

# LINN S C NEWS

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### **NEW MEMBERS:** We welcome:

Ms Catherine E Bushell – Fields of interest: herpetology, conservation of data deficient skink species

Miss Vanessa P Gonçalves – Fields of interest: behaviour, ecology, cognition in spiders

Ms Kelsey Graham – Fields of interest: Australian ecology and conservation, herpetology

Ms Susan M Kerridge - Fields of interest: environmental science, biology, microbiology

Miss Tessa Manning – Fields of interest: ecology, animal behaviour, conservation genetics

Mr Joseph Schubert – Field of interest: spiders

Dr Megan L Williams – Fields of interest: geology, geochemistry, volcanology, mass extinctions

Ms Elisabeth M Williamson – Fields of interest: microbiology, metagenomics, entomology



The 147<sup>th</sup> Annual General Meeting was held at the Royal Botanic Gardens Sydney on Wednesday 16 March 2022 at 6:00pm. The President reported on the affairs of the Society for the preceding year and the Treasurer presented his report covering the finances of the Society for 2021 (see pages 6 and 7). Results of the elections for the Presidents, members of Council and auditor for 2022-23 were declared. Dr Ian Percival delivered his Address *“Recent scientific*

*research into the Ordovician System in Australia*". The 15 members and friends in attendance were treated to an extensive review of the geology and life of the Ordovician period.

The talk reviewed discoveries made over the past decade in an Australian context. Fossil representatives of most major invertebrate phyla featured, as well as early vertebrates (fish) and some of the most ancient microfloral remains known in the world.

The Presidential Address was recorded by Bruce Welch (the Society's webmaster) and is now available to Members who were unable to view the presentation in person via the following link: <https://youtu.be/HnCkKB57yZg>

The Vice-President, John Barkas, gave the Vote of Thanks to the President for his Address.

**Abstract.** - Rocks deposited during the Ordovician Period (486.9 to 443.1 million years ago) are widely distributed across Australia. In the western two-thirds of the present-day continent, Ordovician strata formed in predominantly shallow-water marine intracratonic rift basins, whereas in the eastern third, clastic sediments accumulated in deep-water marine settings, sometimes around volcanic islands with fringing limestones. In the Canning Basin of northern Western Australia, stratigraphic and petroleum exploration drilling has cored through a Tremadocian to Darriwilian carbonate and clastic succession over 1500 m thick. Conodonts from the carbonates have been extensively revised, underpinning a new biozonation constrained by radiometric ages from interspersed tuffaceous beds. These results are especially important in precisely dating the Floian–Dapingian interval. Dapingian conodonts from the Nambheet Formation in the Canning Basin closely resemble those described from the Horn Valley Siltstone in the Amadeus Basin of central Australia.

Trilobites (including the largest genus known from Australia) have recently been documented from the overlying Stairway Sandstone and Stokes Siltstone in the Amadeus Basin. Ordovician research over the past decade has been most active in eastern Australia. Revision of graptolites from the classic Pacific Province in Victoria continues; there has also been renewed interest in documenting Ordovician graptolites from central and southern NSW. A detailed conodont biozonation spanning the late Tremadoc to early Sandbian has been established in deep-water cherts and siliceous siltstones from the Lachlan Orogen of central and southern NSW. The mid Katian record of corals from island-fringing carbonates of central NSW and the New England Orogen in northeast NSW has been substantially revised with updated identifications. Deeper water (Benthic Assemblage 4) lingulate brachiopods from the Lachlan Orogen of central NSW are now fully described, with several key taxa also known from allochthonous limestone in the Broken River Province of central north Queensland, associated with mid-Katian conodonts.



**Linnean Society of New South Wales**  
**President's Report to Members on the Affairs of the Society**  
**at its 147th Annual General Meeting, 16 March 2022**

Though the current pandemic continued to limit the Society's operations over the past year, particularly impacting the Natural History Symposium that was scheduled for the end of October 2021. This has now been postponed to later this year. The office-bearers and members of Council have met on a regular basis (generally by Zoom). The Society has continued to publish the Proceedings, distributed our quarterly newsletter Linn Soc News to Members, and supported new and ongoing research projects with grants from the Joyce Vickery, Betty Mayne and Microbiology Research Funds.

