

Entomological Society of Queensland

NEWS BULLETIN



Price \$3.50
Print Post Approved
100001946

Volume 46, Issue 1, March 2018

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Front Cover: A photograph of the saltmarsh mosquito, *Aedes vigilax*. This species is found in coastal saltmarshes and mangroves from the south coast of New South Wales north around the continent and down to the southwest corner of Western Australia, and in the Riverland and Adelaide region of South Australia. Its drought-resistant eggs are laid in the margins of temporary pools that are flooded by peak tides or rain events. On subsequent inundation, these eggs can hatch simultaneously in millions, taking as little as 7-8 days to pupate into adults. The adult mosquitoes are renowned for their capacity to disperse over many kilometres. This makes them the worst pest species in coastal Queensland, where the larvae are the target of aerial spraying programs by councils from the Gold Coast to Noosa. *Photo by Stephen Doggett, Department of Medical Entomology, NSW Health Pathology, Westmead Hospital. Used with permission.*

ISSN 1037-2989



Entomological Society of Queensland

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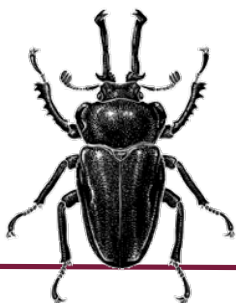
The **ENTOMOLOGICAL SOCIETY OF QUEENSLAND**, since its inception in 1923, has striven to promote the development of pure and applied entomological research in Australia, particularly in Queensland. The Society promotes liaison among entomologists through regular meetings and the distribution of a *News Bulletin* to members. Meetings are announced in the *News Bulletin*, and are normally held on the second Tuesday of each month (March to June, August to December). Visitors and members are welcome. Membership information can be obtained from the Honorary Secretary, or other office bearers of the Society. Membership is open to anyone interested in Entomology.

Contributions to the *News Bulletin* such as items of news, trip reports, announcements, etc, are welcome and should be sent to the News Bulletin Editor.

The Society publishes **THE AUSTRALIAN ENTOMOLOGIST**. This is a refereed, illustrated journal devoted to Entomology in the Australian region, including New Zealand, Papua New Guinea and the islands of the South Western Pacific. The journal is published in four parts annually.

EMBLEM: The Society's emblem, chosen in 1973 on the 50th anniversary of the Society, is the King Stag Beetle, *Phalacrognathus muelleri* (Macleay), Family Lucanidae (Coleoptera). Its magnificent purple and green colouration makes it one of the most attractive beetle species in Australia. Other common names include Rainbow, Golden and Magnificent Stag Beetle. It is restricted to the rainforests of northern Queensland. Emblem illustration by Sybil Curtis.

The issue of this document does **NOT** constitute a formal publication for the purposes of the "International Code of Zoological Nomenclature 4th edition, 1999". Authors alone are responsible for the views expressed.



Entomological Society of Queensland

Minutes for General Meeting

Tuesday, March 13th, 2018

Held in the Seminar Rooms, Ecosciences Precinct, Boggo Rd, Dutton Park.

Meeting open: 1:05 pm

Attendance (65):

Members (45): Desley Tree, Mark Schutze, Des Foley, Vesna Gagic, Greg Daglish, Geoff Monteith, Colleen Foelz, Susan Wright, Vivian Sandoval, Richard Zietek, Chris Lambkin, Shun Takano, Lachlan Jones, William Arnold, Shannon Close, Christine Goosem, Kerri Moore, Stephen Frances, Susan House, Tara Wheatland, Manon Griffiths, Graham Forbes, David Exton, Julianne Farrell, Lyn Cook, Craig Edwards, Brogan Amos, Andrew Hayes, Don Sands, Ian Buddle, Brendan Trewin, David Merritt, Jessa Thurman, Natalia Medeiros de Souza, Luke Barnett, Richard Bull, Gaia Marini, Kathy Ebert, Penny Mills, Bradley Brown, Mike Muller, Lui Lawrence-Ranger, Cate Paull, Jane Royer, Tim Heard

Visitors (20): Brendan Missenden, Colin Harris, Alexandra Grutter, Serena Dorf, Sophie Darnell, Ross Darnell, Hervoika Pavic, Peter Lehmann, Adrian Borsboom, Geoffrey Smith, Melina Gillespie, Suzy Perry, Diane Allen, Skye Byer, Bleuenn Marchand, Rod Goldsworthy, Dale Mullin, Brad Mayger, Shane Casson, Katina Heard.

