



## Our first issue for 2016

David Yeates, Director, ANIC



The last two seasons have seen considerable activity to build ANIC through field work in various corners of Australia, and increase the number of researchers working on the collection. We highlight some of these activities in this edition of ANICdotes. First and most importantly, we warmly welcome our new Collection Manager Federica Turco, who arrived and settled in to her

new role in February. Federica also has research interests in a number of coleopteran families.

Recruitment activities for our new scientist, hymenopterist Dr Juanita Rodriguez, are ongoing, and Juanita will be arriving in July.

ANIC staff have been in the field to Kangaroo Island, south western Tasmania and the Lake Eyre region, and we provide more detail on some of these ventures, with all adding to our DNA and pinned collections. Our visit to Kangaroo Island was facilitated by Dr Richard Glatz who provided access to private property, his extensive collection of KI insects, accommodation and hospitality! Thanks to Richard and his

wife Janine Mackintosh. Sampling in south western Tasmania was facilitated by the Bush Blitz program of the federal government, and The Australian Wildlife Conservancy provided access and accommodation during our visit to Kalamurina, their wildlife sanctuary on the north shore of Lake Eyre. A very important component to building ANIC is the donation of private collections, and Ted Edwards provides some details of some recent generous donors and donations in Lepidoptera. Two workshops were run in ANIC by Dr Mike Hodda, one to support biosecurity and one on nematode identification.

We also welcomed Roy Larimer from the USA in March to upgrade and extend our BK (Big Kahuna) digital imaging equipment, and to train staff. Our facilities to store specimens, tissue and DNA extractions have been greatly enhanced with new -80 degree and -20 degree freezers in a dedicated basement facility.

Finally, we have recently heard the great news that Dr Adam Ślipiński and Dr Hermes Escalona won the prestigious J. O. Westwood Medal of the Royal Entomological Society of London, and will receive the medal at the International Congress of Entomology in Florida.

Adam and Hermes join Marianne Horak who won the inaugural Westwood Medal in 2008. This is quite an achievement since now our staff have two of the five medals so far awarded.

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BANNER: *Graphium macleanus* image: [Biodiversity Heritage Library](#).

## New People in ANIC

David Yeates and Adam Ślipiński

### FEDERICA TURCO

On the 1st February this year ANIC happily welcomed Federica Turco to the role of Collection Manager.

Federica has quite a long background in entomological research. Starting in 1999 in Italy she completed her studies working on various aspects of the biology and systematics of blister beetles (Coleoptera: Meloidae). After completing her PhD in 2007 she moved to Australia and continued her taxonomic work not only on Australian Meloidae but also other tenebrionoids. In fact, Federica has worked on an ABRIS-funded project to describe new species of Zopheridae from Australia, along with Adam Ślipiński and Christine Lambkin. During more than fifteen years of research in taxonomy Federica has



Federica collecting leaf litter at Flinders Peak (SE Queensland)

described many new species as well as some new genera of Meloidae and Zopheridae from Australia, Europe and Africa.

Over the years Federica has also accumulated extensive knowledge and experience in managing insect collections. This first developed during her University years in Rome and then in Australia, where she actively participated in the maintenance and expansion of the insect collection of the Queensland Museum in Brisbane. Federica has in fact worked in QM for almost nine years as Assistant Collection Manager, Postdoctoral Fellow and more recently as Curator, job-sharing with Christine Lambkin.

Federica brings to the ANIC Collection Manager's role her passion for Entomology, her experience in taxonomic research and a strong drive to see the collection flourishing as the main resource and reference for entomologists in Australia and overseas. I know Federica feels very excited and honoured to be part of ANIC and to have the opportunity to play an important role in its future development. We are all very glad to welcome her and to work with her to reach our common goals.

### YU-LINGZI ZHOU

Yu-Lingzi Zhou is a young scientist from Beijing, working on systematics of the rove beetles (Staphylinidae). She completed her PhD in Zoology from the Institute of Zoology (IOZ), Chinese Academy of Sciences in May 2013, and continued as a postdoctoral researcher at IOZ for two more years. In March this year Lingzi started her tenure as a visiting postdoctoral fellow in ANIC, supported by the International Postdoctoral Exchange Fellowship from China. Lingzi will work with Adam Ślipiński on beetle projects for two years.