***Proceedings of the Linnean Society of New South Wales***

Volume 143 of our Proceedings was published in 2021, continuing the Society's practice, since its inception, of producing a world-class journal of peer-reviewed scientific papers covering a

wide spectrum of natural history. Papers are published online progressively as they are accepted, with a complete volume available for download at the end of each calendar year. Volume 143 comprised five papers on diverse topics in zoology, botany and palaeontology, with a geographic spread including Australia and New Guinea. I wholeheartedly encourage Members to take a look at the Proceedings – links to view or freely download current and past volumes can be found on the Society’s website. The continuing high quality and standing of the Proceedings is due in large part to the efforts of the Editor, Mike Augée, who is supported in the review of submitted papers by the Editorial Committee of Council and in the production of the journal by Assistant Editor and Webmaster Bruce Welch.

### ***Research Grants***

In 2021, the Society received 13 applications for financial support of scientific research projects. Following evaluation and recommendations by the Research Committee of Council, we awarded seven grants totalling \$10,437 from the J W Vickery Scientific Research Fund, one grant of \$2,000 from the Macleay Microbiology Fund, and one grant of \$1,600 from the Betty Mayne Scientific Research Fund for Earth Sciences. Details of these awards were published in Issue 180 (April 2021) of *Linn Soc News*.

### ***Donations to Research Funds***

The Society extends its profound gratitude to the following benefactors who supported our sponsorship of natural history research with donations totalling \$6,825 to our Scientific Research Funds in 2021: Mr N. Anderson, Mrs M. Baker, Mr D. Benson, Prof J.A. Elix, Dr I. Endersby, Dr T. Grant, Dr L. Gunton, Miss R. Harris, Dr & Mrs Hatherly, Mr I. Hill, Ms J. Howell, Mr. McCormack, Dr and Mrs Medd, Dr A.O. Nicholls, Dr H. Ramsay, Mr W.S. Semple, Dr H.M. Smith, Dr S. Turner, Mrs K. Wilson, and two anonymous donors.

### ***Membership***

During 2021, we welcomed 11 new Members into the Society, including 3 students. The new Members are: Mr J.K. Day, Mr B. Everingham, Miss A.K. Fjeld, Mr J. Illingsworth, Mr A. D’A Macqueen, Mr J. Martyn, Mr J.M. Sanders, Ms J. Stewart, Mrs M. Street, Prof R. Street, Mr S. Wild. At 31 December 2021, the Society had a total membership of 146, comprising 38 Ordinary Members, 59 Ordinary Retired Members, 20 Students, 15 Honorary Members, and 14 Associate Members.

Council’s decision that a single one-year subscription fee to cover membership of the Society for the two calendar years 2020 and 2021 meant that members who had already paid for 2020 were not invoiced for 2021. We anticipate, with the continued removal of COVID-related restrictions on meetings and events that impacted our ability to hold regular lectures for Members, that we will return to a more normal schedule this current year.

### ***Council***

The current Council includes 15 members, six of whom (D. Bickel, J.C. Herremans, I. Hill, D. Keith, R. King, B. Welch) are being re-elected at tonight’s meeting. Members of Council serve in various “behind-the-scenes” roles that are essential to the continued achievement of the Society’s aims and objectives. For example, the eight members of the Research Committee are tasked with reviewing and assessing applications for grants from our Scientific Research Funds. I sincerely thank the current Vice Presidents John Barkas and Robert King and all my colleagues on Council for their support and guidance over the past year. I’m also grateful to the Society’s Secretary, Jean Claude Herremans, who is responsible for the day-to-day operations and administration of the Society, without which we would be unable to function. The Secretary also edits *Linn Soc News* and maintains our records. Several vacancies exist on Council and we are always seeking enthusiastic members who would like to join us in guiding the Society and promoting its values and interests. A Ph.D is not necessary but a commitment to Natural Science is. The time involved is quite minimal in most cases. Please contact anyone on Council if you are interested.

### ***Finances***

As Honorary Treasurer, I reported separately to this meeting on the Society's financial position. Maintaining the Society's ongoing viability through the current period of extremely low interest rates for our invested funds, which provide the overwhelming majority of income, has been very challenging. We are especially grateful for donations that help us offset the low returns on investments. Council may in the future investigate other forms of investments to see if these can maximise returns at an acceptable level of risk, in order to provide a greater pool of funds to disburse as research grants.

