduced species is just a matter of time.

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Wednesday 23 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

DR. JUDITH FIELD

School of Biological, Earth and environmental Sciences, University of New South Wales

PLANT USE THROUGH TIME IN THE HIGHLANDS OF NEW GUINEA

Dr. Field and colleagues study plant microfossils, such as starch and phytoliths, found in cultural sediments and on stone tools to determine plant use. They are looking at the way plants have been used through time from initial colonization through to the Holocene.

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Wednesday 22 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof MARTIN VAN KRANENDONK

School of Biological, Earth and environmental Sciences, University of New South Wales

EARLY LIFE ON EARTH: EVIDENCE FOR A DIVERSE BIOSPHERE 3.5 BILLION YEARS AGO

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Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 152 **JULY 2014**

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IN THIS ISSUE

THE COUNCIL OF THE LINNEAN SOCIETY OF NEW SOUTH WALES

At the last Annual General Meeting, Prof Robert King was elected President. Five Council members retired and were re-elected unopposed. The present Council Members are listed below, together with their interests.

Dr Mike Augee: Mamalogy and paleontology.
Dr John Barkas: Geology
Ms Michele Cotton: Veterinary science, Wildlife health and management, Veterinary Public Health, Biosecurity and International Animal Disease
Ms Emma Gorrod: Plant ecology, Restoration ecology, Decision making for conservation, Adaptive management
Dr Mike Gray: Spider studies, Photography, Reading, Kayaking
Mr J-C Herreman: Arachnology, Bibliography of Arachnida, Volunteering
Prof David Keith: Plant ecology, Royal National Park
Prof Robert King: Botany, especially phycology, Science policy and education, Natural history generally
Dr Helene Martin: Palynology and its applications, Biogeography, Ecology, Climatic change
Dr David Murray: Australian flora, the Iris Society of Australia, Environmental education, Plant breeding, the Preservation of heirloom vegetables, the Effects of elevated atmospheric carbon dioxide on the quality of food crops

Dr Peter Myerscough: Plant Ecology
Dr Ian Percival: Palaeontology (especially Palaeozoic invertebrates), Geology, Geological heritage.
Dr John Pickett: Stratigraphy, Biostratigraphy, Invertebrate palaeontology, Regional geology, Geomorphology, Biogeography
Ms Helen Smith: Arachnology, especially systematics of Hadrotarsinae (Theridiidae and Stiphidiidae); Ethology and systematics of Araneidae
Mr Bruce Welch: Speleology
Ms Karen Wilson: Botanical systematics, Phylogenetics and biogeography, especially of the families Casuarinaceae (she-oaks), Cyperaceae (sedges), Juncaceae (rushes) and Polygonaceae (docks and smartweeds); Digital dissemination of biodiversity-related information; Botanical history and nomenclature

JENOLAN CAVES PAPERS

Papers arising from a symposium held by the Linnean Society of NSW at Jenolan Caves 22-23 May 2013 have now been published on line and may be viewed at http://ojs-prod.library.usyd.edu.au/index.php/LIN/index The papers are as follows:
Minerals of Jenolan Caves, New South Wales, Australia: Geological and Biological Interactions. *R. E. Pogson, R.A.L. Osborne, D. M. Colchester*
The Jenolan Environmental Monitoring Program, *Andrew C. Baker*
Invertebrate Cave Fauna of Jenolan, *Stefan M. Eberhard, Graeme B. Smith, Michael M. Gibian, Helen M. Smith, Michael R. Gray*
Jenolan Show Caves: Origin of Cave and Feature Names. *Kath Bellamy, Craig Barnes*
Understanding the Origin and Evolution of Jenolan Caves: The Next Steps. *R. Armstrong L. Osborne*
Geology and Geomorphology of Jenolan Caves and the Surrounding Region. *David F Branagan, John Pickett, Ian G. Percival*

MARINE MICROBIAL ECOLOGY: FROM DROPS OF SEAWATER TO OCEAN BASINS, a lecture given by A/Prof Justin Seymour.

A teaspoon of seawater contains 10 million bacteria and 100 million viruses. There are more microbes in a teaspoon of seawater than stars in the sky. A picture of the microbes in seawater, stained to make them visible under the microscope does indeed look like the starry sky with tiny viruses, larger bacteria and much larger phytoplankton. The photosynthetic microbes form the base of the food web but only 50% of the carbon fixed by these microbes goes up the food chain: the other 50% becomes dissolved in the sea water where it is utilised by other microbes.

The photosynthetic microbes are eaten by the plankton that is then eaten by larger invertebrates and fish, all the way up to the largest fish of all, sharks. On the way up the food chain, the non-photosynthetic organisms produce waste products that are then re-used by the non-photosynthetic microbes that are then eaten by the plankton.... Microbes control the carbon, nitrogen and sulphur cycles in the ocean. The ecology and interactions of these organisms are very important and fundamental to properly understanding ocean function.

The microbes are identified using molecular techniques. In a north-south transect of the Atlantic, from southernmost South America to England, the different strains of microbes showed different patterns of distribution: some tropical and some temperate. The Cyanobacteria *Prochlorococcus*, are abundant in the tropics, and *Synechococcus* is more abundant in temperate regions. These two microbes are responsible for most of the productivity and oxygen production of the oceans. Climate change will affect the productivity and distribution of these microbes.

The East Australian Current that brought Nemo's dad to Sydney does indeed bring tropical fish south at least to Sydney and it also brings the tropical microbes south. Along a transect across the current, tropical microbes are found in the centre of the current and temperate ones along the edges. The East Australian Current is becoming stronger and now extends some 3-400 km further south than it used to go. The Tasman Sea has temperate microbes

It was thought that a drop of seawater would be homogenous, but it is now known that this is not so. A significant fraction of the carbon fixed during photosynthesis exudes into the water as dissolved organic carbon (DOC). There is thus a zone of elevated DOC surrounding individual phytoplankton cells that can be utilised by other microbes. If the microbe is motile or sinks in the water column, then the spherical zone of DOC is distorted into a comet-like plume. Zooplankton excretes a plume rich in inorganic nutrients such as ammonia and phosphate. Some copepods also release an amino acid rich trail of pheromones during mating. Viral infected cells break down, releasing a short-lived pulse of dissolved organic matter. All of this contributes to a rich chemical tapestry that is food for other microbes.

The bacteria must cope with this patchy distribution of resources. Some are motile and have flagella that they use to swim. Microbes can sense a chemical gradient and then direct their movements according to the gradient. Studying these processes within a drop of water requires some very special techniques called microfluidics. A chamber on a microscope slide has a point of entry at the end of the slide for the drop of water. Half way along is another entry point for injecting a nutrient. When a nutrient is introduced, the bacteria can be tracked concentrating in the area of the nutrient, just like a feeding frenzy of sharks on a school of fish. Other bacteria are non-motile and then, when a patch of nutrient is introduced, they wait for the nutrient to diffuse out to them. Resources are used up faster by the motile than the non-motile bacteria.

Microbes drive other nutrient cycles. Nitrogen fixing microbes fix nitrogen from the air and make it available to other organisms, but only under aerobic conditions. If the environment is anaerobic, such as in sediments, then denitrifying microbes reduce the fixed nitrogen to free nitrogen that is then lost to the biosphere. The phototropic bacteria release a sulphur containing compound DMSP that is broken down to DMS that forms sulphate aerosols when released to the atmosphere and can seed clouds. There are sulphur oxidising bacteria in aerobic environments and sulphate reducing bacteria in anaerobic conditions. Microbes drive all of the complex chemical cycles in the ocean.

Prof Seymour opened up a whole new world to us. This mini-microscopic world within one drop of water could only be studied by special techniques that were in themselves just as amazing. Throughout, the microbial inhabitants of this world were following the general ecological principles observed in the larger world, for example, of fish and sharks.

A question was put to Prof Seymour: What is the value of iron seeding in the ocean? It has been found that limited iron resources limit fixation of carbon and it is thought that by adding the nutrient iron, carbon fixation could be increased that would help to lower the carbon dioxide in the atmosphere. Seymour replied that experiments have shown that increased iron does increase carbon fixation, but it also increases the productivity of the non-photosynthesising organisms that produce carbon dioxide through respiration so that the reduction of carbon dioxide in the atmosphere by adding iron fertilizer to seawater is negligible.

RAPID EVOLUTION IN INTRODUCED SPECIES: WILL WEEDS IN NEW ZEALAND AND AUSTRALIA EVENTUALLY BE ACCEPTED AS UNIQUE NATIVE TAXA? A lecture given by A/Prof Angela Moles

One hundred years ago, Aclimatisation Societies were active introducing species to "enrich" our native flora and fauna. We know of some spectacular results, like the introduction of the rabbit. In New York, someone decided to introduce all the birds mentioned in Shakespeare's works into Central Park. The English Starling was one of them and they are present in plague proportions now. Most introductions, though, are accidental.

In Australia, there are over 3,000 introduced species and they upset people for two reasons: the weeds cost us money and they are a threat to biodiversity. The average ecological approach is to exterminate all introduced species to return the environment to its former pristine state.

Aclimatisation is almost the perfect recipe for evolution to make a new species. The most common way species evolve is for some individuals to be isolated in a new environment and they then adapt to the new conditions. Darwin's finches are the best-known example. If isolated long enough, they will not interbreed with the original population. Introduced species are under strong selective pressure.

Herbarium specimens preserve changes over time, and there are specimens over 100 years old in Australia. Sexually reproducing, annuals or short-live species that were accidentally introduced were chosen. Numerous measurements were taken, and of 1900 species, 70% showed a significant difference in at least one trait over 100 years. If changes are correlated with environment, there is even more significant change.

To test the changes against some controls, introduced species of a genus with a similar native species were chosen. Then the introduce species was compared with 2 controls: 1) a similar native species and 2) the introduced species in its original home. The introduced species showed more change. It was known that species could change, but not how much change.

Using the same methods in New Zealand, only 28% of the species showed change, much less than in Australia. This could be because the environment in New Zealand was more like the environment of the original home of the introduced species, hence there was less pressure to change.

Clonal species reproduce asexually (cuttings, bulbs etc.): could introduced clonal species adapt to new environments? Experiments showed that there were no significant difference in the number of changes or the rate of change when compared with sexually reproducing species. Mutations can occur anywhere, and if a mutation occurs in one branch of a plant, it may be broken off and the mutant clone established. With animals, the mutation must occur in the reproductive cells if it is to be passed on to the next generation. Somatic mutations that occur elsewhere in the body are three times as common as mutations in the germ cells.

The herbaria in England have a 200 year record and introduced species show significant change also. There is a lag phase in population size of introduced species, and is there a lag in the rate of change also? Experiments show that there is no lag phase and change is still going on after 200 years, although not necessarily in the same direction.

The introduced South African species, the beach daisy has a small home range, hence less diversity in the population than a species with a large home range. If there is a large diversity in a species, it may be argued that the change observed may only be selection for some of the variation. An experiment compared the introduced Australian beach daisies with South African ones when grown on to the second generation in the glasshouse. The juvenile leaves were similar in both, but the adult leaves were very different. The Australian adult leaves were green and a simple shape, like the juvenile leaves whereas the South African adult leaves were bluish and had a lobed shape. There were physiological changes also: the Australian beach daisies had a lower photosynthetic rate and a higher water use. The next experiment will test if the Australian and South African forms still interbreed, but there is a problem: they flower at different times.

The good news is that if plants are so adaptable to a new environment then they should be able to cope with climate change. The bad news is that we may be stuck with the introduce species. Has any eradication program actually been successful? Should we be trying to eradicate any and all introduced species or put scarce resources to better use.

In New Zealand, $NZ117.5 million was spent on possum control in 2000. The plants were better off for some years, but the possums are back again, just as bad. The total budget for the Department of Conservation in 2012 was $NZ330million. Could the expenditure have been better used on something else?

Weeds are a headache, not a brain tumor. The vast majority of weeds flourish in a disturbed environment. In bushland, under a normal fire regime and without any nutrient enrichment from roadsides and runoff, there are few weeds. Around housing next to bushland where there is increased burning off for fire protection and runoff from household gardens and compost heaps, weeds flourish.

Introduced species should be judged on what they do. Some do not need control: no one suggests that we should eradicate clover. On the other hand, lantana is very invasive and does need control. The dingo has been in Australia for 2,500 years, some 130 generations. There are mixed opinions: some do not consider the dingo a native species. In some environments, the dingo keeps down feral cats and foxes and allows small native animals to flourish. On the other hand, dingoes in sheep country are a big problem.

THE MURRAY BASIN – ONCE AN INLAND SEA by Helene Martin

When Captain Charles Sturt went exploring down the Darling River, he was convinced he would find an inland sea, but he was disappointed. Numerous modern studies, however, reveal that the Darling did once flow into an inland sea, only Captain Sturt was about 15 million years too late.

Groundwater from the river valleys and riverine plain to the west is a very important resource for agriculture. For best management and exploitation of the aquifers, an understanding of the stratigraphy of the alluvial fill of these valleys is necessary. The sands, gravels, silts and clays of the sediments may all look much the same wherever they occur in the sedimentary sequence, but the pollen content changes with time and can be diagnostic of the position in the sequence. Thus the palynology provides the necessary stratigraphic information about the aquifers, and when combined with other studies, reveals the history of the region.

The palynology of the alluvium in the river valleys of the Western Slopes, from the Murray to the Lachlan, Macquarie and Namoi Rivers, shows two distinctive layers. The basal layer has sands and gravels that are almost entirely quartz and yields good quality groundwater, in contrast to the upper layer that has different rock types with very little quartz, and the groundwater quality is not so good. The palynology shows that the basal layer is late Miocene and Pliocene in age (about 10-2.6 million years old) with the upper layer Pleistocene (2.6 million years to present) in age. But why should the alluvial fill in all the valleys be so similar?

The Murray Basin formed in a broad depression between the Mount Lofty Ranges and the western end of the Eastern Highlands over 60 million years ago and older geological texts call it the Murravian Gulf. The rivers of the Murray Darling System flowed into this inland sea (Fig. 1) from at least Eocene time (~40 million years ago). The extent of flooding of this relatively shallow sea varied with the fluctuations in global sea levels (Fig. 2). The mid Miocene (~15 million years ago) was a time of maximum flooding and at this time, the ancestral Darling River would have discharged into the sea in the Menindee region.

Global sea levels fell dramatically after mid Miocene time (Fig. 2) when the ice cap on Antarctica was building up. By about 10 million years ago, the Murray Basin was drained completely and then followed a period when it was dry and soils formed. At this time, the Murray Darling River System went due south and discharged into the sea in western Victoria. Sea levels rose again about 6 million years ago, but did not reach the extent of the mid Miocene levels and fell again soon after.

These changes in sea levels impacted on the river valleys of the Murray Darling River System and the build up of alluvial sediment. When the sea level fell, the base level of the rivers was lowered and erosion increased, removing the older sediments already in the valley. When the sea level rose again, sediments were again deposited in the valleys. It is thought that the major drop in sea levels between 15 and 10 million years ago eroded out all the older sediments and deposition of alluvium re-commenced when the sea level rose again after 10 million years.

Some critics claim that tectonics are the cause of the observed patterns of deposition of the alluvium, but all the evidence indicates tectonic events were minor and even different for adjacent river valleys. There is general agreement that tectonics only served to maintain the elevation of the highlands.

Some critics claim that a changing climate was responsible for the observed patterns of deposition in the river valleys. The palynology shows that most of the landscape was forested and the climate was much wetter than today. About 2.6 million years ago, at the beginning of the Pleistocene glacial/interglacial cycles, the vegetation changed from forests to open savannah woodlands and grasslands, more like the vegetation of the region today, indicating a decrease in rainfall. This climatic change coincided with the change in type of alluvium, from the quartz-rich sediment to the variable rock-type sediments. Under the higher rainfall regimen, there would have been more chemical weathering of the rock types, leaving only the most resistant quartz. The different pattern of weathering that accompanied this climatic change probably accounts for the different type of alluvium. Both sea level and climatic events would have affected all of the river valleys in similar ways, at the same time.

Minor tectonics cut off the mouth of the Murray Basin from the sea and prevented the river system draining into the sea. A fresh-water mega-lake, Lake Bungunnia was formed about 2.4 million years ago (Fig. 3). At its maximum extent, the Darling River would have discharged into the lake in the Pooncarie/Mildura region. Lake levels fluctuated with the climatic fluctuations of the Pleistocene glacial/interglacial cycles. About 700,000 years ago, the modern course of the Murray River into South Australia was forged, probably the result of minor tectonics (McLaren et al, 2011).

Today, the groundwater is in danger of being over-exploited. It is tempting to think of groundwater as a backup in times of drought, but this is not the case. River water recharges the groundwater so that in times of good rainfall, the groundwater levels are high, and in times of drought, the levels fall and could be depleted without recharge. Interconnection of the aquifers is being studied to provide a better understanding of how much water is likely to be available for exploitation, especially in times of drought. The use of groundwater is highly regulated and a water license is a valuable commodity.

References

Martin, H.A. (2014). A review of the Cenozoic palynostratigraphy of the river valleys of central and western New South Wales. Proceedings of the Linnaen Society of New South Wales 136 xx-yy http://ojs-prod.library.usyd.edu.au/index.php/LIN/index

McLaren, S., Wallace, M.D., Gallagher, S.J., Miranda, J.A., Holdgate, G.R., et al. (2011). Palaeogeographic, climatic and tectonic change in southeastern Australia: late Neogene evolution of the Murray Basin. Quaternary Science Reviews 30, 1086-1111

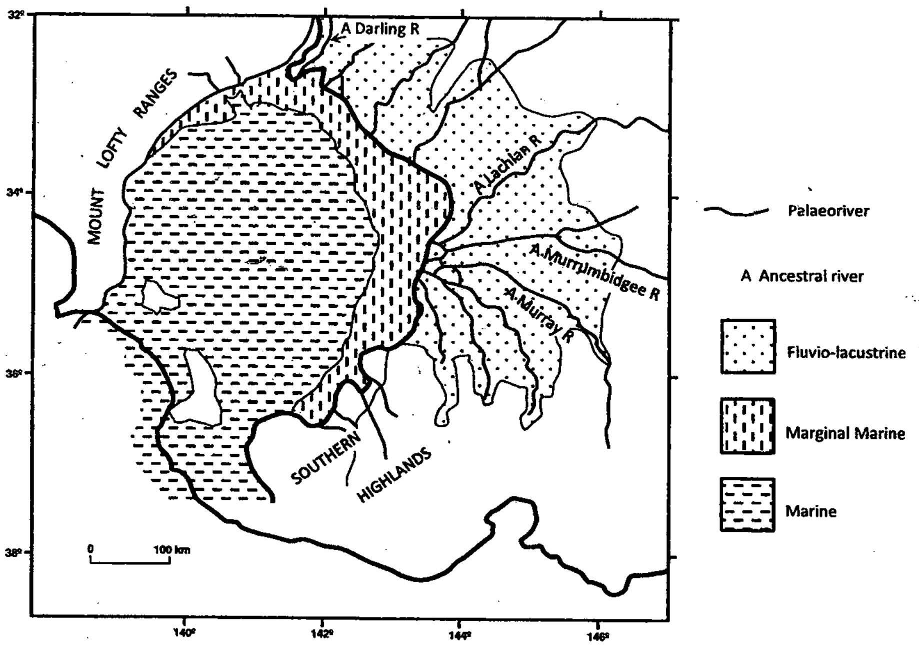

Fig. 1. Maximum flooding of the Murray Basin, about 15 million years ago.

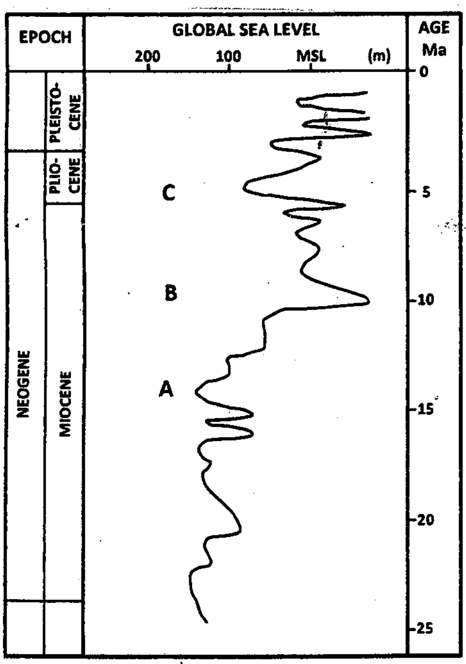

Fig. 2. Global changes in sea level
Ma = million years

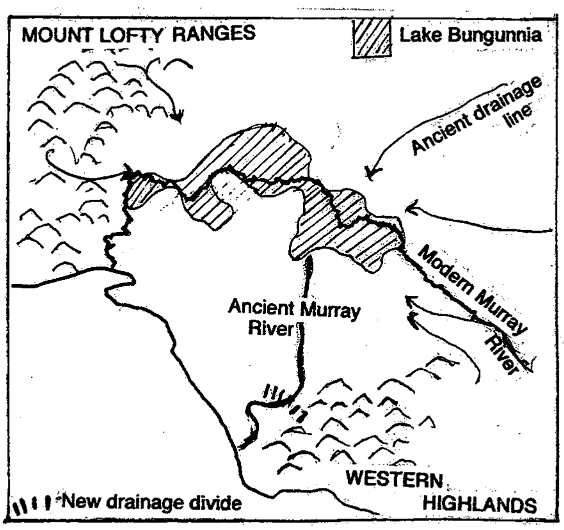

Fig. 3. Lake Bungunnia about 2.4 Ma with the modern Murray River (only 700,000 years old) superimposed

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 23 July, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

DR. JUDITH FIELD

School of Biological, Earth and environmental Sciences, University of New South Wales

PLANT USE THROUGH TIME IN THE HIGHLANDS OF NEW GUINEA

Dr. Field and colleagues study plant microfossils, such as starch and phytoliths, found in cultural sediments and as use-related residues on stone tools. They are looking at the role of plants in the settlement of the PNG highlands and how these may have changed through time. The Ivane Valley study presented in this talk provides an interesting contrast to the research further west at Kuk swamp, where agriculture has been identified from the early Holocene. The Ivane Valley has yielded the earliest evidence from Sahul (Pleistocene Australia-New Guinea) for human settlement and continues to produce exciting new information about the dynamic behaviours of humans in marginal landscapes.

****

Wednesday17 September, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr. REBECCA SPINDLER

Taronga Zoo

CONSERVATION AT TARONGA

Taronga Conservation Society Australia has a strong mandate for Science and Conservation. Our scientists are conservation focused and answer questions about habitat use, species function and impacts of human activities. Our conservation action is grounded in existing knowledge but we also continue to learn from each project at key points along the road. Our conservation work extends beyond our boundaries into many countries around the world and is focused on species, habitats and local communities. This talk will describe key science and conservation projects in NSW, wider Australia, the Antarctic, Asia, Africa and South America.

****

Wednesday 22 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof MARTIN VAN KRANENDONK

School of Biological, Earth and environmental Sciences, University of New South Wales

EARLY LIFE ON EARTH: EVIDENCE FOR A DIVERSE BIOSPHERE 3.5 BILLION YEARS AGO

****

Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 153 **OCTOBER 2014**

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members:
Mr. Matthew Nicolson whose interest is Botany
Mr Timothy L. Collins whose interests are plant conservation, systematics, phytochemistry, ecology.

CHANGE OF SPEAKER FOR 22 OCTOBER

The speaker previously advertised for Wednesday 22 October is unable to give the lecture. Dr Robin Torrence has replaced him: see the Program, page 7 of this newsletter..

VALE ALAN ANDREWS

Alan was a long-standing member of the Society and of Council. His keen interest in historical exploration, skiing and cartography led to him writing or editing various books, including "The Devil's Wilderness: George Caley's Journey to Mount Banks 1804", "Kosiusko – The Mountains in History", "Major Mitchell's Map 1834" and more. He gave the Society several lectures on the subjects of his interests.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS

The Society has received donations to the research funds from Dr. J.M.E. Anderson, two Anonymous donors, Mr. Ian D. Enderby, Dr. Michael Engelbretsen, Dr. Stephen B. Johnson, Prof David Keith, Dr. A.O. Nicholls, Dr. R.A.L. Osborne, Mr. W.S. Semple, Prof L. Selwood, Dr. Lawrence Sherwin and Mrs. Karen Wilson, for a total of $2,785.
We thank our most generous donors. The Research Grants awarded to students do more than provide financial assistance. Research workers must be skilled in the art of writing applications for grants that are highly competitive. Applying for grants from the Linnean Society is good practice for students, and if awarded a grant, it is a moral booster and something they can add to their CV.

All donations and gifts to the Scientific Research Funds are fully tax deductible.

PAPERS PUBLISHED ONLINE

Papers arising from a symposium held by the Linnean Society of NSW at Jenolan Caves 22-23 May 2013.

Minerals of Jenolan Caves, New South Wales, Australia: Geological and Biological Interactions. *R. E. Pogson, R.A.L. Osborne, D. M. Colchester*
The Jenolan Environmental Monitoring Program. *Andrew C. Baker*
Invertebrate Cave Fauna of Jenolan. *Stefan M. Eberhard, Graeme B. Smith, Michael M. Gibian, Helen M. Smith, Michael R. Gray*
Jenolan Show Caves: Origin of Cave and Feature Names. *Kath Bellamy, Craig Barnes*
Understanding the Origin and Evolution of Jenolan Caves: The Next Steps. *R. Armstrong L. Osborne*
Geology and Geomorphology of Jenolan Caves and the Surrounding Region. *David F Branagan, John Pickett, Ian G. Percival*

Articles
A review of the Cenozoic palynostratigraphy of the River Valleys in Central and Western New South Wales. *Helene A. Martin*
Integrating History and Ecological Thinking: Royal National Park in Historical Perspective. *Daniel Lunney*
A Comparative Study of the Australian Fossil Shark Egg-Case *Palaeoxyris duni*, with Comments on Affinities and Structure. *Graham McLean*

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2015. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 15 November, 2014

2015 SYMPOSIUM: BELUBULA RIVER VALLEY

Next year's scientific symposium, with the title *"Natural History of the Belubula River Valley and the adjacent area of central western New South Wales"* is being planned. It will be two days of presentations and a day-long field trip to the region.

The Belubula River commences in the Vittoria State Forest midway between Bathurst and Orange and flows to the south of Blayney where it enters Carcoar Lake (formed by Carcoar Dam). West of Carcoar, the river exhibits a very sinuous course through hilly land, with ridge crests formed by lava flows extruded from the Canobolas Volcano 13-11 million years ago. Caves are developed in highly fossiliferous Ordovician limestones immediately upstream from the Needles Gorge (formed of steeply dipping Upper Devonian sandstones and shales) where a proposed new dam, if constructed, would flood much of the valley including the caves and fossil sites. Extensive flatter agricultural lands occupy the lower reaches of the Belubula River valley, before the river converges with the Lachlan River near the town of Gooloogong, west of Canowindra.

Talks at the symposium might be expected to focus on the palaeontology of the Cliefden Caves Limestone (including significant heritage sites such as Fossil Hill and Trilobite Hill); speleology of the Cliefden and Walli Caves; the world-famous Devonian fossil fish deposit found between Canowindra and Gooloogong (exhibited in the Age of Fishes Museum); geology, botany and zoology of the Mt Canobolas State Conservation area and surrounding State Forests; and the ecology of the Belubula River including its resident platypus population and native fish species. Papers on any other aspects of the natural history of the region (e.g. terrestrial vertebrates and invertebrates, birds, plant communities etc) would be welcomed. The river valley between Carcoar and Cliefden also has a rich mining history, including a weir constructed in 1897 at Junction Reefs to generate hydroelectricity.

Bathurst has been chosen as the focus of the symposium, as it is within easy reach of Sydney by road and rail, has an extensive range of accommodation from very inexpensive to extremely comfortable, with several options for conference facilities. Furthermore it is relatively close to the main field sites in the Cliefden Caves area, between Mandurama and Canowindra. The Symposium will likely be in the first half of September 2015, outside school holidays and away from major car racing events. Further details will be available in the next Linn Soc News. Any suggestions, comments or offers to participate can be sent by e-mail to the office of the Society for consideration by the organising committee.

REPORTS FROM RECIPIENTS OF RESEARCH GRANTS.

Linda **Armbrecht**, Macquarie University.

Project: Phytoplankton characterisation and related biochemical processes in a biological hotspot: Solitary Island Marine Park, Eastern Australia.
The East Australian Current is warming and is expected to cause latitudinal shifts in the plankton. This project provides the first detailed taxonomic time-series survey of monthly sampling for one annual cycle in the tropical-temperate transition zone. All plankton show seasonal variation with a maxima in summer and minima in winter, except the deep water taxa that prefer the cold dense bottom water independent of the season.

Lara **Marcus**, University of Tasmania.
Project: Environmental and biological factors driving whale shark occurrence and abundance at the Ningaloo Reef, Western Australia.
The first field season in May 2013 was very successful, documenting 102 whale sharks and collecting 52 skin biopsies. Zooplankton, invertebrates and fish larvae, all potential prey for whale sharks were sampled. Biochemical analysis, stable isotope analysis, lipid class determination and fatty acid profiles of whale shark biopsies and potential prey have been completed. Analysis of the results is under way.
Increasing public awareness and environmental education are part of this research. The project was given publicity in the Australian Science Week. Even though Hobart does not have whale sharks, the children and public were interested and engaged.

Robert **Mason**, University of Queensland
Project: Does ocean acidification enhance coral bleaching, and if so, why?
Evidence that ocean acidification causes coral bleaching or enhances thermally induced bleaching is not conclusive. Experiments to determine the effect of acidification on the level of the symbionts in the corals and the long term consequences of acidified waters and heat stress are planned. These experiments require CO_2 Certified Reference Materials (CRMs) produced at Scripps Institute of Oceanography, San Diego. CRMs enable the amount of dissolved carbon dioxide to be measured precisely. Corals will be grown in controlled acidified and non-acidified waters in the laboratory and their growth will be compared with corals in the wild.

Samantha **Munroe**, James Cook University
Project: Migratory and dietary selection patterns of the sharpnose shark (*Rhizoprionodon taylori*) in coastal environments using stable isotopes.
Samples from the sharks and the seagrass and plankton were collected from across five embayments and the stable isotopes of $\delta^{13}C$ and $\delta^{15}N$ were assessed. Comparison of the values for plasma and muscle of the shark with that of the seagrass and plankton showed a positive geographic correlation between shark tissue and environmental $\delta^{13}C$ values. Shark populations with the highest $\delta^{15}N$ values lived in bays with the highest environmental $\delta^{15}N$. Overall, this shark has a wide food range and is likely to be a dietary generalist, but there are geographic and temporal variations.

Katie **O'Dwyer**, University of Otago
Project: A study of marine snails and their trematode parasites.
The trematode parasite infecting litorinid snails of the genus *Austrolittorina* in Australia and New Zealand is being investigated. In total, seven species of parasite were found in three species of snails, three in Australia and four in New Zealand. This indicates a doubling of biodiversity when trematodes are included in studies of these snails. Detailed molecular descriptions are being prepared.

Nannette **Thomas**, University of New England
Project: Molecular and morphological analysis of the Winteraceae

All of the Australian species and sub species were sampled. The monotypic *Takhtajania perrieri* from Madagascar and at least two species from New Zealand, New Caledonia and South America were included. *Takhtajania* originated in Madagascar, the result of Gondwanan vicariance. Differentiation is a complicated story of vicariance as the result of rifting, submergence and exhumation of continents and long distance dispersals and extinctions..
Publication: Thomas, N., Bruhl,, J.J., Ford,A. and Weston, P.H. (2014). Molecular dating of Winteraceae reveals a complex bigeographical history involving both ancient Gondwanan vicariance and long distance dispersal. Journal of Biogeography

PLANT USE THROUGH TIME IN THE HIGHLANDS OF NEW GUINEA: a talk by Dr Judith Field

Australia and New Guinea were joined together at times of low sea level (Fig 1), and that has been most of the time during the last 100,000 years. The sea level has only been as high as today in the last 10,000 years. The joined Australia and New Guinea is called Sahul.

When Europeans arrived in New Guinea, they thought the Highlands were unpopulated, but they are the most densely populated regions in New Guinea, thanks to the introduction of the sweet potato that will grow at these elevations. Sweet potato is a relatively recent introduction but the archaeological sites show that people were living in the Highlands long before its introduction.

People arrived in Australia at times of low sea level. If they came by the southern Sunda Timor chain of islands into northwestern Australia, they would have arrived into an extreme drought-affected land. There is another northern route into New Guinea, and from there, into the northern part of Australia. The maximum water crossing would have been 90 km. The first arrivals would have come with a kit of knowledge about what to eat that would then be adapted to the new environment.