Minutes: The minutes of the last meeting were circulated in News Bulletin 45[9] Jan/Feb 2018. Moved the minutes be accepted as a true record: Geoff Monteith; Seconded: Mike Muller. Carried: all

Nominations for membership approved by council:

General members (Jan/Feb):

Bart Hacobian.
Michael Ramsden

General members (March):

Patrick Webster
David Exton

Joint members (Jan/Feb):

Vesna Gagic (joint with Andrew Hulthen)

Student members (March):

Rebekah Wright

General Business:

1. Annual Reports and Financial Statements

a. The Society's annual reports, financial statements, and the independent Auditor's

report were published in News Bulletin 45 [9] January/February 2018.

b. No questions were raised from the floor regarding the annual reports and financial statements.

c. President's report: Move that it be accepted: Tim Heard. Seconded: Christine Lambkin. Carried: All

d. Secretary's report: Move that it be accepted: Mark Schutze. Seconded: Bradley Brown. Carried: All

e. Treasurer's report: Move that it be accepted: Mark Schutze (on behalf of Brenton Peters). Seconded: Penny Mills. Carried: All

f. Permit Officer's report: Move that it be accepted: Christine Lambkin. Seconded: Don Sands. Carried: All

g. Business Manager's report: Move that it be accepted: Geoff Monteith. Seconded: Kathy Ebert. Carried: All

h. New Bulletin Editor's report: Move that it be accepted: Kathy Ebert. Seconded: Mike Muller. Carried: All

2. Election of 2018 Council

a. Tim Heard, as incoming Past President, as the most senior officer of the Society, declared all position on Council vacant.

b. The following nominations were put to the meeting for election and were called out in turn by Tim Heard. As only one name was put forward for each position, a vote was not held.

i. President: Mike Muller. *Nominated by* Kathy Ebert, *Seconded by* Penny Mills



Our first meeting of the year was well attended with over 65 people.

ii. Vice President: Gary Fitt. Nominated by Tim Heard, Seconded by Mark Schutze

iii. Secretary: Mark Schutze. Nominated by Penny Mills, Seconded by Mike Muller

iv. Treasurer: Brenton Peters. Nominated by Mark Schutze, Seconded by Kathy Ebert

v. Councillor: Penelope Mills. Nominated by Craig Edwards, Seconded by Rachel Whitlock

vi. Councillor: Julianne Farrell. Nominated by Cate Paull, Seconded by Bradley Brown

vii. Councillor: Cate Paull. Nominated by Bradley Brown, Seconded by Penny Mills

viii. News Bulletin Editor: Kathy Ebert. Nominated by Shannon Close, Seconded by Brenton Peters

ix. Australian Entomologist - Business Manager: Geoff Monteith, Nominated by Penny Mills, Seconded

by Brenton Peters

Main Business:

Mike Muller warmly accepted the role as incoming President of the Entomological Society of Queensland and provided those present with a brief overview of his entomological background, the focus on which has been on mosquitoes. Mike then introduced the Presidential Address given by incoming Past President, Tim Heard, on the topic of “*Stingless bees, their journey from obscurity to insect ambassadors*”.

Next meeting:

The next meeting will be on the 10th of April at 1 pm with a presentation by Andy Walker on “Exploring insect venoms and silk”.

Meeting closed: 2:10 pm

At our next meeting...

“Exploring insect venom and silk production”

*presented by Andrew Walker
Institute of Molecular Bioscience
The University of Queensland*

The hyperdiversity of the insects represents not only a great number of species, but a galaxy of specific biological adaptations spanning the molecular, anatomical and behavioural levels. Two adaptations that have independently and convergently evolved in multiple insect groups are *venom* and *silk*. Both of these materials are produced inside but used outside the body, usually have a proteinaceous composition, and are of considerable interest for biotechnology: venom as a source of bio-insecticides and pharmacological agents; and silk as a source of structural proteins with which to build protein supermaterials having tunable properties. However, the venom- and silk-producing systems of most insect taxa have not been characterised in detail. Therefore, in this seminar I will describe our recent research in this area, with emphasis on the venom systems of assassin bugs (Hemiptera: Reduviidae), giant fish-killing water bugs (Hemiptera: Belostomatidae), robber flies (Diptera: Asilidae) and nettle caterpillars (Lepidoptera: Limacodidae).

Dr. Andrew A. Walker is a Postdoctoral Fellow at the Institute for Molecular Bioscience in The University of Queensland.