### ***Concluding Comments***

In all of its activities, the Society's continued success depends on the enthusiasm and commitment of its members. To all of you, I extend my thanks for your support and your forbearance during the recent restrictions on public gatherings. As you will be aware, the next Field Symposium will take place in the latter part of this year and will focus on the Natural History of the Northeastern Sydney Basin. Preliminary details have already been circulated and registration will open in the next month or two.

### **I. G. Percival**

President

## **Linnean Society of New South Wales Treasurer's Report to accompany 2021 Audited Accounts**

Although the Society continues on a relatively sound financial footing, our income stream derived from term deposits is in steep decline as interest rates are now less than one-tenth those we enjoyed a few years ago. This continues to impact our ability to rein in the operating deficit, which in 2021 was \$6930 (almost exactly double that for the previous year). Factors contributing to the increased deficit included a significant decrease in interest income, lower receipts from membership and subscriptions (due to the temporary halt authorised by Council), decreased copyright fees (most likely corresponding to the fact that universities were largely closed) and a decline in sales of the Royal National Park guidebook produced in 2013 (stocks of which are nearly exhausted). Our major expenses continue to be the modest salary of our part time secretary, and the annual audit fee. In regard to the latter I am pleased to report that our long-term auditors again did not increase the cost of the audit.

The fall in interest income significantly affects the ability of the Society's scientific research funds – the Joyce Vickery Fund, Betty Mayne Fund, and the William Macleay Microbiology Fund – to maintain their important financial support of basic scientific research undertaken mainly by undergraduate and post-graduate students. To counteract the loss of income that supports these grants, Council reaffirmed last year's resolution to increase the total amount available as grants to 75% (previously 50%) of the preceding year's income from interest. In 2021, grants dispersed from the Joyce Vickery Scientific Research Fund amounted to \$10,437 (including supplements from the JF Noble Bequest and the Surrey Jacobs Memorial award). \$2000 was awarded from the William Macleay Microbiology Fund. The Betty Mayne Scientific Research Fund for Earth Sciences disbursed \$1600 in 2021. The capital of these research funds was increased by tax-deductible donations, for which the Society is most grateful.

Later this year, as our term deposits mature, Council will be investigating whether other investment opportunities providing better returns (though potentially at higher risk) would be more suitable to increase the pool of funds available for grants.

Despite the disruptions to our normal meeting program due to the COVID-19 pandemic, the Society continues to support scientific research with a quality journal, significant grants to

assist students and retired researchers, and a well-attended biannual Natural History Symposium. In regard to the latter I draw your attention to our next symposium to be held in late 2022, which will focus on the geology, botany, zoology and ecology of the Northeastern Sydney Basin.

I thank the Secretary for his day-to-day handling of income and expenditure, and for providing me each month with accurate paperwork to facilitate my compilation of the accounts, and the Society's auditors for thoroughly checking all of the figures.

Ian Percival (Honorary Treasurer)

16<sup>th</sup> March, 2022



## REPORT FROM RECIPIENT OF RESEARCH GRANTS

It is a condition of an award from the Scientific Research Grants that the recipient reports the results to the Society within 12 months of having received their funding.

**Ms Tessa Smith** (University of Tasmania), 2021 Joyce W Vickery Scientific Research Fund recipient. Project title: *Biogeography of Tasmanian leaf-litter beetles*.

For four days in February, I travelled with Lynne Forster (UTas) and my friend Pema to Flinders Island in the Furneaux Group, Tasmania to expand the collection localities for my PhD on the biogeography of Tasmanian leaf-litter beetles. My PhD project aims to identify patterns of diversity within Tasmania, compare phylogeographic patterns of several case-study litter taxa and model these patterns under future climates. I am undertaking the project at the University of Tasmania (UTas) with Prof Barry Brook, Prof Chris Johnson and Dr Nick Porch (Deakin). Flinders Island is the largest of the Furneaux Group of islands between Victoria and Tasmania (latitude -39 to -40) which during glacial periods formed a land bridge between the two larger landmasses across the Bass Strait. While areas of native vegetation have been cleared for agriculture, around half of the area consists of reserves, including the Strzelecki National Park. Previous entomological collecting on Flinders Island has been minimal, with the most recent notable events being a Bush Blitz in 2014. The insect collecting in this trip focused on Lepidoptera, Hemiptera, Odonata and some beetles (Carabidae and Chrysomelidae). As litter sifting was not a technique used on this Bush Blitz, there was an opportunity to add information on the taxa that can be collected with this method to the existing information about the biodiversity of Flinders Island.