Lingzi's research interests include systematics and taxonomy of staphylinoid beetles, fossil beetles and phylogenetics. She has published six taxonomic papers on the staphylinid tribe Xantholinini from China. Based on her extensive knowledge of taxonomy and morphology of beetles, she has developed an interesting research project on the evolution of the endophallus in rove beetles. She likes photographing, drawing,



Yu-Lingzi Zhou collecting beetles in Sichuan (China)

and collecting insects in the field. In the past five years, she has been on a field trip every year and collected more than 10,000 rove beetles. In Australia, she is accepting the challenge of working on the taxonomy of one of the largest and most difficult staphylinid groups, subfamily Aleocharinae, learning how to combine the evidence from fossils, morphology and molecular datasets, to infer the evolutionary patterns that underlie the current fauna.

## Improving our digitisation and genomics facilities

Nicole Fisher, Cate Lemann and Robyn Meier

Recently the ANIC has had the opportunity to continue to improve our digitisation and genomics facilities. Rooms have been renovated in the ANIC building to accommodate upgraded equipment for imaging and for management of our DNA-grade specimens.

### DIGITISATION FACILITY



Cate working at the new workstation that includes both micro and macro photographic systems

ANIC staff recently visited Queensland Museum's upgraded imaging suite to learn about this specialised imaging technology and the corresponding methods and protocols for taking the photographs. We were so impressed with the improvements that ANIC decided to upgrade of its own digital imaging system to match that of the QM.

Consequently, ANIC now has a complete camera workstation for macro and micro photography and a powerful computer with a very fast solid state drive. This imaging system was developed by Roy Larimer, owner of Dun Inc., an Imaging Systems Company based in the USA. Roy first visited ANIC several years ago to install the Visionary Digital BK Plus Lab system. Roy visited ANIC again in March this year to install

the upgrade. Fellow imaging specialist, Geoff Thompson from Queensland Museum accompanied Roy.

After a very intense 1-day installation, Roy and Geoff ran three days of imaging training for staff (Cate Lemann, Debbie Jennings, Anne Hastings, Federica Turco, Michael Frese), PhD students (Xuankun Li, Mengjie Jin, Zhenhua Liu), postdoctoral fellows (Bryan Lessard, Lingzi Zhou) and a visitor from Melbourne (Pedro Vegas). After this exciting and intense training we are now developing the protocols for using the system and keeping it safe, We are getting fabulous images along the way.



Left: Roy and Geoff after four days of intense work. Right: Nicole, Abdul and Roy working on the Passport

While having Roy in ANIC for the week, we also seized the opportunity to have the Passport II Imaging System serviced. This system along with the BK was first supplied by Roy as part of the Visionary Digital Imaging Systems. To our relief, Roy worked his magic and the Passport II Imaging System is back in action. The renovations in ANIC, creating a fully dedicated digitisation room and the repair of the Passport II system have made it possible to increase productivity by allowing volunteers to process much larger volumes of material.

### GENOMICS FACILITY

To accommodate ANIC's expanding DNA collection, space in the basement has been refurbished to accommodate two new -80°C freezers in addition to the existing -80°C freezer as well as four upgraded -20°C freezers. In addition to the freezers ANIC will be soon moving the frozen voucher specimens into bar-coded tubes, which will enormously improve storage capacity, longevity and easy location within the collection.

Additionally, ANIC Genomics facility now also includes a Biorupter and a Fragment Analyser that have been acquired in collaboration with the ANWC. This new equipment will allow DNA samples to be sonically reduced into smaller fragments for analysis.

These improvements will build on our science and genomics capabilities in specimen-based genomic analysis and enable ANIC's participation in international genome research initiatives such as 1KITE and G10K.



Andreas Zwick storing DNA-grade specimens (Photo: Alan Landford)

## Tasmanian Bush Blitz

Bryan Lessard

The first two weeks of February were busy for Bryan Lessard, Alice Wells and Andreas Zwick who represented the ANIC on the Bush Blitz expedition to the Southwest and Hartz Mountains National Parks in Tasmania. Bush blitz is a nationwide biodiversity program that aims to increase the rate of description of new species of animals and plants. The collaborative field trip combined the organisational skills of the Bush Blitz team and their associates from the Tasmanian Museum and Art Gallery, University of New South Wales, Queensland Museum, Australian Biological Resources Study and Earthwatch Australia. The base camp on the Strathblane estuary was comfortable and well equipped and catering was handled expertly and with considerable imagination by the Camp Manager and a local cook and their assistant. No field work has ever been so well supported!

