# ANICdotes

The official newsletter of the Australian National Insect Collection

1

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CSIRO NATIONAL FACILITIES AND COLLECTIONS
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## INSIDE THIS ISSUE



# Welcome

David Yeates, Director

This issue highlights some of the action in ANIC over the past six months but by no means all of it. In particular, we have been heavily engaged with architects because plans are being drawn up for a new building that will house all CSIRO biological collections. The Federal Government has committed 43 million dollars to the project, as part of the scientific infrastructure funding announced in the 2018 budget. As this exciting project matures we will be sure to report progress in ANICdotes.

Many of us have just returned from the annual Australian Entomological Society conference in Alice Springs. Lauren Ashman and Rolf Oberprieler organised a symposium on Burmese amber insect fossils, and Mike Hodda, with Craig Marston from NAQS, organised a symposium on modern diagnostics. PhD student Xuankun Li won the Phil Carne prize for the best student paper at the conference, and Laurence Mound and Alice Wells were made Honorary Members of the Society in recognition of their many years contribution to the AES and Australian entomology.

Anne Hastings, looks back on her career and the way technology has affected her work. Anne will retire in November, but she will continue as an associate. The number of species described by ANIC staff over the past year was tallied, for the first time. There was a staggering number, almost 200 species, genera and tribes. This really surprised us and we will be sure to keep a tally in future years.

David Yeates

We welcome eight new people! Olivia Evangelista, the new curator in the Hymenoptera collection; her husband, Keith Bayless, the new Schlinger Postdoctoral Fellow; Luana Lins, a Postdoctoral Fellow working with Andreas Zwick; Alex Gofton, a Postdoctoral Fellow working with me and Andreas Zwick; Hermes Escalona, returning from Germany to work with Mike Hodda and Adam Slipinski; a new PhD student, Yun Hsiao from Taiwan, working with Adam and Rolf; two students from China, Zhaohong Wang and Shimeng Zhang, working with Laurence Mound.

Christy Geromboux reports on the Virgin Pulse 2018 Global Challenge. One of the three ANIC teams came first out of the CSIRO entries! They did a lot of walking! Go ANIC!

We also have to convey some very sad news. On Sunday, 27th of May, former ANIC Director John La Salle and Jaime Florez, Juanita's husband, were involved in a car accident on their way to a weekend fishing trip. John died in the accident, and Jaime was badly injured but is now recovering very well. It was a difficult time and the loss of John is a tragic shock for ANIC, the ALA and of course his family.

ANIC: www.csiro.au/en/Research/Collections/ANIC
ANICdotes for contact and subscriptions: the ANICdotes home page
BANNER: *Graphium macleayanus* image: Biodiversity Heritage Library.

# ANIC at the AES Conference in Alice Springs

Rolf Oberprieler and Lauren Ashman

A group of 13 ANICists took part in the 49th AGM and Scientific Conference of the Australian Entomological Society, held from 23 to 26 September at Alice Springs, in the heart of Australia. The team consisted of six staff members, four students and three Honorary Fellows and comprised almost 10 % of the delegates of the conference.

The conference was held in the Convention Centre in Alice Springs, below the impressive long narrow mountain range likened to the *yeperenye* (sphingid) caterpillars that play a central role in the Aboriginal culture of Alice Springs. The conference was attended by over 140 participants from all over Australia and some overseas countries, such as New Zealand, Papua New Guinea, Indonesia, Cambodia and the Philippines. In line with Alice Springs being the centre of Australia and *yeperenge* caterpillars being in the centre of its Aboriginal culture, the conference theme was 'Insects as the centre of our world'. The program was organised into 12 symposia and sessions covering a broad range of topics, from taxonomy to physiology to pest management and biosecurity.

The largest number of ANIC people (seven) spoke about their research in a symposium on Burmese amber insect inclusions organised by Rolf Oberprieler and Adam Slipinski. As Adam was unfortunately unable to attend the conference, Lauren Ashman ably stepped in to co-chair the symposium. We heard from Lauren, Debbie Jennings, Zhenhua Liu, Laurence Mound, Rolf, You Ning Su and David Yeates about fascinating new insect discoveries of beetles, crickets, flies and thrips in this 100-million-year-old amber, which preserves long-extinct taxa in often exquisite detail. Burmese amber inclusions provide a glimpse of the diversity and adaptations of higher taxa (genera and families) that lived during a critical period in the evolution of the modern fauna and flora, the diversification of the angiosperms (seed plants). Michael Braby co-chaired and

ANIC attendees at the conference, MacDonnell Ranges in the background

spoke in a symposium on Insect Conservation, and Mike Hodda and Laurence Mound gave presentations in a symposium on Modern Diagnostics in Northern Australia and Hannah Zurcher in a session on Physiology and Adaptation.

The highlight of the conference for ANIC was the presentation by Xuankun Li on his research into the phylogeny of bee flies (Bombyliidae). This was one of the three short-listed presentations for the prestigious Phil Carne Prize, which is awarded to deserving postgraduate students who have not yet submitted their thesis. Not only did Xuankun give a well-presented and thoroughly entertaining talk, but he also won the prize against the stiff competition from the other two entrants. Congratulations, Xuankun!

Xuankun was also on the winning trivia team at the student networking event, where Lauren felt compelled to correct the organisers' weevil terminology (with help from Debbie as the ring-in expert). At the Annual General Meeting on Tuesday afternoon, Alice Wells and Laurence Mound were elected as Honorary Members of the Society. A well-deserved accolade for their sterling and long service to the Society and to Australian Entomology.

Conference details at https://www.aesconferences.com.au/.