Tuesday 10th April at 1 pm

**Seminar Room at EcoSciences. Tea & coffee following.
All welcome!**



Presidential Address

Stingless bees, their journey from obscurity to insect ambassadors

*presented by Tim Heard
SugarBag Bees*

Summary

Over the last one third of a century, stingless bees have journeyed from obscurity to the elevated position of insect ambassadors. They have become, for many people, a gateway to the world of entomology and to the natural environment in general. Along this journey, much research has been done to smooth the path of utilising these insects as pollinators, pets and honey producers. Here I describe the journey and the research, both pure and applied, and its significance. As subjects of pure research, stingless bees are used as model organisms that have furthered general understanding of the natural world. A strong body of applied research has helped bee keepers reach their goals.

History

Stingless beekeeping has come a long way in the last 30 years. In 1984 Dr Elizabeth Exley suggested a topic for my doctoral studies: The role of native bees in the pollination of *Macadamia integrifolia*, the source of commercial macadamia nuts. I clearly needed access to stingless bee colonies but there were effectively no resources to help. I spoke to a few keepers of these bees, but they had no means of propagating hives. There were no manuals or guidelines. I read the considerable scientific literature and consumed the numerous honey bee manuals and kept these exotic social insects but it was clear that very different tools were needed for stingless bees.

Stingless bees as insect ambassadors

How the world has changed in 33 years! Following Geoff Monteith's discovery of splitting hives, add a swarm of innovation and passionate stingless bee

keepers, there are now great techniques and box designs. There are several books, clubs, many websites and social media pages. The bees make regular appearances in the mass media. Newcomers have access to regular workshops and seminars. No community garden or school yard is complete without a hive or two. A conference dedicated to these useful and popular insects will take place this year. They have become mainstream. They have journeyed from obscurity to a position of insect ambassadors. They have become, for many people, a gateway to the world of entomology and to the natural environment in general.

The phenomenon is not confined to Australia. It is happening in Asia and the American tropics. It is also not limited to stingless bees, which only occur in warmer areas, but solitary bees in cooler areas are being attracted to nest in artificial bee hotels built in gardens and schools. But stingless bees seem to attract particular attention. Why? I believe the reason is that they make excellent pets. Their social



behaviour fascinates us as it is a metaphor for our own societies. Honey production is a bonus. The satisfaction in propagating new hives is immense and everyone can feel they are contributing to solving the global pollination crisis. Lastly, the availability of one species, *Tetragonula carbonaria*, because it has a natural distribution that overlaps areas of high human populations including SE Qld and Sydney.

Applied and pure research on stingless bees

This subtropical species, *Tetragonula carbonaria*, is also a model organism in scientific research, that has smoothed the path of utilising these insects as pollinators, pets and honey producers and also furthered our general understanding of the natural world.

Recent research that has supported the practice of stingless beekeeping

All good biological research is based on sound taxonomy. Both high quality studies by Rasmussen and Cameron (2010) on global diversity and phylogeny, and local species descriptions by Anne Dollin and colleagues (1997 and 2015) have provided a platform of understanding that other studies can build on.

The rich suite of natural enemies, mostly insects, but also bacteria that attack hives and predate on and parasitise bees, have been studied. The defense mechanisms of the bees are also now well known. This information, combined with practical experience of observant beekeepers, has aided the management of these pests.

The integral role that plant resins play in the life of colonies of stingless bees has been the subject of several studies. These resins assist in nest recognition and help colonies control microbes and repel natural enemies. One resin in particular is central in an intriguing relationship between

stingless bees and one particular eucalypt species, *Corymbia torelliana*. The fruits of this eucalypt secrete resins close to the seeds. Bees enter the mature gum-nuts to collect the resin. Seeds adhere to their body and are then dispersed by the bees (Wallace and Lee, 2010).

The resins also may be harvested by beekeepers and used for various purposes including handicrafts. Honey too is of course another hive product of great interest. Although only produced in small quantities, the honey has an exciting flavour, tart and aromatic. Its composition has been studied and in addition to high acidity, unusual sugars, which are not yet fully

characterised, are present (Oddo et al., 2008). This honey has the potential not only as a food but as medicine. It shows high anti-microbial activity in several studies using various techniques (Irish et al., 2008, Boorn et al., 2010).

Queen replacement is a crucial process in colonies especially if they are

being actively propagated. The mechanisms of queen replacement are known and a valuable recent study showed that *T. carbonaria* is capable of emergency queen replacement, in addition to the usual means (Nunes et al., 2014).

