

## CSIRO NATIONAL FACILITIES AND COLLECTIONS www.csiro.au

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### **The Director's Introduction**

David Yeates, Director

The ACT was faring quite well in the pandemic through winter, but case numbers in Sydney remained stubbornly high, just 300 km away on a major highway. Then the inevitable happened. A case of the Delta variant appeared in Canberra in early August and we immediately entered lockdown, which lasted through most of spring. So it was back to working from home for all but a few of us working on essential, time-sensitive projects that cannot be progressed from home. The ACT Government and CSIRO are now beginning to ease restrictions as vaccination rates go sky high. We are all hoping for an improved 2022.

However, we have still managed to compile a full issue of ANICdotes, with articles about field work completed before the lockdown, new staff and students, staff awards and the release of new research products. In this issue we welcome Michael Elias and Mark Rullo to ANIC. Michael is working on an exciting project funded by the Department of Agriculture, Water and Environment, that uses artificial intelligence to identify the Brown Marmorated Stinkbug (*Halyomorpha halys*). Mark Rullo is a PhD candidate working on a CSIROindustry project to assess the nutritional value of Australia's native insects.

Laurence Mound's extensive, global, research activities on thrips are well known to readers of ANICdotes, and on page 6 we congratulate Laurence Mound for becoming an Honorary Fellow of the Royal Entomological Society of London. Richly deserved, Laurence! This issue also features field trips to the Border Ranges region of NSW by our beetle and moth crews, squeezed in during the pandemic, and details of malaise trapping for flies around the ACT and southern NSW (pp. 7-9). Honorary Fellow Michael Braby shares with us his experiences chasing down populations of rare azure butterflies on pages 10 and 11.



We also record the release of a new incarnation of the key to Australian fly families *On the Fly*, this time for phone applications (p. 11). One of the last pieces in this issue, just before our list of publications, is an article by Yun Hsaio on beetles he has named after Japanese Digimon and Pokemon fictional characters.

During winter the planning and designing of our new building continued apace, and we are still on track to begin construction early in 2022. The collection itself will be closed for 2022 and 2023 as we prepare for, and complete, the move (p. 2). We will be sure to include news of the ground-breaking in ANICdotes issue #20!

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### ANIC closing for relocation: A message from the NRCA director

#### NATIONAL RESEARCH COLLECTONS AUSTRALIA www.csiro.au

National Research Collections Australia GPO BOX 1700 Clunies Ross Street CANBERRA, ACT 2601 Australia Telephone: (02) 6246 5318 ABN 41 687 119 230

14 October 2021

#### Dear Colleague

I am pleased to inform you that National Research Collections Australia will soon be relocating our Canberra-based collections from their current locations to a new, single, purpose-built collections precinct. The new National Collections Building is jointly funded by CSIRO and the Department of Education, Skills and Employment through the National Collaborative Research Infrastructure Strategy.

The new precinct will be located at the CSIRO Black Mountain site in Canberra. It will provide modern storage and research facilities including secure collections halls, dedicated storage for ethanol-preserved specimens, new molecular laboratories (including a trace DNA laboratory), digitisation facilities, and curation, office and meeting spaces. It will allow co-location of four of our seven major collections:

- Australian National Herbarium
- Australian National Insect Collection
- Australian National Wildlife Collection
- Australian Tree Seed Centre

We have now completed several years of planning and construction is expected to commence in early 2022, with the project to be completed by the end of 2023. Of necessity, preparations for the relocation, and the move itself, will have significant implications for our collections management and science operations over the period commencing 1 January 2022 to 30 June 2024 that may affect you or your institution. The extent of these disruptions will vary across the different collections.

The Australian National Algae Culture Collection and Australian National Fish Collection in Tasmania and the Australian Tropical Herbarium in Queensland will not be impacted by this process.

We expect only minimal disruption to the operations of the Australian Tree Seed Centre and some limited impacts on loans, students and visitors at the Australian National Herbarium as both collections are already located on the new precinct site and neither will be moving buildings.