*Pharoichilus rugiceps* beetle on rotting log near Sugarloaf West. Image and ID Lynne Forster. Image used with permission from Tessa Smith



Mt Strzelecki, looking south towards Mt Belstead, Image Tessa Smith. Image used with permission from Tessa Smith

This fieldtrip was predominantly funded by a grant from the Linnean Society of NSW, Joyce W Vickery Scientific Research Fund, to whom I am very grateful. Other funding came from the Centre of Excellence for Australian Biodiversity and Heritage (CABAH). We also appreciated the assistance from landholders Wendy and Alan Reid and Wayne Warren who allowed us to sample on their land, and the people of Flinders Island for all their assistance.



### **AWARDS FROM THE SCIENTIFIC RESEARCH FUNDS FOR 2022**

The current very low interest rates limit funds available and your 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 very difficult and regrettable.

#### **William Macleay Fund for Microbiology Research**

**Ms Renske Jongen** (Sydney University). Title of project: *Role of belowground microbes in ameliorating heat stress in seagrasses.*

**Summary.** - Across Australia, >275,000 ha of seagrass meadows and associated ecosystem services have been lost. Successful restoration requires detailed knowledge of the factors that foster recovery across a range of environmental conditions. To date, efforts to restore seagrass meadows have yielded limited success, possibly because they have focused solely on improving aboveground processes (e.g. water quality). In terrestrial systems, belowground microbes are known regulators of plant performance. I propose that knowledge of microbe-mediated belowground processes (i.e. plant-sediment feedbacks), is critical for enhancing seagrass restoration efforts. Importantly, the increasing frequency and intensity of marine heatwaves, puts serious stress on seagrasses. These stressors can influence belowground microbial communities, potentially affecting the relationship between these microbes and seagrass performance. So far, the few experimental studies on belowground microbial communities in seagrasses have focused on bacteria. Little is known about the role of seagrass-associated fungi, despite the widely accepted view that fungi have important beneficial effects on terrestrial plant fitness. This project will use an innovative, experimental approach to get a holistic understanding of heatwave-induced changes in belowground microbes in this unexplored ecosystem. Ultimately, this may lead to transformative restoration strategies. **Awarded \$1,000**

**Miss Elisabeth Williamson** (University of Tasmania). Title of project: *Acquisition & importance of gut bacteria in the Australian native bee, Megachile tosticauda.*

**Summary.** - Understanding the factors that influence bee health is increasingly important as we face a global decline in bee diversity and abundance. While the primary cause is habitat loss, another potential threat is exposure to agrochemicals, including antibiotics. Antibiotics used in cattle feed have been found on neighbouring flowers and wild bees, but how this might influence bee health is unknown. Gut bacteria are essential for the health and survival of social bees, such as honey bees, however more than 90% of bees are solitary, and despite contributing essential ecosystem services, the identity and source of their gut microbial communities is largely unknown. This project will focus on the gut microbiome (communities of microbes inhabiting the gut) of the widespread Australian native resin bee, *Megachile tosticauda*. Using state-of-the-art DNA tools, I aim to characterise the identity and acquisition of gut bacteria, both in the larval food and in the guts of adults and brood. This will provide novel information about the bee gut microbiome, and lay the foundation for the experimental assessment of the importance of the gut microbiome for bee development. The outcome may ultimately help improve bee conservation by identifying exogenous factors that may negatively influence these communities. **Awarded \$1,200**

## Betty Mayne Fund for Scientific Research in Earth Sciences

**Dr Megan L Williams** (Wollongong University). Title of project: *The eruptive history of the Lord Howe Island Group: uncovering its mantle source.*

