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The Drought, Bushfire and Pandemic Issue

David Yeates, Director

As this issue is being prepared, Australia and the world heads into uncharted waters as they grapple with the COVID-19 pandemic. We have not seen this kind of upheaval in world health systems and the global economy since the Second World War. Many of us are working from home, and all of us are practicing social distancing measures when at home and at work. All of our domestic and international travel for work, including travel to the International Congress of Entomology in Finland this year, has been cancelled. Our Fullbright scholar working on grasshoppers, Hojun Song from Texas A&M University, has had to return to the USA. All of our affiliates have been invited to work from home, or take a break, until we can get some more clarity on the situation.

However, we do have a lot of content for you in this issue. Top of the list are three books that have been published since ANICdotes #15, Volume Two of *Australian Beetles*, edited by Adam Ślipiński and John Lawrence, and *Ladybird Beetles of the Australo-Pacific Region*, by Adam Ślipiński and collaborators Jiahui Li and Hong Pang. Adam Ślipiński was also recognised as Australia's top-ranked zoologist by *The League of Scholars*, a talent identification website. Ted Edwards reports on the third book published recently, Volume 13 of the Monographs of Australian Lepidoptera Series, *Hawkmoths of Australia*, by Max Moulds, Jim Tuttle and David Lane.

The beetle posse also reports on field work this summer, choosing localities wisely and avoiding having work interrupted by the bushfires. Keith Bayless and his Diptera colleagues were not so lucky with fieldwork, having malaise traps shredded

by hailstorms on Black Mountain, burnt by bushfires in Monga National Park and washed away by local flooding in Budderoo National Park near Robertson. We hope that this combination of processes does not affect our domestic fieldwork in future. Keith Bayless and Olivia Evangelista conducted much more successful field work in the South Island of New Zealand, uninterrupted by any such disasters.



David Yeates

This issue also includes articles on a Bush Blitz treehopper (Membracidae) grant to Olivia Evangelista, a report on the Australian Native Bee Genomics Synthesis Group, the 14th Nematode Identification & Techniques Workshop held at the University of Adelaide in early December 2019, and a Pentatomoidea Diagnostics Workshop held at the university of New South Wales in February 2020.

One of our new staff members highlighted in this issue is Dan Dashevsky, who has just joined ANIC as Juanita Rodriguez's postdoc working on the pharmacological properties of wasp venoms. We also welcome Siwanon Paphatmethin, who works with Andreas Zwick on the systematics of Lasiocampidae (Lepidoptera) for his Masters degree at ANU.

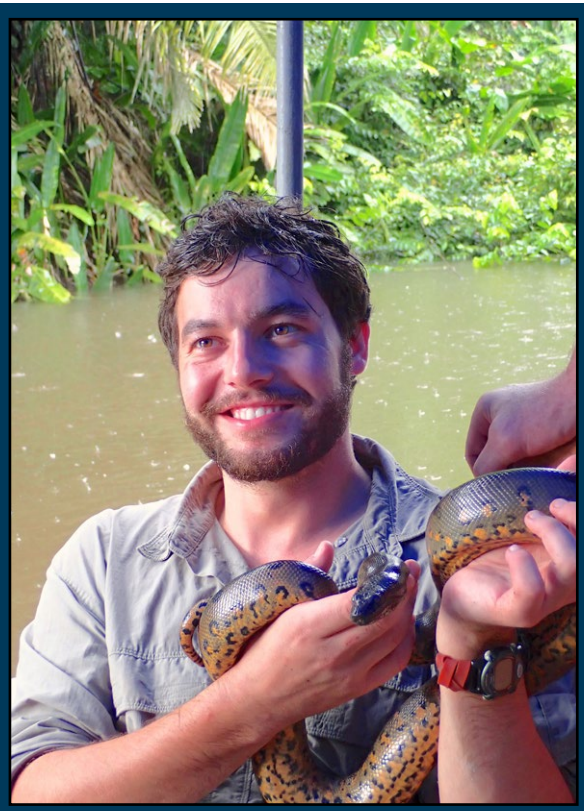
We have a bitter-sweet group of articles from the Lepidoptera group, with Suzi Bond reporting on a rare and threatened butterfly in the ACT, a visit by the descendants of an important donor to ANIC, L.H. Mosse-Robinson, and a touching farewell to long-time volunteer Peter Macnicol.

Welcome to New Staff

Introduction to Daniel Dashevsky and Siwanon Paphatmethin

Daniel Dashevsky

Daniel was raised in Fairbanks, Alaska, but moved to Portland, Oregon, as an undergraduate at Reed College, where he earned a B.A. in biology in 2014. His senior thesis investigated the virus-like particles in the venoms of figitid wasps that parasitise *Drosophila*. During and after undergrad Daniel spent time



Daniel Dashevsky is studying the venom of pompilid wasps

operating a nuclear reactor, researching rattlesnakes, digging dinosaurs, and caring for reptiles in a snake-venom production facility.

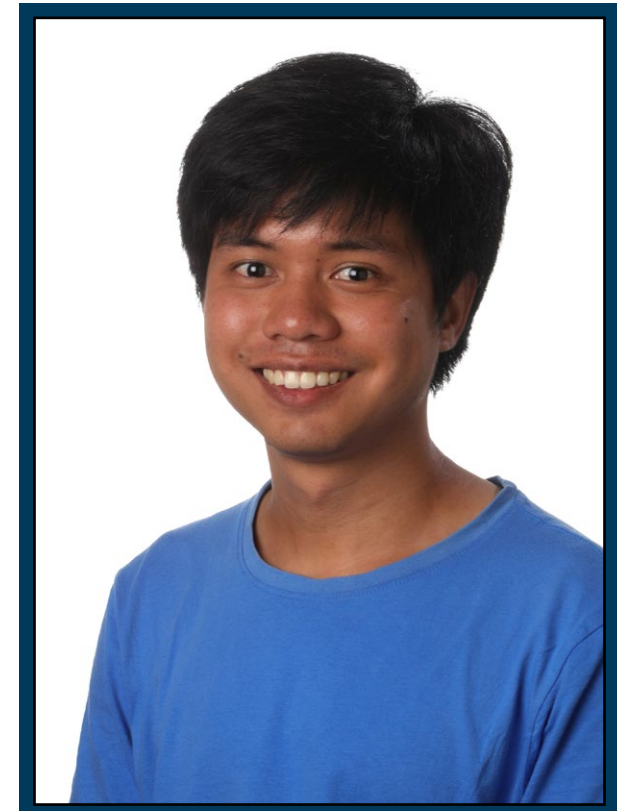
In 2016 Daniel moved to Brisbane for a PhD in Bryan Fry's lab at the University of Queensland. That thesis, recently completed, ended up focusing on the molecular evolution and the origin of novel functions in the three-finger toxin family of snake venom proteins. He has now joined ANIC under Juanita Rodriguez to study the venoms of pompilid wasps. This project aims to gather specimens and data to help understand the basic biological function of these venoms, their specific mechanisms and the evolution of aculeate-wasp venoms more broadly using experimental and bioinformatics approaches. These findings may be applied in the future to help develop new medicines, laboratory tools, or pesticides.