The Australian National Insect Collection will move only a few hundred metres from its current location. However, this will involve disruptions to all activities as we relocate 12 million specimens and associated research equipment. We anticipate visitors, loans in/out and enquiries that require access to the collection to be significantly interrupted during the specified period. The Australian National Wildlife Collection will move the furthest, from its current location at CSIRO's Crace site to Black Mountain, a distance of approximately 10km. We expect to be able to continue responding to requests for tissue samples, except when the freezers are being moved in mid-to-late 2023. However, as with the ANIC, it is expected that visitors, loans in/out and enquiries that require access to the collection will be significantly interrupted from January 2022.

Taking this approach of limiting our operations at ANIC and ANWC over the next two and a half years is necessary to allow our staff to focus on the important and challenging task of relocating these valuable research collections. It will also mean that we will be able to resume our full suite of collections management and science activities, interactions and services as soon as possible following the relocation.

During this challenging time we appreciate your consideration and patience and look forward to being able to welcome you to our National Research Collections Australia Precinct in 2024.

Your sincerely

Dr Andrew Young Director, National Research Collections Australia CSIRO National Facilities and Collections



Artist's impression of the façade of the new national collections building (image courtesy Hassell)

### Welcome to Michael Elias

Michael received his PhD from the University of New South Wales in Systematic Entomology in 2016. His thesis was on the taxonomy and morphology of the plant-bug tribe Orthotylini (Heteroptera: Miridae) in the West Pacific.

Since completing his PhD he has worked in various roles in biosecurity for the NSW and Federal governments in Sydney, Melbourne and Canberra. He became a specialist on heteropteran biosecurity threats such as *Halyomorpha halys* (Brown Marmorated Stinkbug). His work included various roles identifying insects intercepted by biosecurity, writing biosecurity pest risk assessments and management and curation of collection data. In July he was employed by CSIRO to work on a project to develop an app that will enable biosecurity officers to identify stinkbugs that are commonly intercepted at the borders or approved arrangement sites. The project will use artificial neural networks to train AI to positively identify stinkbug species such as *H. halys* using a phone camera.

Halyomorpha halys is a major pest on several crops overseas including apples, stone fruit, hazelnuts, grapes, figs and some cucurbits and solanaceous crops. It causes billions of dollars of damage to crops globally every year. It is originally from East Asia, but with the rapid increase in trade from the region it has spread all over the temperate regions of the world and become a major pest all over Europe, North America, Western and Central Asia during the past 25 years, and in the last few years it has established a foothold in South America.

The app will be specifically focussed on obtaining rapid identification of *H. halys*, one of the Federal Government's most concerning exotic pests. It will be able to identify *H. halys* and other exotic pest species, such as *Erthesina fullo* as well as several native stinkbugs that are commonly confused with *H. halys* by our biosecurity officers.



Michael Elias at his workstation in the ANIC



Halyomorpha halys - dorsal view. (Photo © Michael Elias)

### **Introducing Mark Rullo**

Mark is an industry PhD (iPhD) student from Adelaide. After completing a B.A in Nutrition and Food Sciences at the University of South Australia, he worked in the biosciences team at the Australian Wine Research Institute. This period involved working on molecular tools for studying a wine bacterium involved in malolactic fermentation, *Oenococcus oeni*, and routine microbial testing of alcoholic beverages. His love for unusual foods prompted him to apply for the iPhD scholarship 'Exploring Australia's edible insects' offered through CSIRO and the University of Adelaide.

This project aims to investigate a number of Australia's edible insect species, measuring their protein, fats, micronutrients, antioxidant properties and antimicrobial activities. An overview is given in the image below. Previous work from AgriFutures Australia (previously RIRDC) suggested that it may be possible to commercialise the rearing of witchetty grubs (*Endoxyla* species),



Project summary (left) and Mark (right) at Mt Kosciusko "main cave" entrance

but due to the slow development time of these species, it was deemed worthy to investigate the production of faster growing species such as the Bogong Moth (*Agrotis infusa*), which can be used to generate revenue whilst the witchetty grubs mature.