Fighting swarms in which piles of dead bees accumulate in front of hives are a common sight which alarms many a novice beekeeper. Two studies have used molecular techniques to show that these fights are attempts by one colony to usurp the nest of another (Gloag et al 2008). We know that these attempts are frequently successful and they occur within and between species of *Tetragonula* (Cunningham et al., 2014).

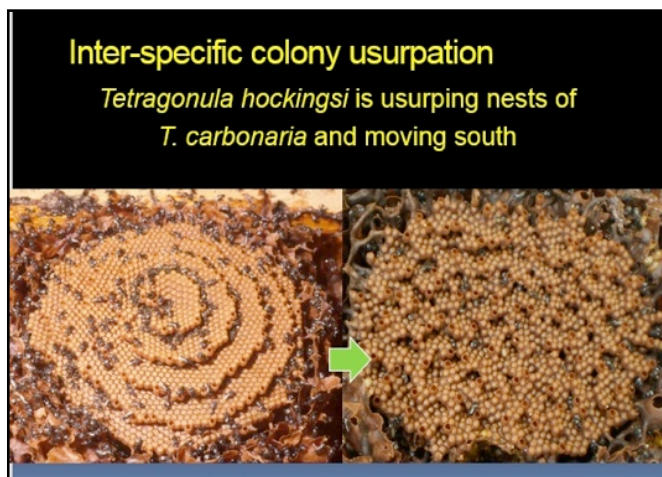
Several interesting behavioural studies on flight range have confirmed the flight range of *Tetragonula carbonaria* stingless bees, and yielded valuable



information for keeping hives and managing them for pollination (Smith et al., 2016). In addition, studies have shown that the homing ability of these bees is habitat dependent and that they are very good at finding their way home in homogeneous environments (Leonhardt et al., 2016).

Effect of habitat type on colony performance has been carefully studied recently and shows what stingless bee keepers have known for a long time, that urban habitats are excellent homes for stingless bees compared to farms or natural forests (Kaluza et al., 2016; Kaluza et al., 2017). Potentially our urban areas could be sources of hives that can be moved to farm for crop pollination.

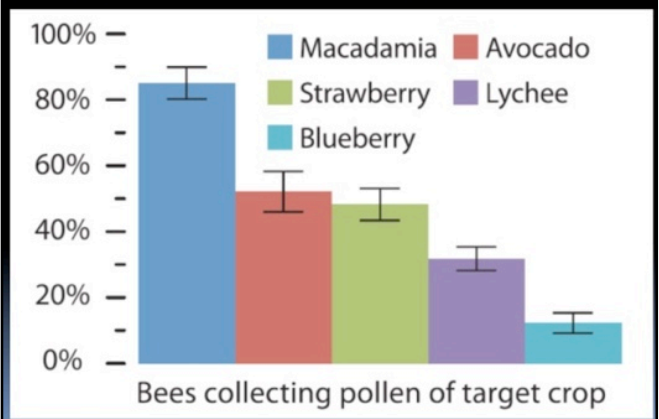
The use of stingless bees as crop pollinators has made great strides with information on their preferences and pollinator efficiency being revealed. Remnant vegetation on farms is of enormous significance in maintaining natural bee populations which perform valuable ecosystem services. But in the absence of natural vegetation techniques for managing artificial hives are being developed (Heard 2016). This area is the focus of several new research projects, which I expect will finally remove any impediments for using these insects to increase crop yields.



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The proportion of bees collecting pollen of the target crop for five crop species



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Record level attendance at the AGM to hear the Presidential Address by Tim Heard.



1ST AUSTRALIAN Native Bee CONFERENCE

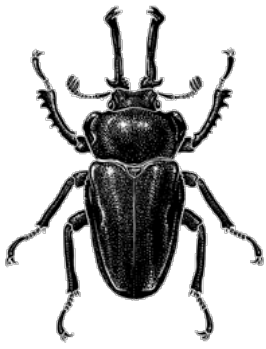
01+02 JULY 2018**GOLD COAST • QUEENSLAND**

Beekeepers, farmers, industry leaders and researchers are invited to share knowledge at the first Australian Native Bee Conference. We will discuss issues required to increase understanding and unlock the potential of our native bees, a valuable but under-utilized natural resource. To register, submit an Abstract, find out about the program, trade show and field trip, or to contact us, go to: australiannativebeeconference.com.au

Where: RACV Royal Pines Resort, Gold Coast, Queensland

When: Sunday 1 July 2018, 8:30 AM – 5 PM

Note that the Australian Bee Congress, which focusses on honey bees, will host two symposia on native stingless bees the day before, Saturday 30 June 2018, at the same venue. We encourage attendees to also consider attending this event.