Siwanon Paphatmethin

Siwanon is a student from Thailand who is interested in invertebrate systematics and taxonomy. He received his B.Sc. in Biology at Suranaree University of Technology in Nakhon Ratchasima, Thailand. Currently he is pursuing a Masters degree at the ANU and is being fully supported by a Royal Thai Government Scholarship. In ANIC he will be using an integrative taxonomy approach, including phylogenomics and morphological data, to revise the taxonomically neglected Australian endemic moth genus *Symphyta* (Lepidoptera: Lasiocampidae). He is co-supervised by Dr. Andreas Zwick (ANIC) and Dr. Scott Keogh (ANU).

Before coming to ANU, Siwanon worked on the systematics of freshwater bivalves of the genera *Pilsbryconcha*, *Ensidents* and *Hyriopsis* (Bivalvia: Unionidae) in Thailand based on morphology

and genetics. He was also a part of the Animal Systematics and Molecular Ecology Laboratory at Mahidol University in Thailand, where he learned the fundamental taxonomy and population genetics of freshwater leeches, jellyfishes, snails, sea cucumbers, pileated gibbons and slow lorises. During his free time, Siwanon enjoys drawing and outdoor activities, such as bush walking and scuba diving.



Siwanon Paphatmethin is revising the Australian endemic moth genus *Symphyta*

Dr Adam Ślipiński: Australia's Top Zoologist

David Yeates

The League of Scholars (<https://www.leagueofscholars.com>) is a new, web-based tool for identifying research talent and is based in Sydney. It uses methods similar to Google plus its own proprietary algorithms to rank scholars. Google's search engine uses the contextual weighted value of backlinks as a proxy for quality and relevance. In other words, being mentioned by the BBC or the New York Times is worth more than a link from an unknown blogger. *The League of Scholars'* search algorithm uses this same approach to rank scholars around the world not simply on their citations or H-Index but also by a new proprietary ranking that takes into account a range of quality and relevance factors such as the impact factor and influence of the venue, industry collaboration and public engagement via high profile media.

Late in November 2019 *The Australian* newspaper announced that *The League of Scholars* had ranked our very own beetle researcher, Adam Ślipiński, as Australia's top-ranked scholar in the field of Zoology. There are many influential zoologists in Australia, so to be ranked the top of the heap is a very significant achievement. We all know Adam is a research powerhouse, having published the second volume of *Beetles of Australia* with John Lawrence in 2019, and his book (with Jiahui Li and Hong Pang) on *Ladybird Beetles of the Australo-Pacific Region* was published last month. However, now *The League of Scholars* has calculated it as well!

Incidentally, the *League of Scholars* uses its data to estimate the age and sex of researchers. It reports that Adam is male with 99% confidence, but it only has 93% confidence that I am male ... Log onto the *The League of Scholars* site and see where your colleagues rank.



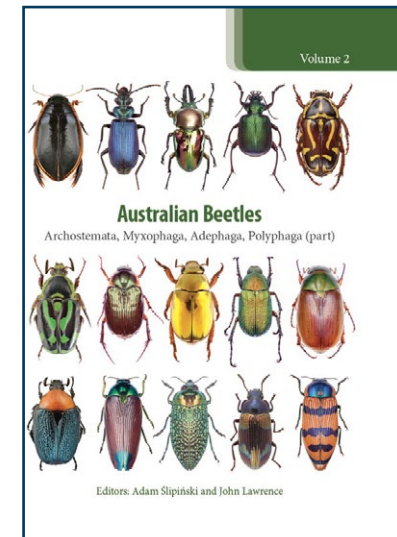
Adam Ślipiński - Australia's top-ranking Zoologist

New Beetle Books

Adam Ślipiński

AUSTRALIAN BEETLES Vol 2

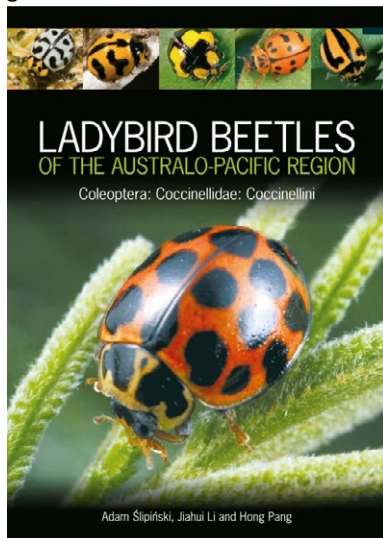
It took six years to write and produce the second volume of *Australian Beetles*, which was published in November 2019, edited by Adam Ślipiński and John F. Lawrence. The 748-page long volume includes chapters on 36 families of Australian beetles written by 23 researchers from Australia, China, Czech Republic, Germany, Poland and the USA. The habitus of almost every genus is depicted in colour, and the generic keys are richly illustrated by black-and-white drawings or photographs. The book includes many iconic and popular families of beetles, including Carabidae, Buprestidae, Scarabaeidae and Tenebrionidae, and as said by Geoff Monteith in his review of the volume, "it takes the Australian Coleoptera a giant quantum leap further into understanding and accessibility by providing definite accounts on many beetle families in Australia." The volume is dedicated to an amazing person, prolific author Dr Martin Baehr, who co-authored the Carabidae chapter with Kipling Will but, sadly did not live to see it published.