#### Edible-insects project update

I thought this would be a good opportunity to give you a quick update on the edible-insect project. Since arriving in Canberra, I have captured adult bogong moths from Mt Gingera and Mt Kosciuszko and maintained a colony for 6 generations. After nearly losing the colony to disease, disrupting egg laying (by leaving the lights on) and experiencing other rearing hurdles, it looks like the moths are settling into their new routine. The



Making the diet

moths have been reared using similar methods used to rear pest species such as *Spodoptera* and *Helicoverpa*. Using these methods, we are able to produce adult moths in 8 weeks. Unfortunately, the current rearing method is time-consuming, the larvae are cannibals and I am yet to develop a mass rearing method. I am hoping to resume this work once COVID restrictions allow!

Once I have enough material, I hope to do a nutrition comparison between wild moths and lab-reared moths. Previous work has shown that the whole moths contain approximately 24% protein and 20% fat, although, when taking the abdomens only, the fat content can be as high as 40%. The final-instar larvae will also be analysed, as they are easier to process (no scales) and are likely to contain higher amounts of nutrients.



Trialling rearing methods

... continued from page 4

#### Other edible species and future work

During a field trip with Keith Bayless, I was able to trap an *Abantiades* species. With little information available, I used a modified *Spodoptera* rearing method to collect eggs and maintain larvae. The larvae have been growing since March and the largest weighs approximately 3g. The larvae are amazing, as can be seen in the images below. They tend to move backwards extremely quickly when handled and can survive without food for months.



Although I am mainly concerned with the nutritional aspects of edible insects, there may be also be research opportunities, such as the documentation of the life history of the species.

Once I have completed the nutritional analysis on the bogong moths, I would like to look at other iconic species as listed below. The full list of edible insects contains species from other orders and many different families. Unfortunately, due to COVID restrictions and limited resources it is not possible to collect and rear all of these species.

In closing, I would like to reach out to the readers of ANICdotes and ask for your assistance. If you are heading out for fieldwork or have contacts who have access to these species, I would love to chat with you! Thank you all for your assistance so far!

If you would like to see the full list or chat about this work, please feel free to get in touch using my email: Mark.rullo@csiro.au

### Selection of Australian edible insect species

Agrianom spinicollis Anoplognathus viriditarsus Bardistus cibarius Macrogyrus viridisulcatus Camponotus inflatus Abantiades: marcidus, atripalpis, argentata, Endoxyla: amphiplecta, biarpiti, cinereus, duponchelii, encalypti, leucomochla, lituratus, mackeri Hyles livornicoides

Teleogryllus commodus

### Living with lockdown

### Ying Luo

A lockdown never comes at a good time, and a lockdown that prevents you from accessing specimens and labs during your PhD is definitely not ideal. I was actually in Melbourne in 2020, and at least I can say that that experience gave me some tools and skills for coping with a lockdown. One thing I've found extremely helpful is getting myself outside every day. Fortunately, lockdown has coincided with the onset of spring, and I have been using my outside time to improve my plant ID and leaf-miner rearing skills which are vital for my PhD project on leaf blotch miner moths (Lepidoptera: Gracillariidae). I am extremely grateful to be in the "bush capital" of Australia, where we are surrounded by lovely parks. I have been able to set up a little rearing station at home (complete with a trusty ANIC field microscope) and the antics of my tubes of leaf miners has meant there's something different to observe each day.



Ying spending time outdoors in lockdown searching for leaf miners.