# Pen to pixel, 1983 – 2018 in scientific illustration

Anne Hastings

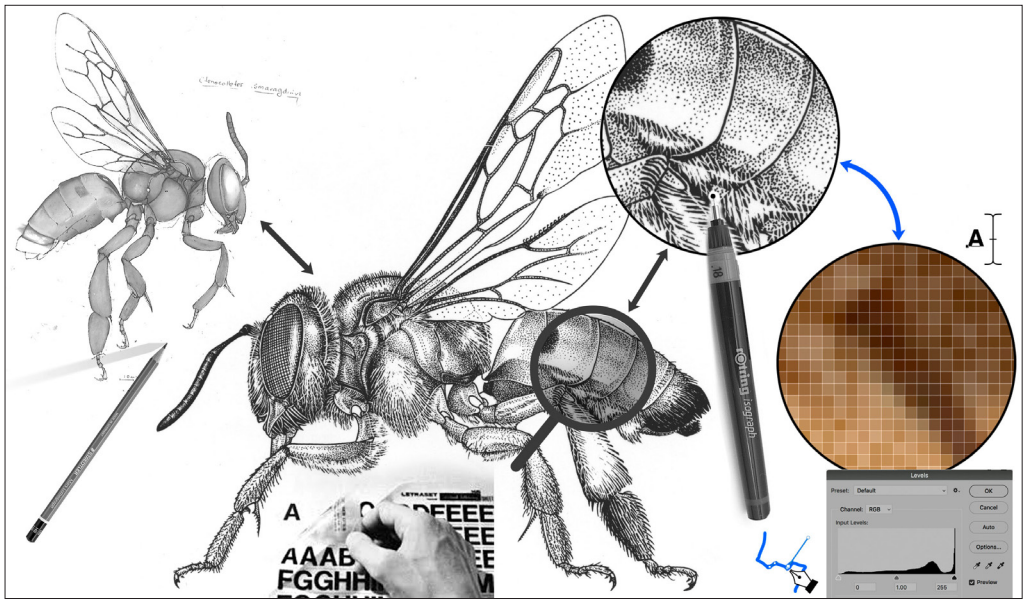
When I started at CSIRO in the early eighties, pen, pencil and ink were the tools of trade for a scientific illustrator. How things have changed!

An illustration began with the specimen under the microscope. A camera lucida attached to the side of the microscope reflected the image of the insect onto a piece of paper. Here the hand of the illustrator holding the pencil could be seen superimposed over the specimen. The insect could then be traced, ensuring complete accuracy.  Evidence suggests that Vermeer employed a similar trick for his Dutch Interiors.

Often the legs, wings and body of the insect were twisted and tangled. This required each component to be drawn separately, untangled and re-joined to produce a well conformed drawing.

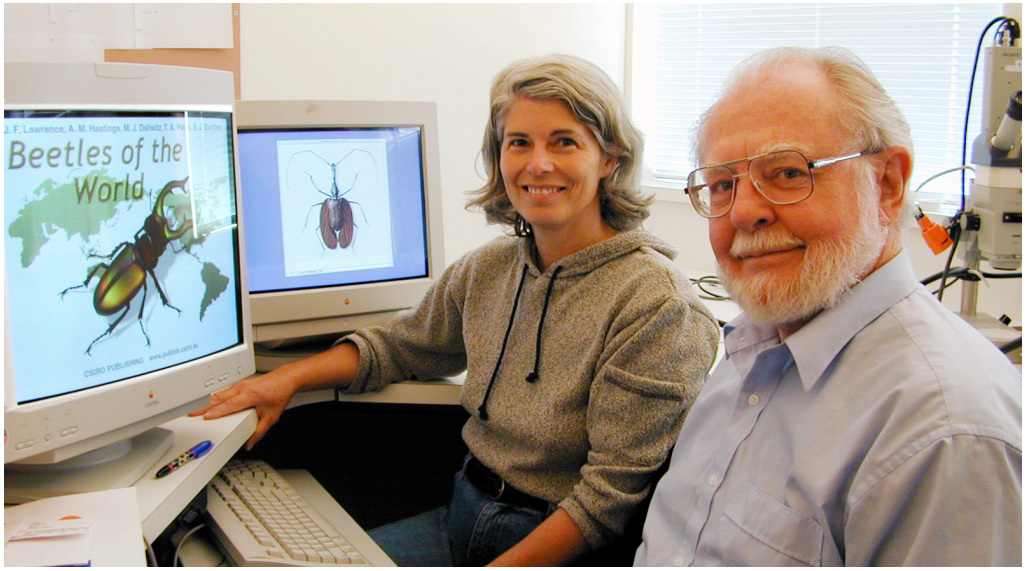
Pencil drawings were converted to ink using Rotring pens. These pens held a quantity of black ink in the same way a syringe holds fluid. Pens with nibs of specific thickness were available and using these, the outline of the pencil drawing was traced through a transparent medium — either drafting velum, or by employing a light-table. Making a tonal drawing to feature the specimen as a three-dimensional object was easy with pencil but tricky with pen. With pen, you used a technique called stippling — a method that involved building up the tone by making small individual dots of ink at different densities. This was a time-consuming process.

The first technology to produce a change in these methods was a large static camera called a Process Camera; it was about 1900 mm wide, 1400 mm high and 900 mm deep. The camera was housed in a large dark room, along with chemical developers and a clothes line for hanging up the developing images. It produced a hard copy called a bromide.




In a black-and-white world, the tools of trade for a scientific illustrator were pencil, pen, Letraset – sticky letters for labeling illustrations, and stippling – a technique used to represent light and shade in an ink drawing.

These old methods give way to pixels, full colour, digital controls, Bézier curves and text tools.




John Lawrence and Anne Hastings preparing ‘Beetles of the World’, to be published on a CD-ROM. This was our second digital product after ‘Beetle Larvae of the World’.