The Base Camp was outside the park and while forays by road into some parts of the parks were possible, access to other parts were achieved by helicopter. Flying low over the SW Wilderness area was a very real privilege. The views were spectacular, and often the drop-off sites were a surprise, indeed, such as when Bryan and Alice chose to be dropped off on the summit of Mt La Perouse, expecting to be able to hike to wetlands to collect soldier and caddisflies. They were greatly relieved when, as cloud descended and were about to attempt scaling down the treacherous valley, the helicopter returned to rescue them before it became impossible to do so later in the day.

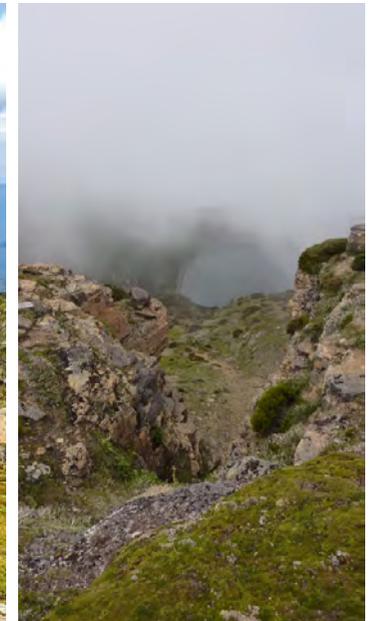
Bryan took advantage of the helicopter to set up malaise traps in several environments, ranging from the low land remnant rainforest of Old River to the summit peak of Mount Picton. These were successful in collecting fresh specimens of the soldier fly genera *Boreoides* and *Lecomylia* which will be useful for his molecular revision of the family. To his glee, Bryan's



Hitching a ride in the helicopter to Mt Picton (Photo: B. Lessard)

collecting also benefited from having several team members attract swarms of horse flies, including the persistent species *Scaptia jacksonii*.

Andreas had a fantastic time exploring the southwest National Parks at night, accompanied by members of TMAG, to collect over 1000 specimens of moths and other nocturnal insects. Seeing some of the iconic plants of the wet forests and mountain tops of Tasmania was a highlight for Alice, and having local botanists who could help with plant identifications was a great asset for collection of thrips. One site, the top of Crest Ridge, was marked on the map as 'conifer forest'. The conifers were cryptic but we eventually found them shortly before we were picked up again and had to leave.



The steep descent on Mt La Perouse (Photo: Alice Wells)

The collections of thrips provided Laurence Mound with many days of slide preparations. It increased the number of thrips known from Tasmania by around 45% and confirmed several host plants. No new caddisfly species were taken, but second specimens were collected for two species, hitherto known only from their holotypes.

All in all, the team from ANIC returned to Canberra with a large bounty of specimens from the historically under sampled southwest parks. There was very amiable cooperation between participants making Bush Blitz Tasmania a most enjoyable and successful collecting trip.

## ANIC field trip to Lake Eyre (SA)

Alan Landford

In mid-March 2016, three members of ANIC, David Yeates, You Ning Su and Alan Landford undertook a two week 4,000km+ field trip to 'Kalamurina' in the remote area to the north east of Lake Eyre in South Australia, at the southern edge of the Simpson Desert. Kalamurina is a former marginal cattle station now being managed and regenerated by the Australian Wildlife Conservancy, who invited ANIC to undertake a project of initial insect sampling. ANIC staff have not visited this area for many years.



Front gate of Kalamurina property (photo: Alan Landford)

The Lake Eyre Basin is one of the world's last unregulated dryland river systems. The range of dune systems and swales, gibber plains, high temperatures and dry-adapted vegetation has resulted in some distinctive species evolving in the area.

After sustained and unseasonable heavy rain which initially delayed our trip by about a month, the driving conditions were challenging, with the Birdsville Track closed until the day before our arrival. The last 50km to Kalamurina after leaving the Birdsville Track at Mungerannie involved us following an

often indistinct tyre track made by a vehicle that had only just successfully got through to a neighbouring station - with many detours around impassable areas and getting in and out of our vehicle in over 40 degree heat, mud and unusually high humidity to double-check the way ahead. It was comforting to some extent to know that (if required) we had a two-way radio in the vehicle, as well as satellite phone, Spot 3, GPS, personal locator beacon, compressor, generator, jump starter, well stocked field first aid kit, full vehicle recovery equipment and food and drink for at least a week, along with all our collecting equipment.