Pollen, phytoliths (silica bodies), plant tissue fragments and starch grains preserved in swamp sediments may be used to identify plants of the region. It is remarkable that starch grains can be preserved for thousands of years, but there are resistant forms of starch. Some starch grains appear to have a membrane around them that may be an advantage for preservation. Very few starch grains are recovered from sediments but they may be found on the surface of artifacts. It is not known why they should be preserved on stone tools, but they may become embedded in cracks. Starch grains indicate the plant foods being eaten.

Starch grains have relatively few characters that may be used for identification. There is considerable variation in shape and size and the characters of one species may overlap with other related species. A statistical approach allows identification of a population of grains characteristic of a species.

Niah Cave in Borneo is 41-39 thousand years (41-39 kyr) old. Starch grains of sago palm, taro (*Colocasia* sp) and yam (*Dioscorea* sp) have been identified. Yam is toxic and must be processed before it is eaten. It is baked in the ground, then mashed up and leached in running water for days to remove the toxins. Wild species of these food plants are found in the tropical forests and the people knew how to exploit these resources. There is debate about whether the people of Niah Cave were hominoids or fully modern humans, but whatever they were, their methods for exploiting the resources of the tropical environment were just as sophisticated as modern humans.

Kosipe Mission and several other sites in the Ivane Valley are the oldest known sites in New Guinea, dating from 49-38 kyr. These sited are in the far east of New Guinea at about 2,000 m above sea level. *Pandanus* does not have starch but the phytoliths of *Pandanus* are found in the sediments. It is rich in oils and fats but is also toxic and the nuts and seeds are buried in a pit for weeks then boiled. Tree fern spores are common in the sediments of Ivane Valley, but there are no tree ferns there today

Kuk Swamp is 10 kyr old and the swamp was drained for agriculture. Taro and banana phytoliths are found in the sediments and residues off artifacts show starch grains of taro and yam. Baliem Swamp in Iran Jaya was also drained for agriculture.

There are other similar sites in the Highlands. Southeastern Australia does not have sites with comparable long histories.

Mortar and pestles of all shapes and sizes and up to 7.5 kyr old were found in swamps, but rarely at sites over 2,000 m elevation. Their use generated much speculation but starch grains of *Castanopsis acuminatissima*, the New Guinea oak were retrieved from them. *Castanopsis* has small acorns that are not toxic and can be eaten raw or cooked. The acorns are pounded in the mortars for the elderly and the young. *Castanopsis* is a common tree in the lower montane forests and its pollen is usually found in the sediments.

These studies offer insights on some debatable topics. It was thought that the exploitation of the environment evolved gradually, but the oldest sites suggest that the people were just as intelligent and innovative as modern man. All of the food plants identified with cultural artifacts have related wild species that would have been gathered before the innovation of agriculture

Most of the archaeological sites in New Guinea are found along the north coast, and indicate that people migrated along the northern coastline of New Guinea before going into the highlands. It was thought that these excursions into the highlands were hunting trips, but the mortar and pestles suggest the old and the young were there too, hence they must have been living in the highlands. These highland sites were unoccupied during the last glacial maximum when Kosipe would have been about the tree line and it would have been very cold. Future work should provide interesting results.

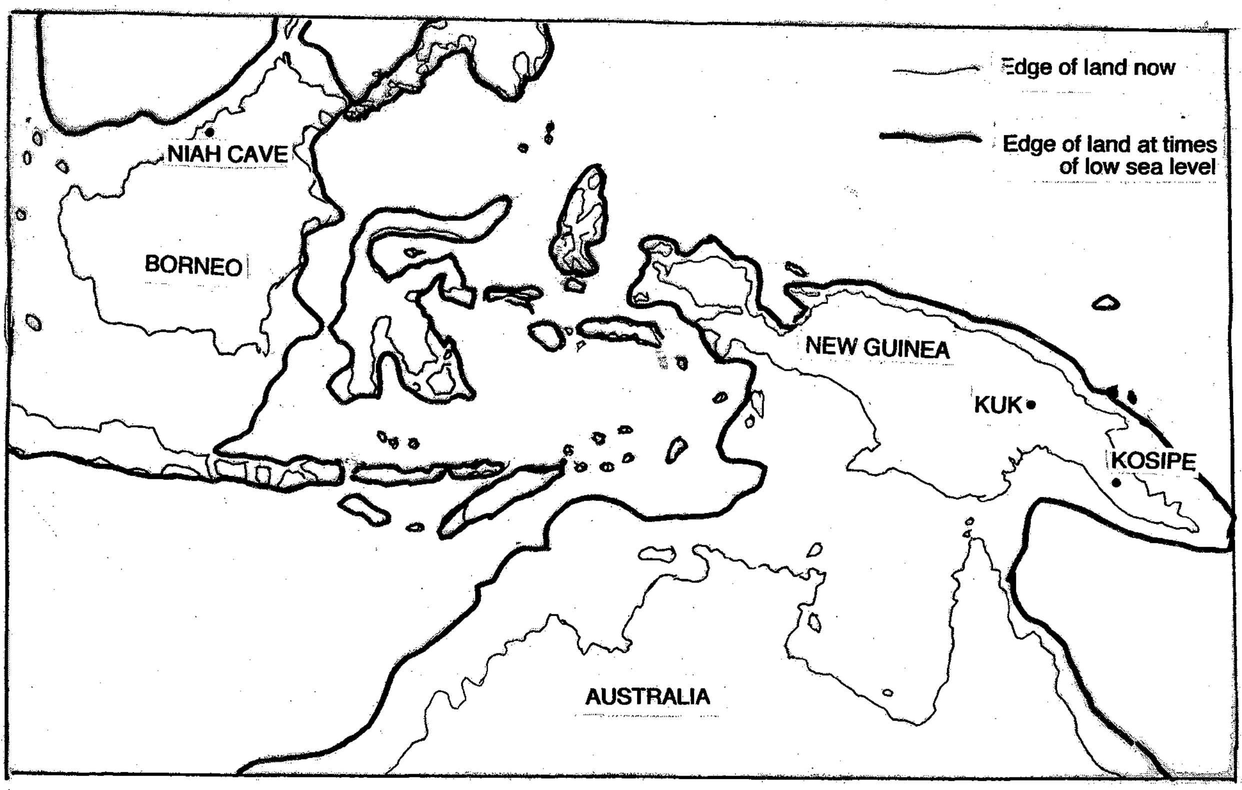

Fig. 1. The land at times of low sea level

LINNEAN SOCIETY OF NEW SOUTH WALES

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PROGRAMME

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Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.**

Dr ROBIN TORRENCE

Australian Museum

POMPEIS OF THE PACIFIC: CATASTROPHES, EVOLUTION AND CREATIVITY IN NEW BRITAIN, PAPUA NEW GUINEA

For over 20 years an interdisciplinary project of archaeologists, geologists, physicists, and botanists has investigated the remarkable history of human responses to volcanic disasters during the past 40,000 years in the Willaumez Peninsula of New Britain, Papua New Guinea. Although over 20 volcanic events have been identified, our research has focused on the effects of 5 large Holocene plinian eruptions. Unlike many stories of ancient volcanic catastrophes, we have identified ways that communities might have adapted and possibly even evolved their cultures to enable persistence in this highly punctuated environment. On a more controversial note, I will also discuss how creative responses to one volcanic event may have led to the peopling of the remote Pacific regions.

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Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 154 **DECEMBER 2014**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Membership renewal form
Natural History of the Belulula River area
Registration form, Symposium, Belubula River area

NEW MEMBERS: We welcome

Dr Martin Denny. Fields of interest: wildlife management, mammals, ecology.

Mr K. David Mackay, University of New England. Fields of interests: plant ecology, plant-animal interactions

Ms Jana Rogasch, Flinders University. Fields of nterests: Archaeology, earth building, history of architecture, geoarchaeology.

Nr Mark da Silva, an Associate member

Mr Ryan J. Sims, University of New England. Fields of interest: vegetation dynamics, grassy ecosystems, vegetation classification and mapping.

Mrs Renee Woodward, of the University of New South Wales. Fields of interests: Vegetation and plant ecology, ecosystem dynamics.

LINNEAN MACLEAY FELLOW FOR 2015

Mr K. David Mackay, a PhD candidate at the University of New England has been awarded the Linnean Macleay Fellowship for 2015. His project is titled "Can native figs beat climate change?" He will concentrate on the sandpaper fig (*Ficus rubiginosa*) at the most westerly, driest part of its range to find out how climate and weather variation affects flowering, fruiting and seed distribution. This fig relies on one species of wasp (*Pleistodontes imperialis*) for pollination, and climate and weather variation may affect is as well. He will investigate the impact of a fragmented distribution on pollination and seed dispersal. The aim of this study of a species not yet endangered should reveal indicators of decline that could lead to extinction before the species becomes endangered, so that early action can be taken.

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.

A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

VALE BARBARA STODDARD

Mrs Barbara Stoddard was a long time secretary of the Society. She passed away on Saturday afternoon, 1st November

Barbara studied science at Sydney University, with majors in Mathematics and Geology, graduating in 1950 with a BSc. She was keen to do Science and obtained a job in Ionospheric Atmosphere Services. Raw data from weather balloons would come in and had to be worked up for use by others. This was her job, and in those days before computers, it had to be done by hand. The Boss explained that the best she could hope for by way of a career was to become office manager. And she had to tell the Boss how to use antilogs.

Barbara's father was known for discouraging boyfriends. Bert knew that he was building a boat in the back yard, and Bert was a sailor too, so when he met her father, he asked him how the boat was coming along. Bert had it made and they were later married.

Once married, Barbara was automatically sacked from her job since the Commonwealth Government did not employ married women at that time. As there was no one else to do the work, she was kept on as a casual. When she became pregnant, she was out for good. As the Boss explained, someone might see her.

After bringing up a daughter and two sons, she became Secretary to the Linnean Society in 1977, a position she held for 21 years. Barbara was a member of the Australian Federation of University Women NSW (now the Australian Federation of Graduate Women) for more than 40 years and was President in 1982. She was also a keen member of a book club for many years

Barbara is survived by her daughter, two sons, their spouses and seven grandchildren.

CALL FOR PAPERS

The Linnean Society of NSW is hosting a SYMPOSIUM on

Natural History of the Belubula River Valley and the adjacent area of central western New South Wales

To be held at Bathurst NSW 7-10 September 2015 (Presentations 8 and 9 September)

For planning purposes, people interested in presenting a spoken or poster paper should send a proposed title

to Mike Augee as soon as possible, but no later than 1 July 2015.
Abstracts must be received by 1 August 2015

M.L. Augee
fossil@well-com.net.au
89 Caves Road
Wellington NSW 2820
02 6845 4294

PALAEONTOLOGICAL SIGNIFICANCE OF THE CLIEFDEN CAVES AREA

Ordovician rocks in the vicinity of Cliefden Caves contain some of the most scientifically valuable (in some cases unique) fossils in Australia, with several examples of global significance. Specimens found at Fossil Hill and documented in the geological literature include the world's oldest known *in situ* brachiopod shell beds and the earliest rugose corals found anywhere on Earth. One of the most diverse deepwater sponge faunas ever recorded is found near Trilobite Hill: it was living on an oceanic slope environment that is very rarely preserved in the geological record.

Many fossil genera and species were first described from Fossil Hill, the adjacent Dunhill Bluff, or Trilobite Hill. These type localities are all in danger of inundation or complete submergence beneath the lake resulting from the construction of a dam at the Needles gorge on the Belubula River. Several of these fossil species, such as the trimerellide brachiopod *Belubula spectacula*, occur nowhere else in the world and the genus is only recognized in two places – Cliefden Caves and Zhuhuia in south China. This provides critical evidence of plate tectonic movement from when these areas were situated considerably more closely in the Ordovician Period than today.

In terms of modern biological conservation, the known population of *Belubula spectacula* (about 20 individuals at most) can be argued to be equivalent in scientific importance to the discovery of the Wollemi Pine. No-one would consider flooding the gorge in the Wollemi National Park containing the only wild stand of *Wollemia nobilis*. Only those that are unaware of the palaeontological riches of the Cliefden Caves area would contemplate such a fate for the unique fossils of the Belubula River valley.

Fossil Hill and Trilobite Hill have long been recognized as iconic examples of Australia's palaeontological heritage (Percival 1985, 2014; Australian Heritage Commission 2012). At least 62 scientific papers have been published in a variety of international journals, documenting 191 genera and 263 species of fossils from these and other sites in the vicinity of Cliefden Caves; of these, 45 genera and 101 species are unique to the area threatened by flooding. The Cliefden Caves area is also highly significant in the geological evolution of New South Wales, with limestones 363 m thick deposited there during a hiatus lasting approximately 5 million years when intense volcanic and intrusive activity characterising the Macquarie Volcanic Province of the Lachlan Orogen temporarily ceased.

Given the global scientific significance of the Cliefden Caves area, it is not surprising that it has been the focus of several field visits associated with major international palaeontological conferences in recent years. Many palaeontologists from overseas have visited the area, either on these conference excursions or as part of international scientific collaborative projects to study the rich fossil heritage of this biodiversity hotspot in Late Ordovician time, when the area was an island located in the northern tropical zone.

Clearly, the Cliefden Caves area has outstanding palaeontological scientific value and is certainly worthy of Australian heritage protection, and arguably of world heritage listing. Flooding by the Needles dam would destroy this irreplaceable icon.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page:
http://linneansocietynsw.org.au

Intending applicants please read instructions carefully and submit your signed application by email to
linnsoc@iinet.net.au

The date for submission of applications for all the funds is 1st March, 2015.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to $2,300 is available to members of the Linnean Society of New South Wales and $1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2015.** Submit your signed application by email to linnsoc@iinet.net.au

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of the earth sciences.

Applications will be accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth Sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members will be given preference.

Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2015.** Submit your signed application by email to linnsoc@iinet.net.au

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- Realistic costing and timetable
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed $2,500 for Members of the Linnean Society of New South Wales and $1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment and consumables, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project, and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

An application form may be obtained from the website or from the Secretary of the Society. The application may contain no more than three (3) pages of additional information plus references.
The Society's decisions are final and no correspondence will be entered into about the results.

Closing date is **1 March, 2015.** Submit your signed application by email to linnsoc@iinet.net.au

CONSERVATION AT TARONGA: a talk given by Dr Rebecca Spindler

If you think that conservation in zoos is breeding up endangered species for release into the wild, think again. Release of zoo-bred animals into the wild rarely works. At Taronga, conservation is defined as "The protection, management, restoration and enhancement of the natural environment". Dr Spindler has so many projects on the go she hardly knew where to start, so she started close to home with community campaigns.

The campaign "Calling on you" collects mobiles for recycling. They have collected 237,000 and 30c per mobile goes to conservation. The 'Don't palm us off' campaign raises awareness of the use of palm oil in food. Oil palm plantations destroy the natural habitat and cause wasteland. There is a glut of palm oil for biofuel, so it is being promoted to food manufacturers. We never used to have palm oil in foods and the campaign is to get correct labelling. A third campaign 'Fish 4 life' encourages supermarkets to sell only sustainable fish.

In 2011, there was a competition, the Taronga Green Grant, for the best conservation project. Pollution and consumerism were the most common themes. First place award went to the Surfing Dudes for their Clean Beach campaign to encourage people to take away rubbish from the beach, even if you didn't put it there in the first place. Rubbish on the beach impacts on wildlife, our environment and ultimately our health.

The ecosystem health includes human health, wildlife health and animal health, and health issues of one may well impinge on another. Pittwater Council had a problem: a lot of *Salmonella* infection in children. Swabs were taken from all the people, the animals and the environment where the children spend time. It was found that bandicoots carried *Salmonella java* so the Council wanted to get rid of all the bandicoots. But bandicoots like sand pits and use them for latrines. Replace the sand with rubber tyre material and no more problems with *Salmonella.*

Innovative pest control is a concern of Taronga. The introduced black rat has become established in bushland, replacing the native bush rat. Black rats eat seedlings and climb trees to eat birds' eggs and are destructive in the ecosystem. If black rats hear or smell bush rats, they clear out. It was found that the bush rats require a good ground cover, so the solution is to clean up the bush and plant ground cover. Lantana establishes quickly and is used as a temporary ground cover until the native species can recover.

Strategic banking is a way of maintaining genetic diversity by targeting species before they become endangered. There are 18 species of coral on the Great Barrier Reef and 40 individuals represent about 80 % of the genetic diversity. 120,000 coral embryos can be bred from the thawed coral and used to reseed damaged parts of the reef. Monitor lizards will take a battering when cane toads arrive in the Kimberleys but stored frozen embryos can be used to replace the monitors after the cane toads have moved on.

Modifications of human actions can benefit wildlife. Yabby traps are lethal to platypus: they get in to get at the yabbies then cannot get out. Put a hole in the trap so they they can get out.

The value of marine parks for biodiversity is being investigated. At Montague Island, global warming is sending the currents further offshore and the penguins have further to go to find food. Calculations of the metabolic cost of swimming show that the penguins are coping, but only just. The Port Jackson shark is social and congregates in large aggregations. They are an unwanted bycatch for fishermen. If we understand where they congregate, the fishermen could avoid them.

Nutritional geometry is studied: all animal species require protein and it is important to get the balance of other nutrients right. This is very important in projects like saving the Tasmanian devil.

Breeding zoo animals for release into the wild usually does not work and it is far better to find ways to prevent populations from becoming too low. In many parts of Africa and Asia, the rural communities are poor and may rely on the wildlife for survival. Taronga conservationists work with the communities and help them understand their wildlife, at the same time calling in agricultural experts to advise them about better crops to grow. With better economic circumstances, the villagers do not have to raid the national parks. Cultures can be changed and conservation partnerships are forged.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2015 Annual General Meeting

The 140 Annual General Meeting of the Society will be held at 18:00 on 19 March 2015 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17:30.

Five members of Council are due to retire at this AGM:

John Barkas
Michael Gray
John Pickett
Helen Smith
Karen Wilson

and all offer themselves for re-election.

Council recommends the election of Professor Robert King as President of the Society for 2015.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2015.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2015.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 155 **APRIL 2015**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Record of Annual General Meeting, 18 March 2015
Form for donations to the Scientific Research Funds
Registration form for Belubula Symposium

NEW MEMBERS: We welcome

Mr Kye R Adams, University of Wollongong. Fields of interest: marine biology, ecology, natural history, genetics.

Mrs Sophie Bratenkov, Macquarie University. Fields of interest: geochemistry, biostratigraphy, climate reconstruction.

Miss Kirilee Chaplin, Museum of Victoria. Fields of interest: conservation, population genetics, taxonomy, evolutionary ecology.

Ms Jodi M Fox, University of Tasmania. Fields of interest: geology, volcanology, fauna and ecology.

Miss Jessica Hacking, Flinders University. Fields of interest: conservation biology, molecular biology, herpetology.

Ms Melanie K Laird, University of Sydney. Field of interest: natural history, particularly marsupials and monotremes.

Mr John Marchant. Field of interest: palaeontology.

Mrs Floret L Meredith, University of NSW. Fields of interest: biogeography, plant ecology, community ecology, botany.

Prof Angela T Moles, University of NSW. Fields of interest: plant ecology, biogeography.

Mr Harry A Moore, Deakin University. Fields of interest: conservation biology, applied ecology, general habitat preservation.

Mr Timothy Morris, University of NSW. Fields of interest: arid ecoloty, mammals, foraging behavior, grazing.

Ms May M Noble, Australian National University. Fields of interest: Freshwater ecology and biology

Ms Parisa Noorian, University of NSW. Fields of interest: effects of protozoan predation on pathogenicity of marine bacteria.

Mr Niels Rueegger, Southern Ctoss University. Field of interest: wildlife research.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS

From Mrs Betty Jacobs

Mrs Betty Jacobs has made a donation of $5,000 to the Joyce Vickery Scientific Research Fund in memory of the late Dr Surry Jacobs. Dr Jacobs was a grass specialist at the National Herbarium of New South Wales who demonstrated that the behaviour of plants in the field bore scant resemblance to carefully controlled experiments in the glasshouse. The Surry Jacobs Scientific Research Grant will be given for a fieldwork project in botany. We thank Mrs Jacobs for her generosity

From the Sisters of Saint Joseph

The Sisters of Saint Joseph, Victoria-Tasmania Region, has made a one-off donation of $5,000 to the Society in celebration of the 125th year of the death of Julian E. Tenison-Woods, who with Sister Mary Mackillop, founded the Sisters of Saint Joseph. Tenison-Woods was President of the Linnean Society of NSW 1879-1881, Vice-President 1881-1889. Tenison Woods made a significant contribution to scientific discovery and exploration of Australia and South East Asia. Council decided to divide the $5,000 donation into four $1,250 grants. The grants will be in honour of Julian Tenison-Woods and one grant will be awarded each year 2016-2020 (inclusive). Applicants for the Betty Mayne and Joyce Vickery grants will also be considered for the Tenison-Woods grant and there will not be a separate application process for this grant. According to the wishes of the Sisters, the donation will be made available to young post-graduate research students who have a particular interest in scientific areas that interested and excited Julian Tenison Woods. The Sisters' generosit is much appreciated.

From Members

Members have also donated a total of $766. We thank Mrs Sophia Bratenkov, Dr Martin Denny, Mr Ian Endersby, Dr Michael Englebretsen, Ms Jodi Fox, Miss Jessica Hacking, Dr Patricia Hutchings, Ms Rached Levin, Dr M.J. Littlejohn, Dr Daniel Lunney, Dr Graham McLean, Mrs Floret Meredith, Dr A.O. Nicholls, Mrs Mae Noble, Ms Parisa Noorian, Dr R.A.L. Osborne, Dr John Pickett, Mr Niels Rueegger, Prof L. Selwood, Dr Helen Smith, Dr B.V. Timms, Dr J.C. Turner, Dr Barry Webby, Mrs Karen Wilson, Dr Leigh Winsor, Dr Alec Wood, and Joseph Wright. Their generosity is much appreciated.

REGISTRATION FOR SYNPOSIUM,
Natural History of the Belubula River Valley and the adjacent area of central western New South Wales, Bathurst NSW, 7-10 September 2015

The registration form and information about the symposium is included with this newsletter. Expressions of interested in presenting a spoken or poster paper should be send to Mike Augee as soon as possible.

M.L. Augee
fossil@well-com.net.au
89 Caves Road
Wellington NSW 2820
02 6845 4294

Deadline for submission of abstracts from prospective speakers, 1st July, 2015
Deadline for registration of all participants of the symposium, 1st August, 2015

PAPERS IN VOLUME 136 (2014) OF THE PROCEEDINGS

Section 1 Papers arising from a symposium held by the Linnean Society of NSW at Jenolan Caves 22-23 May 2013

R. E. Pogson, R.A.L. Osborne, D. M. Colchester: Minerals of Jenolan Caves, New South Wales, Australia: Geological and Biological Interactions.

Andrew C. Baker: The Jenolan Environmental Monitoring Program.

Stefan M. Eberhard, Graeme B. Smith, Michael M. Gibian, Helen M. Smith, Michael R. Gray: Invertebrate Cave Fauna of Jenolan.

Kath Bellamy, Craig Barnes: Jenolan Show Caves: Origin of Cave and Feature Names.

R. Armstrong L. Osborne: Understanding the Origin and Evolution of Jenolan Caves: The Next Steps.

David F Branagan, John Pickett, Ian G. Percival: Geology and Geomorphology of Jenolan Caves and the Surrounding Region.

Articles

Helene A. Martin: A review of the Cenozoic palynostratigraphy of the River Valleys in Central and Western New South Wales.

Daniel Lunney: Integrating History and Ecological Thinking: Royal National Park in Historical Perspective.

Graham McLean: A Comparative Study of the Australian Fossil Shark Egg-Case *Palaeoxyris duni*, with Comments on Affinities and Structure.

Rumeaida Mat Piah, Daniel J Bucher: Reproductive Biology of Estuarine Pufferfish, *Marilyna pleurosticta* and *Tetractenos hamiltoni* (Teleostei: Tetraodontidae) in Northern NSW: Implications for Biomonitoring.

Carmen Booyens, Anita Chalmers, Douglas Beckers: The Effect of Disturbance Regime on *Darwinia glaucophylla* (Myrtaceae) and its Habitat.

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

POMPEIS OF THE PACIFIC: CATASTROPHES, EVOLUTION AND CREATIVITY IN NEW BRITAIN, PAPUA NEW GUINEA: a talk given by Dr Robin Torrence.

Dr Torrence is interested in the impacts of natural disasters that cause destruction and collapse of the communities in the region. People live in regions subjected to catastrophic events such as volcanic eruptions, tsunamis, cyclones etc. that cause collapse of living conditions, yet they come back, knowing that the same event will happen again at some time in the future. How do they cope? Dr Torrence works in New Guinea, on the Willaumez Peninsula of New Britain that has Rabaul on the end of this peninsula. The area is volcanic, with the type of volcanoes that blow their top and spew out ash, as did Pompei.

The chosen study area is at the isthmus of the peninsula, some 50 km to the south of the Dakataua volcano that is close to Rabaul. It is some 50-60 km west of Witori, another active volcano. In this position, the eruptions would not have killed the people, but the ash fallout would have killed off the vegetation and gardens, making the area uninhabitable.

Pits were put down at random over the area to find out if there was any archaeology there. Artefacts were found almost everywhere. A long profile on an exposure on the side of a hill dated back to the Pleistocene, almost 40,000 years ago. There was a series of about 10 bands formed by the tephra or ash layers. Artefacts were found above each ash layer, but the sequence was too weathered to work with, hence a younger site on Garua Island, half way along the peninsula and to the east, was chosen for study. Five ash layers from eruptions of the Dakataua and Witori volcanos over the last 6,000 years could be identified.

The artefacts found between ash layers changed with time. Obsidian (volcanic glass) stemmed tool artefacts survived the W-K1 eruption (about 6.000 years ago) but disappear after the W-K2 eruption (about 3,000 years ago). The source of the obsidian can be traced by its chemical nature and the obsidian artefacts come from different sources, suggesting that they were traded. Following the W-K2 event, Lapita pottery appeared in the record, but it disappears after the W-K3 eruption (about 1,500 years ago). Stone axes appear rather late, about 500 years ago. These changes in the artefacts found indicate cultural changes.

The obsidian-stemmed tools were made in two stages: the head first with the stem added later. The head was made in one village and the stem added in a second village. They were high status implements and were exchanged amongst the high status individuals. Any one village could have made the entire artefact, but by dividing the making between villages, it became an opportunity for trade. There were three sources of obsidian in the area, and each source had a distinctive chemical signature. Sites close to one source had obsidian artefacts from the other sources, showing that there must have been exchange.

As well as durable artefacts that persist in the archaeological record, objects made of perishable materials, e.g., baskets, wooden implements could also all be made in one village, but today, the villages specialise and then exchange goods. In this way, a network of friends is built up and this network could support them at times of catastrophes. The Lapita pottery was not traded, but was made locally, each village with its own distinctive variations. The Lapita expansion happened very rapidly and ideas and styles were exchanged.

After an eruption, when everyone had been forced to leave and become refugees, when do they return and what do they find? Leave it long enough, and the forest would regrow, but if they came back earlier in the grass stage of regeneration, there would be no need to clear the forest and making gardens would be much easier. This may be why stone axes appear very late in the record: they would not be needed to clear the forest. The population was quite low, judging by the density of artefacts, probably because of the need to leave then return and build up the system all over again. Language is no barrier. New Guinea has the highest number of languages in the world, but everyone speaks at least six languages.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 22 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

DR JOHN PICKETT

A GEOLOGICAL TOUR OF ICELAND

Iceland, by virtue of its position athwart the Mid-Atlantic Ridge, offers a unique opportunity to observe a young continent in the making, and the beginnings of crustal differentiation from primeval basaltic lavas. The fact that Iceland (about 1½ times the size of Tasmania) lies above the ocean means that we can observe at first hand the processes and landforms associated with the zone of rifting between separating continental plates. Almost all areas of plate divergence lie beneath the oceans, so that the opportunity that Iceland offers to observe these phenomena is all but unique. As well as that, the country lies over a mantle hotspot, which is responsible for most of the cataclysmic volcanism for which the country is known. Further, the entire country plus its continental shelf was submerged under ice at the peak of the last glaciation, at about 15,000 years ago. This has resulted in a range of landforms, some of a kind rarely seen elsewhere. We can see the conveyor belt of continental separation in action, and watch the evolution of the country and its young landforms. Through a series of fine photographs we can learn what lies behind the unusual landscapes of this singular country.

****

Wednesday 20 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Prof MARTIN J. VAN KRANENDONK

School of Biological, Earth and Environmental Sciences UNSW

EARLY LIFE ON EARTH: EVIDENCE FOR A DIVERSE BIOSPHERE 3.5 BILLION YEARS AGO

New evidence from the very old rock record of the Pilbara Craton, Western Australia, suggests that life was already diverse and occupied different niches 3.5-3.4 billion years ago. This evidence comes from both morphological variation of stromatolites (the preserved rock structures built by living microbial communities), and from analysis of the geological habitats in which they are found.

Shallow coastal marine environments (shallow shelf and lagoonal settings) contain laminated microbial mats and coniform stromatolites, whereas deposits from hotsprings contain more variable morphologies, as well as evidence for the utilisation of different available chemical energies (Fe, S), and large, unusual microfossils. In this presentation, I will present a picture of early life on Earth and show how it appears to have adapted to different environments, using different metabolisms, suggesting that life started on Earth as soon as it could, and diversified early.

****

Drinks will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

NEED A TAX BREAK?

Donations to our Scientific Research Funds are fully tax deductible

The Joyce W. Vickery Scientific Research Fund
Is open to anyone engaged in research in Natural History. Over 80 projects have been supported in the last five years

The Betty Mayne Scientific Research Fund
Supports projects in Geology and other Earth Sciences. Sixteen awards have been made in the last five years

SO HELP YOURSELF AND A STRUGGLING RESEARCH STUDENT

MAKE A DONATION TO A SCIENTIFIC RESEARCH FUND

To

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I wish to make a donation of $........................... .. to the

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☐ Betty Mayne Scientific Research Fund

Please make all cheques payable to "Linnean Society of NSW"

Payment through a bank:

To ST GEORGE, BSB: 112-879, ACCOUNT # 466 447 867

If you pay through a bank, it is essential that you e-mail the Society at linnsoc@iinet.net.au and tell us about your payment, otherwise we will receive the money and not know who payed it.

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Address ....

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 156 **JULY 2015**

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IN THIS ISSUE

NEW MEMBERS:

We welcome
Mr Richard Bird. Field of interest: Geology
Ms Clare Brandenburger, School of BEES, University of NSW. Fields of interest: Plant evolution, plant ecology and introduced plants.

AWARDS FROM THE SCIENTIFIC RESEARCH FUNDS

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Miss Michaela Ebony LARSSON, University of Technology
Project: Understanding the ecological niche of toxic dinoflagellates.

Ciguatera fish poisoning (CFP) arises when people eat fish contaminated with ciguatoxins and it is a problem world wide. There have been large outbreaks in Australia with two fatalities and more than 1400 cases documented in the last 50 years. Ciguatoxins are produced by dinoflagellates from the genus *Gambierdiscus* which was thought to be monospecific, but molecular techniques have defined at least 12 species. Over 20 strains of *Gambierdiscus* have been isolated from Australian sites and seven strains are growing well in culture. *Gambierdiscus* is notoriously difficult to grow in culture hence these cultures are extremely valuable and material is now available to be used in further research. This project aims to identify the strains isolated from Australian waters using molecular methods, characterise the toxin profiles of each strain and deposit the strains into a national collection so that they are made publically available for further research. Awarded $1,640

Ms Parisa NOORIAN, University of New South Wales
Project: Investigation of an iron-dependent antiprotozoal factor in *Vibrio vulnificus*
Vibrio vulnificus.is an opportunistic pathogen responsible for septicaemia following ingestion of contaminated raw oysters and wound infections on exposure to infected seawater. It has the highest reported mortality rate for seafood related diseases. It inhabits coastal marine environments where it is exposed to protozoan predation. Bacteria evolve anti-protozoal mechanisms that may increase its virulence. One strain of *V. vulnificus* shows toxicity towards a filter-feeding ciliate but this toxicity is dependent on iron in the media. Without the iron, the protozoans survive being preyed on by *V. vulnificus*. Humans with an iron overload are most susceptible to *V. vulnificus*. Not all the strains are equally pathogenic. The aim of this project is to identify the genetic factors that contribute to the survival of *V. vulnificus* in its natural environment. Intracellular iron is known to play a key role in the regulation of many toxins and virulence determinant factors. Awarded $1,000

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

Ms Jodi Fox, University of Tasmania
Project: The physical volcanology of the Cenozoic volcanics, NW Tasmania
The volcanics of the Cape Grim and Stanley area are late Paeleocene to Pliocene in age, and the most recent rocks in the state are found here. They consist of well-preserved sheet lavas, pillow lavas, lobate lavas, volcanic breccias and tuff. This project will determine the facies architecture in the Cape Grim area and establish age relationships, including the first radiometric ages to be obtained on these rocks. The results should show the relative timings, volcanic products and processes in the area. Awarded $2,450

THE JOHN NOBLE FUND FOR INVERTEBRATE RESEARCH

Miss Mae Marjore NOBLE, Australian National University
Project: Population biology and ecology of the threatened Murray crayfish in upland streams.
Murray crayfish are relatively well known in their lowland habitat but little is known about their population biology and ecology in upland streams. This project will evaluate their environmental and habitat preferences in upland streams using in-stream snorkel surveys. Knowledge gaps for the crayfish in upland streams include size at maturity, sex ratio and abundance: all critical for management of the fishery and recovery plans for the species. Conservation requires a deeper understanding of the environment controlling distribution and abundance. In these upland streams, key environmental factors can vary considerably within relatively short distnces.This project will address these problems. Awarded $750.