Meet the new ESQ President for 2018: **Mike Muller**

I grew up on the family dairy farm at Meroo Meadow, between Nowra and Berry in the Shoalhaven area of the South Coast of NSW. My secondary schooling was as a boarder at Chevalier College at Bowral, from where I went on to study agriculture while in residence at St Johns College, Sydney University. In those days, agriculture was a very general course for three years, covering a wide range of subjects, and you then chose a specialty as a major in fourth year. I found I had enjoyed agricultural entomology in third year and chose that subject for my major. Most of the lectures in that fourth year were with Professor Fred McDonald.

At the beginning of 1972 as a fresh graduate, I applied for a job advertised in the CSIRO Division of Animal Health based at the McMaster Laboratory in the Veterinary School on the campus of Sydney University. The position was for someone to get out into the field and find out what insects were biting sheep, particularly *Culicoides* biting midges. At that time, bluetongue was an exotic virus disease and considered to be a major threat to the sheep industry in Australia. It was known to be transmitted by *Culicoides* species in its home land of Africa and also in the USA, but nobody knew what biting midges were feeding on sheep in Australia.

Fortuitously, the job interview was with Alan Dyce, then Australia's biting midge taxonomy expert. We both came from a farming background so we hit it off and I landed the job. Alan had worked with the CSIRO Division of Wildlife in the 1950s as a member of the group introducing the myxoma virus



Monitoring for *Aedes vigilax* larvae in saltmarsh at Tinchi Tamba wetlands, Brisbane. Note the high-tech dipper - a soup ladle on a telescoping paint roller handle.

to control rabbits. He knew from that work that there was a good variety of *Culicoides* species and mosquitoes in the Moree area of northern NSW, so I had many excursions to a sheep property there collecting midges and mosquitoes biting bait sheep, and analysing blood meals from light trap and truck trap collections on the property.

At that time, the McMaster Laboratory was working with the CSIRO Microbiology group at Long Pocket Laboratories in Brisbane. We had joint field trips where I met mosquito expert Harry Standfast. The joint program was studying other livestock arbovirus diseases including Ephemeral Fever, or 3-Day Sickness, in cattle. Almost nothing was known of the vectors and epidemiology of this disease, which was important for the livestock export industry. Based on results from a sentinel herd serum bank at Long Pocket, a site was chosen where there was known to be regular virus activity and abundant biting insects. That site was the Coastal Plains Research Station near Humpty Doo in the NT. From

October 1974 to May 1976, the joint laboratories ran a continuous program of insect collection and cattle, buffalo and wildlife blood and serum sampling. I took my turns in the roster for that program, and also had the job of processing all the blood-fed mosquitoes and midges to identify the blood source back at McMaster Laboratory.

At the beginning of 1977, I was transferred from the McMaster Laboratory to Long Pocket in Brisbane, to take my acquired biting midge expertise to that site. Harry Standfast became my boss and mosquito mentor, and I was given the task of developing techniques for handling live biting midges in vector competence studies in a newly commissioned high security insect-proof facility that could hold sheep and cattle. I managed to do that fairly quickly, which was fortuitous because in October 1977 we were notified that one of the unidentified viruses isolated from a mixed species pool of biting midges at CPRS in March 1975 was in fact a bluetongue virus. The virus had taken its turn in a queue of unknowns at Long Pocket, at the regional arbovirus laboratory at QIMR, and finally at the world reference centre at Yale in the USA. In those days, we worked with tissue cultures. PCR technology had not been invented so things happened a little more slowly.



A Bell 204 helicopter applying Bti to saltmarsh pools in Tinchí Tamba Wetlands.

Australia's live animal exports closed overnight, and the course of our work was then set for the next 15 years or so. The virus had gone undetected in the field because it will infect cattle without making them sick. Because of the expertise that had been developed in the CSIRO group, and with the help of the serum bank with samples from all around Australia, a reasonably rapid picture was drawn showing that at that time bluetongue virus was restricted to the Top End of the NT and had not reached the sheep producing areas of Australia. However, over subsequent years, ongoing studies showed that there were multiple strains of bluetongue virus which kept arriving in the Top End, almost certainly in wind-borne biting midges from Indonesia. Some of these virus strains made it to Queensland and down the east coast of NSW in cattle. There were also multiple species of biting midges that were more or less efficient as vectors. There is no doubt that there are strains of bluetongue virus in Australia that will kill sheep, as was found in experimental work, and when small numbers of sheep were pastured at the DPI research station in Darwin.