Adult *Stilbopteryx* sp. at rest (photo: Alan Landford)

The abundance of surface water, flowing creeks, plant growth and recent flowering resulted in extensive dispersal of native mammals and high breeding activity of birds (especially Zebra Finches and Budgerigars), and abundant insect life. Hot sunny days and warm and clear weather at night meant that setting up malaise traps, extensive collecting by sweeping with hand held nets and night collecting at light sheets in various

localities were all very productive. Samples of a number of collected specimens were stored in 100% ethanol and RNAlater solution.

Collecting was predominantly on the sand dunes, open plains, and drying watercourses and included a range of insects and other arthropods, including beetles, moths, lacewings and antlions (Neuroptera), large scorpions, wasps, grasshoppers, stick insects and crickets and some Diptera (flies) many of which will improve and expand ANIC holdings and complement research programs. A number of interesting and potentially new Bombyliidae (bee flies), Asilidae (robber flies), a Buprestid beetle apparently not previously seen in the area, a profusion of Sphingidae (hawk moth), Geometridae (including an undescribed moth of the *Hypobapta* genus), interesting oecophorid moths and a primitive braconid wasp of the genus *Megalohelcon* are just some that await further study. An unexpected find was the remains of large shield shrimps along the margins of dried freshwater lakes (see photograph below).



Shield Shrimp (photo: Alan Landford)

## News from the Lepidoptera collection

Ted Edwards and Federica Turco

### NEW DONATIONS

During 2015 the Lepidoptera unit received two wonderful donated collections.

The first was part of the incredible collection of *Delias* (Pieridae), commonly known as Jezebels, amassed by Fred and Nel Gerrits over many years. Last year the last of three instalments of this immense collection was received. The entire donation consists of some holotypes, many paratypes and large numbers of set and a few unset specimens. Fred and Nel's collection is the second most complete *Delias* collection in the world with only one or two species missing. It fills eight cabinets. Fred worked as a physician in Papua New Guinea, Indonesia and Africa and amassed the collection mostly through exchange. The genus *Delias* is highly relevant to us as it has its origin in the Australian Region and has speciated explosively in the mountains of New Guinea and Indonesia. There are about 250 species in the genus and they are remarkable for their plain uppersides and brightly coloured undersides. The larvae of nearly all species feed on mistletoes



L. to R. Fred Gerrits, Nel Gerrits, Marianne Horak (Photo: Ted Edwards)

but a few feed on other parasitic plants and one on mangroves. We extend a big thank you to Fred and Nel for this gem of a collection.



L. to R. John Kerr, Don Sands, Maureen Field, Marianne Horak (Photo: Ted Edwards)

Also from Brisbane, Professor John Kerr donated his wonderful Australian moth collection. (To find out more about John's unrivalled butterfly collection see ANICdotes 3 p. 4.) John's moths came in 140 store boxes and represented his diligent collecting over the last quarter century. He did not run a generator in the bush but mostly collected at his holiday homes, initially on the Sunshine Coast and later at Upper Brookfield. There were exceptions when he and Maureen holidayed at Mission Beach, Mapleton and other parts of Qld. As with the butterflies, the collection is in immaculate condition with micro lepidoptera well represented and it includes a box of unidentified tiny moths. For me the diamond was the female of *Taurometopa haematographa* (Odontiinae, Crambidae) from Mission Beach, one of the few described

genera and species previously unrepresented in ANIC. There was also the second species of Dugeoneidae known from southern Qld. Brisbane. This is an important historical type locality for Australian moths and John's collection will aid sound identification of old and broken types. As with the butterfly collection, we are immensely grateful to John and Maureen for this wonderful gift.

### STUDENT AWARD



ANIC is very happy to welcome back Sandra Schachat (Smithsonian Institution), who is resuming her status of visiting scientist. During her visit in 2015 Sandra also attended the 46th Scientific Conference of the Australian Entomological Society in Cairns, where she was awarded the 1st prize as Best Student Oral Presentation for her talk entitled "Wing pattern evolution in jaw moths (Lepidoptera: Micropterigidae)".