THE SURREY JACOBS FUND FOR SCIENTIFIC FIELD WORK

Mr Timothy Lindsay COLLINS, University of New England
Project: Rare and endangered *Eucalyptus magnificata* L.A.S Johnson and K.D. Hill (Myrtaceae): genetic diversity and taxonomy.
Doubt about northern populations near Tenterfield and Warwick that are thought to be different varieties will be resolved. They may be new species or they may be part of a larger more genetically diverse population with a greater demographic range. If the latter, there are better prospects for the overall health and survival of the species. This study will inform conservation and land management practices for *E. magnificata.* Awarded $1,.000.

JOYCE W VICKERY SCIENTIFIC RESEARCH FUND

Mr Kye Rhys ADAMS, University of Wollongong
Project: Site fidelity and habitat preference of the banjo shark, *Trygonorrhina fasciata*
The behaviour and movement of the banjo shark will be studied in Jervois Bay, a no-take zone. It is not known if they migrate and a no-take zone is ineffective if movement patterns take the species beyond its boundaries. The banjo shark is a commercial by-catch species and this study should assist the assessment of no-catch zones and aid in the management and conservation of the species. Awarded $1,500.

Miss Kirilee Jane CHAPLIN, Museum of Victoria/University of Melbourne
Project: Taxonomy, ecology and conservation genetics of grassland earless dragons (Agamidae, *Tympanosryptis* spp) in Queensland
The taxonomy and systematics of the earless dragon is unclear because there are cryptic species that cannot be distinguished on morphology, but the species are genetically different. On the Darling Downs, taxonomic revision has resulted in three new species being described. These species occur in highly fragmented grassland. Several other mitochondrial DNA lineages have been identified elsewhere in Queensland and northwest NSW. Grasslands are in decline in Queensland, yet only one species is listed as endangered. The taxonomy will have to be resolved before the conservation status of species of earless dragons can be decided. Awarded $1,500

Miss Belinda FABIAN, Macquarie University
Project: Functional biology of extrafloral nectaries of Australian native cotton species *Gossipium sturtianum*, Sturts. Desert rose.
Extrafloral nectaries are found on leaves and sepals, and many plants in the arid region possess them. They produce sugars and amino acids that are a cost to the plant's metabolism but this is traded off against the benefit of ant mutualists that consume the nectar and and provide protection against herbivores. It is thought that increasing carbon dioxide will increase the carbon content of the nectar and make it less attractive to ants, but this has not been studied. The distinctive extrafloral nectaries have been bred out of the commercial species of cotton. This project will investigate the functional biology and structure of the arid species of native cotton and the effects of increasing carbon dioxide. Awarded $750.

Miss Jessica HACKING, Flinders University
Project: Factors shaping disease-resistance-gene diversity in the tawny dragon lizard .
Wildlife disease and mechanisms of disease resistance are poorly understood yet disease is among the top five causes of species extinction world-wide. A higher diversity of disease-resistance-genes (DRG) enables the immune system to identify and destroy a greater range of pathogens. Knowledge of such genes is lacking in reptiles: a concern as Australia has a very high diversity of reptiles. This study will examine the selective forces maintaining diverse DRG in the

tawny dragons lizard. Dragons in four districts in South Australia will be studied. Dragons in the three southern sites are monomorphic for throat colour but the northern site is polymorphic. Only the northern site has ticks. It is thought that parasite diversity/load drives diversity of these genes, but other factors, e.g. mate selection could be involved. Awarded $1,000

Mrs Anuradhi JAYAWEERA, Macquarie University
Project: The effect of sexual cannibalism on mate ejaculatory expenditure and female receptivity in false garden mantids (*Pseudomantis albofimbrata*)
The false garden mantid attack the male prior to copulation and only about 40% of males succeed in transferring sperm to their partners. Males do not seem to have evolved any defensive mechanisms such as preference for less risky females. This project will compare the resource investment between cannibalised and non-cannibalised males and the attractiveness of cannibal and non-cannibal females. This proposal should offer insights into our understanding of sexual conflict in mating. Precopulatory sexual cannibalism represents an especially extreme form of conflict. Awarded $500.

Dr Anna Rachel KEMP, Griffith University
Project: Environmental degradation will destroy the Australian lungfish (*Neoceratodus forsteri*)
Lungfish populations in southeast Queensland rivers suffered in recent droughts. They also suffered in the subsequent floods when washed over reservoir walls and smashed on the spillway below. Eggs of newly hatched lungfish rely on submerged water plants that are plentiful in normal flowing water of streams but do not exist in reservoirs with a fluctuating water level. Adults in reservoirs have so little food that they cannot provide eggs with sufficient nutrients and the young die. How widespread is this problem? So far, three localities have been examined for poor development and loss of recruitment and the same abnormalities are found in all three when eggs collected in the wild are raised in the laboratory. New spawning sites need to be found and tested for abnormalities. Analysis of the environmental conditions may make it possible to repair the situation for the lungfish. Awarded $500.

Miss Melanie Kate LAIRD, University of Sydney.
Project: Unlocking amniote live birth, the 'other' mammalian model.
This project aims to identify the uterine changes involved in preparation for pregnancy in marsupials and their importance for live birth. For live birth, the surface cells of the uterus must undergo remodelling to allow for implantation of the embryo and development of the placenta. A suite of changes in the epithelial cells, called the plasma membrane transformation appears to be the key component of pregnancy in live-bearing amniote groups. Marsupials have an unusual pregnancy with a very short gestation in the uterus and a long period of lactation in the pouch. Uterine changes have only been studied in one species of marsupial. This project will study uterine changes in the fat-tailed dunnart, tammar wallaby and brush-tailed possum. These three species, from different branches of marsupials, have different modes of implantation, hence are ideal for comparison. Awarded $1,000.

Mr Timothy Charles MORRIS, School of BEES, University of New South Wales
Project: The effect of dingoes via kangaroo regulation on vegetation, seed banks and soil nutrients.
Top predators have strong effects on the populations and behaviour of herbivores, and hence influence the intensity and spatial patterns of herbivory. Herbivores have the potential to influence nutrient cycling and the pool of nutrients available for plant growth. The loss of top predators such as dingoes or wolves can shift ecosystems to alternative states. This project focuses on the dingoes in the Strzelecki Desert that strongly regulate the kangaroo populations on the western side of the dingo fence but are prevented access in NSW. The effects of kangaroos

grazing on vegetation cover and composition has been studied, but the effects on plant traits, seed banks and nutrients is poorly understood. Awarded $1,500.

Mr Joshua PENALBA, Australian National Unviversity
Project: The genomic origin of species: a case study of the avian group the Australian Meliphagoidea.
The Meliphagoidea includes fairy wrens, honeyeaters, pardalotes and Australian warblers. Incipient species pairs, such as a northern and a southern species in Queensland that hybridise in the geographic contact zone will be studied. The genomes and morphological data of birds sampled through their ranges and the hybrids will greatly benefit our understanding of how speciation occurs. Awarded $800.

Mr Niels RUEEGGAR, Southern Cross University

Project: Factors influencing roost selection by Australian tree-hollow using bats.
Habitat clearing for any of the many uses of forests means the loss of tree hollows that are used for shelter and breeding by the fauna. Many species of microbats use tree hollows for daytime resting and the females aggregate in large chambers of hollow trees for breeding. There is a lack of information about the factors that influence roost selection, especially the number of maternity roosts required for a viable local population. The forest industry is required to retain some hollow-bearing trees in coups and buffers, but the effectiveness of current practices is largely unknown. Bat boxes are used to supplement tree hollows, but their effectiveness is largely unknown and some species do not take to standard designs. This problem will be investigated with the view to a better design of the bat boxes. Awarded $1,500.

Mr Ryan J SIMS, School of BEES, University of New South Wales

Project: Response of critically endangered box gum grassy woodland to exclusion of livestock. Only about 10% of the once widespread box gum grassy woodland remains and it is subjected to numerous restoration projects. Mining approval requires that large areas of woodland and secondary grassland be offset and rehabilitated. There are other restoration projects as well. The most cost effective method removes the stock and hopes that the ecosystem will recover. Numerous projects have shown that this results in poor restoration and suggests a legacy of problems from past farming practices. This study will investigate these problems with a view to proposing better and cost effective ways to restore the woodlands. Awarded $500.

Mrs Connie Victoria WARREN, Deakin University

Project: Conserving biodiversity in agricultural landscapes: the role of land use
Remnant bushland in heavily modified agricultural landscapes are home to a diverse range of native species. However, little is know about how the context of surrounding agricultural land use affects the conservation values of these remnants or how agricultural land use affects the species that utilise the farmland. A region encompassing dairy, horticulture and cropping wiyh only one to 3% of native vegetation has been chosen for study. Birds, bats and bees will be studied because these groups provide important services to the ecosystem, namely invertebrate pest control and pollination of crops. Better understanding of how special composition and configuration of land uses influences these groups should provide guidelines for land owners on how to structure their agricultural production and increase biodiversity. Awarded $500.

A GEOLOGICAL TOUR OF ICELAND: a talk given by Dr John Pickett

Iceland is one and a half times the size of Tasmania and sits athwart the Mid-Atlantic Ridge. Its location gives us a unique opportunity to observe the processes and landforme associated with rifting. It also lies over a hot spot that is responsible for most of the cataclysmic volcanism for which Iceland is known. During the last Ice age, the entire country and continental shelf was entirely covered by ice, adding further to the environmental complexity.

At zones of divergence, the continental plates are being pulled apart and basalts form new crust. At zones of convergence, where one plate over-rides another and results in mountain building, the new rocks are richer in silica..

A geological map shows the Mid-Atlantic ridge running almost north-south through the island. The oldest basalts are 16 million years (Ma) old and are found the furthest away from the mid Atlantic Ridge. Basalts 8-3 Ma and 0.8 are progressively closer to the Ridge and patches of basalts less than 1,000 years old are located along the Ridge. The youngest basalts are only 10-20 years old. With the oldest basalts only 16 Ma old, Iceland is geologically very young.

The geology is even more complex: there is a micro-continent on the west side of the Ridge, hence convergence occurs against the micro-continent and divergence on the other side of the ridge. Where divergence is going on, there are lots of crevices and lava flows form longitudinal ridges. In 2010, one eruption produced a large ash cloud that caused havoc over Europe. In 1780, an eruption produced large quantities of sulphur dioxide that converted to acid rain over Europe, destroying vegetation and crops and causing much hardship. It took years to recover from the disaster.

The signs of volcanic activity are everywhere: there are geysers (an Icelandic word) in active areas and spatter cones where lumps of basalt are blown out of the volcano and then they stick together. These basalt boulders may have a thick covering of moss. An areal view shows several circular craters within an area rather like a golf course.

Where basalts flow over wet ground, steam vents cool and solidify the lava around it, forming basalt pillars. When eruptions occur under ice and the flow is contained by the pressure of the ice above it, the basalt forms a table. If the eruption breaks free of the ice, then it spews out volcanic ash. There has been a huge amount of alteration to the original basalts to form clay minerals and mud holes. All the volcanic rocks are so young that they have not had time to be compressed and hardened, hence break up easily. Icelanders use volcanic steam for heating and power.

The moraines of the glacial landforms all show that the glaciers are in retreat. When large chunks of ice trapped in the moraines melt, they leave holes called kettles. Frosts are incredible harsh causing cracking of the rocks and rapid weathering. The ground is almost a permafrost. An enormous amount of sediment is brought down by the rivers and deposited on the flood plains and estuarine environments. Sometimes there are lava flows interbedded with the sediments. The basalts also get wind and sand blasted. All the sand from the basalts is black, but in the west, there is one beach with white sand that has been formed from shells of barnacles that were washed up in Atlantic storms.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 23 Septmber, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr MAURIZIO ROSSETTO

Principal Research Scientist, Manager Evolutionary Ecology National Herbarium of NSW Royal Botanic Gardens Sydney

AUSTRALIAN RAINFORESTS, A DYNAMIC MIX OF HERITAGE AND TRANSFORMATION

Despite occupying only a small fraction of the continent, Australian rainforests enclose considerable levels of biodiversity. For us to be able to conserve and manage this biodiversity we need first to understand it. With the help of students and collaborators I have been exploring the factors impacting on the distribution and assemblage of the Australian rainforest flora. This was achieved by integrating evolutionary, functional and environmental datasets obtained through a range of innovative tools and approaches. What has emerged is the portrayal of highly dynamic systems that respond to environmental heterogeneity and temporal change, a far cry from the now dated narrative of static island-systems sheltering evolutionary relics.

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Wednesday 21 October, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

A/PROF SHAUNA MURRAY

ARC Future Fellow, Plant Functional Biology and Climate Change Cluster, University of Technology, Sydney

THE MOLECULAR ECOLOGY OF PHYTOPLANKTON AND IMPACTS ON SEAFOOD SAFETY

Phytoplankton produce approximately half of the world's oxygen through their photosynthesis, and include representatives of most of the major groups of eukaryotes. Ecological interactions among phytoplankton species are complex, and involve similar mechanisms to those in multicellular organisms, including the evolution of chemical and physical defense mechanisms. Some of the compounds involved in chemical defense have proved to be a problem for our fisheries and aquaculture industries, as they can lead to harmful algal blooms (HABs), which result in the deaths of marine life or in the uptake of toxins in seafood. Aquaculture continues to increase in importance worldwide, as fisheries catches are in decline. Ocean temperature changes and human assisted introductions appear to be impacting the distribution and abundance of some HAB species. Information from emerging molecular genetic techniques, such as transcriptomics and environmental sequencing, have provided the first information on the genetics of marine biotoxins and the presence of previously undetected cryptic species. The harnessing of such information allows for the development of rapid tools to protect seafood safety, and to build our understanding of marine microbial ecology. I will discuss examples of tools recently developed for the detection of *Alexandrium* blooms and cryptic species of *Gambierdiscus,* both of which appear to be increasing their ranges in Australian waters, with corresponding recent spikes in ciguatera fish poisoning and paralytic shellfish toxin incidences.

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Refreshments will be served from 5.30 pm

EVERYONE WELCOMED

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 157 **OCTOBER 2015**

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IN THIS ISSUE

NEW MEMBERS

We welcome new members:

Mr Matthew J Nimbs of Southern Cross University. Fields of interests: malacology, taxonomy and biogeography of heterobranch sea slugs, ecology of temperate rocky reefs.

Mr Ross Pogson, Australian Museum. Fields of interests: general geology, mineralogy, palaeontology, cave minerals, historical geology.

DONATIONS TO RESEARCH FUNDS

Members who donated to the research funds early in the year were acknowledged in the April newsletter. Since then, more donations have arrived. Members have donated a total of $3,175 for the year and we thank everyone for their generosity.

Donations since April have been received from Dr J.M.E. Anderson, two anonymous donors, Dr Donald S. Horning, Dr Patricia Hutchings, Dr David Keith, Mr Matthew Nicolson, Mr W.S. Semple, Dr Lawrence Sherwin and Dr Susan Turner. Your generosity is much appreciated.

All donations are fully tax deductible.

EUREKA AWARD TO PROF DAVID KEITH

Professor David Keith and his IUCN Red List of Ecosystems team were awarded the **NSW Office of Environment and Heritage Eureka Prize for Environmental Research** "for their establishment of a universal standard for assessing ecosystem risks".

Similar to the influential Red List for the world's threatened species, it allows environmental threats to different ecosystems to be compared, making it easier to persuade politicians and the public of the need for policy change. This year the team published the first study implementing the new system, identifying ecosystems at high risk of degradation in Australia, particularly from climate change.

David Keith is a member of the Council of the Linnean Society of New South Wales.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2016. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 15 November, 2015

BELUBULA RIVER SYMPOSIUM A GREAT SUCCESS

The Symposium *Natural History of the Belubula River Valley and adjacent area of central waetern New South Wales*, held on 7-10 September was very successful. Seventy three people attended. It enabled our Society to contribute to the debate concerning this area of outstanding importance through the provision of scientific assessment of the caves, the river and the surrounding region. A highlight was the excursion to the fossil sites. It has raised the profile of the Society in our traditional support base but also beyond that. The attendance of community members from the surrounding area was very gratifying.

We all owe a very considerable debt of gratitude to Dr Mike Augee, Dr Ian Percival and Mr Bruce Welsh for organizing the event. Special thanks to Wellington Caves Fossil Studies Centre (Mike Augee and Christine Robinson) for sponsoring a great "reception" at the Fossil and Mineral Museum.

REPORTS FROM RECIPIENTS OF RESEARCH GRANTS

A condition of an award of a research grant is that the recipients report on the results of their endevours.

Dr Fernando Soley (Macquarie University) studies the assassin bug *Stenolemus giraffa* that preys on spiders, even spiders in webs. His grant was to work out how they did it in the field. He observed 38 predatory interactions between the assassin bug and the spider *Parasteatoda* sp., a formidable predator also. He found that the assassin bug captures its prey by stealth, but in about 10% of the encounters, the prey captured the predator. Thus pursuing this spider is dangerous for the assassin bug.

Georgia Roberts (Latrobe University) was awarded a grant to study the long term adaptability of the common wombat (*Vombatus ursinus*) in Tasmania, using stable isotope analysis on teeth from archaeological sites ranging in age from ~35,000 to 11,000 years ago, compared with modern wombats. The money has been used to pay for the stable isotope analysis and the results are being written up for publication.

Dr Scott Fabricant (Macquarie University) investigates the colour changes in the *Kosiuscola* grasshoppers in alpine areas. They are black when cold and turquoise when hot, but only the males change colour and in only one of the four species. It was thought that the colour change was a thermoregulatory mechanism. The colours are produced by the array of adjustable granules in the cuticle and epidermis. It was found that all of the grasshoppers in all of the species have the same sub-cellular array of granules, hence possess the machinery to change colour. Colour change is not a thermoregulatory mechanism but what purpose it serves remains a mystery.

CONFERENCE: INVERTEBRATE BIODIVERSITY AND CONSERVATION: SASB 2015 NEW GENERATION | NEXT GENERATION

The Organizing Committee is pleased to invite you to the upcoming Society of Australian Systematic Biologists Biennial Conference combined with the 11th Invertebrate Biodiversity & Conservation Conference. **It will be held on the 6-9 of December at the Esplanade Hotel in Fremantle, Western Australia.**

The conference is the national forum to discuss research on systematic biology and invertebrate biodiversity conservation, which have formed a productive and passionate scientific community.

We encourage you to visit the website and subscribe to the SASB 2015 Mailing List. http://sasb2015.org

Once you have been added to the list, all conference information will be sent to you via email. You will ONLY receive further information about the conference if you subscribe to the mailing list.

We hope to see you at the upcoming SASB & IBC 2015 combined event. If you have any questions, please feel free to contact Promaco@promaco.com.au

EARLY LIFE ON EARTH: EVIDENCE FOR A DIVERSE BIOSPHERE 3.5 BILLION YEARS AGO: a talk by Prof Martin J Van Kranendonk

The oldest rocks on Earth are about 3.5 billion years old, and this is about the age of the crust on Mars. Studying early life on Earth may assist us in understanding life, if it is present on Mars.

The Universe began about 9.2 billion years ago and there have been many cycles of star formation and collapse. These cycles serve to concentrate heavy elements that are essential for life. The planet Earth is just right for habitation: the right size, the right distance from the Sun and the right temperature.

The first ingredient for life is liquid water. The second ingredient is plate tectonics. Heat is lost through spreading at zones of divergence and material, including water is dragged down into the mantle at zones of contraction. This incorporation of water into the earth's mantle saves it from being lost to space by evaporation. Plate tectonic can only function if there is water: it softens the earths crust. Plate tectonics makes new minerals, including clay that is probably critical for life. Oxygen is also necessary, but very little has been formed outside of biological systems.

Cyanobacteria split water and release oxygen that has accumulated over time. The change has been from an atmosphere rich in carbon dioxide and sulphur dioxide to one rich in oxygen. For the first two billion years of life, Cyanobacteria, Archea and Bacteria were the major forms of life. Then complex forms of life developed.

The Pilbara has the best record, and living stromatolites of cyanobacteria show us what early life may have been like. The cyanobacteria grow in layers alternating with fine sediment layers to produce laminated structures that may have up to 10,000 organisms embedded in them and are thus complex ecosystems. They are found in pools where the salinity is up to three times that of sea water and this hypersalinity suppresses grazers that would otherwise destroy them. When a stromatolite from the Pilbara is taken out and examinined, it has a pillar shape with a flange at the bottom, and this flange is attributed to uplift by tilting of the land.

Ancient stromatolites are dated using zircon crystals that have uranium trapped in them and the ratio of the two isotopes of uranium in the crystals indicate its age. The biggest problem is proving biogenicity of structures in the rocks, and that they were actually formed by living organisms. Calcium carbonate crystals formed by living organisms are different to those formed by physical processes and are thus a good indicator of biogenicity.

In an exposure of rocks of the Ediacara period, 600 million years ago, the biota was mainly soft-bodied multicellular organisms living on the mud, and stromatolites lived on the beach. Rocks 1.4 billion years ago show domed stromatolites at the base of upright corals. Rocks 2.4 billion years ago show aggregates of filaments with predator filaments living off them in a complex community.

Before oxygen became a substantial part of the atmosphere, the water was a green colour, rich in iron and silica and the atmosphere rich in carbon dioxide. The land was mostly like new volcanic islands. Stromatolites appeared over three billion years ago, although the first appearance is being pushed back and back. In the Pilbara, 3.4 billion yeas ago, tightly packed cone shaped stromatolites with curved laminations showed that life was already complex. The exposure in the rocks showed beach, deep water and marine environments and there was life in all of them. The stromatolies were different shapes with different patterns of the lamellae, depending on growing conditions. Cone shaped stromatolites grew straight up through the sediment towards the light. Asymmetrical cones grew on slopes.

The oldest rocks in the Pilbara are 3.5 billion years old and ripples in the sandstone are still visible. A large, arching rock structure has veins in the basal layers, probably of hydrothermal origin. The region was probably volcanic instead of a quiet marine environment. When hot springs erupt as geysers, very fine layers of titanium and clay are formed as geysers are seasonal. Perhaps the stromatolites were utilising minerals brought up by the hot springs.

Preservation is remarkable and these rocks were not subjected to temperatures above 150°C at any time in their history. This evidence suggests that life did not originate at the deep sea black smokers where it would have been much hotter, but at the surface. In hot springs, there is no life in the boiling water part. Around the edges where temperatures are lower, starting about 70°C, microbial mats flourish. In storms, platy pieces of bacterial mats are broken off and deposited elsewhere. Prof Van Kranendonk will be comparing structures seen in the Pilbara rocks with structures around New Zealand hot springs.

Small one-centimetre cones had layers of sulphur recycling microbes. Dendritic patterns of haematite were made by iron cycling microbes. Tourmaline crystals contain boron – are there boron cycling microbes? All of these were formed around hot springs.

Was there life on Mars? Mars has three of the largest volcanoes in the solar system and a very large fissure, formed in the last expansion and loss of heat of the planet. Mars is now geologically dead. But there are signs that water has been there in rivers and has formed sedimentary rocks. The study of Astrobiology is growing an it is well funded, all to do with space exploration.

Prof Van Kranendonk and his colleagues are trying to have the sites protected. At present, their remoteness gives them some protection, but this cannot be counted on to keep them safe from fossil hunters. There is still much to be found for the keen eye.

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NEWSLETTER NO: 158 **DECEMBER 2015**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Membership renewal form
Minutes of the Annual general Meeting, 18 March 2015

NEW MEMBER: We welcome Mr Arjun Verma of the University of Technology. Field of interests: marine microbiology and toxins, seafood safety, harmful algal blooms, biodiversity and biogeography, functional genetics.

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.
If you have already renewed your membership for 2016 or are a life member, please disregard this notice

A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.
The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

JULIAN TENISON WOODS AWARDS

The Sisters of Saint Joseph have made a generous donation of $5,000 to celebrate the 125th year of the death of Julian E. Tenison Woods. The Rev Fr Tenison Woods is well known for his work in Catholic Education and he founded the Order of the Sisters of St Joseph, although Mary McKillop made the Order a reality. It was their collaboration that gave Australia a new form of religious life with special care for the underprivileged.

Tenison Woods was also a notable natural philosopher and made very significant contributions as President of the Linnean Society in 1879 and 1880. He published more than 60 papers in the Proceedings of the Linnean Society of NSW. He also contributed to other scientific journals and wrote extensively for the general public.

Two research awards of up to $2,500 will be made, one each for 2016 and 2017. The Research Grants Committee will choose the best applications that fall within the interests of Tenison Woods from the Betty Mayne and Joyce Vickery applicants. Tenison Woods interests included biogeography, botany, ecology, fisheries, geology, malacology, marine invertebrates, mycology and paleontology.

The Presidential Address at the Annual general Meting on the 23rd of March will be given by Prof Robert King and will be about Tenison Woods and his contribution to Natural History.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page: http://linneansocietynsw.org.au
Intending applicants please read instructions carefully and submit your signed application by email to linnsoc@iinet.net.au
The date for submission of applications for all the funds is 1st March, 2016.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:
- The quality of the project
- The applicant's ability to carry it out

- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to $2,300 is available to members of the Linnean Society of New South Wales and $1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2016.** Submit your signed application by email to linnsoc@iinet.net.au

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of the earth sciences.

Applications will be accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth Sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members will be given preference.

Individual grants will not normally exceed the level of equivalent awards from the Joyce

W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2016.** Submit your signed application by email to linnsoc@iinet.net.au

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- Realistic costing and timetable
- The quality of the project
- The applicant's ability to carry it out
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed $2,500 for Members of the Linnean Society of New South Wales and $1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project, and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

An application form may be obtained from the website or from the Secretary of the Society. The application may contain no more than three (3) pages of additional information plus references.

The Society's decisions are final and no correspondence will be entered into about the results.

Closing date is **1 March, 2016.** Submit your signed application by email to linnsoc@iinet.net.au

THE MOLECULAR ECOLOGY OF PHYTOPLANKTON AND IMPACTS ON SEAFOOD, a talk by Dr Shauna Murray

The phytoplankton includes numerous species from most of the major groups of Eucaryotes. Ecological interactions between the species are complex and are achieved mainly through chemical mechanisms. Some of these chemicals are toxic and have proved to be a problem for our fisheries and aquaculture industries. Some phytoplankton can lead to harmful algal blooms that result in the death of marine life and the uptake of toxins into sea food. Paralytic shellfish poisoning and ciguata fish poisoning are the two that give us most trouble, but there are at least five others that are toxic. In all, over 100 toxic compounds are known, but not a lot is known about their activity.

These toxins have an impact on a wide range of species: birds, mammals and marine species. They may cause fish kills, but some fish such as the Spanish mackerel tolerate the toxins and accumulate it to levels that can kill people if they eat the fish. Similarly, the shellfish that harbour the paralytic shellfish toxin, tolerate the toxin. The Hitchcock film The Birds can be traced back to a real incident where the birds were affected by one of these toxins.

Not all species or all strains are toxic and some strains do not accumulate the toxin.

Biotoxins can structure marine ecosystems by disparate effects on different organisms. If copepods at the bottom of the food chain are exposed to toxins, they are less affected when exposed again. Shellfish evolve resistance in response to exposure to the dinoflagellate *Alexandrium,* the producer of paralytic shellfish toxin. Incidents of poisoning have been increasing over the last 40 years. *Alxandrium* may be found in the Sydney Rock oyster. An outbreak of *Amphidinium* in Curl Curl Lagoon killed off the eels but it is considered relatively benign to humans.

Studying the toxins and the organisms that produce them has problems since they are all single cells and can only be seen down the microscope. Morphologically, one species may differ from another only in a pore or two and the ability to form chains. Another approach is to study the genetics. These phytoplankton species are Eucaryotes (”higher” plants and animals) and have many more genes than the Procaryotes (bacteria) and belong to many different taxonomic groups.

The genetics are used to trace the evolution of the toxicity genome and show that the genes involved come from other species. Lateral transfer of genes from one species to another is well known for bacteria and it also happens in the the phytoplankton. Dinoflagellates can steal plastids from other organisms and transfer genes from one organelle to another. A series of genes are necessary to produce the toxin and the non-virulent strains may lack a gene or two or have an inactive form. The genetic history of the synthesis of saxitoxin, the paralytic shellfish toxin can be traced back more than 2,100 million years to a cluster of cyanobacteria species (blue-green algae). The gene cluster has been conserved through selection, rearrangement, recombination and duplication to function as a neurotoxin today.

Several hypotheses exist as to the likely ecophysiological role of saxitoxin: a chemical defense method, cellular nitrogen storage, DNA metabolism, or chemical signaling. That the machinery for saxitoxin production has been conserved all this time under radically changing environmental conditions shows it continues to play some important adaptive role in the cyanobacteria.

A large on-going project to fully sequence the genomes of the phytoplankton aims to illuminate the ecophysiological interactions in the marine environment. These small, invisible to the naked eye organisms face the same ecological problems that are seen in ecosystems anywhere else. They solve these problems mainly through chemical means. The dinoflagellate *Alexandrium,* responsible for the paralytic shellfish toxin has somehow acquired the genetic mechanism to produce the toxin from the blue-green algae.

THE LINNEAN SOCIETY
OF NEW SOUTH WALES

2016 Annual General Meeting

The 141st Annual General Meeting of the Society will be held at 18:00 on 23 March 2016 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17:30.

Five members of Council are due to retire at this AGM:

Michael Augee
Emma Gorrod
Robert King
Helene Martin
Bruce Welch

and four offer themselves for re-election. Dr Augee decided to retire from Council.

Council recommends the election of Dr Michele Cotton as President of the Society for 2016.

Council recommends that the current auditors, Phil Williams Carbonara, be retained for 2016.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2016.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 159 **APRIL 2016**

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NEW MEMBERS: We welcome
Ms Leeora Gubbay-Nemes, University of New South Wales. Fields of interest: geology, igneous petrology, mineralogy.

Mr Darryl Lawler of Orange. Fields of interest; palaeobotany and invertebrate palaeontology.
Ms Valentina McCormick, University of Technology. Fields of interest: microbiology of seagrasses.
Ms Julia Ryeland., Western Sydney University. Fields of interest: evolutionary behavior and ecology, conservation biology.
Mr Thomas Semple, Australian National University. Fields of interest: systematics and evolution of insects, particularly thynnine wasps.
Ms Claire Sives, University of New South Wales. Field of interest: arid aquatic ecology, aquatic microcrustaceans, climate change, filter feeding ducks
Mr Jack Tatler, Adelaide University. Fields of interest: ecology, natural history, physiology, invasive species.
Mr Joshua R van Lier, Australian National University. Fields of interest: distribution and diversity of coastal marine fishes.
Ms Maria L Vozzo, Macquarie University. Fields of interest: marine and benthic ecology, habitat restoration, marine biology, conservation.
Ms Lucy N Wenger, Australian National University. Fields of interest: marine ecology, habitat and behavioural ecology of fishes, phylogenetics, conservation and woodland bird ecology.

LINNEAN MACLEAY MEMORIAL LECTURE

Dr Mike Crisp of the Australian National University will give the Linnean Macleay Memorial lecture on the 20th of July, 2016. See the program for further information.