...beetle books continued

LADYBIRD BEETLES OF THE AUSTRALO-PACIFIC REGION

It took about ten years to complete the book on the Australo-Pacific ladybird beetles, published in March 2020 by Adam Ślipiński, Jiahui Li and Hong Pang. The project was conceived and started during the PhD tenure of Jiahui Li (Sun Yat-sen University, Guangzhou) at CSIRO. During subsequent visits to ANIC, Jiahui Li and his PhD supervisor, Prof. Hong Pang, continued the project. The book covers 95 species of the tribe Coccinellini, the true ladybird beetles, of Australia, New Guinea and the Pacific Islands. All species of ladybirds are diagnosed, described and richly illustrated in colour on 111 plates, and the distribution is summarised on accompanied maps. The book includes a special key to identification of the Australian species using external colour pattern, which will be useful to identify common species often seen in garden and in the nature.



Both books have been completed over the years as side projects to other research activities in the beetle group in ANIC, and would be impossible to complete without dedication and skills of Coleoptera Technical Officer Cate Lemann, and direct and indirect funding and support received from the Australian Biological Resources Study and the Department of the Agriculture and Water Resources.

New Moth Book

Ted Edwards

HAWKMOTHS OF AUSTRALIA

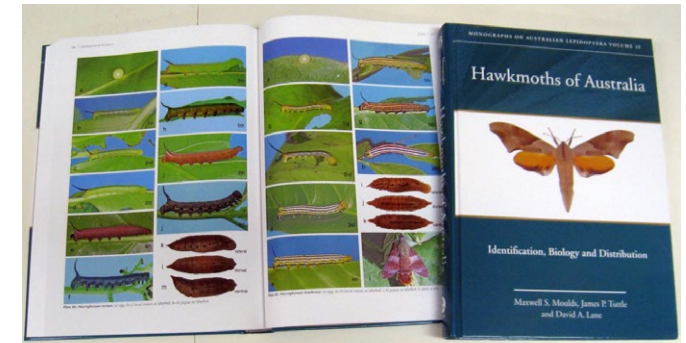
For such a charismatic group of moths, the jet aircraft of the insect world with streamlining and swept-back wings, Australia has not been well served for studies on hawkmoths. The world left us rather behind. No longer.

That Max Moulds would author a book in the monograph series was foreshadowed in the 1996 *Checklist of the Lepidoptera of Australia*, but little progress was made until about eight years ago, when Max and his co-authors signed a contract with CSIRO Publishing and drafting got under way.

This time it was decided that rather than let the author(s) loose and leaving the editors to clean up at the end, there would be a steady checking of the text throughout its development.

Firstly some decisions had to be made. Hawkmoths and their larvae are popular, so a considerable overseas sale could be anticipated. To tap the overseas market, colour illustrations were a must, unlike in most other volumes of the *Monographs*. To do justice to the moths it was decided that the page size of the book should be increased to A4 even though the book was to be No. 13 in the *Monograph* series, which is printed in a smaller size. Editors and authors concurred that it was important that volumes should reflect aims rather than be constrained by previous books. Again, right from the start it was recognised that immense new knowledge about life histories could be incorporated, and all larval instars and pupae of 71 of the 87 species were described in detail and coloured illustrations of each were achieved. This was a massive accession of knowledge. Small type for larval descriptions was considered, but in the end CSIRO Publishing rose to the occasion and all was published in one size of type. Efforts were made to keep the cost to \$200, but finally this could not be done.

The co-authors assumed somewhat different roles. Max was the leading author and assumed responsibility for the text and descriptions, correspondence and a lot of rearing. David Lane assisted with this but did a lot of the field work for many of the lesser known species, adults and larvae. Jim Tuttle became a



larva-finder extraordinaire and a chewed leaf was such a giveaway that few larvae escaped his attention. He also did much rearing and was the prime mover in the inclusion in the book of a chapter on hawkmoth parasites.

In recent years, with DNA sequencing, there has been resurgence in hawkmoth taxonomy. To be sure that the book would be up-to-date and with European authors constantly competing to name new species, the help of Dr Ian Kitching, hawkmoth guru at the NHM, was invited and given in unstinted measure. The up-to-the-minute accuracy of the book is due in no small way to him. The illustration of male genitalia is an important feature of the book, and here David Rentz came to the rescue with photographs of all species. Both Ian and David made essential and selfless contributions.

Australian amateurs responded wonderfully and a great many made useful contributions. As the book came together, the Chief Editor slaved to keep everyone happy, commas in place, terminology appropriate and the text clear. CSIRO Publishing took several delays with understanding and kindness and have excelled themselves with a worthy production.

This landmark volume *Hawkmoths of Australia: Identification, Biology and Distribution*, now one of the best hawkmoth books in the world, was published in January 2020 in a short print run of 200 copies. I anticipate a rapid reprint.

Beetle Explorations 2019–2020

Lauren Ashman and Hermes Escalona

A trip up north was organised in October 2019, the participants being Hermes Escalona, Living Li, Zhenhua Liu and Yun Hsiao. The localities included Mt Bellenden Ker, the surroundings of Atherton, Kuranda and Mount Lewis. Special effort was made to collect litter beetles from the summit of Mt Bellenden Ker: an 8-hour hike battling bad weather and a plethora of leeches! This locality is among the wettest places in Australia and holds a range of endemic insects that are rarely collected. Several beetle samples were collected for PhD projects, particularly Tenebrionidae and Curculionidae.

In November, the whole beetle crew spent two weeks collecting near Melbourne, in the Great Otways and Yarra Ranges National Parks. Adam Ślipiński, Hermes Escalona, Kim Pullen, Lingzi Zhou, Lauren Ashman, Mengjie Jin, Living Li, and Yun Hsiao drove down to Victoria, only getting a little lost in the winding back roads. Nicholas Porph from Deakin University joined us on the weekends to show us the best collecting sites – patches of dense forest where the soil was still damp, despite the lack of rain.