## Biological collections, trade and biosecurity

Mike Hodda

An advantage enjoyed by many Australian crop farmers in the highly competitive agricultural sector of the economy is the absence of pests and pathogens on or in our products. We grow and export our crops with less pesticides which means they are cheaper to produce. We grow crops in the best places using methods that prevent them from being eaten or destroyed. We don't need expensive testing for many pathogens. And we don't need decontamination before export.

How is this possible? How can grain farmers store and export grain knowing that the Khapra Beetle, a beetle that causes millions of dollars of damage to stored grain in many other areas of the world, is not present in Australia?

The answer is: we have proof. The proof is present in Australia's biological collections. We have specimens that show that all those little brown beetles we find here are NOT the exotic Khapra Beetle. We can do this not just for Khapra Beetle, but for a myriad of other damaging plant arthropods, nematodes, fungi and pathogens as well. We identify pests and substantiate occurrence records to the international standard so we can confidently export to anywhere in the world.

CSIRO is custodian of the largest collection of arthropods, nematodes, plants and fungi in Australia. Our collections are leaders in techniques for collecting, curating and keeping the specimens in excellent condition. ANIC is also a pioneer in the digitisation of collections: everything from imaging automatically in three dimensions to taking images of many specimens at once. We are expert in managing the data for large numbers of specimens together with their DNA, images and paper records.

ANIC is sharing this expertise in collection digitization, techniques and management with other collections in the biosecurity community. ANIC delivers essential services to

biosecurity in the form of specimens of exotic pests and their indigenous relatives. We also supply the systematic research that enables differentiation between the two. Recently, we have helped to train biosecurity staff in collection and management techniques as well.

ANIC hosted a four-day workshop from the 15th to the 18th of February for the plant biosecurity community. The workshop was supported financially by Plant Health Australia, the peak body for plant-based agriculture. More than twenty staff members from the CSIRO collections presented the workshop.

The demand for the workshop was so great that people were turned away. But the 65 lucky participants included commonwealth and state government employees, private consultants, university researchers and students from all over Australia, New Zealand, Fiji and the Solomon Islands.



The course attracted a large number of participants

The workshop covered different types of physical and molecular specimens, images, database records and the relationships between them all. Sessions focused on the practical issues of preparing specimens, labelling them, photographing them, storing them, monitoring them for pests and deterioration and transporting or shipping them to other collections. Other sessions covered nomenclature for different groups of organisms, as well as name changes and how to



Workshop participants look at the small and often not particularly striking species of insects which are often the most important ones for trade and biosecurity rather than the larger, more readily-noticed species

track them. Various specimen, name and DNA databases were considered (GenBank, QBOL, ALA, etc).

ANIC delivers to biosecurity diagnosticians not only our important specimens and taxonomic expertise in telling apart exotic pests and harmless native species, but also our expertise in techniques for managing and digitising collections.

This demonstrates the importance of the CSIRO collections in underpinning our trade in so many agricultural commodities.

## Nematode identification & techniques workshop

Mike Hodda

Nematodes are the most numerous multi-celled organisms on earth. They occupy many niches: in the soil, fresh- and salt-waters, in plants, invertebrates and vertebrates. They are of great importance to agriculture because some species reduce plant yields, while others are biocontrol agents of invertebrate pests. Other species recycle soil nutrients, and yet others are bio-indicators of soil health. They are frequently encountered in quarantine work.

Nematodes are also one of the most diverse groups of animals on earth. Nematodes are small and cryptic and so require specialised knowledge handling and identification, which is where the nematode identification and techniques workshop comes in.

Mike Hodda from ANIC, with Dr Kerrie Davies from The University of Adelaide, ran a workshop on nematode identification and techniques at the University of Southern Queensland, Toowoomba from 7th to 11th of December 2015. 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. Demand for this, the tenth workshop was so great that it was oversubscribed. Nevertheless, 17 participants completed the workshop, coming from all states of Australia, plus New Zealand, Laos and Fiji. As well as students, a lecturer from The University of the South Pacific, Dr Sunil Singh, also came to get valuable experience in teaching nematology.

This time the workshop concentrated on nematodes from broadacre crops with lectures and hands-on laboratory sessions covering sampling, extraction, specimen preparation, culturing, diagnosis, and identification. A feature of all workshops is sampling local nematodes to give an authentic



Course participants.

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.

More importantly, they learned how to deal with undescribed new species that are frequently encountered and to cope with the many surprises with which nematodes continue to challenge scientists and diagnosticians.

## Recent publications

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