PAPERS IN VOLUME 137 (2015) OF THE PROCEEDINGS

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

Spawning of threatened Barred Galaxias *Galaxias fuscus* (Teleostel: Galaxiidae)
Daniel J. Stoessel, Tarmo A. Raadik, Renae M. Ayres

A preliminary investigation of the reproductive biology of the Blind Shark *Brachaelurus waddi* (Orectolobiformes: Brachaeluridae)
Anne Foged, David Mark Powler

Translation to English of speeches given in French to honour William Macleay at a picnic of the Linnean Society. 1st May 1875
Graham R. Fulton, Peter Bialek

Fruiting phenologies of rainforest plants iin the Illawarra region, New South Wales, 1988-1992
Matthew Mo, David R. Waterhouse

The history and status of Apostlebirds (*Struthidea cinerea*) in the Sydney region
Matthew Mo

A new species of the fairy shrimp *Branchinella* (Crustacea: Anostraca Thamnocephalidae) from western New South Wales, Australia
Brian V. Timms

Presidential Address delivered at the 140th Annual Meeting, March 18th 2015
Robert J. King

The story of Science House and the history of the Linnean Society of New South Wales
Helene A. Martin

An alloenzyme electrophoretic study of populations of spiders of the genus *Corasoides* (Araneae: Stiphidiidae) from Australia and Paua New Guinea
Margaret Humphreys

Late Ordovician Conodonts and Brachiopods from near Greenvale in the Broken River Province, North Queensland
Yong Yi Zhen, Ian Percival, Peter D. Molloy

ALISON McCUSKER, 1933-2015

Alison McCusker was a botanist of renown and a life member of the Linnean Society of New South Wales. After a science degree and research at the University of Sydney, she lectured at the University of New England. She then ventured overseas to the University of Ghana, then the University of Dar es Salaam in Tanzania. McCusker's leadership and initiative contributed greatly to these developing universities. Health issues prompted a return to Australia where she headed the flora division of the Australian Biological Resources Study. She was also active in environmental strategies and the recognition of heritage values. She moved on to the International Plant Genetics Resources Institute, a branch of the United Nations Food and Agriculture Organisation and was responsible for coordinating research on genetic diversity of crops in many parts of the world. Back in Australia again, she returned to work on the Flora. Alison McCusker has left a formidable and diverse legacy.

CAVES AND KARST OF YARONGABILLY, edited by Ross Ellis and Erik Halbert
Sydney Speleological Society Occasional Paper No 19, 389 pp, 2016
Cost $70, postage in Australia $16

This handsome book is well illustrated with many photographs, some of them of historical content. There are 16 chapters covering all aspects of access, the surrounding areas, flora and fauna, the geology and karst features and details of each of the individual attractions. The history of settlement and human activities in the area are outlined. Everything you wanted to know about Yarongabilly and more, this book is suitable for everything from the coffee table to a serious scientific read.

URUGUAYAN TARANTULAS IN DANGER: PET TRADERS STRIKE AGAIN

These tarantulas are some of the biggest spiders known and are captured and smuggler out of Uruguay where possession and commercialization of wild animal species is prohibited. In January of this year, an attempt to smuggle 61 tarantulas through the post was thwarted. In the past, other attempts have been intercepted, and one had 80 spiders in the consignment, only four of which survived. There are serious worries about the conservation of these large spider species. Should you see them in the pet shops, support their conservation by not buying them.

JULIAN E. TENISON WOODS

Julian E. Tenison Woods was born in England in 1832, one of a family of eleven children. His family encouraged learning and the study of natural history. For health reasons he spent some time in the warmer climate of France, before migrating to Australia in 1855. After a brief sojourn in Hobart and then Tasmania he moved to Adelaide where he studied to become a priest and he was ordained in 1857. He began his work as a priest in Penola and with Mary McKillop, founded the Order of the Sisters of Saint Joseph with its emphasis on education and special care of the underprivileged. After 10 years in Penola Tenison Woods was appointed Director General of Catholic Education in South Australia, a position he held for four years. Thereafter he found various roles conducting missions in NSW, Tasmania and Queensland.

He studied Natural History and it became his passion, eventually publishing over 300 scientific papers, numerous reports and several books. He was President of the Linnean Society of New South Wales in 1879 and 1880. His interests included biogeography, botany, fisheries, geology, malacology, marine invertebrates, mycology and palaeontology. Geology was his favourite. As an astute observer in many locations he was able to see the overall picture and patterns. For example whereas a new species of mollusc might in those times have been described for every new and isolated locality, he could appreciate the range of variation found within a single species. He set the foundation for modern science to build upon in what we would now treat as different disciplines.

The Sisters of Saint Joseph have made a generous donation of $5,000 to celebrate the 150th year of the Foundation of the Congregation by Tenison Woods and Mary McKillop. Two awards have been given to students working in fields pertinent to Tenison Woods' scientific interests: one for work on volcanoes and one for work on fish and coral reefs (see the reports on the research grants awards). Two more awards will be made next year.

AWARDS FROM THE SCIENTIC RESEARCH FUNDS

The amount of money requested by the applicants far exceeded the sum available. The Society regrets that it has not been able to fund more applications or make larger awards.

Julian E. Tenison Woods Award

Ms Leeora **Gubbay-Nemes**, University of New South Wales
Project: *The Sources & Transport Mechanisms of Metals in Submarine Arc Volcanoes.*
The Kermadec Arc is the most hydrothermally-active segment of an intra-oceanic arc in the world. Hosting at least three Volcanogenic Massive Sulfide (VMS) deposits, it is seen as a natural laboratory for understanding the formation of modern VMS systems. The arc comprises a chain of 30 major submarine volcanoes that extends ~1200km northeast from the North Island of New Zealand towards Tonga. Brothers Submarine Caldera Volcano, situated 1.5km below sealevel is the most hydrothermally active volcano found along the arc. It hosts the largest accumulation of VMS mineralization rich in Cu-Au-Ag (up to 90 ppm Au) and clearly shows the close association between arc volcanism and large deposits of important economic ore metals. Ancient VMS ore deposits in Australia and globally yield much of the world's significant mineral resources and were formed through analogous volcanic systems. However, the ultimate source of the metals and the role that magmatic volatiles (sulfur and chlorine) play in their transportation onto the seafloor as economic ore deposits is still largely unknown. Brothers volcano is also a unique ecological site and was recently included in the world's largest marine park, hence a better understanding of the evolution of the volcano that forms the underlying basis for the marine ecology will help in their understanding of the development of life on this volcano. Awarded $1.250

Ms Lucy N. **Wenger**, Australian National University
Project: *Could coral reef fishes have evolved from seaweed-associated ancestors?*
Coral reefs support a spectacular diversity of fishes and evidence suggests many families of coral reef fishes have undergone dramatic radiations. Using the closely related genera *Macropharyngodon* and *Xenojulis* of coral reefs and seaweed meadows, this project will explore whether the *Macropharyngodon* radiation and *Xenojulis* could have arisen from a common seaweed-associated ancestor at Ningaloo Reef. *Macropharyngodon* spp have an unusual diet of benthic foraminifera and *Xenojulis* is a microcarnivore. Morphology, biology, ecology and gene sequence will be studied to determine the degree of specialisation and how the coral reef fish radiation may have evolved. Awarded $1,250

William Macleay Award for Microbiology Research

Mr Matt **Johansen**, Veterinary Science, University of Sydney
Project: *The role of cholesterol-associated genes for the early pathogenesis of* Mycobacterium marinum *in a zebrafish model.*
Johne's disease is a chronic intestinal inflammation in ruminants caused by *Mycobacterium avium* subspecies *paratuberculosis*. Once the animal is exposed, macrophages engulf the bacterium but many mycobacterial species are capable of persisting intracellularly. Research with other species has shown that cholesterol is a key requirement for establishment and persistence of infection and cholesterol is utilised by M. *tuberculosis* as a primary carbon-based energy source. Within the *M. a. paratuberculosis* genome there is a large cluster of genes with functions to do with fatty acids and cholesterol metabolism. This project will explore the genes involved in the cholesterol metabolism. Completing such studies in ruminants is not feasible hence zebrafish, a widely used model for mycobacterial infection will be used. Awarded $1,200.

Ms Valentina H. **McCormick**, University of Technology Sydney
Project: *Assessing the threat of anthropogenic impacts to seagrass meadows as a consequence of the un-coupling of seagrass-microbe associations*
Evidence suggests that ecological interactions between seagrasses and associated microorganisms strongly control the physiology, health, and function of meadows. Disruptions to the delicate balance results in declines of seagrass stocks. Seagrass meadows grow in estuaries, sheltered bays etc. and have substantial economic importance as a

nursery for fish. Anthropogenic pressures threaten seagrass meadows, particularly in Lake Macquarie where thermal and nutrient discharges from power stations occur. This study will monitor the ecological conditions and the microbial communities to determine if this method is useful as a management tool. Awarded $600

Mr Arjun **Verma**, University of Technology Sydney
Project: *Population genomics and local adaptation of toxic marine microbial eucaryotes along the East Australian Current*
Marine microbial eucaryotes (protists) are amongst the most important primary producers in the marine ecosystem. Few species cause harmful algal blooms that can contaminate food webs and seafood and pose a significant public health threat. *Ostreopsis* cf. *siamensis* is a palytoxin producing epi-benthic dinoflagellate found along 1,500 km of southeast Australian coastline and is known to produce severe toxic blooms. Population structures and variability are important to understanding the environment and for developing improved tools to monitor and predict toxic blooms. Awarded $1,200

Betty Mayne Award for Scientific Research in the Earth Sciences

Mr Kyle **Ferguson**, University of Queensland
Project: *Geochemically 'fingerprinting' fossils collected from Chinchilla, an Australian Pliocene age fossil deposit.*
The Chinchilla Sands is exposed for 65 km between Nangram and Warra, Northern Darling Downs, Queensland and is one of the richest Pliocene (5.3-2.6 million years ago) age fossil deposits in Australia. Thousands of Pliocene age fossils have been excavated from this region for well over a century and a half. However, the palaeontologial importance of the collection is still poorly understood. Adequate documentation and site localities for a substantial portion of Chinchilla material makes it difficult to determine stratigraphic positioning. The Pliocene was warmer than today but similar temperatures are predicted for the end of the twenty first century, hence understanding Pliocene ecosystems and climate has become increasingly important. Awarded $1,500.

Mr Ian **Houshold**, EPA Tasmania.
Project: *The role of meteoric versus endogenic processes in the geomorphic evolution of the Cliefden Caves landscape.*
Karst caves in southeastern Australia have developed through solution by naturally acidic groundwater. Caves and surrounding landscapes contain significant records of the development of surface and underground landforms but little consensus currently exists regarding the interpretation of these features. Earlier work focused on the history of surface/groundwater interaction e.g. the influence of gaining and losing streams, percolation flows etc. Later interpretations have emphasized the role of endogenic drivers (such as the production of sulfuric acid through oxidation of sulphides or production of carbonic acid). These processes rely on deep-sourced groundwater and are less dependent on shallow groundwater and surface land-forming processes. Resolution of these conflicting interpretations is needed. Awarded $900

John Noble Award for Invertebrate Research

Mr Thomas **Semple**, Australian National University
Project: *Phylogenetics, ecology and novel taxonomic techniques in thynnine wasps.*
There are currently 474 species of thynnine wasps listed in the Australian Faunal Directory and an estimate of at least 1000 additional known but not described species. Thynnines are depicted as a dominant group, second only to ants across much of Australia. This project aims to establish the first broad scale phylogeny of the thynnine wasps using DNA sequencing. Fresh DNA is required for some genera, requiring field work. As well, 3D imaging using the immensely promising x-ray micro computed tomography allows imaging of external and internal features of tiny organisms on the micro scale. This means a 10 mm wasp can be scanned at a 3-micron resolution, allowing examination of individual hairs. The immense datasets generated from scanning will be available to anyone for future study. Awarded $2,000.

Surrey Jacobs Award for Scientific Field Work

Mr Jack **Tatler**, University of Adelaide.
Project: *Spying on dingoes in the desert: new insights into the behaviour, energetics and resource selection of free*

*ranging dingoes (*Canis lupus *dingo)*
Determining how an apex predator, such as the dingo interacts with its environment is of paramount importance for the conservation of ecological communities, and for predicting conflicts with livestock enterprises. Behaviour in the wild under natural conditions is particularly difficult to study. This project will remotely monitor animal-attached sensors (on collars) on free-ranging individuals to determine behavioural states, make predictions about energy expenditure and understand how dingoes utilise their geographic range through time by measuring their selection of resources. Awarded $1,500.

Joyce W. Vickery Scientific Research Awards

Mr Kye **Adams**, University of Wollongong
Project: *Does recreational fishing initiate abortion in a common elasmobranch?*
Characteristics of low fecundity, late maturation and slow growth rate are shared by many elasmobranchs, including sharks, rays and their relatives. Large scale and prolonged fishing activity puts them at risk. Many sharks and rays are caught by recreational fishers, with up to 82% being discarded. A baited remote underwater video showed that fiddler rays in the no-take zone of Jervois Bay increased by 90% over 4 years when compared with a recreationally fished zone. One reason could be abortion during capture and release. Stress induced abortion is especially common in yolk-sac (aplacental) viviparous species, common in many species of rays. Southern fiddler rays have a relatively low fecundity of an average of three embryos per breeding cycle and this species is rated at high risk. This project aims to determine if abortion could be responsible for the reduced number of juveniles in fished areas where ray species are commonly discarded. The study will capture the rays by SCUBA that does not cause abortion and use ultrasound to determine pregnancy and count embryos. Awarded $1,200.

Ms Phoebe A **Burns**, University of Melbourne
Project: *Environmental determinants of smoky mouse (Psuedomys fumeus) population fluctuations.*
The smoky mouse has a disjunct distribution and is found in a wide diversity of habitats. Species in the group exhibit short-term fluctuations but whether the population is sustainable is inconclusive from the few surveys available. This study will examine seasonal variation and whether it has a relationship with soil moisture as a proxy for rainfall, since rainfall figures are not available over much of the area. Predator pressure may also be a factor as the Victorian National Parks predator abatement programs differ in the parks where this survey will be conducted. Generally, native rodents have been in decline since European colonisation. Awarded $1,800.

Mr Ricardo **De Paoli-Iseppi,** Australian Antarctic Division, University of Tasmania
Project: *Molecular biomarkers for seabird age estimation; Implications for ecological monitoring.*
The chronological age of of an animal is a critical factor in many biological processes that can change with time. In animal populations, age-class distribution is both a determinant of current growth rate and a reflection of past growth rates and may reveal the effects of harvesting and other impacting human influence.. This study will use epigenetic biomarkers that have proven successful in age estimation in mammals but have not been applied to birds. The sampling method for DNA will be validated on a population of known aged short tailed shearwater, the most abundant seabird in southern Australia. The method will then be applied to the population on Fisher Island (off Flinders Island) that has been studied and banded for 40 years. Awarded $800

Daniel C **Huston,** University of Queensland
Project: *Evolutionary radiation of enenterid and gorgocephalid trematodes in Australia*
Digenetic trematodes are a group of extraordinarily diverse parasites. Their life cycle has a main vertebrate host and a secondary invertebrate host, almost always a mollusc. There may be more than one invertebrate host. Two of the lesser-known families, Enenteridae and Gorgocephalidae have diversified almost entirely in the fishes of the family Kyphosidae. This family of circum-global herbivorous fishes is at its highest diversity in Australian waters. The taxonomy of the parasites is very confused and that of the host fishes is uncertain in many cases. Sites from north Queensland to southern Australia will be sampled and the taxonomy of the parasite studied using both morphology and molecular genetics. Awarded $800.

Ms Caitlin **Morrison,** University of Sydney
Project: *Developing toll-like receptor (TLR) markers for studying how disease impacts the orange-bellied parrot*
The orange-bellied parrot is critically endangered with only about 20 individuals remaining in a wild population. It is one of only two obligate migratory parrot species. Despite release of captivity-bred individuals and other recovery

actions, the wild population has continued to decline. Risks now include low genetic diversity, inbreeding depression, disease and loss of habitat. This project aims to develop markers for the innate immune system genes, the TLR, that can be uses in future studies to assess risks of disease. The TLRs are a family of genes involved in the innate immune system in animals and are the first line of defence against pathogens. Ten TLRs in birds have been chatacterised to date. Particular diseases may be associated with variation in particular TLRs, eg tick-borne disease with TLR2 in rodents. Two TLRs known to be associated with viral diseases in parrots will be targeted. Awarded $800.

Mr Ben A **Parslow**, Flinders University
Project: *Systematics and host associations of the Australian Gasteruption (wasps)*
This study examines the association between the wasps and their host, native bees, using molecular phylogeny to investigate possible co-evolution. The current 113 described species will be reviewed. Traps will be placed at sample sites. The traps consist of bundles of bamboo 6-10 mm wide as these bees are solitary and most nest in dead plant stems. Successfully parasitised nests will be collected and allowed to develop in the laboratory. Awarded $500.

Ms Julia **Ryeland**, Western Sydney University
Project: *Home range and fine scale habitat use of the emu: management implications for an Australian icon.*
Emus are an incredibly adaptable species and are abundant in semi-arid environments. They are known to migrate up to 550 km to areas with an abundant food supply. Emu habitat requirements have been inferred solely on presence and absence, scat densities or from farmed populations yet their home range is unknown. Emu behaviour has been deduced from farmed populations and is unknown for the wild. This project aims to gain quantitative data on home range size, genetic diversity, how they use their habitat and what their daily behaviour patterns are. How does an urban populations compare with the rural populations? This information is important in managing populations of emus. While emus are found across most of Australia, increasingly few sightings are reported from the central arid zone and the north. Is this what we would expect from climate change? Awarded $1,200.

Miss Charlotte **Simpson-Young**, University of New South Wales
Project: *Assessing the success of ecological restoration using plant functional traits*
The recovery of plant communities after disturbance from human activity is not well understood. Restoration attempts tend to be site specific and it is difficult to generalise about methods and outcomes. This project aims to use plant functional traits (PFT) to understand and predict patterns of recovery following human disturbances across habitats. PFTs (e.g. plant height, seed size, leaf architecture, tissue density etc.) relate to how plants adapt to given environmental conditions and are broadly comparable across species. The study will test the hypotheses 1) FPT diversity in remnant bushland communities around Sydney will decrease over time and 2), remnant bushland communities with high FPT diversity will also have greater resilience and capacity to persist (e.g. high resistance to invasive species and high native seedling establishment. Awarded $600.

Ms Claire **Sives**, School of BEES University of New South Wales
Project: *Microcrustacean egg bank adaptations: now and under climatic change.*
Aquatic microcrustaceans are extremophiles: when ephemeral lakes dry up, the eggs persist in baking hot, desiccated sediments in a resting egg stage. They are known to remain viable for up to15 years and thrive in the "boom or bust" conditions of Australia's harsh semi-arid zone. As lakes fill, eggs hatch and microcrustacean life explodes, driving the food web and the wetland "boom". The resting "egg bank zone" is the top 2.5 cm that may be blown away in wind storms. This project will investigate the present conditions that the egg bank survives and survival under likely conditions of a future climate change. Awarded $1,800.

Mr Joshua R. **van Lier**, Australian National University
Project: *How acute habitat disturbance affects seaweed associated fishes in Ningaloo ecosystem.*
Tropical seaweed meadows cover vast areas of coastal ecosystems and are home to a wide diversity of tropical fish. Focusing on the fish family Labridae (includes the wrasses and parrotfishes), this study aims to determine the extent of specialisation among the seaweed associated fishes and how they respond to an unseasonal loss of meadow habitat over the short (weeks) to medium (year) time scales. Canopy height of the seaweeds is an important driver of fish abundance, so canopy height will be reduced up to 50% and the fish surveyed before and after this manipulation. Awarded $1,000

Miss Maria L **Vozzo**, Macquarie University
Project: *Density dependent effects of transplanting Sydney rock oyster onto sea wslls to enhance native biodiversity*
Seawalls lack complex microhabitat and provide less surface area for organisms to attach as compared to natural habitat. Furthermore, non-native species rapidly colonise free space on newly constructed seawalls. The Sydney rock oyster is an important habitat-forming species and the complex structure provided by the oysters protects associated species such as invertebrates and juvenile fishes. Competition for space increases with density and predatory mortality decreases with density, hence oyster growth and survivorship may depend on density. Can we accelerate development of diverse native marine communities and reduce colonisation of non-native species by seeding seawalls with a habitat-forming oyster species? This study also aims to determine optimal density of oysters to use when ecologically engineering newly constructed seawalls. Awarded $500.

Mrs Catherine **Young**, Australian National University
Project: *Relatedness and extra-pair offspring in the group-living crimson finch.*
Crimson finches use rank grasslands for food and nest in *Pandanus* across northern Australia. They are the only finches to live and breed in stable colonies the year round. There is competition for mates with colonies having more males than females. The faithfulness of the males to their partners is unknown, but in other group-living species, up to 90% of extra pair paternity has been found. This project will take blood samples for DNA determination to establish paternity. Awarded $500.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 20 April, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

GEOFF BEDFORD

School of Biological Sciences, Macquarie University

THE RHINOCEROS BEETLE, THE COCONUT PALM AND A VIRUS IN THE SOUTH PACIFIC

The Rhinoceros Beetle *Oryctes rhinoceros* L. is endemic in SE Asia, & was accidentally introduced into the South Pacific area early in the 20th century. Here it has since spread widely, also to Indian Ocean locations. The cryptic behaviour of adults, and larvae, appears to facilitate its spreading. An adult bores into the heart of a coconut palm to feed on sap, & this damages immature fronds which when they unfurl show characteristic V-shape cuts which reduce photosynthetic area. Repeated attacks kill the meristem resulting in death of the palm. The beetle is thus a burden on the coconut and copra industries. Oil palms are also attacked.
Males produce an aggregation pheromone.
In the South Pacific a virus, *Oryctes* Nudivirus (OrNV) was released many years ago in a number of countries – it became established & significantly reduced rhinoceros beetle populations and damage. There is evidence this reduction persists long-term.

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Wednesday18 May, at 6 pm, in the Classroom, Royal Botanic Gardens.
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

Dr KATIE COLEBORN

University of New South Wales

STALAGMITES: AN ARCHIVE OF FIRE HISTORY?

Wildfires dramatically change the surface environment by removing vegetation and soil microbial communities and altering soil structure and geochemistry. Karst subsurface processes such as dissolution, cave formation and speleothem deposition are sensitive to environmental change, precisely why speleothems have been widely used as recorders of surface and climate change at an annual to millennial temporal scale. The effect of fire on karst processes is poorly understood. We hypothesise that a wildfire induced change at the surface will impact karst dissolution and precipitation processes. Firstly, sterilisation of the soil by heating causes a reduction in soil CO_2 concentration which is a key component in dissolution processes. Secondly, removal of vegetation alters surface albedo and soil water storage properties. This could change the hydrology and isotopic signature of speleothem-forming drip water. We also hypothesise that a wildfire will produce a unique biogeochemical signature due to a change in the organic and inorganic properties of soil, which can be transported into speleothem forming drip water. Quantifying the biogeochemical signature from a burnt landscape enables us to determine whether this wildfire signature is preserved in speleothems. This could provide the opportunity to use speleothems as recorders of fire history for the first time. Determining the impact of fire on karst processes also informs fire management and karst conservation policies.

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Wednesday 20 July, at 6 pm, in the Classroom, Royal Botanic Gardens.s
Enter through the gate to the Herbarium Carpark, on Mrs. Macquaries Rd.

LINNEAN MAC,EAY MEMORIAL LEDTURE

Dr MIKE CRISP

Australian National University University

ASSEMBLY OF THE AUSTRALIAN FLORA OVER THE LAST 65 MILLION YEARS: WHAT WE HAVE LEARNED FROM DNA

Australia has a mostly dry, open, fire-shaped landscape of sclerophyllous and xeromorphic flora dominated by eucalypt and acacia trees, with diverse shrubs from a few families such as Myrtaceae, Proteaceae, and Fabaceae. Our work uses molecular phylogenies to test hypotheses derived from the fossil record. I will describe our improved understanding of the principal forces that transformed the ancestral Gondwanan rainforest through the Cenozoic to today's vegetation.

****

Refreshments will be served from 5.30 pm

Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 160 **JULY 2016**

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IN THIS ISSUE

NEW MEMBERS: We welcome

Mr Harrison Burkitt, Sydney University. Fields of interests: geology, conservation of Cliefden caves, everything in natural science.
Mr David Max, University of Technology Sydney. Fields of interest: microbiology, biology, virology, toxicology.
Ms Nasim S Mohammadi, University of Technology Sydney. Fields of interest: marine molecular biology; climate change; heavy metal pollutants.

DONATIONS FROM MEMBERS

The Society has received generous donations to the research funds from the following members: Mr Kye Adams, two anonymous donors, Dr John Barkas, Mr Stephen Johnson, Prof David Keith, Dr Murray

Littlejohn, Prof R.A.L. Osborne, Prof L. Selwood, Mr W.S. Semple, Dr Helen Smith and Mrs Karen Wilson. The Sisters of Saint Joseph has also made a generous for research. These donations are much appreciated and will benefit students.

HAYLEY BATES: NEW COUNCIL MEMBER

Hayley is an Associate Lecturer at the University of NSW. She recently submitted her PhD on Assessing environmental correlates of populations of the endangered Mountain Pygmy-possum (*Burramys parvus*) in Kosciuszko National Park. Her research interests include conservation biology, palaeontology, phylogenetics, biogeography, evolutionary biology, adaptation and ecology. She is currently a research member of the *Burramys* Project and a Council member of the Royal Zoological Society of New South Wales.

VALE ALEC WOOD

Dr Alec Wood, a member of the Linnean Society of NSW since 1968, was a long-standing member of the School of Botany, and then the School of Biological Science. He was one of the last whose employment commenced at Ultimo. prior to the move to Kensington. He was the Director of First Year Biology for many years, and taught mycology to generations of students. Back in the days when the students produced the 'alternative handbook', he was chosen one year for a profile, which as well as praising the course said of Alec, that his humour was always appreciated, especially when it was a 9 am lecture on a Monday morning. In the tea room, Alec bemusedly commented that he never told jokes in lectures!

Since retirement he actively continued his research on the taxonomy and distribution of Australian macrofungi, and at the time of his death was writing a major revision of one of his favorite groups, the genus *Cortinarius*.

Paul Adam

LINNEAN MACLEAY MEMORIAL LECTURE

Dr Mike Crisp of the Australian National University will give the Linnean Macleay Memorial lecture on the 20th of July 2016. Dr Crisp studied long-term change in the arid zone and will described our improved understanding of the principal forces that transformed the ancestral Gondwanan rainforest through to today's vegetation. See the program for further information.

THE RHINOCEROS BEETLE, THE COCONUT PALM AND A VIRUS IN THE SOUTH PACIFIC, A talk by Dr Geoff Bedford.

Dr Bedford was a member of the CSIRO Division of Entomology. He then joined the International Project for Research on control of Coconut Palm Rhinoceros Beetle and worked in Samoa, Madagascar, Papua New Guines and Fiji.

Coconut palms are important commercially in the small Pacific Island states where there is not much else that creates employment. When the palms are small enough, the nuts are harvested green for markets and eating. When the palms become too tall for the nuts to be harvested from the ground, the nuts are left on the tree until they fall off, for then there is maximum development of the endosperm, the copra. The nuts are split open, and left to dry before being bagged and transported for processing to extract the coconut oil.

The rhinoceros beetle (*Orycetes rhinoceros*) was introduced into Samoa in1909 but it did not take off until after World War 2 and then spread through much of the Pacific. The adult beetle flies to the top of the palm, bores a hole and feeds on the sap. The hole damages the immature leaves and when they emerge, the leaves have a characteristic notch of missing frond that results in reduced photosynthesis and production of nuts. If the palm is damaged repeatedly, it dies and the top of the pole becomes a breeding ground for the rhinoceros beetle.

The rhinoceros beetle originated in south east Asia and while it seems to prefer coconut palms, it will attack other palms, including ornamentals. The adults hide in holes during the day and are nocturnal, hence go un-noticed until the damage to the fronds appears. The larvae also go un-noticed at the top of the palms.

Research shifted from coconut palms in the Pacific to oil palms in south east Asia where it is a pest. In the oil palm plantations, bunches of soft green fruit are harvested, and when the palms get too high to be worked from the ground, the palms are cut down, shredded, used for mulch and young trees replanted. The mulch becomes a breeding ground for the beetle.

There are three methods of control: the first is a fungus pathogen that kills both larvae and adults. It worked well in the laboratory, but in the field, it did not spread to the breeding grounds at the top of the palms. It is, however, a good control for the oil palm mulch that is inoculated with the fungus.

Attempts to eradicate the virus have not been successful. In Suva, they tried putting insecticide into the crown of the palm. To do this, someone had to climb the palm, but they used spiked shoes and this damaged the trunk, creating more entry points for the virus. Inspection of copra being shipped attempted to prevent the spread of the beetle to other islands, but it was not successful. Since the beetle is nocturnal, loading of cargo was restricted to daylight hours.

A pheromone has been synthesised and is put in traps to catch the beetles. It is not used much in the south Pacific because of the low level of infestation but is used routinely in oil palm plantations.

A virus disease discovered in Malaysia kills the beetles. When swallowed, the virus multiplies in the gut and passes out with the faeces to infect other individuals. The virus is most effective where the infestation and damage is the highest. The virus particles do not survive long in the wild, limiting its spread, but trapped beetles are infected in the laboratory and then released to spread the disease. The virus is harmless to other insects, animals and vertebrates.

All this work was done some 30 or 40 years ago and the management practices have received little attention in recent years. Dr Bedford recently visited the sites he worked on to see if the control measures were still working. He found the palms that had been badly damaged now looked healthy, with very little sign of new damage to the fronds. The beetles were still present, but in low numbers and the control measures were self-perpetuating.

STALAGMITES: AN ARCHIVE OF FIRE HISTORY? a talk by Katie Coleborn

Katie Coleborn gained a BSc with Honours in Environmental Science at the University of Birmingham and as part of her degree, she spent a year in a research placement at the University of New South Wales in the Connected Waters Initiative Research Unit. Since completing her degree, she has worked as a Research Associate at UNSW and has now gained an International Research Scholarship to do her PhD.

Fire is a destructive force and an environmental modifier but it is necessary for the maintenance of certain ecosystems. Wildfires remove the vegetation and soil microbial communities and alter soil structure and geochemistry. It is important to understand these changes and how they impact on the fire history.

In karst landscape,water percolates through the soil, finding its way through cracks in the limestone and may eventually drip down in a cave to form speleothems. Stalagtites and stalagmites are common forms of speleothems. Dissolution processes form caves and there are many factors involved, but the primary needs are water and carbon dioxide (CO_2). When the water drips down in the cave, the CO_2 outgasses and the dissolved minerals are deposited on the speleothem. Speleothems are built up in layers like tree rings and are archives of the environment. They have been used to deduce valuable palaeoclimate records.

The layers may be different colours, and there are many causes of colouration. Black layers are most noticed especially around cave entrances. It is often thought that fire has caused the black layers but analysis has shown no evidence of burnt particles or of aromatic compounds that could be attributed to smoke. It is probably manganese oxide and humic acid compounds. Black layers in flow-stone in Yarrongabilly caves have no trace of burnt material. Colouration may be due to vegetation die-back and decay in times of drought

Removal of .the vegetation with burning results in lower CO_2 in the soil and this effect is still present some 5 to 10 years after the fire. With less vegetation, less water is used in transpiration and initially, increased soil moisture leads to increased runoff and recharge. There is also a greater hydrological response to rainfall intensity without the buffering effect of the vegetation. Post-fire recovery is dictated by the recovery of the vegetation. The lack of vegetation after a fire also changes surface temperatures, evaporation, shading and albedo that all have some effect on the soil, with a potential to alter the drip water and impact on speleothem growth.

Analysis of the drip water shows a spike in the concentration of the minerals released from the ash. These levels fall as the vegetation recovers and uses the minerals. The release of sulphur is perhaps the most promising proxy. Dissolved organic carbon may indicate the severity of the fire with very high values the result of intense fires.

The changes in the soil after fire have been investigated with experiments. A column of soil taken after a control burn was irrigated weekly for five weeks and the drip water analysed for combustion by-products. Adding a layer of limestone beneath the soil simulated karst. Whether the experimental evidence is a good representation of the processes in the field will have to be tested.

Work continues to assess stalagmites for records of fire history. It may be that a change in land use will produce at least some of these changes in soil water after fire. The next stage of the program is to test stalagmites in an area with a known fire history.

G.A. WATERHOUSE OF ALLOWRIE

Eryldene, the home and garden of Professor E.G. Waterhouse ('Gowrie') at Gordon has been conserved and is renown for its camellias. E.G. Waterhouse had an older brother, G.A. Waterhouse ('Athol') who had a similar large house and garden called Allowrie at Killara. Graham D. Rushworth grew up in Killara and knew Athol and his garden that he considers equally worthy as Gowerie's Eryldene. Sadly, Allowrie has not been conserved and has been sold off and subdivided. Rushworth records the life and times of Athol and his garden at Allowrie. G.A. Waterhouse, Athol, was a Council Member of the Linnean Society of NSW from 1912 to 1943 and President from 1921 to 1923.