Partly visible over John’s shoulder is a video camera, on top of a microscope. We used this camera to create the visual content for the interactive identification key and information system for ‘Beetles of the World’.

Using this camera, a toned pencil drawing was photographed through a fine screen that converted the pencil tones into stipples in the way that black-and-white photographs were prepared for newspaper publication. Although still time consuming, it was an improvement over the time taken to stipple an ink drawing.

Then, in the mid 1980s, computers arrived in the CSIRO Entomology graphics departments. They brought two new approaches: a pixel-based program called “Digital Darkroom” and a Bézier curve program for drawing mathematically determined curves and lines, thus making them independent of pixels and resolution.

These early programs morphed into the familiar Adobe Photoshop, Adobe Illustrator and Corel Draw. They radically changed my world. We went from black-and-white to full colour, from using the convention of broken inked lines to indicate transparency to having the ability to actually make structures transparent! There was so much to learn and so many new ways of doing things. It was an exciting time for an illustrator.

The next change was replacement of the camera lucida with a video camera mounted on top of the microscope. The resolution was low, but we could take photographs of sections of the subject matter under high magnification and then stitch the images together to make a high-resolution composite.

In time, the video camera gave way to high-resolution digital cameras with automated focusing software, culminating in the Visionary Digital BK system widely used in ANIC today.

John Lawrence, Mike Dallwitz, Matt Colloff, Adam Ślipiński and David Yeates were all influential in the transition of scientific illustration to digital media. One of the early products I worked on with John Lawrence and Mike Dallwitz was ‘Beetles of the World’, an interactive key and information system. It was produced as a CD-ROM, a technology now superseded by other digital technologies such as the World Wide Web. Interactive identification keys and supporting material could go online. HTML and coding languages to control websites and keys became part of the mix of new tools and skills required by an illustrator.

In 2018 there is no sign of developments slowing. Three dimensions seems to be the next frontier. New approaches such as 3-D scanning, 3-D printing, CT scanning and the amazing new software packages required to process this new type of data are developing.

All in all, it has been quite a journey.

## THRIPS STUDENTS FROM CHINA

Zhaohong Wang from South China Agricultural University, Guangzhou, arrived in September. She will be here for 12 months working with Laurence Mound on various genera of Thripidae, particularly southern Asia taxa that are likely to be found in parts of northern Australia. She joins Shimeng Zhang of Northwest A&F University, Yangling, who has been here now for a year, studying various aspects of the systematics of Thripidae as well as producing a web-based Lucid identification system to the genera of Thripidae of China.

Zhaohong and Shimeng in front of the 'Thrips of China' website

## LAUREN AND MENGJIE

In late August, Lauren Ashman and Mengjie Jin went to Europe to visit the three insect collections that house important Australian material: London (BMNH), Brussels (RBI) and Paris (MNHN). They spent an enjoyable two weeks sorting through longhorn beetles looking for old type specimens to help with their taxonomic projects on Australian *Rhytiphora* (Lamiinae; Lauren) and Prioninae (Mengjie).

A portable version of the ANIC camera setup was used to photograph specimens in the collections. Lauren and Mengjie also borrowed some material from the Brussels collection to bring back to Canberra. In their spare time they took the opportunity to do some sightseeing: museums, landmarks and West End musicals in London; comics and chocolate in Brussels; shopping and art galleries in Paris.

Lauren also spent a week attending the Joint Evolution Conference in Montpellier, France: an interesting if slightly overwhelming experience (numbers were capped at 2500 participants!). A lot of amazing science was crammed into four days.

Lauren and Mengjie in Brussels

# Species discovery

Alan Landford

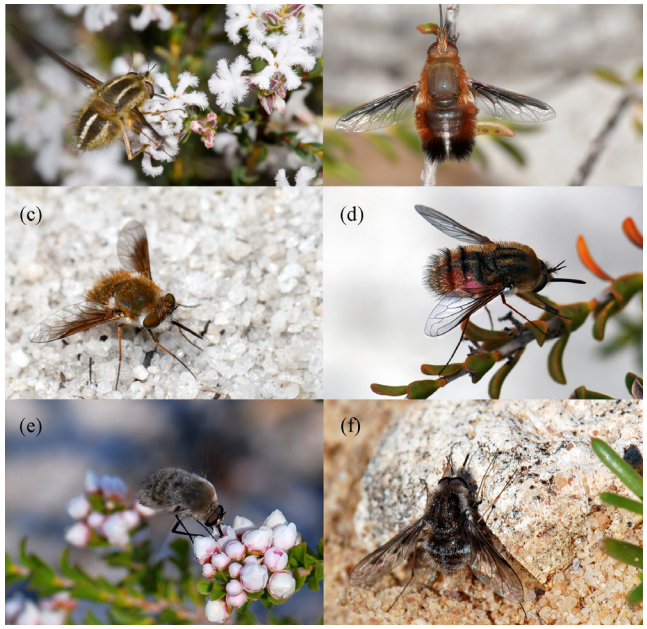
An exercise to quantify the number of new species described by National Research Collections Australia (NRCA) has resulted in an exciting outcome for ANIC, with significant uptake of the story in the national press.

In the past twelve months, more than 200 new species of animals and plants were identified and described by NRCA staff from our CSIRO collections and through important collaborations with other researchers in Australia and overseas. The newly described species are almost exclusively insects, only half a dozen representing other animals and plants.

The new species include 73 *Melophorus* ants, over 50 Coleoptera (beetles) and 21 Diptera (flies). Other taxa represented were Gryllidae (crickets), Thysanoptera (thrips), Trichoptera (caddisflies), Hymenoptera (wasps) and Lepidoptera (butterflies and moths).