Beetle crew from the Victoria trip

We were lucky with the weather, going out collecting almost every day and running a light trap most nights. Our energy levels were sustained by the multiple excellent cooks on the team, and the well-stocked IGA a short drive away. We caught a great variety of beetles, including some *Lamingtonium* specimens (Lamintoniidae, a monogeneric family endemic to Australia) – Hermes found a dozen on a single tree! We also saw koalas in the Otways, up trees or crossing the road, luckily without any collisions – although our car got stuck in a deep rut one afternoon and had to be rescued by the local tow-truck driver.

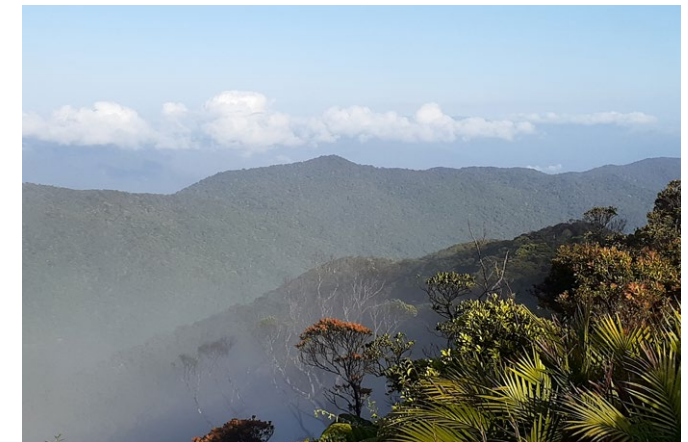
Hermes Escalona and Nick Porph went on another collecting trip in January 2020 with Simon Grove (Tasmanian Museum and Art Gallery). They travelled around Tasmania collecting DNA-grade beetles, sifting from litter and fogging from trees. The trip covered temperate forest in the South West, around Mount Field, Mount Barrow and around Weldborough. Some endemic beetles were collected including *Tasmosalpingus* (Tasmosalpingidae) and *Sirrhas* (Promecheilidae).



Sirrhas specimen collected from Mt Field (Photo: Nick Porph)



Yun searching for cycad weevils near Julatten



Views from Mt Bellenden Ker summit

South Island New Zealand Expedition

Keith M Bayless and Olivia Evangelista

Biogeographic connections between Australia, Chile, and New Zealand are complex and poorly understood in many groups. New Zealand contains several mysteriously old lineages including tuatara reptiles, kauri trees, *Starkomyia* fungus gnats and *Mystacinobia* bat flies. Acalyptrate fly phylogeny is comparatively poorly explored. Ancient and informative lineages may be perpetuating themselves in New Zealand. Following up on recent ANIC expeditions to Chile, Western Australia, and Tasmania, Keith Bayless and Olivia Evangelista headed to New Zealand to collect flies, bugs, and wasps.

Since the expedition took place somewhat late in the summer, we focused on the South Island. Keith spent his first few days in the Canterbury Museum in Christchurch, chatting about collecting and biogeography with crane fly expert Peter Johns and arachnologist Cor Vink. The collection was well-curated and there is extensive recently collected ethanol material. I recommend any interested experts consider visiting that museum. Keith also liaised with Simon Hodge, an ecologist at nearby Lincoln University with experience concerning various semi-aquatic beach flies. The rough southern seas are highly productive. A diverse assemblage of acalyptrate flies use kelp and other resources stranded along the coastline. New Zealand is the centre of diversity for Coelopidae and Australimyziidae and contains endemic genera of Helcomyziidae and Canacidae.

Olivia and Keith then headed south to Dunedin to collect and meet up with Steve Kerr, who avidly contributes unusual flies to iNaturalist. They collected along Tomahawk Lagoon and then Sullivans Dam, an incredibly productive site. This 100-year-old artificial lake is ringed with trails going through various types of vegetation, including huge old *Nothofagus* trees. Many target acalyptrate flies were collected there, including *Aneuria* (Heleomyziidae: Fenwickiini), *Napaeosciomyza* (Helosciomyziidae), and *Pseudopomyziidae*.



Olivia about to beat aradids from a dying tree

The West Coast was the next destination, with an overnight stay in Queenstown and collecting along the way in high-elevation forests around Lake Hawea. The coastal podocarp-hardwood forest near Haast is an intriguing habitat, yielding unusual species of *Huttonina* (Huttoninidae- endemic to NZ) and *Maorina* (Pallopteridae). The expedition then turned north, passing by the touristy Franz Josef Glacier and collecting along the coastline or roadside where possible. Near Mount Hercules we found the jewel of the trip — a specimen of *Prosochaeta*, the highly divergent second genus of New Zealand endemic Huttoninidae, an intriguing genus that has never been placed in a phylogenetic context. Although the diversity of many other orders was comparatively low, Olivia and Keith also collected a variety of groups such as treehoppers, planthoppers, leafhoppers, stinkbugs, spider wasps, ichneumonids, beetles and lacewings, amongst others. When fully sorted the material from the malaise traps may also yield additional taxa.



Olivia and Keith looking for insects in the flax along Tomahawk Lagoon

After several productive days, rain hindered collecting on the way northeast. Keith and Olivia took a night off to partake in Diptera-based tourism to see the glow-worm dell in Hokitika. Fern flies (Teratomyzidae) and treehoppers (Membracidae) were picked up north of Greymouth, but the weather rarely cooperated. After exploring the Banks Peninsula near Christchurch, Keith and Olivia packed up their flies, bugs, wasps, and other insects to bring back to ANIC for identification.

The trip was highly successful in terms of acalyptrate flies, as Keith collected nearly all the target taxa he could hope for on the South Island. We now have the material to test whether the New Zealand lineages of families including Heleomyzidae, Helosciomyzidae and Teratomyzidae are more closely related to their Australian or Chilean counterparts, or indeed constitute independent ancient lineages.

Seasonal Malaise Trapping Update 2019—2020

Keith Bayless

Malaise traps are powerful tools for studying biodiversity and ecology, particularly in light of potential declines in the abundance of insect fauna. Studies that have tackled insect declines are primarily European and hinge on long-term data, for instance malaise traps run for extended periods, at least a year. No such data exist for Australian flies, so we need a baseline to accrue data sets that can address the trajectory of insect populations in Australia. Malaise traps are also extremely useful for discovering new species and obtaining fresh material of rare species for molecular analyses. Particularly in poorly known groups such as Australian acalyptrate flies, in which most species are undescribed, malaise trapping will help us determine what taxa are here now and to gather vouchers for future comparisons.