Abantiades spp larvae in petri dishes

### **Royal Entomological Society award for Laurence Mound**

#### Peter Cranston

Laurence Mound, commander cum patron of the 'thrips room' in the corner of the upper 'new' (now old) wing of the ANIC collection halls, is to receive a new wall hanging - the scroll awarded to Honorary Fellows of the Royal Entomological Society (of London, UK; RES). This honour is well over-due: Systematic Entomology and its now six stable mates originated under Laurence's carving-up in 1976 of the society-published Transactions and Proceedings A and B. Encouraged by the registrar, these journals divided and became a substantial income-generator with commercial publisher Wiley rather than the previous encumbrance. As with the subsequent sale of RES HQ real estate in Queen's Gate, South Kensington, initially changes were not popular. Ahead of his time as ever, somehow Laurence missed earlier RES recognition even as the healthy finances that flowed allowed expansion and much innovative support of insect study. Two decades ago I was similarly rewarded only for editing just one journal, but belatedly a successful case was made recently for Laurence. A condensed version for those who do not know the fullness of his career follows.

Laurence's entomological interests started young, in England. After his first degree, postgraduate studies followed at the British Museum of Natural History (BMNH) and then employment in the 'colonies' to study agricultural entomology. Placed initially in Ibadan, Nigeria, he studied whitefly vectors of crop virus diseases, followed by a period in the Sudan (1961-1964) studying the effects of whiteflies on cotton and recognising that environmental influences underpinned taxonomy. Next he returned to London to take responsibility for the whitefly and thrips collections in the BMNH. There Laurence's research turned to thrips, persisting for 50 years despite interruptions due to managing the Department of Entomology (1981-1992), helping organise the International Congresses of Entomology (1976–1992) and accepting many invitations to speak on the role and future of the discipline. Then he became collateral damage of the Thatcher-government-driven cuts to science. Britain's loss of Laurence Mound was Australia's gain.

Laurence has been now in Australia for more than a quarter of a century, continuing as a prolific research scientist with over 460 published papers. Early on he worked with Canadian Bernie Crespi in seminal studies on our social acacia thrips. An Australian thrips catalogue followed, with funding from Australian Biological Resources Study. After a CSIRO McMaster Fellows he became a continuing Honorary Research Fellowship with ANIC. He even found time to edit *Myrmecia* from 1999 to 2004, expanding the contributions from regional laboratories and caring very much for the issues of layout and coherence of contributions. He has been a long-time member of the Australian Entomological Society and, naturally, retains his membership (now honorary!) of the Royal Entomological Society.

Laurence has retained an international perspective, notably revisiting the UK frequently and collaborating with Kiwi exile in California, Mark Hoddle. As his colleagues know, in the 'thrips room' he has hosted a continuous stream of visitors from everywhere on the globe, each receiving individual advice on projects, and training in thrips identification, with strong emphasis on significance of thrips' biology. Laurence has hosted many workshops in Australia for guarantine and agriculture personnel and also in Malaysia over several years, involving Indonesians, Malaysians, Vietnamese and Americans (Californians) and Thai and Singaporean students. Biosecurity workers have also received his wisdom. As subject editor for thrips and whiteflies for the international journal Zootaxa, Laurence has been influential in maintaining publication standards on these groups. The Lucid developers have benefitted greatly since his pilot keys and continuous testing of software. This has resulted in Lucid thrips identification and information systems for many countries, including Brazil, California, China, New Zealand, Timor Leste as well as Australia, most developed with co-workers and where appropriate in both English and the primary language of the co-worker. These systems are supported by the ThripsWiki web site that he developed, in that it provides access to nomenclatural details of the world Thysanoptera as well as other information resources about thrips.

Until COVID-19 intervened, Laurence's field-based research covered all points of the Australian continent, from wet to arid, and including offshore islands, among them Lord Howe, Kangaroo, Flinders and Torres Straits islands, and Norfolk Island in relation to potential quarantine issues. As ever, a practical reason was found for the journeys, although a taxonomist's interest is easily piqued by these exotic locations. Let's hope these thrips trips can resume someday soon.