Athol attained a Bachelor of Science (1899) and a Bachelor of Engineering (1900) from Sydney University and was appointed Assistant Assayer at the Sydney branch of the Royal Mint. He had many extra-mural interests and foremost amongst them was his passion for butterflies. While his garden contained many plants of interest, it was a garden designed to attract butterflies and there were plentiful food plants for the larval stages.

Prior to the 1950's, Killara and Gordon were small settlements extending one or two kilometres from the railway line and surrounded by bushland. Some of the ridges retained their original sclerophyll forest with a rich diversity of native plants that were the best collecting spots for butterflies. About 100 species of butterflies could be found through the year. At times, the abundance of some species was quite remarkable and annual migrations would pass through Killara. Other native insects, birds, mammals and reptiles were diverse and plentiful.

Athol named over 400 species of butterflies and wrote the book 'What butterfly is that?'(1932). He had extensive collections and ran a breeding program to hybridise subspecies. His work was acknowledged with the Doctor of Science and the University Medal from the University of Sydney (1924). Athol encouraged and inspired enthusiasm among young butterfly collectors and budding entomologists.

He was also a member and one time president of the Royal Zoological Society and an Elective Trustee of the Australian Museum. He also held positions on the Economic Entomology division of the Commonwealth Council for Industrial and Scientific Research, the Australian National Research Council and ANZAAS. Athol died in 1950 and urbanisation since then has left no trace of his garden, and with extensive loss of habitat, very few of the butterflies are seen today.

Reference

Graham D. Rushworth (2016). G.A. Waterhouse of Allowrie – Dr Waterhouse's Garden (Upper Caboolture, Queensland)

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LINNEAN MACLEAY MEMORIAL LECTURE

Dr MIKE CRISP

Australian National University

ASSEMBLY OF THE AUSTRALIAN FLORA OVER THE LAST 65 MILLION YEARS: WHAT WE HAVE LEARNED FROM DNA

Australia has a mostly dry, open, fire-shaped landscape of sclerophyllous and xeromorphic flora dominated by eucalypt and acacia trees, with diverse shrubs from a few families such as Myrtaceae, Proteaceae, and Fabaceae. Our work uses molecular phylogenies to test hypotheses derived from the fossil record. I will describe our improved understanding of the principal forces that transformed the ancestral Gondwanan rainforest through the Cenozoic to today's vegetation.

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Wednesday 21 September at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

A/Prof IAN GOODWIN

Climate and Coastal Risk, Macquarie University

EXPANSION OF THE TROPICS – CLIMATE WINDOWS FOR POLYNESIAN VOYAGING AND COLONISATION OF THE PACIFIC

A signature of modern climate change is the poleward expansion of the tropics, but has it happened in the recent millennia? A/Prof Ian Goodwin will describe how his group at Macquarie University have reconstructed the Pacific climate, decade by decade for the past millennium. He will describe how climate change opened windows of opportunity for Polynesian seafarers to use changing windfields to voyage and colonise the Pacific, in particular, Easter Island and New Zealand, during the Medieval Period.

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Wednesday 19 October at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

A/Prof JES SAMMUT

School of Biological, Earth and Environmental Sciences, University of New South Wales

A/Prof Sammut has introduced fish farming to Papua New Guinea and changed lives.
More information in the September newsletter.

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Refreshments will be served from 5.30 pm
Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 161 **SEPTEMBER 2016**

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IN THIS ISSUE

NEW MEMBERS: We welcome

Mr Daniel R Sloane of Macquarie University. Fields of interest: biology, botany, environmental science and management, natural sciences and ecology.

AUSTRALIAN NATURAL HISTORY MEDALLION AWARDED TO MAX MOULDS.

Congratulations to Max Moulds who has been awarded the Australian Natural History Medallion for 2016. The Field Naturalists Club of Victoria awards the Australian Natural History Medallion to the person judged to have made the most meritorious contribution to the understanding of Australian Natural History. Max is a foremost authority on cicadas and has published many books and papers. He is a member of the Linnean Society and was once on the council

OCTOBER LECTURE BY A/Prof JES SAMMUT

Details about Prof Sammut's lecture were not available in the last newsletter. See Page 7 for the abstract on his talk about fish farming in New Guinea, to be given on 19th October.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2017. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 15 November, 2016

REPORTS FROM THE RECIPIENTS OF RESEARCH GRANTS

It is a condition of an award that the recipient reports the results to the Society. Some have had their work published and others are preparing papers for publication.

Mr Kyle **ADAMS** (University of Wollongong) studied site fidelity and habitat preference of the banjo shark *(Trygonorrhina fasiatata).* This species is a by-catch in commercial fishing and with low fecundity, late maturity and slow growth rate, it is at risk of overfishing. Recent work focuses on the management of the commercial by-catch: this project aims to assess the impact of recreational fishing. The abundance of this species in a no-take zone increased by up to 90 % down to a depth of 10 m when compared with a fished zone, and there were many more juveniles and larger individuals. The increase varied with depth, but it was always positive. Most individuals stayed within a relatively small area.

Mr Peter **BOND** (University of Queensland) investigated the inshore environments ruined with marine debris. The broken-down fragments of plastic are of particular concern because they can be ingested by marine life. The diet and feeding habits of the hardyhead was studied to assess the impact of plastic pollution. The hardyhead is commonly found in bays and estuaries in calm shallow waters and are preyed upon by many commercially important fish species and water birds. The gut contents contained microplastics that appear to have come from their prey – a diversity of zooplankton.

Miss Kiralee Jane **CHAPLIN** (Museum of Victoria/University of Melbourne) studied the taxonomy, ecology and conservation genetics of grassland earless dragons (Agamidae, *Tympanosryptis* spp) in Queensland. A field trip found the Northern Darling Basin lineage of earless dragons in several localities. Preliminary data has suggested that this is indeed a hybrid species, likely to have arisen from a historical hybridisation event millions of years ago between *T. condaminensis* and *T. tetraporophora.* Continued divergent evolution appears to have occurred since this hybridisation event.

Mr Timothy Lindsay COLLINS (University of New England) studied the genetic diversity and taxonomy of the rare and endangered *Eucalyptus magnificata* L.A.S Johnson and K.D. Hill (Myrtaceae). The northern populations near Tenterfield and Warwick are thought to be different varieties but they may be new species instead of part of a larger more genetically diverse population with a greater demographic range. This study has found that a modified method of extraction uses a far smaller leaf sample and far less solvent, and that dried herbarium samples retain their leaf oil profiles for up to 44 years. There are three distinct chemotypes within *E. magnificata* that can be distinguished from the closely related taxa *E. baueriana, E. conica* and *E. polyanthemos.* A paper has been submitted for publication.

Belinda **FABIAN** (Department of Biological Sciences, Macquarie University) investigated extrafloral nectaries and their nectar production. The extrafloral nectaries on the leaves attract ants that provide protection from herbivores in return for the nectar. The morphology of four species of wild cotton (*Gossypium* spp) with abundant nectaries that produced copious nectar was investigated. The nectaries secrete sugary nectar but the sugar composition is different to that in the phloem sap. The nectar also contains some amino acids and proteins. Thus the nectaries have processed the phloem sap. About 1% of the carbon fixed by photosynthesis is secreted as nectar. The investment in nectar from extrafloral nectaries does not change in experiments with elevated carbon dioxide.

Ms Jodi **FOX** (University of Tasmania) surveyed the physical volcanology of the Cenozoic volcanics of northwest Tasmania. Field work has established a complex succession of pillow lavas, sills, lobate lavas, volcanic breccia and tuffs at Cape Grim, northwest Tasmania. All of the units were deposited in a submarine environment and were emplaced in relatively rapid succession. Argon dating will establish the ages of the units.

Mrs Anuradhi **JAYAWEERA** (Macquarie University) studied the effect of sexual cannibalism on male ejaculatory expenditure in the false garden mantids (*Pseudomantis albofimbrata*). The females attack the male prior to copulation and only about 40% of males succeed in transferring sperm to their partners. Males do not seem to have evolved any defensive mechanisms such as preference for less risky females. Tests compared the number of sperm transferred by males in non-cannibalistic matings, in cannibalistic matings and in experimentally manipulated headless matings. Cannibalised and headless males behaved similarly and transferred significantly more sperm than uncannibalised males, suggesting cannibalised males invest more/all of their sperm and that the removal of the head might play a role in triggering this increased sperm allocation.

Dr Anne **KEMP** of Griffith University investigated the reason why there is no recruitment of lung fish in water storage areas. Most lung fish now live in dams where there is little submerged aquatic plants that are plentiful in shallow flowing streams where they would normally breed. Eggs were collected from three water storage areas and the development of the embryos studies in the lab. Many young embryos are grossly abnormal and if they hatch, they do not live for long. Pollution is unlikely to be the cause of deaths as the pollutants are different in each of the dams but the abnormalities are the same. It is more likely that the adults are unable to find enough nutritious food to stock the eggs with sufficient nutrients for normal development. Lungfish are unable to synthesis their own volatile fatty acids and rely on obtaining them from food rich in these nutrient, viz. snails and clams. There are very few snails and clams in water storage areas.

Ms Melanie **Laird** (University of Sydney) investigated the uterine changes in preparation for pregnancy in the marsupials the fat tailed dunnart, the brush-tailed possum and the tammar wallaby. For live birth, the surface cells of the uterus must undergo remodelling to allow implantation of the embryo and this process is essential in eutherian mammals. In the brush-tailed possum, microscopy identified distinctive secretive morphological changes before implantation. The changes that are likely to be essential for implantation and remodelling is remarkably similar for all mammals. An adhesive molecule, talin, is essential for implantation in the rat and is present in the marsupials but has different actions. Unlike both the rat and the fat-tailed dunnart, in the tammar wallaby, the embryo is non invasive, i.e. it does not penetrate the uterine tissue. It is likely that talin plays a more species-specific role in marsupials. A publication is being prepared.

Miss Michaela **LARSSON** (University of Technology) Ciguatera fish poisoning results from eating contaminated fish and it is a problem world wide. There have been large outbreaks in Australia with two fatalities and more than 1400 cases documented in the last 50 years. Ciguatoxins are produced by dinoflagellates from the genus *Gambierdiscus* that was thought to be monospecific, but molecular techniques have defined at least 12 species. This project aimed to identify the strains isolated from Australian waters using molecular methods and to characterise the toxin profiles of each strain. Two sites were sampled: Heron Island Qld within *Gambierdiscus'* known tropical range and a temperate inlet in NSW, the most southerly population in Australia. Eleven strains were isolated from Heron Island and five strains from Merimbula. Species identification of these strains is in process. The ciguatoxin profile for each strain has been established. None of the 16 strains isolated produced ciguatera toxin but most produced a type of maitotoxin. The strains isolated from Merimbula are of particular interest because they did not produce any detectable toxins.

Ms Rachel **Levin**, University of New South Wales studied the genetic and physiological basis of coral bleaching. Corals rely on their symbiotic dinoflagellates (*Symbiodinium* spp) for photosynthesis and different populations of *Symbiodinium* can confer differing levels of heat tolerance on their host. A heat sensitive and a heat tolerant strain were kept at 32°C and both showed no physiological stress for nine days, but both displayed up-regulation of meiosis genes that promote adaptation. After 13 days, the heat sensitive population suffered a significant decrease in photosynthesis and a leakage of reactive oxygen species (ROS) from the cells. Only the heat tolerant population showed an up-regulation of the ROS scavenging genes and directly correlates to susceptibility to coral bleaching. This work has been published.

Levin, R.A., Beltran, V.H., Hill R. et al (2016). Sex, scavengers, and chaperones: Transcriptome secrets of divergent *Symbiodinium* thermal tolerance. *Mol. Biol. Evol.* Advance Access, July 3 2016

Mr Timothy **Morris** (University of New South Wales) aimed to show that an apex predator has cascading effects on vegetation and nutrients. The dingo exclusion fence provides an ideal opportunity to study areas with and without dingoes. Kangaroos grazing effects are high inside the fence where they are largely free of predation and low outside of the fence where they coexist with dingoes. Inside the fence, where dingoes are rare and kangaroos abundant, grass growth was consistently less than outside the fence, where dingoes are common and kangaroo herbivory is low or non-existent. Soil nutrients displayed similar patterns: less inside the fence than outside the fence. There is thus a link between top predator and basic ecosystem processes. This challenges widely held views that bottom-up forces largely control ecosystem functioning and gives support for top-down forces as the dominant regulator of ecosystems. These findings have social and economic relevance: dingoes could be enlisted for conservation of native species and the rehabilitation of degraded land. Cattle raising would benefit economically from dingoes through suppression of kangaroos, but the calves would be subjected to predation. The impact of dingoes on sheep can be devastating. Farmers usually regard dingoes as pests and it would be hard to convince them of their ecosystem benefits.

Mr Matt J. **NIMBS** (Southern Cross University). The biogeography of heterobranch sea slugs in south-eastern Australia. The sea slug distribution is well known near major population centres but not elsewhere. This project made a comprehensive study of some 580 species of sea slugs around the coast of New South Wales and southern Queensland. The results will provide a database for changes in distribution that might occur with climate change. Sea slugs are found mainly in tropical marine areas and species diversity decreases with latitude. This study shows that the Sunshine Coast, Coffs Coast, Port Stephens and Sydney have peaks in diversity. Port Stephens hosts the southern range extensions for twelve species, one species being 2,200 km south of its present accepted southern extension of the northern Great Barrier Reef. This work is being written up for publication.

Miss Mae Marjore NOBLE (Australian National University) investigated the population biology and ecology of the threatened Murray crayfish in upland streams. Murray crayfish are relatively well known in their lowland habitat but little is known about their population biology in upland streams. This is concerning because spiny crayfish are though to play an important role in nutrient recycling and trophic linkages in freshwater ecosystems. Ms Noble found that the Murray crayfish are habitat specialists that display a strong habitat preference for intermediate water flow velocity, deeper pools, areas with a high percentage of overhanging vegetation and a streambed of gravel and boulders. Major shifts in their preferred habitat conditions have resulted in a 91% decline in the preferred pools over a six year period. The threatened Murray crayfish are particularly sensitive to changes in their preferred stream habitat conditions. This work has been published:

Noble, M.M. and Fulton, C.J. (2016). Habitat specialisation and sensitivity to change in threatened crayfish upland streams. *Aquatic conservation: marine and freshwater ecosystems.* DOI: 10.1002/aqc/2620

Ms Parisa NOORIAN (University of New South Wales) investigated an iron-dependent antiprotozoal factor in *Vibrio vulnificus* *V. vulnificus.*is an opportunistic pathogen responsible for septicaemia following ingestion of contaminated raw oysters and wound infections on exposure to infected seawater. It has the highest reported mortality rate for seafood related diseases. It inhabits coastal marine environments where it is exposed to protozoan predation. Bacteria evolve anti-protozoal mechanisms that may increase its virulence. One strain of *V. vulnificus* shows toxicity towards a filter-feeding ciliate but this toxicity is dependent on iron in the media. The aim of this project was to identify the genetic factors that contribute to the survival of *V. vulnificus* in its natural environment. Experiments showed that of the many strains of *V. vulnificus,* only one was resistant to grazing by the protozoans. A total of 255 genes were expressed differentially in iron depleted conditions. Some of the genes are involved in ammonia production that is also toxic to protozoans. Work continues on the evaluation of other secondary metabolites.

Mr Niels **RUEEGGER** (Southern Cross University) studied roost selection by Australian tree hollow-using bats. Many species of microbats use tree hollows for shelter and daytime resting, and females congregate in large hollows for breeding. Land clearing for any use means loss of habitat for the bats. Several designs of bat boxes were tested and multi-chambered, narrow boxed were the best, at least for some species.

Mr Ryan **SIMS** (School of BEES, University of NSW) studied the critically endangered box gum grassy woodland and its response to exclusion of livestock. Only about 10% of the once widespread box gum grassy woodland remains and it is subjected to numerous restoration projects. Mining approval requires that large areas of woodland and secondary grassland be offset and rehabilitated, and there are other restoration projects as well. The most cost effective method removes the stock and hopes that the ecosystem will recover. Numerous projects have shown that this results in poor restoration and suggests a legacy of problems from past farming practices. Fenced areas have been set up to test several hypotheses about restoration, but it will take several years for the results to develop.

ASSEMBLY OF THE AUSTRALIAN FLORA OVER THE LAST 65 MILLION YEARS: WHAT WE HAVE LEARNED FROM DNA: the Linnean Macleay Memorial Lecture, given by Dr Mike Crisp.

Analysis of the DNA gives us a molecular phylogeny that can then be tied in with environmental change over the last 50 million years (my). During this time, Australia went from mostly rainforest that contracted about 15 my ago, to mainly sclerophyllous heath to largely desert during the glacial cycles of the last 2 my.

The DNA records the story of life. Some of it does not change: some *E. coli* DNA is the same as ours. Some other DNA is species specific. By comparing the DNA of two species, we know their evolutionary changes since they last shared a common ancestor, millions of years ago. By working out how fast the molecular clock ticks, we can reconstruct when evolutionary changes in lineages occurred. The molecular clock is considered more reliable now that key points are matched up with the fossil record.

Livistona, the fan palm has eighteen species in Australia. The DNA shows the first common ancestor migrated into Australia 10-20 my ago. In southeast Asia, its homeland, it is mainly found in ever-wet rainforests, but in Australia it inhabits monsoonal environments. It is usually found in gallery forests along watercourses. The monsoon adapted lineage thrived in northern Australia

Australia drifted away from Gondwana some 30 my ago. This separation fragmented the flora of the southern lands (vicariance). So the big question is: did Australia's unique flora evolve in situ from this remnant of the old Gondwanan flora or did it migrate in from elsewhere? Most of the Australian flora has relatives elsewhere. If the age of the common ancestor is less than 30 my, then migration into Australia is a possibility. The fan palm example given above migrated in from southeast Asia.

The DNA shows that 95% of the flora migrated in from elsewhere. This leaves only 5% for vicariance. Examples of vicariance are *Nothofagus*, different species in Australia/New Guinea and in South America: *Callitris* in Australia and the closely related *Fitzroya* in South America: Proteaceae, Casuarinaceae, *Eucalyptus* and Bossiaceeae (Fabaceae). Examples of migrants into Australia are *Brachychiton*, *Solanum*, *Olearia* and *Cycas*. The position of *Acacia* is uncertain as it is borderline.

This is a surprisingly high percentage of the flora that migrated into Australia. Propagules must have somehow crossed large tracts of ocean between the southern continents and Asia. Was it storms, tsunamis or birds? We don't know, but the evidence is that it happened. It was probably more important that the propagules found a suitable ecological niche for them to become established at the new location.

Much of the Australian flora is fire-adapted and rapidly recovers from being burnt. Eucalypts have epicormic buds under the bark that sprout out after a fire. There are other means of recovery: seeds may be held in hard woody capsules that only open after a fire and while the above ground parts of the plant are burnt off, the root stocks survive and readily re-sprout.

Remarkably, *Eucalyptus* fossil flowers and fruits 52 my old have been found in Patagonia, in a volcanic landscape next to rainforest, surrounded by a caldera lake. Phylogenetic analysis of the fossil morphological features combined with a sequence study of extant eucalypt species confirms that it is nested in *Eucalyptus*. This is the oldest fossil record of *Eucalyptus* and fire adaptation probably evolved soon after it moved out of the rainforest. The family Myrtaceae originated in rainforest and *Allosyncarpia*, the nearest relative to *Eucalyptus*, lives in rainforests of Kakadu, and it not fire tolerant.

Fire has been part of the environment for a very long time, more than 60 my. Charred cellular structures have been found in a late Cretaceous deposit in central Australia, where the pollen and leaf fragments indicate a burnt heathland. Fire frequency was higher in the late Cretaceous/ Palaeocene (approximately 65-55 my ago) but decreased when the climate became wetter in the Eocene (55-45 my ago).

About 25 my ago, the climate was very wet, and there was a gradient: wetter in the south east and drier to the north west. The climate became drier about 22 my ago. The gymnosperms did not handle this change very well and there were many extinctions of the conifers that required wet habitats. A few lineages adapted, e.g. *Callitris* and *Macrozamia* are found in central Australia today. Angiosperm lineages were not so badly affected. Xeromorphic traits developed, such as sunken stomates (*Casiuarina* stems, *Banksia* leaves) and rolled leaves (*Triodia*) that protect the stomates.

The sclerophyll biome became widespread as the climate dried. Sclerophyll usually requires acid soils, hence when the limestone of the Nullabor was uplifted about 14 my ago, it split the southern sclerophyll biome into southeastern and southwestern communities, and species could diverge. The monsoon biome is also young, possibly up to 39 my old. There have been multiple shifts of eucalypts into the monsoonal biome. Migrants from Africa and south east Asia may have come pre- adapted to the monsoonal climate, e.g. *Adansonia* and *Cycas*.

Triodia is dominant in the arid zone and while it is a grass lineage, it is really a shrub and gives shelter to many animals. Some species have stomates only on one side of the leaf and when the leaf rolls up, the stomates are enclosed. This is very important for the water economy. A trait such as this may allow the lineage to change habitat, but it may arise as an adaptation after moving into a new habitat.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 19 October at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

A/Prof JES SAMMUT

School of Biological, Earth and Environmental Sciences, University of New South Wales

TRANSFORMING DIETS AND LIVES IN THE HIGHLANDS OF PAPUA NEW GUINEA THROUGH FISH FARMING

More than 80% of people in Papua New Guinea (PNG) are unemployed and live on less than $1.50 a day. Despite an abundance of natural resources to produce food, access to protein is limited leading to nutritional deficiencies. Many rural people successfully produce vegetables crops, but livestock and animal production is uncommon or small-scale. In the absence of refrigeration, slaughtered farmed animals, such as pigs and chickens, usually need to be consumed immediately. Pigs are often kept only for ceremonies and do not provide a regular source of protein. Fish farming is an emerging industry in PNG. Sustainably farmed fish can provide access to protein on a regular basis, and small ponds can be excavated in vegetable gardens and potentially utilise garden refuse as fish feed. Nevertheless, fish farming in PNG is not currently as productive or profitable as in nearby countries. The Australian Centre for International Agricultural Research (ACIAR) has funded a series of inland aquaculture projects that aim to develop the industry sustainably, and to reduce the cost of formulated feeds and dependency on fishmeal as a source of protein in feeds. The current project is conducting research on sustainable and alternative feeds, and ways of improving fish farming practices, broodstock management and fingerling production. In my presentation I will give an overview of the research and also outline social impacts of fish farming, particularly how it has transformed the lives of villagers. I will discuss our past and current projects' Fish for Prisons and Fish for Schools programs, our outreach activities in remote communities, working with Raskol gangs, drug addicts, criminals and urban youth programs, and using fish farming as a means of developing human capacity. The presentation will be illustrated with images of people, communities and fish farming practices.

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Refreshments will be served from 5.30 pm
Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 162 **DECEMBER 2016**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Membership renewal form
Minutes of the Annual general Meeting, 23 March 2016

NEW MEMBER: We welcome Mr Andrew Carr. Field of interests: Natural history, botany, biodiversity and Australian flora and fauna.

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.

A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.
The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN
If you have already renewed your membership for 2017 or are a life member, please disregard this notice

E-MAIL COPY OF THE NEWSLETTER

Now that postage is $1 per newsletter, if you are still receiving a paper copy we would appreciate it if you changed over to an e-mail copy. Please send your email address to h.martin@unsw.edu.au. If you do not have e-mail, we will continue to send you a paper copy.

AUSTRALIAN ALPS SYMPOSIUM

The Society is organizing a symposium on the Australian Alps for 11-12 December 2017, in the theatre adjacent to the National Park Visitor Centre in Jindabyne. Field trips in the Kosciusko region are being planned. Future newsletters will have further information about the symposium.

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page:
http://linneansocietynsw.org.au
Intending applicants please read instructions carefully and submit your signed application by email to
linnsoc@iinet.net.au
The date for submission of applications for all the funds is 1st March 2017.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:
- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to $2,300 is available to members of the Linnean Society of New South Wales and $1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2017.** Submit your signed application by email to linnsoc@iinet.net.au

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of the earth sciences.

Applications will be accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth Sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable; and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members will be given preference.

Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March, 2017.** Submit your signed application by email to linnsoc@iinet.net.au

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- Realistic costing and timetable
- The quality of the project
- The applicant's ability to carry it out
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed $2,500 for Members of the Linnean Society of New South Wales and $1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project, and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

An application form may be obtained from the website or from the Secretary of the Society. The application may contain no more than three (3) pages of additional information plus references.

The Society's decisions are final and no correspondence will be entered into about the results.

Closing date is **1 March, 2017.** Submit your signed application by email to linnsoc@iinet.net.au

EXPANSION OF THE TROPICS – CLIMATE WINDOWS FOR POLYNESIAN VOYAGING AND COLONISATION OF THE PACIFIC: a talk given by A/Prof Ian Goodwin

Hot air rises at the tropics and moves north and south, to sink back again when it has cooled down (the Hadley Cell). When temperatures are warmer, the Hadley cells expand further towards the poles, and this produces the tropical expansion. Thus the width of the tropical zone expands when temperatures are warmer, and there are more tropical influences, like our present weather patterns. The rains come down from the north and the climate is more like summer. When temperatures are cooler, the tropics contract, and the cold air from Antarctica moves further north and it is more like winter. We are currently in a tropical expansion.

The tropics contracted 60,000 to 80,000 years ago and this would have brought drought that stimulated migration. This was the time people migrated of Africa. Then 50,000 to 60,000 years ago, the tropical contraction stopped and migrations stopped as well. Then 3,500 to 3,000 years ago, Polynesians migrated eastwards, but only as far as Tonga. This migration is known as the Lapita voyage that is distinguished by its culture of distinctive pottery and houses on stilts over water. Then in 1025 to 1120 AD, Polynesians migrated further east to the Society Islands and the Gambiers. Then in 1190 to 1290 AD, they voyaged further to New Zealand, Hawaii and Easter Island.

Anthropologists have attempted to explain these migrations but all of these attempts are based on modern windfields. Thor Heyerdahl built a raft and re-enacted a journey from South America to Easter Island, taking advantage of the easterly trade winds. Today, the trade winds are predominantly from the east, making journeys from the west very difficult or impossible. Today, travel from island to island is only possible in the spring, at a time when the subtropical trade winds are at their strongest and avoiding the cyclone season. Modern yachts have a lee board that allows them to tack into the wind at 75°. This means a yacht must tack 14 miles to make one nautical mile into the wind. Polynesian double canoes did not have lee boards and were limited to 30° off the wind, meaning that they would have to tack for 39 miles to make one nautical mile into the wind. This means the winds had to be favourable for the

Polynesians to make any voyage.

One thousand years ago in the Medieval Period, there was a climatic reversal to a dominance of El Nino events and accompanying reversal of the trade winds that allowed eastward migration. The westerly winds under strong El Nino conditions may have been only brief episodes but would have been sufficient to allow long voyages downwind. Migration was very rapid and it all happened in 100 to 150 years. At the same time, climatic changes were apparent in the northern hemisphere: the Vikings settled in Greenland during a climatic amelioration, only to abandon it later and the Mayan civilization in Mexico collapsed due to drought. The El Nino/La Nina events affect ocean currents that eventually make their way into the Indian Ocean then the Atlantic and the northern hemisphere.

Climatic models are built up from proxy climatic evidence. Many environmental studies indicate what the past climate was like and when climatic changes occurred. For example, studies of tree rings in Tasmania indicate a period of warm dry weather. Northerly winds would have brought the warm dry weather. For the same period, New Zealand experienced cold wet weather that would have been caused by southerly winds from Antarctica. And sand cores from the eastern Australian coastline indicate easterly winds. This wind pattern is commonly a high pressure system. Ice cores are the best source of proxy data and even record events such as when lead was taken out of petrol and dust containing uranium from Roxby Downs. They also record dust from volcanic activity elsewhere in the world.

Once a model is built, the climate for any selected time period can be determined. When the decade by decade climate is plotted to show the changes, a surprising feature emerges: climatic changes do not occur gradually but change suddenly from one pattern to another. One reason for this is volcanic eruptions that pump dust and gasses into the atmosphere that are recorded in the ice cores. Thus in the Medieval period to 1300 AD, there was a tropical expansion. From 1190 to 1258 AD, Auckland Island was settled. Today it is a sub-Antarctic island and quite uninhabitable. After 1300 AD, the tropic contracted until the last 50 years, when the tropics expanded again. This last tropical expansion is not caused by volcanism but is anthropogenic.

With windfields varying with the climatic fluctuations, the Polynesians could could just bide their time until favourable winds arose to take them where they wanted to go. Two Maori cultures are recognised in New Zealand, representing two migrations. Folklore tells of multiple comings and goings. The Polynesians were superb mariners, with mental maps of the islands, the stars, wind and wave patterns, birds and other details to use for navigation. The DNA of the Easter Island people reveal two migrations, one from the west and one from South America and this may have contributed to the warfare that wracked the island.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2017 Annual General Meeting

The 142nd Annual General Meeting of the Society will be held at 18:00 on 22 March 2017 in the Classroom in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17:30.

Five members of Council are due to retire at this AGM:

Michele Cotton
J C Herremans
David Keith
Peter Myerscough
Ian Percival

and offer themselves for re-election.

Council recommends the election of Dr Michele Cotton as President of the Society for 2017.

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2017.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 163 **APRIL 2017**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Form for tax-deductible donations
Record of the 2017 AGM

NEW MEMBERS: We welcome our new members:
Mr. Brian J. Atwell, Macquarie University. Field of interest: Plant ecology.
Mrs. Victoria Austin, Western Sydney University. Fields of interest: Animal behavior, bird volcalisation
Miss Belinda Fabian, Macquarie University. Fields of interest: Microbiology, molecular biology, plant physiology, plant disease/pathology.
Mr. William Firth-Smith. Field of interest: Zoology.
Miss Casey M Gibson, University of NSW. Fields of interest: plant ecology, evolutionary ecology.
Ms Melinda J. Greenfield, James Cook University. Fields of interest: Interactions between fungi, plants

and insects.
Ms Anna J. Kretzschmar, University of Technology. Fields of interest: Molecular biology, bioinformatics, toxin evolution, climate change, *Gambierdiscus* spp, ciguatera fish poisoning.
A/Prof Shauna Murray, University of Technology. Fields of interest: Evolution, marine biology, genetics, phylogenetics.
Mr. Aaron Phillips, Macquarie University. Fields of interest: Plant molecular biology, plant physiology. .
Ms. Bronwyn Teece Macquarie University. Fields of interest: palaeontology, geology, organic geochemistry, astrobiology.

DONATIONS TO THE SCIENTIFIC RESEARCH FUNDS

Donations received last year but no previously acknowledged were made by M. Ian Hills, Dr. Lawrence Sherwin, the Sisters of Saint Joseph and Ms Claire Sives. We thank our generous donors: the donations are much appreciated.

PROCEEDINGS OF THE LINNEAN SOCIETY OF NSW, VOLUME 138 (2016)

The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN

Lunney, D, Wells, A and Miller, I. An Ecological History of the Koala *Phascolarctos cinereus* in Coffs Harbour and its Environs, on the Mid-north Coast of New South Wales, c1861-2000
King, R.J. Julian Tenison Woods: Natural Historian
Fulton, G.R. New Information about the Holotype, in the Macleay Museum, of the Allied Rock-wallaby *Petrogale assimilis* Ramsay, 1877 (Marsupialia, Macropodidae)
Fulton, G.R. Bramble Cay *Melomys Melomys rubicola* Thomas 1924: Specimens in the Macleay Museum
Timms, B.V. A Study on the Pools of a Granitic Mountain Top at Moonbi, New South Wales
Mo, M. The Beach Stone-Curlew (*Esacus magnisrostris*) in the Sydney Basin and South East Corner Bioregions of New South Wales.

MARCH FOR SCIENCE

The March for Science celebrates the public discovery, distribution, and understanding of scientific knowledge as crucial to the freedom, success, health, and safety of life on this planet. It is nonpartisan and the march is to demand action in the areas of Literacy, Communication, Policy, and Investment. This is part of a world-wide program of similar events and will be held on 22 April. The Linnean Society of NSW supports the principles upon which the March for Science is based and urges all to attend. For further information, see the website https://marchforscienceaustralia.org

AWARDS FROM THE SCIENTIC RESEARCH FUNDS

The amount awarded to applicants is in part dependent on the funds available. If there are more requests for funds than money available, the Society must make the difficult decision to reduce the amount awarded or not to fund otherwise worthwhile projects. The current low interest rates limit funds available and will make these decision more difficult in the future.

Julian E. Tenison Woods Award (provided by the Sisters of St Joseph to the Linnean Society of NSW.