However, experiments as they are run in Germany face new challenges in Australia. I set up malaise traps in multiple locations in the ACT and New South Wales with the intention of running them on a long-term basis, up to a year. Some of these traps were in parks in which no similar insect trapping regime had ever taken place.



Fig 1. Malaise trap in Monga NP before the fire (Photo: James Lumbers)

By February 2020, all six trap emplacements had been destroyed by natural disasters various and sundry.

In March 2019, PhD student James Lumbers and I constructed a 2-metre malaise trap over a slow muddy stream in Monga National Park between Braidwood and Bateman's Bay. The trap's location (figure 1), Penance Grove, was one of the most humid sites I've visited in southern NSW. The vegetation consisted of a canopy of *Eucryphia moorei*, a mid layer of sparse tree ferns and a ground layer of leaf litter and *Dawsonia* moss. We collected and sorted samples for months, finding lists of curious taxa such as Nannochoristidae, Calliphoridae: *Aphyssura*, Piophilidae: *Piophilosoma*, Neminidae: *Nemo*, on and on. When the Clyde Mountain fire approached, we hoped that soggy Penance Grove would be spared, but it certainly was not.

Miraculously, James recovered the sample, as the tree to which the collecting head was tied fell into the stream while the rest of the trap ignited or melted (figure 2). We are in the process of sorting this material, which appears to contain several rare canopy taxa. No trace was left of another 6m malaise trap in Badja Swamp in Deua National Park, a wet, marshy location we



Fig 2. Malaise trap in Monga NP from Fig 1, after the fire with sample (circled in red) saved by fallen tree (Photo: James Lumbers)

had never previously sampled. Sadly, we will never know which fly species were in Badja Swamp in 2019 before the fire broke through.

I had placed three more traps in various habitats on Black Mountain in 2019, including a green wash, dense bushy vegetation and open sclerophyll. It's quite easy to find undescribed acalyptrate flies, even in the Australian National Insect Collection's extensively surveyed backyard. The microhabitats also yielded starkly different fly faunas. These traps, two 2-m and one 6-m traps, were productive for more than six months before they were suddenly thrust into a new experiment on January 20 — what is the effect of fist-sized hail on Malaise traps? They were all completely destroyed, skeletonised with just the frame preserved (Figure 3). In some cases, the hail even punched through the plastic Nalgene bottles themselves. Luckily, we were still able to recover most of the samples.

Finally, I decided to head towards a region that was less likely to be affected by bushfires. Budderoo NP and Barren Grounds NR near Robertson NSW were hundreds of kilometres from the nearest bushfire in 2019, situated in the Illawarra escarpment



Fig 3. Bronte expressing disapproval at the malaise trap's response to hail

malaise trapping continued...

...malaise trapping continued

which includes several rainforests nearby and comparatively high levels of precipitation. As a final sign of the unpredictability of fieldwork in Australia, a record rainfall occurred, dumping nearly 400 mm of rain in a 24-hour period around February 10. A six-metre malaise trap was directly in the path of one of the newly scoured washes, with water, soil, and branches ripping it apart (Figure 4). Again, luck would have it that we were able to recover the sample.

Thankfully we have had no problems with vandalism as we presume that most Australians appreciate the necessity of biodiversity discovery and ecological research, though any malaise trap has grim prospects if it's in the way of a mob of kangaroos.

Due to the extraordinary series of weather events, this year would not serve as a particularly informative baseline anyway. We have not replaced any of the malaise traps in the same localities to give the environment and insects a chance to recover. We are eager to push on discovering new species and improving our capacity to answer questions about the resilience of Australian wilderness. I sincerely hope we're the only research group to lose malaise traps to fire, hail, and flood in the same season.



Fig 4. Remnants of a trap after the flood

Bush Blitz Taxonomy Research Projects 2020—2021

Olivia Evangelista

The Bush Blitz Taxonomy Research Projects funds, on a biannual basis, specialists who seek to improve the systematics of Australian taxa using specimens from previous expeditions. A recent round of proposals yielded one successful applicant from ANIC, Dr. Olivia Evangelista, who secured a \$10,000 grant to describe new species of treehoppers based on morphological and molecular data.

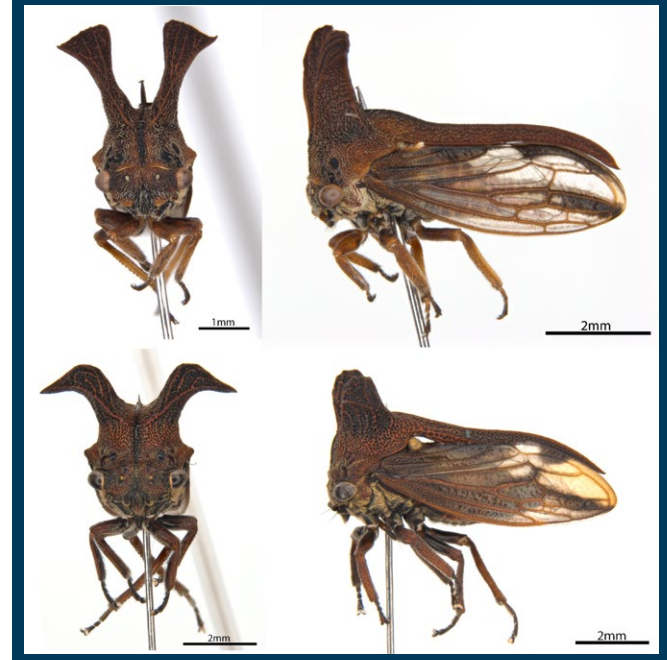
Membracids are renowned for their extravagant shapes, including horns, spines and bulbs arranged in a fantastic array of combinations. The treehopper fauna of Australia, while less diverse than those of other biogeographic regions, is represented almost entirely by endemic members of one lineage (the tribe Terentiini), which may constitute an adaptive radiation. No new taxa have been described in the last 20 years, after the generic revision of Maxwell F. Day, in 1999. Despite the puzzling and dramatic shapes of these insects, the lack of specialists has hindered new work on the systematics and natural history of this charismatic group.