Laurence Mound in his 'thrips room' in the ANIC

### **Border Ranges field trip**

#### Lingzi Zhou and Living Li

A crew from the ANIC beetle and Lepidoptera groups, including Adam Slipinski, Andreas Zwick, Lingzi Zhou, Yun Hsiao, Living Li, Zhenhua Liu and Siwanon Paphatmethin, were lucky to fit in a field trip to the Border Ranges National Park (NSW) before the COVID lockdown hit.

The Border Ranges National Park is a part of the Gondwana Rainforest of Australia World Heritage Area and has the highest concentration of marsupial, bird, snake and frog species in Australia. But this time we were hunting for insects. We were told by the accommodation owner, Hugh Starkey, that in early March this year the Border Ranges seemed a bit cooler and wetter compared to the past few years. Consistent rain made beetle collecting hard work but didn't seem to affect the moths quite as much. On several occassions Andreas and Siwanon ran out of vials and were too busy to get much sleep at night.

The beetle team mainly relied on Berlese funnels and various other traps, such as single- and double-layer slam traps, light

traps, Lindgren Funnel traps as well as pyrethrum spray. The beetle team collected close to 2000 beetle specimens belonging to at least 34 beetle families, including some uncommon species. The sorting work is still being undertaken.







The Border Ranges field trip team: Zhenhua Liu, Yun Hsiao, Lingzi Zhou, Adam Ślipiński, hosts Hugh and Elizabeth Starkey, Andreas Zwick, Siwanon Paphatmethin and Living Li

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Living Li was inspired to write the following creative recollection about his experience in the Border Ranges.

"When the chorus of bell miners began to echo in the hidden valley, Cougal Park shrouded, in milky mist, awoke in the tranquility of morning light. A cup of warm tea, followed by a sweet breakfast, presented the team a fresh day of bush life! While the moth guys were busy with sorting last night's catch, the beetle team set out for remote mountains. Across rivers and through herds of cows, the rugged ridge road winds its way toward exquisite wilderness, where towering eucalypts give way to the lush green of tree ferns. Brindle Creek, lined with vibrant stream lilies, welcomed the team with a fancy dance of rufous fantail. Ease your soul into this timeless rainforest and embrace the cool moist air, it's time for a 'beetle' safari – a thick layer of leaf litter near the buttress, isn't it a good candidate for sifting? A forest corridor along the gully, isn't it a promising land for slam trapping? A little clearing in between the canopy, isn't it a nice spot for hanging a Lindgren funnel? A decaying standing tree decorated by crispy fungi, isn't it a reasonable choice for bark-spraying? The thing with the Border Ranges is, after hours of hard work in dirt, you will be rewarded with something mindblowing.

At Pinnacle Lookout, millions of years of erosion from eruptions of shield volcanoes unfold in the spectacular view of Tweed Valley. Backdropped by the sea, Mt Warning stands in solitude. In the south, the arc of mountains stretches toward Bar Mountain, where Antarctic Beeches flourished since the dinosaur age and the changeable nature of mountain weather is in its full display. Fog thickening and rainclouds gathering, there was no trace of land mullets, no songs of Albert's Lyrebird, just the wind in the trees and the occasional call of scrub wrens. Don't be fooled by the seemingly emptiness of Gondwana rainforests. A few days later, our traps would tell you a rich story of teeny-weeny fairies, which have thrived in this wonderland. Stumbling in leaf litters are *Periptyctus* endomychids, commuting between understoreys are *Rhopalobrachium* phloeostichids, hidden in rotten woods are *Derolathrus* jacobsoniids.

When the veil of night descends, graceful frogs emerged from their daytime shelter, *Platyphanes* tenebrionids took their night patrol on tree trunks. A cup of wine after dinner, now it's time to enjoy the daily moth show at light trap. But that's not all! The highlight was not just at the destination, but also on the way home. Below the surface of Narrabri shire lies the Great Artesian Basin. Take a bath in the steamy hot pool, immerse yourself in the mineral-rich Artesian water before setting out for a night collecting in the Pilliga Forest. After days of heavy rain, the country turned into sheets of water, yet the semiarid inland bloomed with life. A brief stroll along the river of Gilgandra greeted us with an unexpected mating frenzy of *Rhipicera* beetles. Sometimes, the wonders are hidden in most ordinary places, all you need is to open your mind's eye."