The majority of new species are from Australia, with others occurring in Malaysia, Myanmar, China, Papua New Guinea, Hawaii, New Zealand, South Africa and Mexico. Several extinct species preserved in 100-million-year-old Burmese amber (known as Burmite) were also named, which can now be used to calibrate molecular clocks and estimate the tempo of insect evolution.

From a taxonomic point of view, the 200 new species described by ANIC scientists also represented around 20 new genera and, importantly, three new tribes (two of beetles and one of flies). ANIC Director, David Yeates, praised the work of researchers and noted the very specific skill set required to identify new animals to species level, including new genome sequencing techniques.




Bee flies

"Around 90 % of Australia's species are endemic, but many have close relatives in other countries. ANIC's research is critical for understanding what species we have and how to distinguish them from invading relatives. This is an important role as we protect our agricultural industries and natural landscapes in an increasingly connected world", said Dr Yeates.

A number of the newly described insect species particularly captured the public's attention, including the bizarre Macadamia Seed Weevil, *Kuschelorhynchus macadamiae,* which has become a pest in plantations of the macadamia nut tree that is native to Australia.

*Kuschelorhynchus macadamiae*, the Macadamia Seed Weevil

Work is continuing on many groups of insects and other invertebrates in ANIC collections, with thousands of new species still waiting to be identified and described. This year ANIC researchers began describing the native close relatives of the Khapra beetle, a devastating pest of stored grains, and an invasive species not found in Australia.

Despite recent changes in ANIC's research portfolio, with increasing emphasis on genomic and phylogenetic tehniques, discovery and documentation of new species will always remain an important part of our mission.

# NEW COLLABORATION

Chris Freelance, a PhD student at the University of Melbourne, is collaborating with Juanita Rodriguez on various projects that involve the sensory systems of insects.

Chris visited for two weeks in September to image the ommatidia and antennal sensilla of pinned specimens. He used ANIC's desktop SEM to get his results. The SEM images allow us to study the sensilla structure and density in different insects. This enables us to determine how much investment in sensory systems insects with different life histories have.

Chris Freelance and some of the detail from the desktop SEM.

# EUROPEAN MUSEUMS VISIT

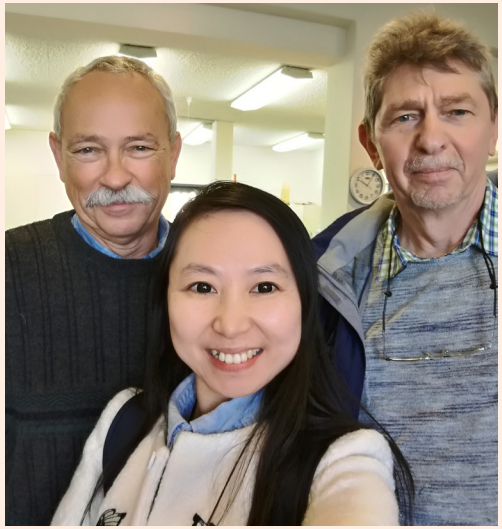
From 1st September to 16th September, PhD students Xuankun Li and James Lumbers visited the Natural History Museum in London and the Muséum National d'Histoire Naturelle in Paris for two weeks to examine type specimens of flies and take photos of the types. After that, James visited the Museum für Naturkunde in Berlin for another two weeks.

Xuankun Li (left) and James Lumbers (right) with staff from the Museum.

# PERTH TROGODERMA TRIP

Lingzi Zhou

In August, Adam Ślipiński and Lingzi Zhou travelled to Perth to meet the *Trogoderma* (Dermestidae) group in the Agriculture and Food Department of PIRD. The curator, Andras Szito, who used to work on the taxonomy of Australian *Trogoderma*, introduced us to the group's project on the Khapra beetle (*Trogoderma granarium*). Nadine Guthrie guided us through the large *Trogoderma* collection and showed us what has already been achieved using morphological and molecular techniques. We were grateful for their hospitality and generosity in sharing information about the project and activities associated with the study of *Trogoderma*. This information will help us plan our dermestid project and will lead to further collaborations in the future.



Andras Szito, Lingzi Zhou and Adam Ślipiński.

# A paper on beetle fossils causes quite a stir

Anne Hastings and Adam Ślipiński

The publication in *Current Biology* this year of the paper 'Beetle pollination of cycads in the Mesozoic', co-authored by Hermes Escalona of ANIC, has caused quite a stir! The content of the paper, written by Cai, C., Escalona, H.E, Yin, Z., Huang, D. & Engel, M.S., has been picked up been many prestigious media outlets. Two of particular note are the *New York Times* and *Fox News,* but there is a long list. To name a few: Gizmodo Australia, the Hindustan Times, The Economist, The Times, Science Magazine, International Business Times (Singapore Edition), The Scientist, Nature World News, National Geographic, Discover Magazine, The Hindu, ZlotoNews, Mid-Day and others.

The New York Times ran the story under the headline "Trapped in 99-Million-Year-Old Amber, a Beetle with Pilfered Pollen". https://www.nytimes.com/2018/08/16/science/beetle-amber-cycad.html

Fox News took a slightly more sensational approach and ran with the headline "99-million-year old beetle, which lived with Tyrannosaurus Rex, found perfectly preserved in amber". http://www.foxnews.com/science/2018/08/17/99-million-year-old-beetle-which-lived-with-tyrannosaurus-rex-found-perfectly-preserved-in-amber.html

The evidence presented in the paper proves that, before bees and butterflies became the world's best pollinators, beetles were numbered amongst the top for prehistoric plants. Of particular interest is their apparent association with cycads. Researchers already knew that some cycads are pollinated by beetles because of studies done on modern cycads . Now trapped in amber from Myanmar, the 99-million-year-old beetle has been found surrounded by pollen from a cycad. The clarity of the fossil preserved in the amber is remarkable. It allows the beetle to be classified as belonging to the family Boganiidae and as related to the recent genera that still feed on cycad pollen in Australia and South Africa and are, to some extent, involved in the pollination of these plants. It also clearly shows how this ancient beetle differs from its current-day counterparts, sporting a much larger head, eyes, mandibles and tarsal claws.

