LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

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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. Osborrne, 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 Guinea 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. Stalactites 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 Yarrangobilly 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)

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 July 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

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