View of the Pinnacle. (Photo © Living Li)



Platyphanes sp. (Photo © Living Li)

### Autumn insect trapping in central NSW

#### Keith M. Bayless & David K. Yeates

With international fieldwork impossible and interstate travel risky, adaptations for fieldwork had to be made. The brief COVID interlude early in 2021 was a chance to stage a collecting campaign for flies active in autumn. We surveyed a less explored part of Australia, at least for acalyptrate flies- central New South Wales. Australian entomological fieldwork often targets the coast or mountains in the spring and summer, but a few strange and potentially important flies seem to be active inland in the autumn. We organised about five overnight trips to raise and recover malaise traps and to light-trap throughout the vast area.

Much of the land between Dubbo and the western Blue Mountains has been converted to agriculture, but the extensive conserved land maintains a striking diversity of ecosystems. We



Western Blue Mountains (Photo © Keith Bayless)

set traps in *Callitris* cypress-pine forests replete with cycads near Binnaway, endangered dry fuzzy box (*Eucalyptus conica*) woodland at Weddin Mtn, open grassy box-ironbark forest in Goonoo Goonoo SCA and in far northwest populations of snow gums and *Nothofagus* in Coolah Tops.

While viral risks were carefully avoided, fieldwork didn't proceed entirely smoothly. The floods in eastern Australia starting on 18 March 2021 damaged four traps. Night drives returning from light-traps through the central NSW mouse plague were surreal. Curiously, the final trap sample we recovered reflected a population explosion of *Pseudoleria pectinata*, an invasive heleomyzid fly associated with rodent burrows (McAlpine 1984. J. Ent. Soc. NSW 16, 45-48).



Mark Rullo helping with a trap over a gravelly wash in dry sclerophyll near Turon NP (Photo © Keith Bayless)

While the primary target, the enigmatic tephritoid *Aliasutra*, remained elusive, the traps caught target Pyrgotidae, Conopidae and Heleomyzidae, along with mosquitoes, wasps and bugs. At Mt. Boyce, sweeping cliffside Restionaceae sedges yielded a single specimen of a bizarre heleomyzid not seen since the 1980s - *Waterhouseia cyclops*, named after a former CSIRO entomologist.

External obstacles causing us to adapt and re-adapt our plans led to positive results. This was possibly the first insect survey research performed in some of these reserves. The efforts of a number of ANIC people made these trips possible- Thomas Wallenius, James Lumbers, Mark Rullo, Daniel Dashevsky, Madalene Giannota and Olivia Evangelista.



Thomas Wallenius helping set up a trap over a temporary stream near Weddin Mountain (Photo © Keith Bayless)

### Azures, sapphires and a splash of gold

Michael F. Braby

Earlier this year, during February and March 2021, Ethan Beaver and Mike Moore (both from Adelaide) and I spent eight weeks in the field in northern New South Wales and south-eastern and north-eastern Queensland. Our quest was to visit known sites supporting extant populations, collect adult specimens and rear larvae of a group of rare but spectacularly coloured butterflies, and we drove some 9500 km to achieve our objective!

The butterflies under investigation belong to the lycaenid genus *Ogyris*, commonly known as Azures. This genus is largely endemic to Australia, where there are 14 species, which fall into several distinct species groups. One species group is the *Ogyris aenone* group, which contains three species – Sapphire Azure, *Ogyris aenone* (Waterhouse, 1902), Golden Azure, *Ogyris ianthis* (Waterhouse, 1900), and Orange-tipped Azure, *Ogyris iphis* (Waterhouse & Lyell, 1914). However, the systematic relationships and evolutionary history of this group



Ogyris aenone male, Port Douglas, QLD. (Photo © MF Braby)

are far from settled, and there are considerable uncertainties regarding species boundaries with the current taxonomy. Ethan is intending to investigate the systematics of this interesting complex for an Honours project, but the ANIC has so little preserved ethanol material and almost no DNA samples, and no one seems to have adequately described and compared the immature stages.