Dr Sanja **Van Huet**, Deakin University.
Project: Drone Mapping of the Bridgewater Formation, Nepean Peninsula, Victoria
Synopsis: The project aims to compile a detailed photographic record of the extent of the Bridgewater Formation from Barwon Heads to Cape Schanck in Victoria, using a remote controlled drone. This footage will be used to produce detailed 3D mesh reconstructions of the Bridgewater coastline – including otherwise inaccessible areas. These reconstructions will enable detailed regional mapping of the Bridgewater Formation. Awarded **$1,250** for extra drone batteries, recharging generator & insurance.

Julian E. Tenison Woods/ Joyce W. Vickery Scientific Research Award

Ms Melinda J **Greenfield**, James Cook University
Project: Interactions among fungi, ants and the ant-plant *Myrmecodia becarii* (Rubiaceae).
Synopsis: *Myrmecodia beccarii* (Rubiaceae) is an epiphytic ant-plant endemic to far north Queensland in coastal *Melaleuca* forests and mangroves, north of Townsville. The domatia of *M. beccarii* is a tuber-like structure that contains a network of tunnels and chambers commonly occupied by the native ant *Philidris cordata*. There are several types of tunnels, including light brown and dark brown/black tunnels, each with different functions. Two taxa of fungi were discovered in the domatia chambers but their identity and function(s) are unknown. Elsewhere in the world, some ants farm fungi in the domatia. This project will identify the fungus and investigate the interactions among fungi, ants and *M. beccarii* to establish if there is a tripartite mutualism. *M. beccarii* is listed as vulnerable, mainly due to habitat fragmentation. It is habitat for the larval stages of the Apollo Jewel Butterfly also vulnerable, which feeds exclusively on this plant and has a mutualistic relationship with the native ant *Phi. cordata*. Attempts to translocate *M. beccarii* in revegetation projects tend to fail because little is known about their requirements for successful establishment and growth. This project may provide a better understanding of the complex interactions within this ant-plant that could assist in conservation. Awarded **$2,300** for experimental consumables.

William Macleay Award for Microbiology Research

Miss Belinda **Fabian**, Macquarie University
Project: Genetic factors influencing colonisation by biocontrol bacteria of plant surfaces.
Synopsis: *Pseudomonas* bacteria are some of the most successful biocontrol bacteria and one of the most well-known strains, *Pseudomonas protogens* Pf-5, has the ability to control diseases that affect cotton, wheat, pea, maize, tomatoes and potatoes, hence could be a valuable alternative to the use of pesticides on crops. However, field trials of biocontrol bacteria show a lack of reliability and persistence on plant surfaces. A number of genes involved in plant surface colonization have been identified, but not any genome-wide study of essential colonization genes. This project will investigate ways to make colonistion more reliable. Awarded **$1,300** for sequencing materials

Ms Anna L **Kretzschmar,** University of Technology Sydney
Project: Evolutionary relationship of *Gambierdiscus* species and ciguatoxins.
Synopsis: Some species of the marine protist genus *Gambierdiscus* produce the polyketide neurotoxic ciguatoxins, which enter the food chain and accumulate to ultimately cause ciguatera fish poisoning. Ciguatera is prevalent in the Great Barrier Reef region and since 2014, outbreaks of ciguatera have occurred in New South Wales, and this has been linked to the change of the East Australian Current due to climate change. Currently, the pathway of the production of the toxins is not known, although it is known that the enzyme(s) involved are of the polyketide synthase (PKS) class. This project will look at the evolution of the entire enzyme class, the evolutionary relationships of the order Gonyaulacales and *Gambierdiscus* within the order, map the active domain(s) of the PKS enzyme class over the species tree and match the polyketide toxin production of the extant species. This would allow us to track the evolution of copies of individual domains and match them with the polyketide toxin producing status of the species. Awarded **$1,300** to attend a special workshop (USA) to gain necessary specialized skills.

Betty Mayne Award for Scientific Research in the Earth Sciences

Iain **Copp**, University of Western Australia
Project: Geodiversity–biodiversity relationships in the southern Southwest Australian Floristic Region
Synopsis: The primary aim is to quantify the relative influences that different geological substrates and their landscape position have on the distribution of vegetation types, species diversity and endemism, and how geodiversity correlates with vegetation patterns. Three hypotheses will be tested within a global biodiversity hotspot — the Southwestern Australian Floristic Region (SWAFR): vegetation types, species diversity and endemism are positively correlated with major regolith–landform types; sandplain sedimentological–mineralogical heterogeneity is positively correlated with diversity and distribution of kwongkan heath communities; and the near-subsurface architecture and hydrology of granite-inselberg landscapes influences surrounding vegetation distribution and species diversity. Awarded **$750** for field work expenses.

Sarah **Houlahan**, Macquarie University.
Project: The Role of Archaeocyathid Reef Bioconstruction in Early Animal Evolution
Synopsis: The project will investigate and document the ecomorphological variation, architectural growth styles, biofacies distribution and biogeochemistry of stromatolites during a period that coincides with Cambrian radiation of animal life. **Awarded $1,000** towards analytical costs.

Bronwyn **Teece**, Macquarie University.
Project: Stromatolite construction, biofacies and biomarkers in Lower Cambrian carbonates of the Hawker Group, Arrowie Basin, South Australia
Synopsis: This project aims to reveal the function and impact of reef building ecosystem engineers as the key driver in diversification and escalation of ecological complexity during the Cambrian radiation. Lower Cambrian reefs are built primarily by archaeocyathids, which act as bioconstructors, and calcimicrobes, which cement the biohermal structures. Awarded **$1,000** towards analytical costs.

Dr Tony **Wright,** University of Wollongong
Project: Silurian and Devonian rugose corals from New South Wales
Synopsis: The project involves a systematic revision of Early Devonian rugose corals from NSW that have been assigned to *Phillipsastrea*, including a dozen described species and about half a dozen undescribed species, mostly from the Mudgee area. This substantial project commenced a couple of years ago and is expected to run into 2018. A concurrent project involves description of new genera from Limekilns and Panuara (near Orange). Awarded **$818** to defray fieldwork expenses.

John Noble award for Invertebrate Research

Miss Cara **Van der Wal**, Sydney University
Project: Assessing the conservation status and genetic diversity of two endemic crayfish *Euastacus spinifer* and *Euastacus australasiensis* using molecular approaches.
Synopsis: Freshwater crayfish are extremely diverse and the Australian groups are the most endangered of all extant species. Fresh water crayfish are important as ecosystem engineers, keystone species and bioindicators. There are about 50 species in the genus *Euastacus* that is found from northern Queensland to southern-most Australia. *E. spinifer* and *E. australasiensis* are cold adapted, both are morphologically variable and species determination can be difficult. They occur over a long range of distribution, but research with other species of *Euastacus* has indicated that there is very little gene flow/dispersal between habitats within the same stream. Molecular techniques will be used to investigate if there are several species involved. Awarded **$,1500** for DNA analysis

Joyce W. Vickery Scientific Research Awards

Mrs Victoria **Austin**, Western Sydney University
Project: The functions of vocal mimicry in female superb lyrebirds (*Menuna novaehollandiae*).
Synopsis: Until recently, it was thought that only males exhibited bird song in the breeding season while song in females was rare. It has now been discovered that song is widespread and ancestral in females. Songbirds evolved in Australia but little is known about the evolution of vocalization in both females and

males. Many of the ancient songbird families are still extant providing excellent research opportunities. As well having vocal females, many of these ancient Australian songbirds are excellent mimics. Females use complex and diverse vocalisations for female-specific contexts (such as nest defense). When feeding, females mimic predators. Early indications suggest that sounds mimicked by females are consistently different to males and quite variable amongst females. This project aims to investigate the function of mimetic vocalization and will be conducted in the wild. Awarded **$2,334** for a Song Meter, microphone and cables.

Miss Hannah **Bannister**, University of Adelaide
Project: Diet of the brush-tail possum in Ikara-Flinders Ranges National Park prior to European settlement.
Synopsis: The brush-tailed possum population once covered most of Australia but is much reduced today, particularly in arid regions. It disappeared from this national park about 70 years ago, but has been reintroduced. It is likely that the diet of the reintroduced possums is different from their pre-European diet because they now have competition from introduced herbivores. There are many rocky slopes in the Flinders Ranges where caves are present and brush-tailed scats have been found there. The scats are likely to be hundreds of years old. A pilot study to see if diet-species can be identified with Next Generation Sequencing of the scats is under way. Then the present diet of brush-tailed possums can be compared with pre-European diets. Awarded **$1,500** for next generation sequencing of possum scats.

Miss Nasim Shah **Mohammadi**, University of Technology Sydney.
Project: Identification of new high resolution genetic markers for the endangered Australian seagrass, *Posidonia australis*.
Synopsis: *P. australis* is categorized as threatened, and in some locations, endangered. It forms extensive populations in harbours where it may be subjected to disturbance, and restoration and conservation management is necessary. Molecular biology will provide an insight into genetic diversity and resilience in the populations. Whole transcriptome sequencing gives high-resolution genetic markers and can be used to detect simple genetic repeats that allows detection of polymorphisms. The genetic sequence will be available to others for further study. Awarded **$1,000** for car hire and RNA extraction and sequencing.

Mr Aaron **Phillips**, Macquarie University.
Project: Searching for the basis of heat tolerance in Australia's arid-zone plants.
Synopsis: Under climate change, temperatures are increasing and the intensity and duration of heat waves are also increasing. Heat stress is a major limiting factor on photosynthesis that in turn limits yields in crop plants. Understanding how plants adapted to hot environments could assist improved crop productivity. Rubisco activase (RCA) is a photosynthesis related protein found in all plant species. RCA increases a plant's ability to fix CO2, but it's activity is diminished by supra-optimal temperatures. Substantial variation exists in the gene sequence coding for RCA and heat acts as a selective force generating similar mutations. The forms of RCA that evolved at higher temperatures are now of world wide interest. To date, only about six species have been investigated with the most persuasive evidence coming from relatives of rice in northern Australia. This project will investigate the efficiency of RCA isoforms from a range of Australian indigenous relatives of rice, cotton and tobacco that are adapted to temperature regimes from cool temperate to the hot arid zone, and the response of photosynthesis under heat stress. Awarded **$2,500** for analysis of the abundance of RCA in leaf tissue.

Claudia **Santori**, University of Sydney
Project: Halting the decline of the Murray River turtles: threat assessment and alternative conservation approaches.
Synopsis: There are three species of turtles in the Murray-Darling Basin and because of their large biomass, they are a key component of the ecosystem, recycling nutrients through their broad diet. The carrion consumption by the turtles is fundamental in preventing eutrophication and turbidity. Disappearance of the turtles could be problematic for the river system. There has been a drastic decline in the turtle population (especially the juveniles), mainly due to predation of the turtle nests by foxes. Other hazards to turtles are dams and weirs, collisions with boats, drowning by pumps and carp screens and road kill as they move overland to their breeding sites. This project will assess the risk factors and rank them, and this will assist conservation management. Awarded **$900** for car hire and petrol.

Miss Sonu **Yadav**, Macquarie University
Project: Understanding the adaptive capacity of alpine grasshoppers under climate change.

Synopsis: Mountain ecosystems are highly sensitive to climate change and human modification of the landscape. The persistence of many insect species is under threat from rapid climatic change and their survival largely depends on their adaptive capacity and underlining genetic processes. *Kosciuscola cognatus* and *Kosciuscola tristis* will be collected from three sites within Kosciuszko National Park and 98 samples will be sequenced to evaluate the geneti diversity, gene flow and genetic admixture in these species. The project will predict changes in distribution and the likelihood of hybridization in the grasshoppers with changing climate. Awarded **$900** for genomic sequencing

TRANSFORMING DIETS AND LIVES IN THE HIGHLANDS OF PAPUA NEW GUINEA THROUGH FISH FARMING, a talk given by A/Prof Jes Sammut

More than 80% of the people in Papua New Guinea are rural-based and depend on subsistence agriculture, and most people live on less than $1.50 a day. The people grow vegetable crops but small-scale chicken and pig farming cannot sustain the protein requirements of the population. Hunting cannot meet the needs for protein either. There is a lack of infrastructure with no electricity for many and a lack of a road network. Most people live in primitive conditions. Canned meats and tuna are too expensive for many. Smoked dried fish is not good for them for too much can cause stomach cancer. There is a high consumption of salt, lamb flaps (mostly fat and of little nutritional value) and carbohydrates that have a high GI and are not good for health.

Malnutrition is the leading cause of death in children in PNG. 31% of the children are stunted and this is attributed to the lack of protein and a high vegetable/carbohydrate diet. 76% of children between 6-10 years consume less than 2/3 of the FAO/WHO recommended daily level of protein. They have pigs, but they are expensive and if killed, the meat cannot be stored without refrigeration. The pigs are only killed for big ceremonies. HIV and TB are prevalent and the poor response to treatment is linked to a low protein diet.

There is social control over access to protein: father eats first and most, then the other men eat, followed by the wife and then the daughters. Malnutrition is also a problem with wealthy people in PNG because of poor food choices. Fat people can be malnourished also, with poor health.

A/Prof Jes Sammut and associates have been training people in remote villages to farm fish for their own consumption and for profit. There was some fish farming, but the fish were not doing well from lack of food and inbreeding. The fish are carp related that thrive in a basic mud pond. Team members teach the farmers how to make fish food pellets to boost productivity, but the fish do quite well on the insects, algae and plankton in the pond without extra feeding. Fish provide protein at an affordable cost and can be caught and cooked when needed, without refrigeration.

The social changes that come with a better diet are remarkable. Clans that had been at war for decades now cooperate, sharing shovels, pumps, equipment and knowledge. Old adversaries become unexpected business partners. Sammut knows of three tribal wars that have stopped with the introduction of fish farming. With better nutrition, their health is better and there is less crime. With more income, the children can go to school and with better nutrition, they are able to concentrate on the schoolwork. Prisoners are being taught fish farming so that when they are released, they have something to support themselves. In an interview, one man who had committed murders said that when he felt like murdering someone now, he looks at his fish pond and realizes how much he has now, and does not feel like murdering any more.

This work in PNG is particularly important where even a small change makes a big difference. Seeing the impact that it has on the people's lives fuels Sammut's desire to keep going. The aim now is to find better fish stocks that are more self-sustaining.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 19 April at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

KAREN WILSON

Honorary Research Associate, National Herbarium of NSW

BIODIVERSITY OF MADAGASCAR, THE GREAT RED ISLAND

An overview will be given of the natural history of Madagascar, a continental island that is part of the old Gondwana landmass but isolated for at least 40 million years. Its fascinating mix of mainly endemic plants and animals has been strongly influenced by the varied topography and geology. As with other islands, there is relatively low diversity in families but great diversity at the species level. Iconic species include the lemurs, chameleons, geckoes, several endemic bird families, and the baobabs, poinciana, and traveller's palm. Humans arrived there only about two thousand years ago from the Indonesian region, with later migrations from African and Arabic regions. Their arrival seems to have coincided with numerous animal species going extinct, judging by the known fossils of giant and dwarf species. There have also been coincident changes in the vegetation.

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Wednesday 24 May at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

Dr DAN BICKEL

Australian Museum Research Institute

"TEARS OF THE GODS" - THE HISTORY AND SCIENCE OF AMBER

Amber has fascinated people since prehistoric times and has long been traded from sources along the Baltic Sea. As well as being admired and used in jewellery, amber is of great scientific interest as it provides a clear window to past life. Being the hardened and fossilized resin of ancient trees, amber frequently contains inclusions of trapped animals and plants, where tiny insects and delicate floral structures can be seen in exquisite detail. Amber therefore is a great source of information about both the evolution and distribution of major biotic groups and past environments generally. Within the last 20 years, significant amber deposits have been discovered in Australia. These include Cape York amber, washed up on remote beaches, and Cretaceous and Paleocene deposits from Victoria and Tasmania. This talk will review the history, occurrence and study of amber. .

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Wednesday 19 July at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

A/Prof PAUL ADAM

School of BEES, University of NSW

THE TRUTH, THE WHOLE TRUTH AND NOTHING BUT THE TRUTH?
THE USE OF LANDSCAPE ART AS A SOURCE OF INFORMATION IN HISTORICAL ECOLOGY

Historical ecology is a growing field.. One source of evidence may be provided by historical landscape paintings. In Australia, Gammage has used landscape paintings as one of his sources for reconstructing the pre European pattern of vegetation across the whole of Australia. His theory has been used to advocate particular approaches to fire management. There are however difficulties with treating art works as' accurate' records, and the magnitude of these problems is poorly appreciated. To regard landscape painters as the 'photographers ' of their day is inappropriate, but even photography presents issues when used as a source of information.

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Refreshments will be served from 5.30 pm
Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 164 JULY 2017

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IN THIS ISSUE

NEW MEMBER

We welcome Mr David P. Barnes whose interests are history, natural sciences, photography, film and music.

DONATIONS TO THE RESEARCH FUNDS in 2017

A total of $18,630 to the research funds has been received. Many thanks to our generous donors: Dr J.M.E. Anderson, two anonymous donors, Prof Roger Carolin, Dr Michelle Cotton, Ian Endersby, Dr Michael Engelbretsen, A/Prof Anders Hallengren, Mr Ian Hill, Mrs Betty Jacobs, Dr Stephen Johnson, Prof David Keith, Dr N.J. Littlejohn, Prof L. Selwood, Dr Lawrence Sherwin, Dr Helen Smith and Mrs Karen Wilson.

BIODIVERSITY OF MADAGASCAR, THE GREAT RED ISLAND, a talk by Karen Wilson

The island of Madagascar lies some 4-500 km off the east coast of Mozambique, Africa and it is about 1700 km long and 600 km at its widest place. It separated from India during the breakup of the old Gondwandan landmass and has been isolated for at least 40 million years. The topography controls the climate and the vegetation: central highlands run the length of the island and the eastern side of the island is better watered, while the western side is in a rain-shadow. Most of the island is in tropical latitudes and the temperatures are hot. The highlands, however, experience frosts.

Most of the rainforest is restricted to the east coastal strip and survives mainly because of the topography: a steep escarpment makes development impracticable. The central highlands are mainly grasslands and much of it is given over to rice growing. There is very little of the original vegetation left, and most of it is secondary growth but there are still some patches of original grassland and forest in the central highlands. The southwest is more arid and spiny forests are found there.

The long isolation has allowed the evolution of numerous endemics that are found nowhere else in the world. More than 80% of the plant species are endemic, and for the angiosperms, it is about 85%. There are many species of orchids and most of them are endemic. The spiny, small-leaved succulents Didiereaceae and *Pachypodium* spp. are limited to the dry spiny forests. There are six endemic species of baobab plus two African species. The baobabs have swollen, water storing trunks and are the "stars of the plant world". Of an estimated 850 species of Rubiaceae (many undescribed), 92 % are endemic, and this includes 45 species of coffee, which, however, are not used commercially.

Other well-known endemics include the leguminous flame tree and the traveller's palm that is not a palm but is related to the strelitzias. The Madagascan traveller's palm is most closely related to the Amazonian traveller's palm. There are 80 species of *Pandanus* and a Winteraceae that is related to *Tasmannia* in Australia. There are 19 genera and 67 species of Celestraceae, thought to have evolved in Madagascar and radiated out. In the drier regions, there are bulbous, water-storing species and agaves. There is less endemicity amongst the mosses and ferns as their spores are easily dispersed. The plants show many connections with southeast Asia, less so with Africa and South America. The ocean currents are predominantly from the east, although this has not always been so. Molecular work also shows up the long isolation.

In the animal world, there are very few connection with Africa, despite the proximity. There are no lions, giraffes or penguins as portrayed in the animated film "Madagascar". There was once a pigmy hippopotamus. There were about 100 species of lemurs, all descended from the one ancestor. Early explorers described apes, but they were most certainly lemurs. Many lemurs have become extinct, especially the large-bodied ones. The puma-sized predator the fossa is related to the mongoose. So-called hedgehogs are related to the African shrew. There is less endemicity amongst the birds as they are more mobile, although there are five endemic families. There was once a giant bird, the elephant bird, now extinct.

There are many species of chameleon and the smallest would fit on your fingernail. There is one that looks exactly like a dry leaf. The larger brightly coloured species that change colour to match the environment are well known. There are frogs, a few snakes, some related to the boas of South America and giant tortoises, freshwater fish and a land crab in the rainforest. There is even a native silkworm that lives on a species of Euphorbiaceae

Most of the people are of Indonesian descent, apparently carried there by the prevailing east-west ocean currents. Madagascar was a French colony, becoming independent in 1960. There is heavy pressure on the environment from a population that exceeds that of Australia. Outside of the main towns, most of the people live in rural poverty. There is very little electricity in rural regions and firewood (as charcoal) is the main source of fuel. Eucalypts and acacias are grown for fuel but in the more arid regions where they do not grow, the spiny species are harvested. The national parks have cattle and people living in them. The challenge is how do villagers make a living while protecting the environment at the same time. Various projects have been tried and some are working, but the problem is overwhelming.

Madagascar is a fascinating place to visit, but the overwhelming poverty, lack of development and such extensive destruction of the unique environment adds a sad note.

"TEARS OF THE GODS" – THE HISTORY AND SCIENCE OF AMBER: a talk given by Dr Dan Bickel

Amber is the hardened and fossilized resin of ancient trees, particularly of conifers. Trees produce the resin to seal wounds and excess may drip down or accumulate in cavities. Being sticky, it traps small insects and spiders, bits of plant material and other debris, and there may be spectacular preservation, such as the detail of hairs on insects. Amber is lightweight and easily transported by water, but it is soft and breaks down easily. Amber from the Baltic is the best known, but amber is found around the world and more is being found all the time.

Baltic amber is Eocene (50 million years) in age and it is found in large quantities in Poland and in the Ukraine where it is mined. It is not known why there is so much of it. Rivers drained large areas of coniferous forests and the resin was deposited in the delta where it was preserved. Today, storms erode the sediments and expose the amber. It is speculated that there must have been incredible flows of resin, but there could well be other explanations. Amber was highly prized in in classical times and was traded, some reaching as far as China.

Amber may be carved and there are Neolithic and Bronze aged figurines. It is used in jewelry and varnish, and being hydrophobic, it may be used where this property is required. But amber is unstable if not kept under water, and it may become crazed or the surface oxidized to a cloudy patina. One piece of amber may be beautifully clear on one side, revealing inclusions but the other side is all roughened and cloudy.

Early Cretaceous (120 million years) Lebanese amber is one of the oldest and readily becomes brittle. A bee has been found in early Cretaceous Burmese amber and it is one of the oldest bees: there must have been flowering plants around at that time to sustain it. Dominican and Mexican amber come from a leguminous tree and is Tertiary in age. It is beautifully clear, often with many inclusions: flies, ants, termites: some mating pairs and even a small lizard. One piece had 47 inclusions: something must have attracted them to the resin while it was still sticky.

The preserved biota in amber may shed light on evolution. A primitive ant in mid Cretaceous amber from Mexico and the Dominican Republic indicates links with tiphild wasps, the most primitive of the ants. Most modern families of insects were in place by the beginning of the Tertiary. The Baltic Amber insects are essentially modern species. The biota may also comment on biogeographic topics. A family of primitive termites known only from the Northern Territory and New Guinea is found in amber from Mexico and the Dominican Republic where it is now extinct, showing that the group once had a much wider distribution. The fly *Atlatlia* is found in SW and SE Australia and New Caledonia, suggesting a Gondwanan origin, but there are three species in the Baltic amber. Its present distribution is thus a remnant of a much wider distribution.

Australian upper Cretaceous (90 million years) amber was found in cores from oil and gas exploration bores in the Otway of western Victoria. Amber found along the coast of Cape York in far north Queensland is probably Miocene in age. This amber has a chemical signature similar to kauri (*Agathis*) of New Zealand. There are four species of *Agathis* in north Queensland today. Two hundred and fifty inclusions of arthropods and a bird's feather have been found in the amber. There is Paleocene-Eocene amber in Tasmania.

In Greek mythology, the Sun God Helios drove the sun chariot across the sky each day. His son Phaeton begged to be allowed to drive the sun chariot, but when Helios reluctantly allowed him, he could not control the horses. When the sun chariot was too far away, the earth froze, when too close, it burnt the land and created the African deserts. Zeus intervened and killed Phaeton. Helios' daughters were distraught and cried for months, and the gods turned their tears into amber.

Dr Bickel's enthusiasm for amber was evident and his lecture was a fascination story of amber science and its long history.

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Wednesday 20 September at 6 pm, in the Classroom, Royal Botanic Gardens
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Dr JACQUELINE NGUYEN

Australian Museum

A FLOCK OF FOSSILS: EVOLUTIONARY HISTORY OF AUSTRALIA'S SONGBIRDS

Molecular studies have consistently supported an Australian origin for songbirds, the world's largest avian radiation that includes lyrebirds, robins, honeyeaters, ravens and swallows. If the majority of living birds had their roots in Australia, what does the fossil evidence tell us? In this seminar I will present recent fossil discoveries from Australia and discuss their important roles in shaping our understanding of songbird evolution.

Refreshments will be served from 5.30 pm
Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 165 SEPTEMBER 2017

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members:
Dr Daniel Bickel. Fields of interests: entomology, Diptera
Mr Alex Kenins. Fields of interests: freshwater algae, aquatic ecology, botany
Dr Sandra Claxton. Field of interest: Australian terrestrial Tardigrada.

NEW COUNCIL MEMBER

We welcome Dr Dan Bickel to the Council of the Linnean Society of NSW. Dr Bickel, formerly of the Australian Museum is a specialist in the Diptera family Dolichopodidae, which has a rich recent fauna with some 7000 described species globally, but many more undescribed.

It also occurs in Baltic amber, partially because species enjoy resting on tree trunks and thereby get trapped in the sticky resin. Dr Bickel recently gave the society a fascinating talk about amber.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2018. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 15 November, 2017

REPORTS FROM THE RECIPIENTS OF RESEARCH GRANTS

Mr Kyle **Ferguson**, University of Queensland, award from the Betty Mayne Fund
Project: *Geochemically 'fingerprinting' fossils collected from Chinchilla, an Australian Pliocene age fossil deposit.*
The Chinchilla Sands is exposed for 65 km between Nangram and Warra, Northern Darling Downs, Queensland and is one of the richest Pliocene (5.3-2.6 million years ago) age fossil deposits in Australia. Thousands of fossils have been excavated from this region for well over a century and a half. However, the palaeontologial importance of the collection is still poorly understood. Inadequate documentation and site localities for a substantial portion of Chinchilla material makes it difficult to determine stratigraphic positioning. Analysis of diagenetically incorporated trace elements can assist in assigning fossil provenance. A geochemical analysis could determine if the signatures vary between localities.
Results: Seventy five samples were collected from Chinchilla fossils in the Queensland Museum. The results are being analysed and a manuscript is being prepared.

Daniel C **Huston**, University of Queensland: Award from the J. Vickery Fund
Project: *Evolutionary radiation of enenterid and gorgocephalid trematodes in Australia*
Digenetic trematodes are a group of extraordinarily diverse parasites. Their life cycle has a main vertebrate host and a secondary invertebrate host, almost always a mollusc. There may be more than one invertebrate host. Two of the lesser-known families, Enenteridae and Gorgocephalidae have diversified almost entirely in the fishes of the family Kyphosidae. This family of circum-global herbivorous fishes is at its highest diversity in Australian waters. The taxonomy of the parasites is very confused and that of the host fishes is uncertain in many cases. Sites from north Queensland to southern Australia will be sampled and the taxonomy of the parasite studied using both morphology and molecular genetics.
Results: Collections of the trematodes in species of *Kyphosus* (famiy Kyphosidae) were made from Moreton Bay in southeast Queensland, Lizard Island and the Great Barrier Reef. Both known and unknown species of the trematodes were collected.

Mr Matt **Johansen**, Veterinary Science, University of Sydney: Award from the William Macleay Microbiology Fund

Project: *The role of cholesterol-associated genes for the early pathogenesis of* Mycobacterium marinum *in a zebrafish model.*
Johne's disease is a chronic intestinal inflammation in ruminants caused by *Mycobacterium avium* subspecies *paratuberculosis* and many mycobacterial species are capable of persisting intracellularly. Research with other species has shown that cholesterol is a key requirement for establishment and persistence of infection. This project will explore the genes involved in the cholesterol metabolism. Completing such studies in ruminants is not feasible hence zebrafish, a widely used model for mycobacterial infection will be used.
Results: The knockdown of genes in the cholesterol and lipid metabolism significantly reduced the bacterial burden in modified zebrafish embryos but gene expression of additional cholesterol and lipid genes were differentially regulated to accommodate for the knocdown. Work is continuing on this project.

Ms Valentina H. **McCormick**, University of Technology Sydney received the William Macleay Award for Microbiology
Project: *Assessing the threat of anthropogenic impacts to seagrass meadows as a consequence of the un-coupling of seagrass-microbe associations*
It is thought that that ecological interactions between seagrasses and associated microorganisms strongly control the function of meadows and disruptions to the delicate balance results in decline of seagrass stocks. Seagrass meadows have substantial economic importance as a nursery for fish. Lake Macquarie, where thermal and nutrient discharges from power stations pollute the environment was chosen for study.
Results: Sampling sites were set up in Lake Macquarie near a power station and for comparison, at Palm Beach, Narrabeen Lagoon and Rose Bay. Bacterial and microalgal communities were more biogeographically conserved while fungal communities were more consistent with the plant and its surrounding microenvironments. Lake Macquarie shows distinctive microbiomes at both the regional and plant scales, suggesting both environmental and anthropogenic factors as potential drivers of microbial shift.

Ms Caitlin **Morrison**, University of Sydney: Awarded a J. Vickery grant.
Project: *Developing toll-like receptor (TLR) markers for studying how disease impacts the orange-bellied parrot*
The orange-bellied parrot is critically endangered with only about 20 individuals remaining in a wild population. It is one of only two obligate migratory parrot species. Despite release of captivity-bred individuals and other recovery actions, the wild population has continued to decline. Risks now include low genetic diversity, inbreeding depression, disease and loss of habitat. This project aims to develop markers for the innate immune system genes, the TLR, that can be uses in future studies to assess risks of disease.
Results: Nine primer sets for seven TLR loci that work in other parrot species were trialled on the orange bellied parrot DNA and five sets proved partially effective but all of these sets produced non-specific amplification of the DNA. Primer redesign was necessary and all seven redesigned primers were effective at amplifying target loci at a level sufficient for sequencing, except for two that had to be redesigned again. Eventually, this resulted in seven sets of effective primers for the TLR loci in the orange bellied parrot, the aim of this project.

Mr Thomas **Semple**, Australian National University received the John Noble Award for Invertebrate Research
Project: *Phylogenetics, ecology and novel taxonomic techniques in thynnine wasps.*

Thynnines are depicted as a dominant group, second only to ants across much of Australia. There are currently 474 species of thynnine wasps and an estimate of at least 1000 additional known but not described species. This project aims to establish the first broad scale phylogeny of the thynnine wasps using DNA sequencing and 3D imaging using the immensely promising x-ray micro computed tomography that allows imaging of external and internal features of tiny organisms on the micro scale. This means a 10 mm wasp can be scanned at a 3-micron resolution, allowing examination of individual hairs. The immense datasets generated from scanning will be available to anyone for future study.
Results: Five weeks were spent at the University of Western Australia using the high resolution X-ray microscope at the Centre for Microscopy and 50 specimens were scanned, producing an incredibly useful dataset. The results are being analysed. There will be further trips to Perth.

Mr Joshua R. **van Lier**, Australian National University, awarded a J.Vickery Grant
Project: *How acute habitat disturbance affects seaweed associated fishes in Ningaloo ecosystem.*
Tropical seaweed meadows cover vast areas of coastal ecosystems and are home to a wide diversity of tropical fish. Focusing on the fish family Labridae (includes the wrasses and parrotfishes), this study aims to determine the extent of specialisation among the seaweed associated fishes and how they respond to an unseasonal loss of meadow habitat over the short (weeks) to medium (year) time scales. Canopy height of the seaweeds is an important driver of fish abundance, so canopy height will be reduced up to 50% in late summer and the fish surveyed before and after treatment.
Results: A total of 5,134 individual labrids in 25 species were recorded in a 6 month period. Unfortunately, extreme cyclone events precluded monitoring for a year after manipulation. A significant reduction in labrid species richness, abundance and biomass occurred between the control and treatment patches that continued for up to six months. Predatory fish made up a much higher proportion of the community post treatment.