Through this project, recently discovered species from the 2018 ACT Bush Blitz will be formally recognised, in conjunction with undescribed taxa not treated by Day in his revision. As part of this project, Olivia visited the Western Australian Museum in February 2020 to sort bulk samples from other Bush Blitz expeditions, which were made available by hemipteran fellow Nikolai Tatarnic. Many unusual cicadomorphans were found in this material, including spittlebugs, planthoppers, and leafhoppers in the tribe Cephalelini. Specimens were borrowed for identification and further analysis and will be incorporated into revisions alongside a wealth of specimens housed in the Australian National Insect Collection.

In addition to this critical taxonomic work, molecular phylogenetic methods will be used to provide support for

species recognitions. Sequence data will also be necessary to place the new species in a phylogenetic context of the Australian Terentiini in a broadly sampled worldwide phylogeny of Membracidae. Using a species-level molecular phylogeny enriched by Bush Blitz material will test whether the high rate of endemic Australian Membracidae taxa represents a single-origin adaptive radiation.

“Breaking 20 years of silence: new species of endemic Australian treehoppers and their phylogenetic placement in a worldwide context”



Putative new species of *Ceraon* (top) and *Eufrenchia* (bottom) collected in the 2018 ACT Bush Blitz

Nematode Identification & Techniques Workshop

Manda Khudhir

Mike Hodda from ANIC recently delivered the 14th Nematode Identification and Techniques Workshop. Run together with Dr Kerrie Davies (University of Adelaide) and Dr Dorota Porazinska (University of Florida), the latest workshop in this series was held at the University of Adelaide from 2nd to 6th of December 2019. The workshop has been run biennially since 1999, but has constantly evolved with changes in knowledge, methods, and the particular interests of each group of participants. This time, 13 participants completed the workshop, coming from all states of Australia as well as from Myanmar and Fiji. These participants ranged from bright-eyed undergraduate students to fully-fledged professionals working in agriculture or quarantine.

Why the interest? Nematodes are diverse, small and cryptic and require specialised knowledge, skills and techniques to work with them. They are the most numerous multi-cellular organisms on earth. They occupy many niches: in soil, fresh and salt waters, plants, invertebrates and vertebrates. They are of great importance to agriculture, because some species reduce plant yields, while others are biocontrol agents of invertebrate



Workshop participants alongside Dr Kerrie Davies (far left) and Dr Dorota Porazinska (far right).

pests. Some species recycle soil nutrients, and others are bio-indicators of soil health. Ten species are National Priority Plant Pests and fifteen species are Industry High Priority Pests, so they are frequently encountered in quarantine work.

The workshop featured lectures and interactive laboratory sessions covering sampling, extraction, specimen preparation, culturing, diagnosis, and identification. A feature of all workshops is sampling local nematodes, providing an authentic experience of identifying nematodes that are genuinely unknown—even to the presenters!

At the end of the week, everyone had learned a lot of what is known about nematodes and how to identify and handle them. As a wonderful added bonus, University of Adelaide is home to many resident koalas, much to the delight of overseas participants and those who have never encountered a koala in the wild (me!).

And a final note that yes, those koalas would have had nematodes inside them, too



Participants from Myanmar sampling for nematodes in a garden bed on University of Adelaide Waite Campus.

Australian Native Bee Genomics Synthesis Group

Juanita Rodriguez

During the Australian Native Bee Conference held in Brisbane on December 2019, native-bee researchers from around Australia held a working group to explore the use of genomic data for Australian bee taxonomy, pollination, evolutionary ecology and conservation. The working group was funded by the Centre for Biodiversity Analysis (Australian National University), CSIRO and the Hawkesbury Institute for the Environment (Western Sydney University), and was organised by Simon Tierney (WSU), Saul Cunningham (ANU) and Juanita Rodriguez (CSIRO).

As a result of the working group, the Australian Native Bee Genomics Synthesis Group was created. The main goal of this synthesis group is to facilitate an assessment on the status of our knowledge on Australian bee taxonomy, diversity and genomics and to create an action plan that will allow Australian researchers to reach the goal of a unified “bee dataset” including diversity, plant-pollinator interactions, spatial patterns, and molecular resources.



Australian Native Bee Genomics Synthesis Group members.

Front row left to right: Olivia Bernauer, Michael Branstetter, Eduardo Almeida, Michael Batley, Simon Tierney, Juanita Rodriguez, Julian Brown, Saul Cunningham. Back row left to right: Margarita Lopez Uribe, Francisco Encinas-Viso, Ros Gloag, Remko Lejis, Tobias Smith, Sandra Rehan, Dona Kireta, Laurence Packer, Korjent van Dijk, Katja Hogendoorn, Liz Milla, Sasha Mikheyev, Lucas Hearn. Not pictured: Ben Oldroyd.

Pentatomoidea Diagnostics Workshop

Olivia Evangelista and Thomas Wallenius

Between the 10th and 14th February 2020, the University of New South Wales (UNSW) hosted the Pentatomoidea Diagnostics Workshop for members of the National Plant Biosecurity Diagnostics Network (NPBDN).

Eighteen participants from federal and state-based agencies in Australia and New Zealand gathered for the five-day event, focusing on the identification of economically significant stinkbugs. The excellent representation across organisations included three members based at ANIC: Olivia Evangelista (Research Projects Officer); and Thomas Wallenius and Chris Palmer, the CSIRO liaison entomologists with the Department of Agriculture, Water and the Environment (DAWE), which organised and sponsored the workshop.

In-depth training on stinkbug systematics and ecology was provided by world-renowned experts Gerry Cassis (UNSW) and Cristiano Feldens Schwertner (Universidade Federal de São

Paulo, Brazil). Participants were given a comprehensive and well-illustrated manual covering common Australian genera as well as exotic groups known to have been intercepted at the Australian border. The workshop also provided focal lectures on the morphology and ecology of Brown Marmorated Stink Bug (*Halyomorpha halys*), a species of critical concern for Australian biosecurity at the moment.

The workshop offered fundamental tools to enable the accurate recognition of native and exotic species of agricultural significance. Hemipteran specialists are scarce and sparsely distributed in Australia, and it is therefore essential to enhance our taxonomic capacity and research infrastructure in this group. Participants also identified their own specimens and shared work experiences with their colleagues. Special thanks to Ross Rickard (DAWE) for his engagement and support to this productive and strategic workshop.