We had three key objectives. These were to install larval traps, to collect, rear and photograph the immature stages (egg, all larval instars and pupa) of all species and to sample fresh tissue material for laboratory analysis. The larvae specialise on plants in the mistletoe family Loranthaceae, and they feed nocturnally, retreating under loose bark or hiding in holes made by wood-boring insects during the day. They are also obligatorily associated with ants, and the association is usually highly specific. For example, typical *O. aenone* in the Wet Tropics breeds predominantly on *Diplatia* or *Dendrophthoe* mistletoes growing on *Melaleuca* trees, and the larvae are obligatorily attended by Philidris cordatus ants, whereas the larvae of O. ianthis feed on Amyema or Dendrophthoe mistletoes parasitising eucalypts and are obligatorily attended by Froggattella kirbii ants. Another population in this complex breeds on Lysiana or Amyema mistletoes growing on Allocasuarina and its larvae are attended by Anonychomyrma inclinata ants.

Thus, much of our time was spent searching for the early stages of these butterflies, which are difficult to find because of their highly localised occurrence and complex association with host trees that have suitable combinations of mistletoe larval food plants and nests of the specific attendant ant. Perhaps only 5-10% of trees at a site might support both the appropriate species of mistletoe and a colony of the particular ant, but even when these resources co-occur they are not always occupied by breeding colonies of the butterfly. Once such host trees with the correct combination of ant and mistletoe were found, we set up larva traps. In the past, some collectors would remove the mistletoe clump from the host tree or, worse, chop down the host tree to collect the larvae or pupae (Le Souëf 1976). However, a more sustainable method is to



Ethan Beaver inspecting bark of *Melaleuca viridiflora*, Cardwell, QLD. (Photo © MF Braby)

... continued from page 10

install traps to catch the larvae. One method is to place a broad piece of bark or a band of corrugated cardboard secured with wire around the branch or trunk of the host tree subtending the mistletoe clump. The bark or cardboard provides a convenient but temporary shelter for the larvae. In total, we installed 237 cardboard traps on 143 trees sampled at 23 sites in 10 locations



Ethan Beaver and Mike Moore installing larval traps for Ogyris aenone, Cardwell, QLD. (Photo © MF Braby)

spread between the Pilliga and Port Douglas. A ladder (Le Souëf 1977) and/or good tree-climbing skills is essential for this work (it also helps to be tall, like Ethan!). Our plan was to re-visit all sites again this spring to check the traps, but COVID-19 lockdowns in the ACT and border closures in QLD put an end to that! We hope to do a follow-up trip in early 2022. We look forward to the results of Ethan's project next year.

#### References:

Le Souëf JC. 1976. Collecting butterflies with a chain saw. Victorian Entomologist 6, 43-44.

Le Souëf JC. 1977. A ladder is a help for Ogyris. Victorian Entomologist 7, 74-75.



Ethan Beaver with Mike Moore processing specimens, Bendidee State Forest, NSW. (Photo © MF Braby)

### On The Fly released as an app

#### David Yeates

The original On The Fly key to Australian fly families was first released on CD-ROM in 2005. The keys were later modified and upgraded for the web on the What Bug Is That? website, served from the ANIC web pages http://anic. ento.csiro.au/insectfamilies/.

Over the past year we have ported the Diptera keys and other information over to be used as an application on a phone or tablet. The app can be downloaded from the Apple or Google app stores to run on devices using either iOS or Android operating systems.