Photo of a mid-Cretaceous beetle fossil in Burmese amber as it appeared in the New York Times article. Image courtesy of Chenyang Cai

The discovery of this beetle fossil, named *Cretoparacucujus cycadophilus* Cai and Escalona, has opened exciting possibilities. Beetles preserved in amber will help us understand their evolution. Unlike compression fossils, which don't give up clues to the past readily, fossils in amber reveal much more detail and information.

# The Bob Gotts collection of butterflies

Ted Edwards

In May our lepidopterists were delighted to receive the Robert Gotts collection under the Taxation Incentives for the Arts scheme. The collection is primarily of New Guinean butterflies.

Robert Gotts (1929-2018), universally known as Bob, began collecting Australian butterflies in northern Queensland in the mid-1950s. In 1961 he and his family moved to the highlands of Papua New Guinea, where his first posting as a teacher was to Tari in the Southern Highlands. His son, Bob Jr., tells how he captured their first *Ornithoptera chimaera* by hand on a hibiscus flower at school. Bob then went on to rear a series of *O. chimaera* and discovered the life history of the species, which was later published by Ray Straatman.

Bob became great friends with the small community of butterfly collectors in Papua New Guinea, including Ray Straatman, Harry Borch and Richard Carver. From then on he collected intensively in all but two of the New Guinean provinces and widely in South and Southeast Asia. Bob would offer his class of school children a small reward for any live pupae collected and, with such sharp eyes in support, rapidly built up a large collection. Bob Jr. remembers that over time they had 40 pairs of *O. alexandrae* hatching in the laundry cupboard. There is a story of a technique he and Joan (his wife) developed; while she drove slowly along a track, he stood on the backboard of the vehicle, net at the ready. One day, at the end of the track he was missing, having fallen off 30 miles back.

When PNG became self-governing in 1973, Bob returned to Sydney, living at Wahroonga, but he continued collecting widely in Asia and the Pacific, commissioned by J-P Sclavo and others. In 1994 he sold most of this first collection overseas but immediately started to build a second collection. He moved to Winmalee near Springwood, NSW, in 1996 and continued to build the collection, concentrating on a few groups like *Delias* (Pieridae), of which the collection contains some paratypes, and *Ornithoptera* (Papilionidae, birdwing butterflies).

Andreas and Alan taking possession of the collection from Bob Jr.

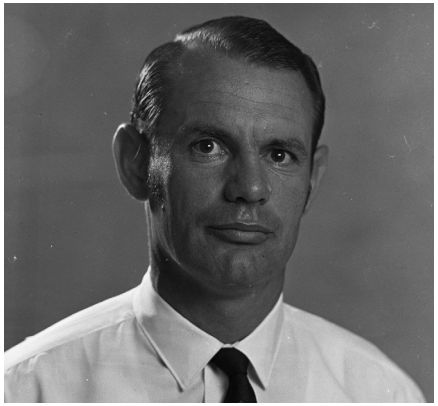
Eventually, through Ray Straatman, Bob was invited by Freeport Mining to join with Norris Pangemanan to write a book on the butterflies of the area covered by the Freeport Copper Mine in West Papua. He travelled to Tembangapura and Timika, wrote the text, took the photos and then type-set the book before sending it to the publishers. “Mimika Butterflies” was published in 2001 and ran to a second edition, which has itself become a collector’s item.

The collection is contained in four 14-drawer wooden cabinets, beautifully hand-made and with well-fitting protective doors. The donated collection is about a third the size of the one

originally sold. This is a fantastic addition to the ANIC. It provides us with an even deeper coverage of *Delias*, a genus of Australian origin but with many species in New Guinea and Indonesia. There are specimens of *Leucacria* known from two rare species, which Michael Braby assures me are the probable sister-group to the speciose, spectacular *Delias*. The ANIC Brandt collection is deficient in *Ornithoptera* and, while the birdwings are not part of our research focus, the fact that the Australian National Insect Collection should be so deficient in these large butterflies was an embarrassment. Bob Gotts' collection contains all the species, and good series of them, except for *O. alexandrae,* which we have from other sources. There are some miscellaneous gems, such as a drawer of stick insects and a drawer of Parnassiinae, the Northern Hemisphere, cold-climate subfamily of Papilionidae, which are so exciting for an Australian overseas to see alive.

Bob Gotts married Joan Keith in 1954 and they had three children, a girl and two boys. All spent their early childhood in PNG and all have a treasure trove of the most wonderful memories. Bob himself never forgot the wonder of *O goliath* on the wing at Bundi in Madang Province.