Pentatomoidea Diagnostics Workshop: a view of the classroom



Adult BMSB *Halyomorpha halys* and genitalia dissections (female, top right; male, bottom right).

Even unto the 4th Generation

Ted Edwards and You Ning Su

The Lepidoptera unit was honoured on the 4th September 2019 by a visit from the descendants of L.H. Mosse-Robinson, an early donor of Lepidoptera to ANIC.

We had met Leslie Mosse-Robinson's daughter, Marigold, when she attended the book launch of *A Rare and Diverse Fauna* by Murray Upton, in 1998. Sadly Marigold has since passed on. It was a delight now to meet Maud Currawong (a chosen name), Marigold's daughter and a staunch environmentalist, as well as Megan Hearn, Maud's daughter, and Megan's cousin Ange Maloney.

Leslie Herbert Mosse-Robinson (1886-1954) joined the Australian squadron of the Royal Navy and came to Australia from the UK in 1913 as part of the new Royal Australian Navy. After World War 1 he retired in 1921 with the rank of Lieutenant Commander to run a citrus orchard at Narara, NSW, and collected moths assiduously until his death. His specimens in the ANIC are characteristically low on the pin as was the English fashion, and his labels are often misread as L. M. Mosse-Robinson.



A drawer of the British collection of Leslie Mosse-Robinson. L-R. Megan Hearn, Ted, Maud Currawong, Ange Maloney.

Even unto the 4th generation continued...

Helen Cameron Visits the ANIC

Federica Turco

...Even unto the 4th generation continued

He contacted CSIRO in 1953 and, after some correspondence Mrs Mosse-Robinson, by then widowed, donated the collection to the CSIRO Division of Entomology in 1956. It consisted of 81 storeboxes of Australian Lepidoptera, eight of British and five of miscellaneous foreign Lepidoptera. Ian Common, in a lecture to the Royal Society of Canberra in 1959, gave the size of the collection as 15000 specimens. This was the third major collection of Lepidoptera donated to CSIRO Division of Entomology, coming after those of A. Jefferis Turner and Sir Edward Hallstrom.

Leslie Mosse-Robinson was an active member of the Amateur Entomologist's Society, Australasian Branch (1949-51), and its subsequent reincarnation, the Entomological Society of New South Wales (1953-55), and contributed several papers about his collecting in his garden, around Narara and at Blackheath in the Blue Mountains of NSW. There are many specimens from the Mosse-Robinson collection in the ANIC, which we were able to show our visitors. Most notable were the series of *Oxycanus incanus* (Hepialidae) collected at Jervis Bay in June 1919 and not seen since and the series of *Oxycanus hamatus* also collected at Jervis Bay in 1919, while Mosse-Robinson was attached to the Naval Base there. The latter species was not seen again until David Rentz re-collected it at Bawley Point in the 1990s. We were also able to show our visitors the British collection in an unchanged form although transferred from storeboxes to metal cabinets many years ago.

Our ANIC Honorary Fellow Len Willan, who has personal reminiscences of Mosse-Robinson, recalls that when Len was a 14-year-old he was particularly impressed by a hedge Mosse-Robinson had planted of flowering *Buddleja davidii* to attract butterflies, all carefully pruned to net-height and frequented by such exciting Hesperiidæ as *Hesperilla mastersi* and *Telicota anisodesma*.

His extended family and we are proud to remember the contribution Leslie Mosse-Robinson made to the ANIC.

A few months ago, I was contacted by a woman I've never met, Fiona Cameron, who said her mother had worked in ANIC for many years between the 1960s and the 1970s. She would like to get in contact as she has research documents that she wanted to leave in good hands. She had worked on cockroaches (Blattodea). Her name is Helen Cameron.

I could not refuse to meet Helen. As a relatively young woman in Science (I would like to think), I have always felt a strong interest and fascination with women who have walked the same path in a time when they were certainly a minority. In December I went and visited Helen and Fiona Cameron in Helen's lovely house in Yarralumla.

Helen is an enchanting lady full of passion for entomology and with a keen interest in hearing how this area of research has changed over the years. She told me of the wins and of the disappointments of her career, when her contribution had not been acknowledged as she should have deserved. She is stronger than her physical appearance may mislead you to think, and she certainly is strong-willed. I invited Helen to visit the ANIC in early March when Dr David Rentz, the eminent Australian

expert in Blattodea, had also planned to be in Canberra. It took her no time to say "Yes, I would like that!"

Helen, accompanied by her daughter Fiona and her son-in-law, Roy, visited ANIC on the 6th March. She was fascinated to see how some aspects of the job she knew are still the same, captivated by the new techniques she could not even think about, such as the high-resolution images of primary types we showed her on a computer screen or the molecular work we do in the lab, and she was moved by finding the specimens she had collected as Helen Cane (her maiden name), perfectly preserved in the ANIC and put in good use for scientific research.

Many in ANIC stopped and spent some time with Helen: Ted Edwards, Marianne Horak, Jaime Florez Fernandez, You Ning Su, Thekla Pleines and ANIC Director, David Yeates. And of course, David Rentz.

ANIC is a repository of Australian diversity, science and the history of these. ANIC is also the heart and soul of all of those who have spent their years, passion and intellect to grow the heritage we now have the duty to safeguard, grow and showcase. Helen is and always will be part of all of this.



Helen Cameron (right) with David Rentz (left) and Federica Turco (centre).



Helen Cameron and David Rentz looking at specimens

The Small Ant-blue in the ACT

Suzi Bond

The Small Ant-blue (*Acrodipsas myrmecophila*), is a delightful but easily overlooked lycaenid endemic to Australia. The females are about 20 mm in wingspan with wonderful iridescent blue patches on their wings, while the males instead have bronze wings. They have a widespread but scattered distribution in Australia, known from one location in the NT and from southern Qld to western Vic., and while adults can be reliably observed at places such as the Blue Mountains in NSW, breeding colonies are localised and rarely encountered. The species is listed as critically endangered in Victoria, where it has not been seen for many years.