Mr Ricardo **De Paoli-Iseppi,** Australian Antarctic Division, University of Tasmania: awarded a J.Vickery grant
Project: *Molecular biomarkers for seabird age estimation; Implications for ecological monitoring.*
The chronological age of an animal is a critical factor in animal populations. This study will use epigenetic biomarkers that have proven successful in age estimation in mammals but have not been applied to birds. The method will be validated on a population of known aged short tailed shearwater, the most abundant seabird in southern Australia on Fisher Island (off Flinders Island) that has been studied and banded for 40 years.
Results: During a field trip in December, 35 birds of known age from 2 to 21 years in age were found. Blood and feather samples were taken. Several genes that have shown age-related methylation in mammals were investigated in 67 sites in 13 target gene regions. In blood samples, five of the top relationships with age were identified. Feather samples were also weakly correlated with age. The majority of markers had no clear association with age (only 12 out of 131). The approach that works in mammals does not appear to work for this sea bird.

Mr Joshua **PENALBA,** Australian National Unviversity
Project: *The genomic origin of species: a case study of the avian group the Australian Meliphagoidea*
The Meliphagoidea includes fairy wrens, honeyeaters, pardalotes and Australian warblers. Incipient species pairs, such as a northern and a southern species in Queensland that hybridise in the geographic contact zone will be studied.
Results: A field trip in north Queensland filled in the gaps in museum collections. The study shows that patterns of differentiation when the populations are in contact are different to the patterns when the populations are geographically disjunct.

Ms Lucy N. **Wenger** (Australian National University) received the Julian E. Tenison Woods Award
Project: *Could coral reef fishes have evolved from seaweed-associated ancestors?*
Coral reefs support a spectacular diversity of fishes, suggesting many families of coral reef fishes have undergone dramatic radiations. Using the closely related genera of wrasses, *Macropharyngodon* and *Xenojulis* of coral reefs and seaweed meadows respectively, this project explored whether they could have arisen from a common seaweed-associated ancestor.
Results: *Macropharyngodon* showed a strong preference for hard coral microhabitats, consuming foraminifers from sand-paved microhabitats whereas *Xenojulis* preferred canopy-forming seaweeds and a diet of epibiont prey in the canopy. *Xenojulis* was highly dependent on the seaweed canopy, for at the height of the seasonal reduction of the canopy by 10 cm, there was a 40% decline of *Xenojulis* abundance. This research suggests seaweed habitats should be conserved and managed as equally important components of the tropical marine ecosystem.

THE TRUTH, THE WHOLE TRUTH AND NOTHING BUT THE TRUTH? THE USE OF LANDSCAPE ART AS A SOURCE OF INFORMATION IN HISTORICAL ECOLOGY – a talk given by Dr Paul Adam.

Landscape art is being used in historical ecology with the hope of finding out what the environment was like in times gone by. For example, the Medway estuary has sedimentary problems and when trying to establish how far back these problems go researchers found a 1680's painting of the estuary. But the scale is wrong: the ships are too large and the trees too small. Artists are inclined to paint what they want us to see and accuracy must be questioned. Landscape is a surprisingly modern concept and scenery even more so.

A distinction must be made between topographic art and artistic representation. Topographic sketches are accurate and recognizable for they were done mainly by the military for their own purposes. There has long been a school for teaching midshipmen topographic art and it still operates today. Some artists attempted accuracy with the aid of a pinhole camera, but it draws in the edges, producing some distortions. The Claude Glass is a plano-convex mirror about 4 inches across, on a black foil and the artist drew what he saw in the mirror, which however, distorted colours.

Bill Gammage (2011) wrote "The Biggest Estate on Earth: how Aborigines made Australia". Early European settlers had noted how open and park-like the native vegetation was and he concluded that aboriginal management had made it so. He consulted written and visual records (paintings) to come to this conclusion. His work has been used to advocate management practices along purported aboriginal practices, especially in the use of fire. Dr Adam has examined the reliability of using early colonial paintings as scientific evidence.

Gammage regarded artists as the "photographers" of their day, but discrepancies between the pictures he selected (and it is not known how or why he selected them) and the landscape it was supposed to represent soon become obvious. Aborigines were put in Tasmanian landscapes when it is known they had all gone at the time of the painting. Aborigines were shown using woomeras when it is known that Tasmanian aborigines never used woomeras. Aborigines are shown clothed in loin-clothes! And the list goes on and on.

Joseph Lycett was sentenced to transportation for forgery and he was an accomplished portrait painter. He did many paintings of landscape, some thought to be accurate but he clothed the Aborigines. Some paintings of Tasmania and around Lake George were attributed to him but he never visited those places: it is not known who did them. When he returned to England, he made etchings of the paintings, "tidying" them up with the purpose of encouraging settlers to go to Australia. John Heaviside Clark published ten paintings of Australian landscape, but he never visited Australia. It is not known who did them, but there seems to have been a connection between Lycett and Clark. Because

Lycett had been a convict, it was avoided mentioning his name. Those were the days before any copy write laws.

Artists would travel around the country doing sketches, then back in the studio construct the large scale pictures, inserting the sketches where they thought appropriate: they were more "photo-shoppers" than photographers of the day. If Aborigines managed the landscape with fire, there are surprisingly few paintings showing fire or the effects of fire. These early paintings should be viewed in the light of the agenda of the artist: the political, commercial or other message they wished to convey to the viewer, and if done for commission. Although photographs are more accurate, the interpretations can be controversial.

Paul intends to publish the findings of his research in the Proceedings.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 20 September at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

Dr JACQUELINE NGUYEN

Australian Museum

A FLOCK OF FOSSILS: EVOLUTIONARY HISTORY OF AUSTRALIA'S SONGBIRDS

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Wednesday 18 October at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

Dr NEIL JORDAN

Centre for Ecosystem Science, University of NSW & Taronga Conservation Society Australia & Botswana Predator Conservation Trust

UNDERSTANDING AND MANIPULATING ANIMAL COMMUNICATION FOR CONSERVATION

Animals communicate using a range of signals in diverse contexts including hunting, defending territories and in inter-specific competition. My research focuses on large carnivore communication in particular, and subsequently applying this understanding to direct their movements and behaviour. I have a particular focus on human-wildlife conflicts that currently tend to be managed reactively by removing predators using lethal control and translocation. In contrast to these traditional approaches, I aim to developing biologically-relevant preventative tools that promote coexistence between livestock, people and predators. I will give examples from Botswana and Australia, including lions, African wild dogs, and dingoes

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Refreshments will be served from 5.30 pm
Everyone welcomed

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 166 **DECEMBER 2017**

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IN THIS ISSUE

Included with this newsletter:
Membership Renewal form
Minutes of the 2017 AGM

NEW MEMBERS

We welcome our new members:
Mr Bradley Clarke-Wood, Melbourne University. Field of interests, fresh water ecology
Miss Sonia Geange, Australian National University
Mr Timothy Greville, Office of Environment and Heritage. Fields of interest, alpine areas, cold climates, conservation management, threatened species protection.
Ms Elizabeth Hindle, La Trobe University. Field of interest, alpine ecosystems.
Dr Bobbie Hitchcock. Field of interest, entomology.

A/Prof Scott Mooney, University of NSW. Fields of interest, palaeoecology, Quaternary science, fire, climate change, human impact.
Ms Aviya Naccarella, La Trobe University. Fields of interest, ecology, alpine ecology, geoecology.
Mr Dan Nicholls, National Parks and Wildlife. Field of interest, alpine ecosystems
Mrs Jodie Rutledge, Newcastle University. Fields of interest, speleology, geology, palaeontology
Ms Lauren Szmalko, La Trobe University. Fields of interest, Australian alpine ecology, alpine seed dispersal.
Dr Kate Umbers, Western Sydney University. Fields of interest, ecology, conservation.
Dr Susanna Venn, Australian National University/Deakin University. Fields of interest, plant ecology, alpine, botany

RENEWAL OF MEMBERSHIP

A form for renewal of membership is included with this newsletter. Please note: you get a discount if you pay before 31 March. If you send a bank transfer, make sure you tell us, or we will receive the money and not know who paid it.
A CD of the *Proceedings* is available to Members at no extra cost, on request. The form for renewal of membership has a box to tick if you want a CD, or you can contact the office at any time.
The *Proceedings* is published on line and may be accessed free of charge by anyone at the website http://ojs-prod.library.usyd.edu.au/index.php/LIN
If you have already renewed your membership for 2018 or are a life member, please disregard this notice

CONGRATULATIONS TO PAUL ADAM

Paul Adam has been awarded the 2017 Australian Natural History Medallion for his contribution to conservation, natural history and education.
The Natural History Medallion is awarded by the Field Naturalists Club of Victoria for the study and advancement of any branch of Natural History and the dissemination of the knowledge of Natural History. Our congratulations: the award well-deserved.

2018 SYMPOSIUM: VOLCANOES OF NORTHWEST NEW SOUTH WALES

The 2018 Symposium will be held in Coonarabran on September Tuesday 25 and Wednesday 26. The Field Trip will be to the Warrumbungles National Park all day Thursday September 27.
Presentations are invited on any aspect of the natural history of the Warrumbungles National Park, Mount Kaputar National Park, and related areas of Miocene-age volcanic activity in NW NSW, focusing on (1) geology and geophysics, (2) geomorphology and soils, (3) floral and faunal species (particularly native plants and animals), distribution and ecology, and (4) the effects on the biota of the recent fires in 2013 and the subsequent recovery of plant and animal communities. Talks on the geoheritage and biodiversity significance of the volcanic features, and the geotourism potential of the region are also welcome.
The symposium is scheduled for the week prior to NSW school holidays with expected peak displays of wildflowers in the National Park. It will also be convenient for those wishing to extend their stay in Coonabarabran by a few days to take part in the annual Star Fest held at Siding Springs Observatory on the first weekend of October. Accommodation fills early for this event, so you are advised to book early.
For further information, visit the Society's website at : http://linneansocietynsw.org.au

APPLICATIONS FOR GRANTS FROM THE SCIENTIFIC RESEARCH FUNDS

Application forms for all Research Funds may be obtained from the Secretary or the Home Page:

http://linneansocietynsw.org.au

Intending applicants please read instructions carefully and submit your signed application by email to linnsoc@iinet.net.au

The date for submission of applications for all the funds is 1st March 2018.

WILLIAM MACLEAY MICROBIOLOGY RESEARCH FUND

Grants are available from the William Macleay Microbiology Research Fund to support original research in an Australian context within the field of Microbiology.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a microbiological emphasis.
- Applications are also encouraged from amateur or professional microbiologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Microbiology.

In awarding grants, the Council of the Society will assess:

- The quality of the project
- The applicant's ability to carry it out
- A realistic costing and timetable.
- The likelihood that successful completion of the research will lead to publication.

A grant of up to $2,300 is available to members of the Linnean Society of New South Wales and $1,200 is available to non-members of the Society.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the William Macleay Microbiology Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

Closing date is **1 March 2018.** Submit your signed application by email to linnsoc@iinet.net.au

BETTY MAYNE SCIENTIFIC RESEARCH FUND FOR EARTH SCIENCES

The Betty Mayne Scientific Research Fund for Earth Sciences provides financial assistance to support short term original research projects in all aspects of the earth sciences.

Applications will be accepted from postgraduate and honours students, amateur or professional geologists who can demonstrate a level of achievement in original research in Earth Sciences.

Projects proposed for support do not have to be restricted to Australian locations or specimens, but, given the Society's interests in the natural history of Australia, they must demonstrate a strong Australian context.

In awarding grants, the Council of the Society will assess: the quality of the project; the applicant's ability to carry it out; a realistic costing and timetable and the likelihood that the successful completion of the research will lead to publication.

Applicants need not be members of the Society, although all other things being equal, members will be given preference.

Individual grants will not normally exceed the level of equivalent awards from the Joyce W. Vickery Scientific Research Fund, i.e. $2,500 for Members and $1,500 for non-members. Money awarded must be used for research purposes, and field work or travel within Australasia. Requests for subsistence, travel to conferences, or thesis preparation expenses, will not be supported.

The Council will take into account other sources of research funds currently held or applied for by the applicant. While financial support from other sources will not ordinarily exclude award of a grant from the Betty Mayne Scientific Research Fund for Earth Sciences, a grant from this Fund cannot be held concurrently with one from the Joyce W. Vickery Scientific Research Fund.

Applications must be made on the form specific to the Betty Mayne Scientific Research Fund for Earth Sciences. Intending applicants are strongly urged to seek assistance from their supervisor or an appropriate colleague with experience in writing research proposals, and further, to have their application reviewed before submission.

Successful applicants are required to make a written report to the Society no later than 12 months from receipt of their grant, detailing progress of the project, briefly outlining research results, and justifying expenditure of the award money. Any publication arising from studies supported by the Betty Mayne Scientific Research Fund for Earth Sciences must acknowledge that support. Type material, representative sample collections, relevant analytical data, and figured or mentioned thin sections, must be lodged in a state or national museum or university collection.

The Council's decision in regard to the award or non-award of grants from the Betty Mayne Scientific Research Fund for Earth Sciences is final, and no correspondence will be entered into.

Closing date is **1 March 2018.** Submit your signed application by email to linnsoc@iinet.net.au

THE JOYCE W. VICKERY SCIENTIFIC RESEARCH FUND

Grants from the Joyce W. Vickery Scientific Research Fund are intended to support worthy research in those fields of the Biological Sciences that fall within the range of interests of the Society, especially natural history research within Australia.

- Applications will be accepted from postgraduate and Honours degree students at recognised Australian Universities who are undertaking full-time or part-time studies with a biological emphasis.
- Applications are also encouraged from amateur or professional biologists, whether in employment as such or not, who can demonstrate a level of achievement in original research in Biological Sciences.

In awarding grants, the Council of the Society will assess:

- Realistic costing and timetable
- The quality of the project

- The applicant's ability to carry it out
- The likelihood that successful completion of the research will lead to publication.

Individual grants will not normally exceed $2,500 for Members of the Linnean Society of New South Wales and $1,500 for non-members.

The Society envisages that grants would normally be used for items such as travel within Australia, equipment, photographic and other expenses, but not for subsistence, travel to conferences, or thesis preparation.

Applications are not restricted to members, but other things being equal, members of the Society will be given preference.

As a rule, the deadline for applications will be 1st March in any year; however, in exceptional circumstances, applications for emergency support will be received at any time.

Grantees will be required to make a report at the end of the project, and no later than 12 months after the receipt of the grant, and to justify their expenditure.

Any publication arising from work supported by the Joyce W. Vickery Scientific Research Fund should include an acknowledgement to that effect.

Any type material generated by studies supported by these grants should be lodged in the collections of an appropriate scientific institution.

An application form may be obtained from the website or from the Secretary of the Society. The application may contain no more than three (3) pages of additional information plus references.

The Society's decisions are final and no correspondence will be entered into about the results.

Closing date is **1 March, 2018.** Submit your signed application by email to linnsoc@iinet.net.au

A FLOCK OF FOSSILS: THE EVOLUTIONARY HISTORY OF AUSTRALIAN BIRDS: a talk given by Dr Jacqueline Nguyen

The Passeriformes, with more than 6,000 species is the largest of the bird groups, with over 60% of all living birds. More than 80% of the passerines are songbirds, small to medium-sized birds that include lyrebirds, bowerbirds, fairy wrens, honeyeaters, pardalotes, magpies and relatives, thornbills, logrunners and many more. The songbirds are a particularly uniform group and diagnosis based on the skeleton are impossible. They are equivalent to one family.

It was thought that as the skeletons were so uniform, it was pointless trying to study fossils, but there are sufficient differences if you know where to look for them. Dr Nguyen studied the top of the leg bone, just below the knee-joint and found sufficient differences to identify many birds. This character may be very similar in other unrelated birds: for example, songbird treecreepers and treecreepers that are not songbirds. It is a character influenced by the use of the leg. These leg bones may be small, comparable to a matchstick.

Murgon in southern Queensland has the oldest songbird fossils, at about 55 million years ago (mya). The Riversleigh World Heritage area in north Queensland has a yielded many fossils: logrunners in the late Oligocene (28-23 mya) to late Miocene (10-5 mya); magpies, currawongs and kin, early Miocene (23-16 mya); sittellas, middle Miocene (16-10 mya); quail thrushes, early to middle Miocene (23-10 mya). Lyrebirds, oriolids, honeyeaters, crow-like songbirds, magpie relatives, logrunners, treecreepers, sittellas and more were present before 2.5 mya.

Birds can be indicators of past environments, for example, log runners need dense forest and sittellas are birds of the understorey. The Rackhams Roost site at Riversleigh (at least 2.7-1.1 mya) has a rich bird fauna, but they are all small to medium-sized birds: there are no large birds and they are all birds of the open plains. The bones also had puncture marks on them. This site was a bat colony and the bats were preying on the birds.

Nuclear DNA and the fossil record indicate that the origin of the passerines was in the late Cretaceous, some 71 mya and the songbirds originated in Australia. It had long been thought that song originated in the northern hemisphere and this revision of their origin was rejected or ignored in the northern hemisphere for a long time. It was unthinkable that the ancestors of their cherished songsters like the nightingale may be descended from Australian ancestors, especially as many of the Australian songbirds have harsh songs that may not be melodious to our ears.

The DNA evidence shows relatedness and the evidence is overwhelming that northern hemisphere songbirds had evolved from ancestors that were in Asia, but had migrated there from Australia. Fossils of songbirds in Australia are older than any European fossil songbirds. A southern origin for northern hemisphere songbirds is now becoming accepted. Dr Nguyen accompanied her talk with many pictures of birds and it was a visual delight.

Editor's note. The book *Where Song Began*, by Tim Low (2014 Penguin Group Australia) covers this topic in detail and more. It is very easy to read, even for people who do not know anything about birds. I found it most enjoyable.

THE LINNEAN SOCIETY OF NEW SOUTH WALES

2018 Annual General Meeting

The 143rd Annual General Meeting of the Society will be held at 18:00 on 21 March 2018 in the Charles Moore Room in Anderson Building, Royal Botanic Gardens, Mrs Macquaries Road, Sydney.

Members and guests are invited to join the Council of the Society for wine and light refreshments from 17:30.

Five members of Council are due to retire at this AGM:

John Barkas
Hayley Bates
John Pickett
Helen Smith
Karen Wilson

and offer themselves for re-election.

Council recommends the election of Dr John Barkas as President of the Society for 2018

Further nominations are invited for vacancies on Council (6), the office of President, and Auditor. Nominees must be financial Ordinary Members (a category which includes Life Members) of the Society. The nominations must be signed by at least two financial Ordinary Members of the Society and countersigned by the nominee in token of their willingness to accept such office.

Nominations must be received by the Secretary at the Society's offices at 3/40 Gardeners Road, Kingsford (PO Box 82, Kingsford 2032) by 31 January 2018.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 167 **APRIL 2018**

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IN THIS ISSUE

INCLUDED WITH THIS ISSUE
Form for tax-deductible donations
Record of the 2018 AGM
Warrumbungles Symposium circular

NEW MEMBERS

We welcome
Mr Yi-Yang Chen, Australian National University. Field of interest: marine ecology.
Mr Richard J. Dimon. Sydney University. Fields of interest: taxonomy and systematics, evolution, phylogenetics, botany.
Ms Eva Fernandez Fernandez, University of Technology, Sydney. Fields of interest: microbiology, climate change.

Mr Kawsar Khan, Macquarie University. Fields of interest: behavioral ecology, evolutionary biology, conservation biology, taxonomy
Dr Lizzy Lowe, Macquarie University. Fields of interest: Ecology, behavior, invertebrates.
Mr Max Mallen Cooper, University of NSW. Fields of interest: biological soil crusts, functional traits, climate change, biopedturbation
Dr Jacqueline Nguyen, Australian Museum. Fields of interest: palaeontology, ornithology, evolution, taxonomy, systematics.
Dr Katrina Mikac, University of Wollongong. Fields of interest: wildlife conservation and ecology.
Mrs Anita Perkins, Southern Cross University. Fields of interest: multifunctional role of fungi Ascomyta, mycology, biochemistry, environmental science.
Dr Mitchell Tulau, Office of Environment and Heritage (OEH). Fields of interest: geology, soils, geomorphology.
Miss Jenna Wraith, Griffith University. Fields of interest: using big data to access conservation issues of threatened species, including orchids.

ROBERT DANIEL WALSHE, OAM 28th December 1923 – 6th March 2018

Bob Walshe was a gentle and humble man who touched so many lives and he leaves our world a better place. Bob was twice named Sutherland shire Citizen of the year, and has been recognised as an environmental champion, a prodigious author and writer, a community advocate, as a teacher and an historian. When the Linnean Society of New South Wales produced its book on the Royal National Park, Bob was an enthusiastic supporter buying well over 100 copies which he generously gave as gifts to friends and colleagues. He also wrote two positive reviews published in the local press. He will be sorely missed by all his friends and acquaintances.

Robert King

AWARDS FROM THE SCIENTIFIC RESEARCH FUNDS

The current low interest rates limit funds available and the Society is unable to fund as many applications as it would like or to provide the full amount requested by the applicants. Decisions on where to make the cuts have been difficult and regrettable, worthwhile projects go unfunded because we do not have the money.

A most generous donation to the Research Funds by Roger Carolin has funded one extra grant and this will continue for the next five years. Thank you, Roger from the Society and on behalf of the applicants for your generosity.

Julian E. Tenison Woods Award (provided by the Sisters of St Joseph to the Linnean Society of NSW).

Timothy **Frauenfelder**, University of New England
Project: **Description of sauropod remains from the Griman Creek Formation at Lightning Ridge NSW and Bymount Queensland.**
The Early Cretaceous age Griman Creek Formation at Lightning Ridge is unique on a global scale, being the only locality that preserves a terrestrial fauna as natural casts in precious and non-precious opal. Fossil discovery there is almost exclusively the result of mining activity, which results in damage and strips fossils of their geological/stratigraphic context. The only outcrop of the Griman Creek Formation that is not within the opal fields of Lightning Ridge occurs near Bymount in SE Queensland. Sauropod remains there are relatively plentiful and

potentially taxonomically more informative than the isolated teeth found at Lightning Ridge. Awarded $820.

Alexandra **Murray**, James Cook University
Project: **Analysis and Description of a Complete Ichthyosaur Skull from Boulia, Queensland**
This project will formally describe QMF58949, an ichthyosaur found near Boulia, western Queensland, place it within its global taxonomic context, and discuss the specimen's implications for our understanding of Cretaceous ichthyosaur diversity. The specimen consists of a complete skull, anterior cervical vertebrae and the nearly complete right front limb. Due to the completeness of the skull of QMF58949 and the presence of diagnostic postcranial material, this specimen has the potential to bring further clarity to our understanding of Australian Cretaceous ichthyosaurs. Awarded $430.

William Macleay Award for Microbiology Research

Miss Eva **Fernandez Fernandez**, University of Technology Sydney
Project: **Revealing the sulphur cyclers on Port Hacking natural sea waters (Australia)**
Dimethylsulphoniopropionate (DMSP) is a key sulphur compound in the marine environments, which satisfies 95% of the sulphur and 15% of the carbon demands of marine microbes. DMSP is also the precursor of the climatically active gas dimethylsulfide (DMS),
Once in the atmosphere, DMS can increase cloud formation and light scattering which results in a decrease in sea surface temperature. Therefore, DMS has the potential to regulate local climate and counteract some of the effects of climate change. Phytoplanktons are the major producers of DMSP and together with heterotrophic bacteria, recycle and transform DMSP that may be incorporated into the biomass or converted into DMS. However, the conditions required for each pathway are unknown. What work that has been done has concentrated on the heterotrophic bacteria that ventilate about 3% of the DMSP production and incorporates 10% into the biomass. This project will study both phototrophic and heterotrophic microbes in a temperate environment. The method was proven in tropical regions. Awarded $1,700.

Betty Mayne Award for Scientific Research in the Earth Sciences

Thomas **Claybourn**, Macquarie University.
Project: **Multiproxy correlation of the stratigraphy of East Antarctica and South Australia**
The lower Cambrian Byrd Group of eastern Antarctica has yielded a new fauna of small primarily phosphatic and phosphatised shelly fossils which are ideal for correlation to the shelly fossil biozones of South Australia. A multiproxy approach utilising carbon isotope ($\delta^{13}C$) chemostratigraphic data from the Byrd Group and biostratigraphy from a second section collected in South Australia allows direct comparison to be made between these regions. This will create a more unified stratigraphic understanding of East Gondwana (East Antarctica + South Australia) and its context in the global Cambrian timescale. Awarded $1,080.

Dr Jacqueline **Nguyen**, Australian Museum.
Project: **Evolution of the Australasian passerine avifauna: insights from the New Zealand fossil record.**
St Bathans, one of the richest fossil sites in New Zealand, is 19–16 million years old and provides the only insight into New Zealand's terrestrial vertebrate fauna (including 35 types of birds) during this period. Little is known about the evolution of passerines (perching birds) in New Zealand, even though passerines represent over 50% of the world's bird diversity. This project will describe new fossils of passerine birds from St Bathans and interpret their evolutionary relationships to living taxa by estimating the phylogenetic relationships of various New Zealand passerine groups with Australian and New Guinean taxa. These groups

are important in understanding the evolutionary and biogeographic history of the Australasian avifauna. Awarded $1,729.

Surrey Jacobs Award for Scientific Field Work

Mr Timothy Lindsay **Collins**, University of New England
Project: **Study of *Xerochrysum* from the Pilbara and revision of the genus**
The number of species in the genus is in doubt. Revision requires collection of new material at the right stage of flowering and fruiting, requiring well timed trips to the Pilbara and SW of WA. Awarded $1,500.

John Noble award for Invertebrate Research

Dr Lizzy **Lowe**, Macquarie University
Project: **Variations in the brain size and behaviour of urban and rural jumping spiders**
To survive in urban areas, animals must cope with a range of novel environmental conditions. Some species are able to navigate these challenges and thrive in urban areas (exploiters) whereas others cannot and are excluded (avoiders). Comparing functional traits between urban exploiters and avoiders should identify mechanisms driving community structure. Increase in brain size has been shown to facilitate environmental exploration in birds and mammals. This project will study brain size in relation to behavioural plasticity in urban and rural communities of jumping spiders. Experimental behavioural responses will be recorded in both groups and brain size found from Micro CT scanning. Awarded $1,700.

Joyce W. Vickery Scientific Research Awards

Yi-Yang (Alex) **Chen**, Australian National University
Project: **How does tropical macroalgae epifauna respond to changing sea temperature?**
Epifauna are invertebrates, typically 0.5-10mm long, living attached to the canopy of other organisms such as macroalgae and corals. This epifaunal community can have high levels of productivity, sufficient to support high levels of macro-invertebrates and fish. Shallow water habitats along tropical coastlines are often dominated by seaweed meadows alongside of coral reefs. The meadows are typically dominated by the canopy-forming macroalga *Sargassum* that exhibits seasonal fluctuations in canopy. These canopies are a good home to epifaunal invertebrates that are targeted by carnivorous fish but it is not known how the epifauna respond to the changes in temperature during these changes over space and time. This project will investigate the response(s) to changes, particularly of temperature in the Ningaloo region. Awarded $2,000.

Ms Olivia **Davies**, Flinders University
Project: **The influence of *Wolbachia* on mitochondria in an Australian native bee.**
The Australian bee fauna is most unusual, being dominated by one family, the Colletidae. One subfamily, the Hylaeinae arose in Australia and has gone on to colonise the globe. In the native bee *Amphylaeus morosus*, the only known colonial bee in the family, the mitochondrial DNA (mDNA) has no variation across its entire range, Qld to Vic, except for mitochondrial heteroplasmy (two or more types of mDNA within an individual) and infection with two strains of *Wolbachia*, a bacterial parasite. Mitochondrial heteroplasmy occurs occasionally in other animals, including humans where it causes mitochondrial disease. 100% of the bees have the same two types of mDNA –very unusual. *Wolbachia* infection is very common, and 70% of all land based insects are infected.

Wolbachia is maternally inherited and has profound effects on the host. It can remove mitochondrial variation from the population, act as a feminising agent but interactions that allow it to manipulate the host remain largely unknown. The combination of these two features have never been reported before. This project will investigate whether these two features together in *A. morosus* have enabled deviant genetic systems to develop by following the inheritance of mDNA after *Wolbachia* has been eliminated. Awarded $1,200.

Mr James **Dorey**, Flinders University
Project: **Systematics and evolution of the highly diverse bee genus *Homalictus***
Australia has such a wide range of habitats, from xeric to mesic, but were they all able to support evolution of new species, hence an increase in biodiversity or were only a few able to do this and new species move out to other habitats? This question becomes important with climate change. Native bees are important for their pollination services and understanding how they fared in past climatic changes and how they are likely to fare in the future becomes critical. This project focuses on the highly diverse genus *Homalictus* that is found in all biomes from harsh gibber desert to rainforest. It will revise the systematics and use the phylogenetic relationships to explore what radiations have involved adaptations to climatic niches. Awarded $1,200.

Miss Casey Marie **Gibson**, University of NSW.
Project: **Digging through the plant archives: herbarium specimens and plant traits**
The alpine flora has been sampled repeatedly for a long time and many specimens reside in herbarium collections, a data source to draw on to determine if there has been change in plant traits that may be linked to environmental changes. The first aim of this project is to assess whether there is any change, then to determine if there is any altitudinal difference in the velocity and magnitude of the change and if the change is conserved. The wide temporal range of the collections offer a rare chance to determine response trends through time (e.g flowering and fruiting). Trait measurements will follow standardised international protocol and the results will be useful at the local and global level. Awarded $1,600.

Mr Alex **Kenins**, University of New England
Project: **Discovery of desmids in New England tableland Sphagnum bogs**
Desmids are microscopic green algae commonly found in freshwater *Sphagnum* bogs that are confined to montane and alpine regions. There are few collections and studies of desmids in Australia but what there is suggests a rich diversity. Sphagnum bogs are poorly drained, infertile and acidic. Due to the rarity of sphagnum bogs and the highly limited knowledge of the desmid flora, it is crucial to document the desmid flora, not only as an inventory but as the flora for distinct sites. Diversity and abundance will be compared. Awarded $1,700.

Dr Thomas Edward **White**, University of Sydney
Project: **Illuminating the temporal structure of visual communication using butterflies.**
Communication with the outside world is visual and is crucial to animals' ability to adapt to the environment. Most research focuses on 'snapshots' of communication with little consideration on how communication is modified by behavioural, environmental and perceptual processes, i.e. the dynamic nature of communication. This project aims to integrate the spectral, spatial and - crucially, the *temporal* dimensions of visual communication. How does flashing colour, movement and a dynamic viewing environment enable effective communication in 'noisy' natural environments? Butterflies are good test subjects and will be used in this study. Awarded $1,700.

UNDERSTANDING AND MANIPULATING ANIMAL COMMUNICATION FOR CONSERVATION: a talk given by Dr Neil Jordan

When Humans come into conflict with predators, usually over livestock, the immediate and usual response is to kill the predator. All the large predators in Africa are in decline: the lion population was once 32,000, it is down 83% now; leopards, 250,000, down 37%; hyenas, 40,000, down 27%; African wild dogs, 5,000, down 90%; and cheetahs, 10,000, down 77%. On the other hand, the population of that other large predator, the Human is up to 7 billion. Dr Jordan is an affiliate of Taronga Zoo and works with the Botswana Predator Conservation Trust to find a way for the wildlife and the humans with their livestock to coexist without killing off the predators.

There are three main ways that animals communicate, scent, sound and visual. The wild dogs communicate predominantly by scent. A pack of wild dogs knows its territory by the scent of the dominant breeding pair, and their territories are huge. When reserves are set up, they are usually not big enough for a wild dog territory. The wild dogs know the scent of other dogs and the territorial boundaries. When they reach a boundary of their territory, they turn back. Can this behaviour be used to manage the dogs? Chemical analysis of the defining scent shows there are about 15 chemicals present. The scent in dingo urine has information about the species, sex and age of the individual. It is not known how long the scent markers would last if we were to use it for management. The scent is fresh for 4 days but after 30 days, the response of the dogs is no different. Trials will have to go longer.

Lions use sound for communication. Wild dogs move away from a lion's roar: hyenas usually do, but they may hang around hoping to get a chance steal the prey. Human sounds such as shouts, gunshots etc. are being trialled to see if they might keep lions away. Recordings of other lions' roars, either friend or foe are played at different times or may be activated by radio-collars to see if they can be used to control lions. If a lion can be driven away by a recorded roar, it goes somewhere else and this method may work for an exclusion zone but not the whole landscape. The roar may also attract other lions, as the sound can travel up to 5 km. But exclusion does not promote coexistence.

Lions are ambush predators and when the prey sees the lion, the alarm goes up and lion gives up the hunt once it is spotted. Wood cutters in mangrove forests of India wear painted face masks on the back of the head to deter attack from tigers, also an ambush predator. Inspired by this precedent, Dr Jordan set up a trial where half a herd of cattle (30) had eyes painted on their backsides and the other half were left unpainted. There have been four cows lost to lion attacks: all of them did not have eyes painted on them. None of the eye-painted cows were killed. These cattle are corralled and protected at night. At least this method is cheap and easy for the herders to adopt. It is not known if lions take livestock because there is nothing else or because they are easy pickings. The trial is continuing.