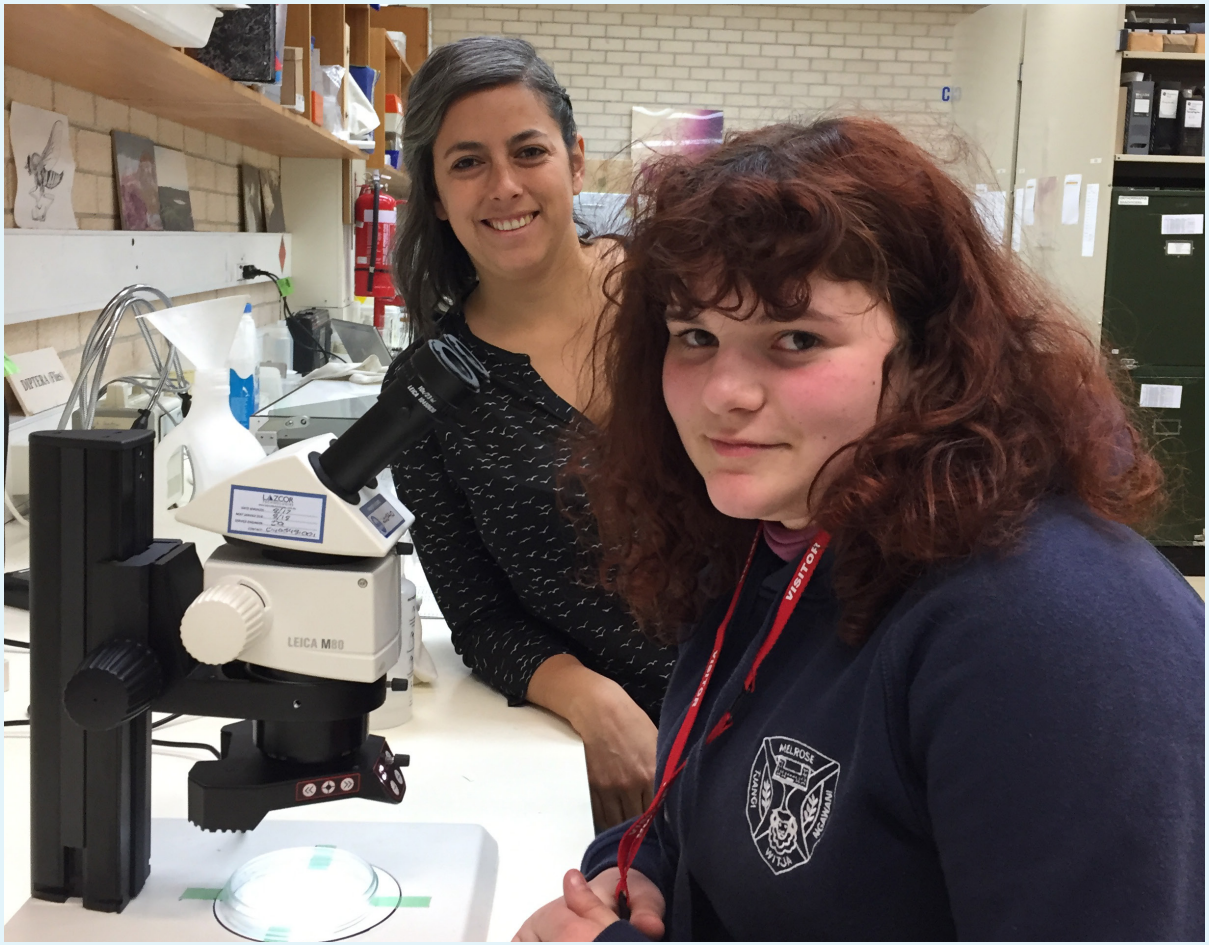
The lepidopterists warmly thank Bob Gotts and his son, Bob Jr., and their extended families and are thrilled and excited by this wonderful and special addition to the ANIC.



Bob Gotts

# SCIENCE MENTORS PROGRAM

During the school year, Melrose High School year-9 student Alesia Avakian, joined CSIRO research scientist Juanita Rodriguez to work on samples from the Future Science Platform project on Australian alpine pollinators. Alesia spent one day a week for three months at ANIC, learning to identify insect orders and sorting pan trap samples. She is working on data analysis to determine whether there is a difference in how effective pan trap colours are to capture insect orders.




Alesia with mentor Juanita

# Dallying in Dili

Laurence Mound & Alice Wells

Thrips work in ANIC over the past 20 years has had two objectives – exploring and documenting the diversity and host associations of these insects across Australia, and providing identification and information systems about thrips for use by entomologists in quarantine, agriculture and horticulture. These approaches have involved us in looking for thrips, not just across Australia but also in various surrounding territories, including Lord Howe Island, Norfolk Island and New Caledonia. We have also examined and published about the trans-Pacific movement of thrips, from Australia to Hawaii and California. Investigations into faunal relationships of territories to the north of Australia have involved visits to Borneo and Malaysia, as well as collaborative studies with recent students from China. As a result of these interests, we were invited by the Department of Agriculture and Water Resources to join three quarantine entomologists for two weeks at the end of August surveying crops for thrips species in Timor Leste. The objective was both to help train quarantine entomologists in that country, and to get some understanding of potential immigrant thrips from Timor as part of a Modern Diagnostics Programme for Northern Australia. Our quarantine colleagues were Glenn Bellis of Darwin, Cameron Brumley of Perth and Luke Watson of Melbourne, and we travelled with several local entomology staff based in Dili. Timor is a steeply hilly country, with rough, winding tracks away from the few main roads. It is not a wealthy country. Frequent stacks of firewood along roadsides are clearly an important source of income for many people, but with a serious impact on biodiversity. Our collecting was targeted at crops, from taro and rice to cabbages and onions. Coffee is the major crop, and one particular thrips species was observed on the leaves, breeding on patches of rust fungus. The team collected over 500 tubes of thrips, despite the clear evidence of high levels of insecticide use. But collecting was only the first stage of the project. Many slides must now be prepared and the thrips be identified. Timor Leste is a country that is now proudly independent of its colonial past. The products of this thrips survey will provide a baseline list of the thrips species encountered, and this will be the first such list of the Thysanoptera of Timor. However, of greater interest to the Timorese quarantine and agricultural entomologists is the "dream child" of Luke Watson. This will be an illustrated Lucid identification system to the most common thrips species of Timor and parts of Indonesia. It will be made available on the web in Indonesian, and will have a similar format to that of the new bilingual Lucid system to the Thripidae genera of China that was produced with Anne Hastings and is available at: https://keys.lucidcentral.org/keys/v3/thysanoptera_chinensis/ This is a system that can be can be operated on a "smart phone", which is important where web access is unpredictable.