**Summary.** - The World Heritage listed Lord Howe Island (LHI), located in the South Pacific Ocean approximately 600km east of Australia, is part of a group of extinct basaltic intraplate volcanoes associated with the newly-identified submerged continent of Zealandia. Small-scale basaltic volcanoes such as these are of great scientific interest because they provide a wealth of information regarding the nature and complexities of the underlying mantle including enrichment and magma generation far from plate boundaries. This information is retained not only in the physical volcanology of the islands but also in the geochemistry of their rocks. The LHI Group, which includes Balls Pyramid and LHI itself, are ideally located for investigating these processes – the Group is located on the margin of Zealandia where the crust is thinner, and near the region of the South Pacific Ocean where the mantle reservoirs are believed to change type. Very few studies, however, have focussed on identifying their detailed physical volcanology or geochemistry. This project seeks to redress this lack of knowledge by undertaking targeted geochemical and petrologic examination of volcanic rocks on LHI and its subsidiaries combined with detailed geologic mapping. **Awarded \$1,000**

## Joyce W Vickery Fund for Research in Biological Sciences

**Miss Silvia Colombo** (Melbourne University). Title of project: *Why do birds build domed nests? Evolutionary drivers and thermal consequences of nest architecture.*

**Summary.** - Bird nests are a fundamental structure for offspring survival. Building a structure that can protect progeny from harsh temperatures should be under strong selection. We, however, still ignore the extent to which nest architecture can help birds to cope with extreme climatic conditions, and how specific nest characteristics can affect its microclimate inside.

This project is focused on the evolutionary drivers and thermal consequences of nest shapes in Passerines. We will combine a broad comparative analysis with data from the field, to delve into which benefits domed nests provide in extreme environments, and whether changes in habitat have been followed by a transition in nest types. **Awarded \$1,000**

**Miss Tessa Manning** (University of Adelaide). Title of project: *Red-tailed phascogale (Phascogale calura). Reintroduction to South Australia: history, diet, habitat use and genetics.*

**Summary.** - Red-tailed phascogales (*Phascogale calura*) are near-threatened and have been extirpated from 99% of their original range. The species is extinct in South Australia, but two projects will reintroduce red-tailed phascogales to South Australian landscapes in the next two years. I aim to support these reintroductions with field-based and lab-based studies. I will investigate the species phylogeographic history by sampling museum specimens gathered from across their former range, and determine the diet of red-tailed phascogales using next-generation sequencing of their scats. I will conduct the first study of red-tailed phascogale breeding in the wild, aiming to understand factors that may affect reintroductions of semelparous species. I will learn about their habitat use under two different predator conditions and examine their vulnerability to predation. My results will contribute to best-practice reintroduction techniques by determining optimum habitat and key dietary items which will improve site selection for future reintroductions of red-tailed phascogales to Australian landscapes. Red-tailed phascogales will be reintroduced to Secret Rocks Nature Reserve on northern Eyre Peninsula, and to the Vulkathunha-Gammon Ranges National Park in the northern Flinders Ranges. Secret Rocks Nature Reserve is fenced and feral predator free. The Vulkathunha-Gammon Ranges National Park is protected by intensive baiting for feral predators. **Awarded \$1,400**

**Mr Joseph Schubert** (Sydney University). Title of project: *Integrative systematics of the Australian peacock spiders and their relatives.*

**Summary.** - The Australian Peacock Spiders and their relatives of the *Saitis* group (*Maratus*, *Prostheclina*, *Jotus*, and *Saitis*) represent a highly diverse and understudied lineage of iconic Australian jumping spiders. The tiny (~2-5mm), colourful males of this group perform elaborate courtship displays to attract potential mates, and their extreme sexual dimorphism suggests a key role of sexual selection in driving speciation. While some work on the phylogenomics of *Maratus* has been recently

conducted, the intra- and intergeneric phylogenetic relationships of its sister genera remain virtually unknown. Our understanding of the systematics of this group is in its infancy with approximately 90% of the species of this group having been described in the last decade and dozens of species remaining yet undescribed. Recently, an undescribed salticid of the *Saitis* group which possesses morphological characters diagnostic of both *Maratus* and *Jotus* was photographed in far-Northern Queensland, bringing its generic placement and the boundaries of these genera into question. Thus, this project aims to elucidate the relationships within and between genera of the *Saitis* group using integrative molecular and morphological data. It also aims to clarify the generic placement of and taxonomically describe the enigmatic undescribed species from far-Northern Queensland. **Awarded \$1,400**