Probably no one approach would work by itself and it remains to be seen if the predator learns it is just a trick. It may be thought that big game hunting for trophies is the cause of the decline in numbers of big predators, but the over-riding reason is loss of habitat which continues apace with the expanding human population.

Communication manipulation for conservation is being trialled in Australia. The individual scent of a Tasmanian Devil could be used to mark out a territory for it to become used to upon release in the wild. It would keep out the neighbours for this critical time of adaptation to the change upon release. It is not known if it would work. Dingoes use both scent and sound for communication: they howl. Perhaps the dingo's howl would keep feral cats away from critical areas where wildlife is being released. There are many other ideas to promote coexistence of wildlife and human activities. The wildlife can be sustainable if the areas for conservation are large enough and they are managed right.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 18 April at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

Dr ANN YOUNG

Wollongong University

ENDANGERED ECOLOGICAL COMMUNITIES (EECs) AND ARCHIVES OF CHANGE:

UPLAND SWAMPS IN THE SYDNEY REGION

Upland swamps are islands of wetland in the midst of eucalypt-dominated woodland on the plateaus around Sydney. They also are archives of history fire and climate history and important to Sydney's drinking water catchments but underground coal mining, forestry and urbanisation are causing significant damage to them. Ann Young's interest in the swamps began 40 years ago and her recent book brings together the wide range of research now available on the swamps' ecology, hydrology and resilience to environmental impacts.

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Wednesday 23 May at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

Dr JOHN PICKETT

CURRENT IDEAS ON THE GEOLOGICAL EVOLUTION OF THE BLUE MOUNTAINS, NEW SOUTH WALES

A brief outline of the regional geology of the Sydney and Blue Mountains areas is followed by presentation of the traditional ideas on the development of the Blue Mountains. It is generally accepted that the Blue Mountains proper begin west of the Nepean River at Penrith. In that area, the rise, or front, of the Blue Mountains coincides with a fold of the simplest kind, known as the Lapstone Monocline. This feature is oriented north-south, persists for many kilometres, and shows prominently on satellite and aerial photographs. The traditional view presents this feature as a post-depositional phenomenon, resulting from relatively recent crustal movements known collectively as the Kosciusko Uplift. Coarse gravels, which occur patchily at different altitudes along the monocline, and extensively on the Cumberland Plain, are interpreted in the traditional view as post-dating the monoclinal fold.

Some evidence, particularly from geophysical surveys, suggests that the folding along the monocline is actually syn-depositional, though some recent publications dispute this. The age of the folding is critical to interpretation of the post-depositional history.

The Nepean River has a course which can only be described as bizarre. Whereas most rivers rise in a mountainous area, flow through foothills, onto a plain and then into the sea, the Nepean rises not far from the ocean and flows INTO the mountains, a feat it performs no fewer than THREE times! A satisfactory explanation of this behaviour is a necessary corollary of any explanation of the post-depositional history.

Age control on the timing of the significant events of this history is poor. In the Blue Mountains themselves, the only dates are yielded by Jurassic spores recovered from the matrix of breccia within the volcanic necks scattered through the region, and an isotope age of Early Miocene. On the coast, estuarine sediments, also of Early Miocene age, imply minimal vertical movement of the terrain since that time. On the other hand, recent work on young sediments in Mountain Lagoon indicates movement of as much as 15 m along the Kurrajong Fault since that time.

The location of many of the basalt highs of the Blue Mountains, immediately adjacent to the gorges of the Grose and Wollangambe Rivers, implies that the gorges have developed since the Early Miocene.

A coherent explanation of all these phenomena is still lacking; an attempt is made to bring as many as possible of these together.

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Refreshments will be served from 5.30 pm

EVERYONE WELCOME

LINNEAN SOCIETY OF NEW SOUTH WALES

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IN THIS ISSUE

NEW MEMBERS

We welcome our new members:

Ms Margarita Gil **Fernández**, Macquarie University. Fields of interest: ecology, conservation, carnivore ecology, natural history of carnivore.

Dr Glynn **Maynard**. Fields of interest: entomology, Hymenoptera (bees, ants), quarantine, survey, biosecurity, plant protection.

Notice to members
Proceedings of the Linnean Society of NSW

Since the Linnean Society of NSW moved to electronic publishing of our Proceedings we have been able to reduce the membership fees and keep them low. From this year a CD of the proceedings will no longer be sent to members.

As each paper is refereed and typeset it is uploaded to the Open Journal system at Sydney University library and are available for free download.

The link is https://openjournals.library.sydney.edu.au/index.php/LIN/index

To gain access to years 2011 to present select <Browse . . . By Issue>

Issues prior to that (from 1877) are available free from the Biodiversity Library.

The link is https://www.biodiversitylibrary.org/bibliography/6525#/summary

PROGRESS REPORTS FROM RECIPIENTS OF RESEARCH GRANTS

Ms Victoria **Austin**, from Western Sydney University, 2017 recipient of the Joyce W Vickery Fund, sent her progress report for her project titled: *The function of vocal mimicry in female superb lyrebirds* (Menura novaehollandiae).

Miss Claudia **Santori**, from University of Sydney, 2017 recipient of the Joyce W Vickery Fund, sent her progress report for her project titled: *Halting the decline of Murray River turtles.*

ENDANGERED ECOLOGICAL COMMUNITIES (EECs) AND ARCHIVES OF CHANGE: UPLAND SWAMPS IN THE SYDNEY REGION:

A talk given on 10 April at 6pm by Dr Ann Young

Dr Young has retired from the University of Wollongong and is now a member of the Independent Expert Panel on Mining in the special areas of Sydney's drinking water catchment. This Panel is chaired by the NSW Chief Scientist and advises the State Government.

Upland swamps of the Woronora Plateau are characterised by a sharp boundary between surrounding Eucalyptus forests and a sedge-dominated low heath community forming a continuous ground cover. Developed on large areas of sandy sediment and without distinct channels, some wetter areas develop very tall, thick vegetation. In the western areas towards Picton, the swamps are slightly drier and scattered Scribbly Gums appear (and wombats!).

Headwater upland swamps sit up high in on plateaux and slopes close to ridgelines. Rather than forming surface channels, the water moves through cracks in sandstone blocks, seeping out horizontally into wet sandy masses. Headwater swamps are sometimes erroneously called hanging swamps, but the latter are different – they hang on steep to even vertical sandstone faces with the top matched to thin claystone beds which constrain groundwater flow. These types of swamps are common in the Blue Mountains, often seen in the sandstone unit above the Banks Wall Sandstone.

Valley floor swamps are different again, formed where sediments accumulate in the valley floors without channels that would otherwise erode the sediment and drain the area. They are found mainly in the Blue Mountains (Newnes Plateau) and Woronora Plateau.

Swamp sediments build up over several thousand years, starting with sands and gravels. Organic matter starts to accumulate, and the anaerobic environment inhibits decomposition; this is the peat layer, with C:N ratio greater than 27. The top layer is the root zone. Sandstones are nutrient-poor; swamp plants with cluster roots compensate for this by spreading over all available surfaces.

Many parameters in the hydrology of swamp systems are poorly known, as are many ecological aspects. A few unique species are well known, such as the Giant Dragonfly (*Petalura gigantea*) which is entirely dependent on swamp habitats and the endangered Blue Mountains Water Skink (*Eulamprus leuraensis*). There is also a distinctive group of birds that occur in swamp habitats, including New Holland Honeyeater (*Phylidonyris novaehollandiae*).

Fire is a major concern – in shrubby swamps, fire can readily lead to erosion of exposed sand. After severe fire, ants are the only visible living thing to initially recolonise the swamp floor, although it is unclear what they are doing there. But if there is no heavy rain after a fire, then swamps are very resilient, and plants will quickly regrow provided the root zone remains wet.

Sediment cores provide an archive of climate and fire history. In most areas, sediments began to accumulate in swamps during the late glacial stage of the Pleistocene into the Early Holocene (i.e. 15,300 to 9,000 years ago). There are some outlying radiocarbon dates of ~43 KA from Gooch's Crater swamp and Stockyard swamp. Gooch's swamp is characterised by 6 m of humified peat, with the upper 3.6 m accumulating over the past 5,000 years. Due to the general impermeable nature of sandstone it is unlikely that swamp formation is a recent phenomenon, in fact there is evidence from Blue Mountains Water Skink population genetics that there have been swamps in the Blue Mountains for at least 2 million years.

Generally, a very low charcoal content is seen in swamp sediments during the wetter Climatic Optimum, until 5,700 years ago. Since then, a higher and more variable charcoal content suggests frequent intense fires – but there is no clear pattern relative to human occupation.

Threats to upland swamp communities include lowering of the water table due to damage to bedrock by mining, and drainage by channelization. Swamp collapse can be catastrophic and very rapid once the underlying peat layers have dried; this may occur slowly over several years. Longwall mining, which removes very elongate panels of coal leading to subsidence of overlying rock layers, is particularly of concern for swamp ecosystems and around Sydney's water catchment areas. Damage to the bedrock is irreversible but some other damage can be remediated.

Drying of the peat dramatically changes the type of plant communities that depend on the hydrologic regime in undisturbed swamps; carbon storage capacity of swamp systems will also change. Other land-use changes such as pine plantations and changes to pH due to run off from urbanisation or mines threaten some areas. Pines are invasive and nearby swamps require continual maintenance to remove pine seedlings.

Upland swamps are fascinating, complex and still poorly understood environments.

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CURRENT IDEAS ON THE GEOLOGICAL EVOLUTION OF THE BLUE MOUNTAINS, NEW SOUTH WALES

A talk given on 23 May at 6pm by Dr John Pickett (Geological Survey of NSW, ret'd)

A brief outline of the regional geology of the Sydney and Blue Mountains areas is followed by presentation of the traditional ideas on the development of the Blue Mountains. It is generally accepted that the Blue Mountains proper begin west of the Nepean River at Penrith. In that area, the rise, or front, of the Blue Mountains coincides with a fold of the simplest kind, known as the Lapstone Monocline. This feature is oriented north-south, persists for many kilometres, and shows prominently on satellite and aerial photographs. The traditional view presents this feature as a post-depositional phenomenon, resulting from relatively recent crustal movements known collectively as the Kosciusko Uplift. Coarse gravels, which occur patchily at different altitudes along the monocline, and extensively on the Cumberland Plain, are interpreted in the traditional view as post-dating the monoclinal fold.

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A coherent explanation of all these phenomena is still lacking; an attempt is made to bring as many as possible of these together.

CRETACEOUS FLAMMABLE VEGETATION

Fire is an integral part of the Australian sclerophyll ecosystem and the vegetation quickly recovers after being burnt. But when did this tolerance, and indeed reliance on fire for maintenance of the ecosystem develop?

During the Tertiary (last 66 million years), rainforests were widespread until about 20-15 million years ago (mya), when sclerophyll forests became predominant. The charcoal content of the sediments increased along with this change in the vegetation: it was low with rainforest, becoming much higher with the sclerophyll vegetation. But this record is for southeastern Australia and variations are to be expected in distant parts of the country. A few Tertiary records from central Australia are similar, with certain differences but the evidence is too sparse to construct a detailed record.

Angiosperms first appeared in the early Cretaceous, some 120 mya. Then, the vegetation was forests of mainly podocarps, araucarians and other gymnosperms, with ferns, some as tree ferns, fern allies, cycads and a wealth of the lower plants. The angiosperm content gradually increased until it was the dominant content of the Tertiary vegetation at 66 mya. By the late Cretaceous (80-66 mya), there was a rich assortment of angiosperms, including the taxa Proteaceae and rare *Nothofagus*. Again, this record is for southeastern Australia with little evidence from elsewhere in Australia.

However, a recent study (Carpenter et al., 2015) reports on late Cretaceous age (about 70-80 mya) pollen, foliar and other remains recovered from a bore sunk by a mining exploration company about 140 km northeast of Alice Springs. The fossil bearing sediments were intersected at depths of 96-108 m and represent a swamp in what was a small late Cretaceous basin.

Proteaceae was the most diverse group amongst the fossils with at least 12 foliar taxa recovered, including two amphistomatic (stomates on both sides of the leaf) leaves that were only 1.0-1.5 mm wide. Sunken stomates and thick cuticles were also found: all features of taxa of open habitats. Some conform closely with open habitat genera such as *Stirlingia, Isopogon* and *Conospermum*, and others are consistent with Grevilleoideae.

Fossil pollen of Proteaceae was very diverse and usually amounted to more than half of the pollen present: an exceptionally high content. Pollen representative of *Franklandia, Beauprea, Faurea* and *Protea* or subfamily Proteoideae, all open habitat taxa, are present. Embothriineae (*Embotherium* and *Telopeia*), the Australian rainforest genus *Alloxylon* and rare *Banksia*-like pollen are also present.

Freshwater, aquatic and wet habitat fossil taxa were common, especially Cyatheaceae, Gleicheniaceae and Sphagnum. Podocarps, araucarians, an extinct conifer and cycads were present but not abundant. Minute-leaved gymnosperms (possibly including *Microcachrys*) also suggest open habitat. Liliales, palm pollen and Ericaceae were also present.

The authors of this study (Carpenter et al., 2015) suggest that open sclerophyll vegetation is of great antiquity. The environment was a *Sphagnum* fenland with raised areas supporting heath dominated by Proteaceae with Ericaceae, Liliales and low-growing gymnosperms. Elsewhere, there were taller trees and/or closed thickets with some rainforest taxa. Relatively open vegetation with Proteaceae and gymnosperms dominant were probably more widespread over larger areas of inland Australia.

Similar late Cretaceous pollen assemblages rich in Proteaceae have been found in the Ayers Rock (Uluru) and Olga's (Kata Tjuta) region of central Australia.

There were abundant burnt fragments, including charcoalified wood fragments. Evidence of burning is confirmed by the presence of combustion-related hydrocarbons (Carpenter et al., 2016). Globally, the late Cretaceous was subjected to periodic dry climates and is regarded as a "high-fire" era.

Similar swamp deposits formed the Yallourn brown coals in Victoria, but they are much younger, Miocene to Pleistocene (25-2 mya).

In contrast to central Australian in the late Cretaceous, southeastern Australia in that period was largely forest, but it would have been open forest with conical or linear shaped canopies for Australia was then adjacent to Antarctica, at about 65° S. Southeast Australia was also rich in Proteaceae, but it had the canopy taxa *Knightia, Macadamia, Gevuina/Hicksbeachia* and possibly others, in addition to the taxa found in central Australia (Dettmann, 1994).

The Southwest part of Western Australia is a centre of ancient phylogenetic diversity of the Proteaceae. Possibly, such vegetation represents a vestige of a once more widespread inland Australian flora and is a testament to the long and continuous stability of the landscape.

References

Carpenter, R.J., Macphail, M.K., Jordan, G.J. and Hill, R.S. (2015). Fossil evidence for open, Proteaceae-dominated heathlands and fire in the Late Cretaceous of Australia. *American Journal of Botany* **102**, 2092-2107.

Carpenter, R.J., Holman, A.I., Abell, A.D. and Grice, K. (2016). Cretaceous fire in Australia: a review with new geochemical evidence, and relevance to the rise of the angiosperms. *Australian Journal of Botany* **64**, 564-578.

Dettmann, M.E. (1994). Cretaceous vegetation: the microfossil record. *In* R.S. Hill (Ed.) *"History of the Australian Vegetation, Cretaceous to Recent"* (Cambridge University Press, Great Britain).

Dr Helene Martin

PLEASE NOTE:
THERE WILL BE NO TALK IN JULY

2018 LINNEAN SOCIETY OF NSW NATURAL HISTORY FIELD SYMPOSIUM VOLCANOES OF NORTHWEST NEW SOUTH WALES: EXPLORING RELATIONSHIPS AMONG GEOLOGY, FLORA, FAUNA AND FIRES

Dates: Icebreaker - Monday evening 24 September (Coonabarabran Visitors Centre)
Symposium sessions - Tuesday & Wednesday 25-26 September 2018
Optional Field trip to Warrumbungle National Park Thursday 27 September 2018
Venue (Symposium sessions): Coonabarabran Bowling Club Auditorium, Edwards Street, Coonabarabran NSW.

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

NEWSLETTER NO: 169 SEPTEMBER 2018

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IN THIS ISSUE

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2019. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays $3,200.00 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's website. These Regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them. **Applications close 15. November 2018**

Members of the Linnean Society of NSW in the News.

Dr Barbara G Briggs, was awarded an AM in the 2018 Queen's Birthday list in recognition to her research as a botanist. Dr Briggs was President of the Linnean Society of NSW in 1976; is a Life Member of the Linnean Society of NSW, the Australian Systematic Botany Society and the Ecological Society of Australia. Her special interests include plant evolution and southern hemisphere biogeography. She has published key papers on the phylogeny and classification of the flowering plant families Restionaceae, Proteaceae, Myrtaceae and Scrophulariaceae.

Dr Gregory Edgecombe FRS, former Councillor of the Linnean Society of NSW and now at the Natural History Museum, London became a Fellow of the Royal Society in 2018. His field of expertise is within Arthropoda phylogeny; Dr Edgecombe is also an authority on centipedes.

Congratulations to both recipients for a well-deserved recognition.

Progress Report from Linnean Macleay Fellowship

Dr David Mackay (Linnean Macleay Fellowship 2014-17) has published the results of his Fellowship project in a paper titled « *Small populations of fig trees offer a keystone food resource and conservation benefits for declining insectivorous birds* ».

Abstract: Novel restoration approaches are required to provide food and habitat for declining bird populations, particularly as pressures increase from growing human populations and climate change. Fig (*Ficus*) species support many frugivores but there is a gap in our knowledge about the importance of these insect-pollinated plants to insectivores. We tested the influences of fig-population size and the number of fig-wasp-producing fruit per tree on avian-insectivore visitation to fig trees in eastern Australia over a three-year period. Eighty-four bird species visited fig trees in our study; two thirds (55) of these species were insectivores. More individual insectivores (1686) than frugivores (1051) visited fig trees ($p < 0.0001$). More insectivore species visited individual fig trees in small, fragmented populations (<16 fig trees) than in large populations (>50 fig trees; p ¼ 0.016). We showed that figs provide insectivores with an important, year-round, food source. We showed that this occurred in a dry, temperate ecosystem and in a mesic, sub-tropical ecosystem. Insectivore visitation was significantly correlated with the number of ripening fig syconia and the number of emerging fig wasps but not with abundances of other insects in fig trees. Temporal resource partitioning between insectivores and frugivores was identified, with insectivores foraging as fig syconia were ripening, and frugivores foraging after syconia had fully ripened. *Ficus* species are very likely to provide similar keystone resources for avian insectivores throughout tropical, subtropical and temperate regions globally. This study revises our understanding of the role played by *Ficus* trees in supporting avian-insectivore populations.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

Wednesday 19 September at 18:00, in the Charles Moore Room, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.

Dr David Mackay, Macleay Fellow recipient
University of New England

"What's so great about figs? ....and what can they tell us about climate change?"

Fig trees are integral to human history. They played key roles in the dawn of civilization. They are the trees of life and the trees of knowledge. Fig trees are awesome in the true sense of the word. Alexander the Great and his troops reached India and encountered a banyan fig, *Ficus benghalensis*, which had hundreds of trunks and covered a vast area of land, enough to shelter ten thousand people according to Alexander's admiral, Nearchus.

Snippets from the past.

First meeting of the Linnean Society of NSW was held in the Board Room of the Free Public Library, Sydney, on 29 October 1874.

In 1885, women were admitted as Associate members and as Ordinary members on an equality with men members in 1909.

Vera A I Smith – Linnean Macleay Fellow in Zoology - was the first woman to be appointed to a Fellowship from 1 April 1919.

GENE DRIVES: A FUTURE WAY TO CONTROL PESTS ?

In elementary genetics, we learn about Mendel and his experiments with peas. Each adult parent has two genes per character but only one in the gametes (egg or sperm), so that when they combine, we are back to two genes per individual. If an individual with two dominant genes is crossed with one with two recessive genes, all the offspring are hybrid with one dominant and one recessive gene. Cross two of the hybrids and we get offspring of the ratio of one with two dominant genes, two hybrids and one with two recessive genes. This is called Mendelian inheritance and relies on a 50:50 chance of the distribution of the genes in the gametes. Then if one form of the gene has some advantage or disadvantage over the other, natural selection will increase/decrease (respectively) the frequency of that gene in the population, usually rather slowly.

But sometimes there is a bias towards one gene and then that gene will rapidly spread through the population and this is called a gene drive. Gene drives are natural and occur in nature in free-breeding populations. A classic example occurs in mice where the "t-type gamete" is preferentially passed on. But the t-type of gene is maladaptive and individuals that inherit two t-type genes have major developmental problems or are sterile. In the hybrid, gametes form in the 50:50 ratio, but the sperm with the t-type gene somehow kill off the normal sperm, hence the bias towards the t-type.

Recent advances in the gene editing technology now make it possible to construct "synthetic gene drives" and some see this as a tool to eliminate pests. There is a long wish-list. Mosquitoes, the insect that spreads the most disease could be "driven out of town". Rabbit plagues could be a thing of the past. Any number of agricultural pests could be eliminated. It could be used for conservation and the seemingly unstoppable cane toads could be stopped. But the prominent conservationists Jane Goodall and David Suzuki have warned that the use of gene drives in natural populations "is a moral and ethical threshold that must not be crossed without great restraint".

Implementation of a synthetic gene drive (SGD) would be risky and uncontrollable once released. New Zealand is considering using SGD to rid it of mammalian pests, but what if the new SGD species of possum in New Zealand spread to Australian possums? Other concerns are raised. It is hard to introduce another species into a closely related population and a lot of individuals would be required. SGD species would be just another form of biological control and great caution would be required.

Comparison with genetically modified organisms (GMO) of commercial crop species have been raised. There would be no commercial value in SGD species and much effort goes into containing GMO species whereas SGD species are designed to spread.
At present only a few academics in the United States are active in research into SGDs. We need to be aware of this possible new biological control method and all its attendant risks.

References

Robin, C. (2017). Gene drives: a way to genetically engineer populations. Australasian Science (Aust. Sc.) 38(4) pp. 14-16.
Scanlin, J. (2017). Driving mosquitoes out of town. Aust. Sc. 38(4) pp. 17-19.
Kelly, E. (2017). Gene drives for conservation. Aust. Sc. 38(4) pp. 20-22.
Fournier-Level (1917). The future of pest control lies with the pest. Aust. Sc. 38(4) pp. 23-24.
Robin, C. (2017). Gene drives: a fork in the road for GMO debate. Aust. Sc. 38(4) pp. 25-27.
"Brouse". (2018). Warning of ecological risks of gene drives. Aust. Sc. 39(1) p. 8.
"Expert opinion" (2018). Gene editing for conservation needs in-built protection. Aust. Sc. 39(1): p. 42.

Dr Helene Martin, School of BEES, UNSW

Short history of the Entomological Society of NSW

The Entomological Society of New South Wales (precursor of the Linnean Society of NSW) was founded in 1862 and, in accordance with resolutions agreed to at a preliminary meeting held on 7 April 1862, the first monthly meeting was held at 153 Macquarie-street on 5 May 1862.

The Entomological Society of New South Wales published two volumes of Transactions, each issued in five parts. The number of members was never large, the original members numbering twenty-eight and those subsequently elected about twenty-five. During the Society's existence the number of members who contributed papers was only six (H. H. H. Bradley [1], Rev. R. L. King [12], G. Krefft [2] W. MacLeay [14], H. L. Schrader [2], A. W. Scott [5])

The Society was given up when it became evident that a natural history society on a more comprehensive basis than a purely entomological society was needed for the zoological talent available in the Colony.

Volume 1(1): xvi, pages 1-74, pls. i-v. 1863.
Volume 1(2): xvii-xxxvi, pages 75-154, pls. vi-x. 1864.
Volume 1(3): xxxvii-l, pages 155-198, pls. xi-xv. 1865.
Volume 1(4): pages 199-298. 1865
Volume 1(5): pages 299-340, pl. xvi; li-lxvi, index i-vi. 1866

Volume 2(1): pages 1-78. 1869
Volume 2(2): pages 79-158. 1871
Volume 2(3): pages 159-238, pls. i-iii. 1871
Volume 2(4): pages 239-318. 1872
Volume 2(5): pages 319-370, index i-viii. 1873

List of papers published in the two volumes of the Entomological Society of New South Wales (1863 – 1873).

Bradley, H. H. B. 1871. Descriptions of eight new species of *Stephanopis* (Cambridge). **2**(3): 233-238. *[Read 7th August, 1871]*

King, Rev. R. L. 1863. On the Pselaphidae of Australia. **1**(1): 37-54. *[Read 3rd November, 1862]*

King, Rev. R. L. 1864a. On the Scydmaenides of New South Wales. **1**(2): 91-99. *[Read 3rd August, 1863]*

King, Rev. R. L. 1864b. On the Pselaphidae of Australia. **1**(2): 102-106. *[Read 7th September, 1863]*

King, Rev. R. L. 1865a. Presidential Address. *[Obituary notice with list of published papers of William Sharp Macleay (xlii-xlvi)].* **1**(3): xlii-l. *[Read 30th January 1865]*

King, Rev. R. L. 1865b. Description of Australian Species of *Georyssides* and *Parnides.* **1**(3): 158-161. *[Read 1st August, 1864]*

King, Rev. R. L. 1865c. On the Anatomy of certain Forms of Australian Entomostraca. **1**(3): 162-166. *[Read 5th September, 1864]*

King, Rev. R. L. 1865d. On the Pselaphidae of Australia. **1**(3): 167-175. *[Read November 7th, 1864]*

King, Rev. R. L. 1866a. On the Pselaphidae of Australia. No. IV. **1**(5): 299-315. *[Read 4th December, 1865]*

King, Rev. R. L. 1866b. Description of *Anapestus Kreusleri*: a species of Coleopterous Insect inhabiting Ants' Nests in South Australia. **1**(5): 316-318. *[Read March 5th, 1866]*

King, Rev. R. L. 1869a. Description of the Anthicides of Australia. **2**(1): 1-24. *[Read 7th January, 1867]*

King, Rev. R. L. 1869b. Description of new species of *Articerus.* **2**(1): 54-57. *[Read 1st October, 1868]*

King, Rev. R. L. 1869c. On the Byrrhides of Australia. **2**(1): 71-75. *[Read 22nd November, 1869]*

King, Rev. R. L. 1869d. Description of *Hiketes*, a new genus of Formicicolous Coleoptera. **2**(1): 76-78. *[Read 22nd November, 1869]*

Krefft, G. 1864. Notes on the metamorphosis of a dipterous insect of the genus *Batrachomyia*, (MacLeay) the larva of which is Parasitical upon various species of Australian Frogs. **1**(2): 100-101. *[Read 3rd August, 1863]*

Krefft, G. 1871. On Australian Entozoa, with descriptions of new species. **2**(3): 206-232. *[Read July 3rd, 1871]*

Macleay, W., Jr. 1863a. Presidential Address. *[Review of entomological books needed for up-and-coming entomologists in Australia].* **1**(1): xii-xvi. *[Read 30th January 1863]*

MacLeay, W., Jr. 1863b. Description of Twenty new Species of Australian Coleoptera, belonging to the families Cicindelidae and Cetoniidae. **1**(1): 9-21. *[Read 4th August, 1862]*

MacLeay, W., Jr. 1863c. Description of Twenty new Species of Buprestidae, belonging to the genus *Stigmodera*, from the Northern parts of Australia. **1**(1): 22-32. *[Read 1st September, 1862]*

MacLeay, W., Jr. 1863d. On the Scaritidae of New Holland. **1**(1): 55-74. *[Read 5th January, 1863]*

Macleay, W., Jr. 1864a. Presidential Address. *[Brief summary of the earlier history of Australian Entomology].* **1**(2): xxx-xxxvi. *[Read 7th March, 1864]*

MacLeay, W., Jr. 1864b. On the Insects of Australia allied to the Glaphyridae. **1**(2): 75-90. *[Read 1st June, 1863]*

MacLeay, W., Jr. 1864c. Descriptions of new genera and species of Coleoptera from Port Denison. **1**(2): 106-130. *[Read 5th October, 1863]*

MacLeay, W., Jr. 1864d. On the Scaritidae of New Holland. 2nd Paper. **1**(2): 134-154. *[Read 7th March, 1864]*

MacLeay, W., Jr. 1865b. On the Scaritidae of New Holland. 3rd Paper. **1**(3): 176-198. *[Read 6th March, 1865]*
MacLeay, W., Jr. 1865a. Description of a New Genus of Carabideous Insects. **1**(3): 155-157. *[Read 6th June, 1864]*
MacLeay, W., Jr. 1865b. The Genera and Species of the Amycteridae. **1**(4): 199-298. *[Read 7th August, 1865]*
MacLeay, W., Jr. 1866. New Species of Amycteridae. **1**(5): 319-340. *[Read 6th August, 1866]*
MacLeay, W. 1869. On the Scaritidae of New Holland. 4th Paper. **2**(1): 58-70. *[Read 6th September, 1869]*
MacLeay, W. 1871. Notes on a collection of Insects from Gayndah. **2**(2): 79-158; **2**(3): 159-205. *[Read 3rd April, 1871]*
MacLeay, W. 1872. Notes on a collection of Insects from Gayndah. **2**(4): 239-318. *[Read 4th December, 1871]*
MacLeay, W. 1873. Miscellanea Entomologica. **2**(5): 318-370. *[Read 7th July, 1873]*
Schrader, H. L. 1863a. Observations on certain Gall-making Coccidae of Australia. **1**(1): 1-6. *[Read 2nd June, 1862]*
Schrader, H. L. 1863b. Further communication on the gall-making Coccidae. **1**(1): 6-8. *[Read July 7th, 1862]*
Scott, A. W. 1863. Description of an Ovo-viviparous Moth, belonging to the genus *Tinea*. **1**(1): 33-36. *[Read 1st September, 1862]*
Scott, A. W. 1864. On a new species of *Ornithoptera*. **1**(2): 131-133. *[Read 7th December, 1863]*
Scott, A. W. 1869a. On the genus *Charagia* of Walker. **2**(1): 25-35. *[Read 2nd September, 1867]*
Scott, A. W. 1869b. Description of a new genus belonging to the family Hepialidae, of Stephens. **2**(1): 36-39. *[Read 7th October, 1867]*
Scott, A. W. 1869c. On the *"Agrotis vastator,"* a species of Moth, now infesting the Sea-board of New South Wales. **2**(1): 40-48. *[Read 21st October, 1867]*
Scott, A. W. 1869d. On the *Ornithoptera* Cassandra. **2**(1): 49-53. *[Read 6th July, 1868]*

ANNOUNCEMENT

The Royal Zoological Society of NSW wishes to advice that – after a long absence - wildlife talks will resume. The aim is for the talks/discussions to be more informal; encourage discussion and debate; and allow participants to eat and drink during the talks. The talks will be held on the 3rd Tuesday of each month at the Botany View Hotel (597 King Street Newtown) starting at 18:30. Each month will have a different speaker (or 2) with topics that will generate questions and discussion. You are invited to join us for a drink at the urban watering hole. Hear from the experts, meet up with some like-minded people and discuss how we can work together to conserve and manage Australian biodiversity. This free* event is brought to you by the Royal Zoological Society of New South Wales with the generous support of the Botany View Hotel.
The Botany View Hotel is near public transport (St Peters station and buses) and parking is available next to Sydney Park.

*Drinks and food can be purchased from the bar and can be consumed during the talk.

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Dates: Icebreaker - Monday evening 24 September (Coonabarabran Visitors Centre)
Symposium sessions - Tuesday & Wednesday 25-26 September 2018
Venue (Symposium sessions): Coonabarabran Bowling Club Auditorium, Edwards Street, Coonabarabran NSW.

REGISTRATION FORM

Name (please print): **E-Mail:**

Affiliation:

Fee category (please circle): Full member / Student member / Retired member / Non-member

Please Note: The Field Trip is now fully booked

Please send completed registration form to

i) linnsoc@iinet.net.au as attachment (indicate date & method of payment), or
ii) Linnean Society of New South Wales, PO Box 82, KINGSFORD NSW 2032.

Payment options	**August 1 – September 24**
Fee category	**Symposium**
Student member	$45
Retired member	$55
Full Member	$65
Non-member	$100

1) Bank transfer: St George Bank. Account name "Linnean Society of NSW" BSB 112879, Account # 466447867. Please label payment 'Warr_yoursurname'

2) Cheque made out to "The Linnean Society of NSW", posted to the above address. Registrants must make their own travel and accommodation arrangements. Lunches during the Symposium Sessions are not included in the Registration Fee, but are available for purchase at the Bowling Club bistro.