The Thrips Team – August 2018

# Welcome to new staff in ANIC

David Yeates and Debbie Jennings

### OLIVIA EVANGELISTA DE SOUZA

Dr. Evangelista's professional background spans a variety of areas in insect systematics, including museum curation, taxonomy, and phylogenetic inference using modern tools of data acquisition and analysis. She obtained her PhD in 2012 from the Universidade Federal do Paraná, the largest graduate program of entomology in Brazil. She was subsequently associated with the prestigious Museum of Zoology at the Universidade de São Paulo as a post-doctoral scholar for five years, before joining CSIRO as a Research Programs Officer in August 2018. At ANIC, she will be working under the supervision of Dr. Juanita Rodriguez on the curation and digitization of the Hymenoptera holdings, as well as managing data acquisition for research projects being developed by Dr. Rodriguez and her graduate students. Dr. Evangelista's primary group of expertise includes the charismatic treehoppers (Hemiptera: Auchenorrhyncha), and her academic interests involve the myriad interactions that they establish with hymenopterans, in terms of their intricate symbioses and mimicry of several hymenopteran models.


### KEITH BAYLESS

Keith is joining us on a 3-year Schlinger Postdoctoral Fellowship working on fly phylogenomics with David Yeates. He received his B.Sc. in Entomology and Genetics at Cornell University in 2007. His Honors thesis was earned through the REU program at the American Museum of Natural History with a taxonomic revision of leptogastrine assassin flies, advised by Torsten Dikow. His graduate studies were performed under Brian Wiegmann's supervision at North Carolina State University. His M.Sc., completed in 2012, was focused on the overall molecular phylogeny of Tabanomorpha, with a systematic study of Xylophagidae, and a phylogenetic revisionary study of the horse fly tribe Diachlorini using a combined molecular and morphological approach. The topic of his PhD, in Entomology and Biotechnology, concerned new combined phylogenomics approaches with broad taxon sampling to address previously challenging radiations in acalyptrates and *Tabanus* horse flies. Understanding the diversity of flies requires diverse approaches, including bioinformatics, genomics, phylogenetics, paleontology, ecology, and species description. His broad research interests include using phylogenomic comparative methods to investigate how and why flies diversified.

### YUN HSIAO

Yun Hsiao is a new ANU PhD student from Taiwan, who completed his B.Sc. degree in the Department of Entomology at National Taiwan University. His previous work in Taiwan was

centered on the taxonomy and systematic paleontology of Cantharidae and some small families of Tenebrionoidea, such as Synchroidae, Melandryidae, Mycteridae, Tetratomidae and Ripiphoridae. Yun Hsiao currently has been awarded a PhD scholarship by ANU and Taiwanese Ministry of Education. In the ANIC Coleoptera lab, he will study the systematics and evolutionary biology of Australian Coleoptera associated with cycads.

### LUANA LINS

Luana is a Postdoctoral Research Fellow joining an ANIC team led by Andreas Zwick. She will be working on the FSP Environomics project, focusing on mobile sequencing.

Luana will be working with some powerful new technology that improves our ability to collect and analyse molecular data in the field. This will not only increasing our knowledge of biodiversity, but will generatie valuable genomic data that can be used in a range of studies.

Luana brings to ANIC a wealth of research experience acquired during her training in the USA, Australia and Brazil. She started her research career focusing on invertebrate taxonomy, but she has since branched out to molecular phylogenetics and, most recently, genomics. Her research activities include the genomic basis of adaptation to extreme environments in fish, in collaboration with Dr Joanna Kelley at Washington State University, and the evolution of the (mostly) tiny crustaceans know as isopods and their colonisation of various environments.

Luana is very excited to be starting this new adventure with her team in ANIC and believes that her range of skills is a good fit for this research.

### HERMES ESCALONA

Hermes returned to ANIC in September this year. For the last two and a half years he has been working on a Humboldt Scholarship as a postdoctoral fellow at the Zoological Research Museum Alexander Koenig and the University of Freiburg im Breisgau in Germany. He was under the supervision of Bernhard Misof and Oliver Niehuis, training on phylogenomics and genomics research. Now Hermes will be once again working in ANIC. He will continue to work under the supervision of Adam Slipinski in beetle systematics but he will also be working under the supervision of Mike Hodda on the Entomological Skills project, replacing Andrew Vossen.

### ALEX GOFTON

Alex joined ANIC in September 2018 as a FSP Postdoctoral Fellow. He has a Bachelor of Science in Genetics and Ecology (2010) from The University of Queensland, B.Sc. Honours in Genetics (2012) from Monash University and a PhD (2018) from Murdoch University, where he studied the microbiome of Australian ticks, uncovering numerous new tick-borne bacterial candidate pathogens. His research interests span parasitology, microbiology, and epidemiology, and he has also worked as a bioinformatician on numerous collaborative projects investigating the genetic diversity and epidemiology of enteric and blood-borne parasites in Australia.

In ANIC, Alex will be researching the microbiomes of Australian synanthropic flies, which are ubiquitous annoyances throughout urban, peri-urban, and rural Australia, and known to spread numerous enteric and opportunistic pathogens. However, we still have a poor understanding of the pathogen diversity carried by flies or how efficiently they spread such pathogens in Australian landscapes. This project plans to utilise metagenomic sequencing to fully resolve the pathogenic and non-pathogenic microbiomes and their vectoral capacities.

# 2018 Global Challenge, ANIC flavoured

The inside story from Christy Geromboux, an unsuspecting participant

Over the last few years, Andrew Young, Director of the National Research Collections Australia, has been sponsoring staff to enter the 100-day Virgin Pulse Global Challenge. The Global Challenge is an initiative designed to improve the health and wellbeing of employees around the world. According to Andrew, “a dollar a day” is well worth the beneficial results he has observed on the health and morale of the participants.