The Small Ant-blue has a complex association and strong obligate relationship with the Coconut Ant (*Papyrius nitidus* complex), named for the characteristic coconut scent the ants emit when disturbed. Coconut ants are widespread over Australia and build their nests largely in coarse woody debris, such as stumps and logs in long unburnt habitat as well as dead wood in standing trees. They cover their nest and trackways with fine plant debris. The butterfly lays its eggs in close

proximity of the ant nest, and the larvae live in the ant nests, where they are thought to feed on the ant larvae. They then pupate on the edge of or close to the ant nest.

There was previously only one record of this species from the ACT, Tony Eggleton's specimen collected near Uriarra Hill in 1991, now lodged in the ANIC. However, in February 2018, sharp-eyed citizen scientist Christine Darwood was birding in a Canberra nature reserve when she noticed a small blue butterfly that didn't look like the Common Grass-blue (*Zizina otis*) she was familiar with. She pursued the butterfly until it landed, took several photos of it and uploaded them to the local citizen science database, Canberra Nature Map, to be identified. Christine had happened upon the second record of a Small Ant-blue for the ACT and had great photos to prove it.

This rediscovery led to the training and collaboration of citizen scientists, park carers and ACT Parks and Conservation rangers, and a project to survey for coconut ants and their nests as well as the butterflies, which incredibly resulted in the subsequent discovery of several breeding colonies in the ACT. These are the only currently active documented breeding sites for this species in Australia.

These were important discoveries as comparatively little is known about the biology and ecology of the Small Ant-blue, and likewise there is little known about the Coconut Ant; both are known to favour eucalypt woodland and open forest, but the specific requirements of the butterfly for selecting breeding sites at particular ant nests remains unknown.

Now we know that, for the ACT populations the Small Ant-blue flies from October through to March with peaks in November and February, males fly around and perch in the vegetation above the Coconut Ant nest that contains the butterfly breeding colony, and females walk around vegetation and coarse woody

debris on and close to the ground near the ant nest. In the afternoon the males fly to the high points in the landscape to hilltop. We also know that we have at least two species of coconut ants in the ACT and encouragingly that the ants have been found to be using timber imported into woodlands by the ACT Government as part of wider strategy to actively manage and restore ACT woodlands.

Crucial to the success of the project was the involvement of senior environmental planner Michael Mulvaney and ANIC expertise of myrmecologist Jon Lewis, who contributed new knowledge on the coconut ants, and lepidopterists Michael Braby and Ted Edwards who assisted with adult butterfly and pupal shell identifications. Surveys of the butterfly and ant are ongoing, and sites are managed to maintain populations of both in the ACT by retaining coconut ant colonies and fallen timber, maintaining a 5-10% cover of native plant saplings such as eucalypts and wattles near coconut ant nests and by minimising disturbance to butterfly breeding colonies and hilltopping sites.



Small Ant-blue (*Acrodipsas myrmecophila*)



Small Ant-blue pupae

Farewell Peter Macnicol (1930 — 2019)

Ted Edwards

The ANIC Lepidopterists very sadly report that Peter, one of our longstanding volunteers, passed away on 27 December 2019.

Peter was born and schooled in Canberra and went on to Sydney University and then the University of New England in Armidale. He met Pat in Canberra in 1958 just prior to spending three years on a Humboldt Fellowship in Tübingen, Germany, where he completed his PhD, and he and Pat were married in Tübingen. Following his PhD, Peter and Pat spent a year in Los Angeles. He then commenced his long career as a biochemist and plant physiologist with CSIRO Division of Plant Industry in Canberra and was sent by CSIRO to Mareeba in 1962 to work on tobacco crops (Peter never smoked) and returned to Canberra in 1965.

Throughout his career, Peter spent much time working in several overseas posts, and between 1985 and 2005 he and Pat travelled widely in Australia and overseas. He had interests in many subjects, including music (Brindabella Orchestra), active sport (tennis, hockey and rugby), languages (German, French and Russian), bee-keeping, fishing, gardening and natural history. He had an early interest in entomology and collected butterflies and sometimes moths and wasps. We have, in ANIC, some useful early records of moths from Mareeba collected by Peter in 1963.

In his later years his interest turned more to wasps, and after retirement from the Division of Plant Industry (where he worked for five years beyond retirement age) he became a volunteer with the Hymenoptera section of ANIC on 2 November 2001. Jo Cardale, Hymenoptera Experimental Scientist, had assembled an effective group of volunteers including the husband-and-wife team Cynthia and Ted Beazley and Judith Clark, with Peter

arriving a little later. John La Salle, the incoming hymenopterist following Ian Naumann, brought a change in direction. Jo took early retirement and Judith and Peter were eventually welcomed by the Lepidoptera section.

Peter thrived on being helpful and was a wonderful colleague. He gave long, faithful and dedicated service to the Lepidoptera section, re-curating the Agaristinae and, particularly after Judith passed away, in staging and labelling accessions. He was interested in taxonomic work and was pointed in the direction of the geometrid genus *Arhodia*, which was known to be a complex of species. It proved to be a very hard nut, which, without Peter's numerous dissections and photos that showed that genital morphology clearly defined the species, could never have been resolved. As Peter aged, You Ning Su and Marianne Horak were drawn into the study, which is now all but complete. Tragically Peter did not live to see the revision of *Arhodia* published, although he saw the mock-up plates and completed text.

He was quiet, considerate, self-effacing, gentlemanly and determined, with a subtle sense of humour and he was a scientist and naturalist of the old school for which a moth is a moth rather than simply a sequence and for which all information is relevant in taxonomy.

Peter had a minor stroke in 2014 and a serious accident at home in 2016 and never fully recovered. He gave up signing the volunteer's book in 2017, so that his total of 2793 hours of service only records his work until then. But he was active and diligent, if very forgetful, up to Christmas 2019, and when we dispersed for Christmas holidays last year we never dreamed we would not see him again.

The staff of ANIC and particularly the Lepidoptera section would like to express their sincere condolences to Pat, his wife of over 60 years, to his son Douglas and to all his extended family.

We will remember him fondly. Farewell Peter, may your roaming spirit thrive netting gorgeous, ghostly butterflies among the asphodels of the Elysian Fields forever.



Peter Macnicol (21 July 1930—27 December 2019)

Recent Publications

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