The application includes the keys and other information provided on the original CD, including a section on fly classifications, an summary of the biology of flies, an overview of the Australian fly fauna, pest flies, collecting flies and curating fly collections. The app is dedicated to Don Colless, a prominent CSIRO dipterist who built up the

ANIC collection over many years, and who is one of the authors of the original CD version. Jaime Florez. Keith Bayless and James Lumbers commented on draft versions, and Jaime also prepared some new images of small and obscure groups for this app version. The original version of On The Fly the key was produced Key to Australian Fly Families using resources from the Australian Biological Resources Study (DAWE).





### **Thanks ANIC**

#### **Jon Lewis**

We've all changed schools or jobs or even countries and sometimes found our new environment a bit challenging. There is so much to learn and people often don't have time or inclination to help you. But this didn't happen when I came to ANIC. I started as a volunteer in June 2017 and found ANIC to be a welcoming and supportive place to work. Not being trained in entomology, I had a lot to learn, but ANIC people have been consistently generous with their time and knowledge. No workplace is perfect and problems will always arise, but the goodwill that flows around ANIC keeps the place a friendly and collegiate environment. Not only do people turn up for cake, but when another 20 cabinets need to be moved in, everyone turns up to help with that too! I published my first taxonomic paper this year, a milestone in my scientific life. I hope there will be more, but it couldn't have happened without this amazing place and the people who work here. So, thanks ANIC!



Anonychomyrma inclinata, a new ant species described by Jon Lewis

### Japanese Anime beetles: a media hit

#### Yun Hsiao

Recently Yun Hsiao (@YHsiaoBeetle), published two taxonomic papers on Australian beetles. The articles featured beetles named after Japanese Anime Digimon Adventure and Pokémon fictional creatures. The posts on social media have attracted nearly 8000 Likes in total, and a Belgian youtuber has created an impressive video on these new discoveries (https://www.youtube.com/watch?v=Ot04tY5f-rM).

One paper, published with weevil expert Rolf Oberprieler, comprehensively reviews the taxonomy of Australian cycadboring weevils, *Demyrsus* and *Siraton*. A new species, *D. digmon* from North Queensland, is described and named after the fictional insectoid Digmon in the Japanese anime television series Digimon Adventure. This character possesses the great power of drilling and manipulating the earth, and the weevil was named after it due to its habits of boring into hard trunks of cycads. Rolf and Yun also found that both these weevil genera prefer to infest the African genus *Encephalartos* more readily than other non-Australian cycad genera, which is probably rooted in the close phylogenetic relationship between this



Demyrsus digmon, a new species of weevil named after the fictional insectoid Digmon. (Photo Yun Hsiao)

*Encephalartos* and its Australian host genera, *Macrozamia* and *Lepidozamia*.

The second paper was written with Darren Pollock, of the Eastern New Mexico University in the USA, in preparation for a book chapter for Volume 3 of Australian Beetles. It describes three new species of fire-coloured beetles (family Pyrochroidae) that were discovered among the specimens of this family housed in the ANIC. They belong to the Australianendemic genus Binburrum and were named after the birdlike creatures Articuno, Zapdos and Moltres in the Japanese franchise Pokemon. Although Binburrum articuno, B. zapdos and *B. moltres* lack external similarity to these bird-like anime characters, they were named after them because they are equally rare as the elusive fictional birds in the video game, with only a few specimens collected in flight-intercept traps known to date and their life histories unknown. The species were also named after the legendary bird characters because the classic game Pokemon inspired Yun Hsiao in his childhood to become a taxonomist ("real Pokemon trainer").



Fire-coloured beetles named after Pokemon characters

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# **ANIC dotes**

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### Amazing insect photography taken in the field by Living Li



Rhytiphora nigrovirens from Lamington NP, Binna Burra. Photo © Living Li



Pterohelaeus sp from Lamington NP. Photo © Living Li



Zopherosis georgii from Lamington NP. Photo © Living Li



Spiloscpaha sp from Lamington NP, O'Reilly. Photo © Living Li