This year ANIC mounted THREE teams eager to take the challenge! THE BEETLES: Mengjie Jin (Captain), Adam Ślipinski, Rolf Oberprieler, Zhenua Liu, Kim Pullen, Lingzi Zhou and Shimeng Zhang; 6-LEGGED FREAKS: Bryan Lessard (Captain), Juanita Rodriguez, Jaime Florez, Francisco Encinas-Viso, Di Hartley, Luisa Teasdale and Alan Landford; ANICISTS & CO: Anne Hastings (Captain), Robyn Meier (Enforcer), Debbie Jennings, Stephanie Routley, Nicole Fisher, Beth Chapman and Christy Geromboux.

To the outside world, ANIC appears to be tranquil and quiet. A place filled with drawers of insects, dusty books, and quietly spoken scientists.

When I began working here 10 months ago, this was the image I held. But don’t be deceived! Under the calm veneer, pleasant nature or short stature of the ANIC challenge participants beats the heart of a fiercely competitive athlete.

It all began benignly enough, little more than a few people looking for an excuse to get out of the office and walk during those cold winter lunchtimes. However, the carefully researched way in which The Challenge operates, by using virtual trophies, step ranking, encouragement, mini challenges and lots and lots of support on healthy eating and how best to look after yourself, drove our competitive spirits into overdrive. The Challenge was well and truly accepted! Habits and lives were altered in weird and unexpected ways as we

The Beetles when seen through augmented reality goggles. From the left: Rolf, Shimeng, Mengjie, Kim, Zhenua, Lingzi and Adam . Montage by Mengjie Jin, photo by Zhenua Liu

Carrying 15kg packs was no excuse for slowing down the team! Robyn being "helped" by Debbie.

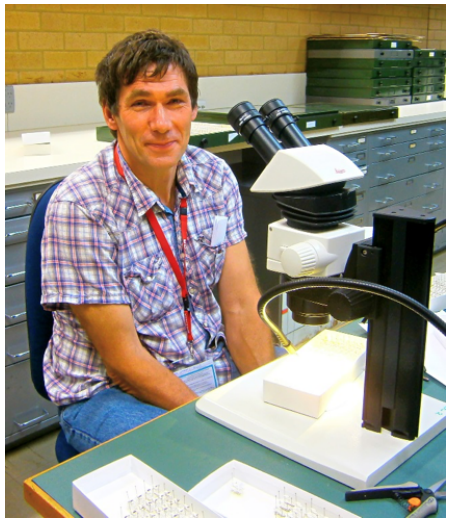
sought to maximise our daily step count. Wherever possible, cars were abandoned in preference to bicycles or walking, and when cars could not be avoided they were parked in the farthest carparks. ANIC toilets were boycotted in favour of those on the top floor of the Synergy building. On the home front, pet dogs found themselves the happy beneficiaries of the new obsession their owners were displaying for “Walkies!” Walking became more than a challenge. It became a way of life. Eat. Drink. Sleep. Walk.

During the 100 days there were many achievements – too many to list but here are a few of note. In the first progress report issued by the Global Challenge, Mengjie Jin, from The Beetles team, came second on the NCMI Top Participants list. She clocked up 318 km in 22 days, just 4 km from the NCMI leader! Jaime Florez from Six-legged Freaks came fifth on the ‘Most Improved’ list of the second Global Challenge Report. A magnificent effort! Alan Landford cracked the 1000 km with 1.6 m steps and took on the role of team motivator, while ANICists & Co eventually became the leading team for the whole of CSIRO! We really felt we had achieved something.

This challenge proved that the people of ANIC are not to be underestimated. They are fiercely competitive, entirely determined and above all, great friends who are always up for a laugh. Thank you ANICist &Co!

Thank you also to Andrew, for sponsoring us! Your dollar a day not only improved our health – it made us laugh and encouraged friendships. What a ride!. Now – where's the champagne? It is time to celebrate.

# Activity in the Coleoptera Hall



Dr Vladimir Gusarov, Curator of Entomology, Department of Zoology, Natural History Museum, Oslo, Norway. He was here to study Aleocharinae: Staphylinidae.

Riccardo Besjak visited to compare specimens in several small families of Salpingidae, Mycteridae, and Bothrideridae.

Allen Sundholm and Stuart Harris came to share their information and enthusiasm for Buprestidae.

Roy Larimer from Dun Inc. in the USA, came to upgrade the software and keyboard of our macro and micro imaging system.

Jingchao Song, Laura Bibiana Ospina, Katrina Rankin and Devi Stuart-Fox from Melbourne University imaging a range of Coleoptera and Lepidoptera under polarising, infra-red and visual spectra light.

Natalia Medeiros de Souza, University of the Sunshine Coast in Queensland, working on *Gonipterus* weevils.

Allen Sundholm studying the Scaritini tribe of the Carabidae as part of a collaboration with Mark Hura in Adelaide and Magnus Peterson in Perth.

Roger De Keyzer and Mengjie Jin in a Cerambycidae collaboration.

# Recent publications

Anderson, R.S., **Oberprieler, R.G.**, & Setliff, G.P. (2018) A review of the *Araucaria*-associated weevils of the tribe Orthorhinini (Coleoptera: Curculionidae: Molytinae), with description of new species of *Ilacuris* Pascoe, 1865 and *Notopissodes* Zimmerman & Oberprieler, 2014 and a new genus, Kuschelorhinus Anderson & Setliff. *Diversity*, 10 (3), 54, 1–25.
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*Thevenetimyia*

*Cretoparacucujus cycadophilus* Cai & Escalona