Suffice it to say that as the epidemiology of bluetongue viruses became a little clearer, and it appeared the viruses would not reach the sheep producing areas of Australia, a certain amount of complacency crept in, and funding arrangements and research priorities changed. Flowing on from the bluetongue studies, there is now a National Arbovirus Monitoring Program in the veterinary area, but the team at CSIRO was disbanded in the early 1990s and I was the last one to go in 1995.

Harry Standfast had retired from CSIRO in 1992 and commenced consultancy work on mosquitoes with local government groups in southeast Queensland. He was able to convince the Brisbane City Council that they needed a Medical Entomologist in their mosquito management program, and I was in the right place at the right time, commencing in April 1995 with BCC just five weeks after finishing at CSIRO. I moved from insects biting sheep and cattle to insects

biting people, in many cases the same insects.....

Two Technical Officers and I formed the Field Monitoring Team, at the Council Depot in New Farm, with responsibility for tasks such as answering customer complaints, field sampling to determine the need for aerial applications over saltmarshes and then monitoring those applications and their effect, recording breeding sites, and operating weekly light traps to monitor mosquito populations.

It was an interesting time to start in mosquito management because it coincided with the arrival of the control product growth regulator S-methoprene and the biological product *Bacillus thuringiensis* var *israelensis*, or Bti for short. Brisbane's worst pest and the sole target of all the aerial treatment programs in southeast Queensland was the saltmarsh mosquito *Aedes vigilax*. Over the previous 20 years or so, the control product of choice for this species was the organophosphate temephos, which was very good at controlling mosquito larvae, but signs of resistance had started to emerge after such long term use, and there were also increasing concerns that it was not very friendly to juvenile marine crustaceans. Bti and S-methoprene remain the mainstays of mosquito management in Australia today.

For the next 22 years, I enjoyed my time at the BCC, even the interaction with the public, which is not always initially friendly when mosquitoes go bad. But usually after a good chat and an explanation of what mosquito management programs are up against in the field, how to use repellents and other avoidance measures, most people can be placated. I was responsible for the helicopter spraying program over all that time, with all its associated challenges of deciding when, where, what with and how much. And saltmarsh mosquitoes don't know about weekends and public holidays.

I had other interesting issues to deal with, such as the sudden detection of a nasty human biting midge pest *Culicoides ornatus* in Brisbane in October 2004. It expanded its distribution south along the coast from around Tin Can Bay and caused a lot of grief around

tidal mangrove channels and tidal creeks off the Brisbane River. There was even tougher interaction with both the public and my management, because I had to point out that no control measures could be applied to the breeding sites of this pest in pristine mangrove drains. The situation eventually led to the BCC appointment in 2008 of my successor, Dr Martin Shivas, who had studied this species in Darwin for his PhD. Another unusual situation was having to deal on a number of occasions with complaints of plagues of small flies which turned out to be scuttle flies, Family Phoridae. I found there was an association of this phenomenon with adjacent



Aedes vigilax. Photo: Queensland Museum

plastic recycling plants, where strapped bales of milk bottles were being held awaiting processing. The scuttle flies had found an ideal breeding niche in the milk residues in the bottles, and it was literally impossible to apply control products that would penetrate into the "honeycomb" structure of the bales.

I also regularly provided advice on mosquito-borne diseases, such as those due to Ross River virus and Barmah Forest virus. I received regular updates from Queensland Health on RRv and BFv notifications and maintained data bases and graphs which I needed at my fingertips. There is now a much closer working relationship between Local Government and Queensland Health, and I like to think I played some part in improving that

association. I also learnt that working in a political council, my job was a mix of science, politics and diplomacy.

Mosquito management still relies on broad acre control programs operated by local governments in southeast Queensland, but there is now much greater recognition of the threat from the introduction of exotic mosquitoes, particularly the dengue mosquito *Aedes aegypti* and the asian tiger mosquito, *Aedes albopictus*. Today there are incredibly sensitive molecular biology techniques being used in monitoring programs for exotic mosquitoes and you will see and hear about some of those from my mosquito colleagues who I have asked to be guest speakers for some of our regular meetings this year.

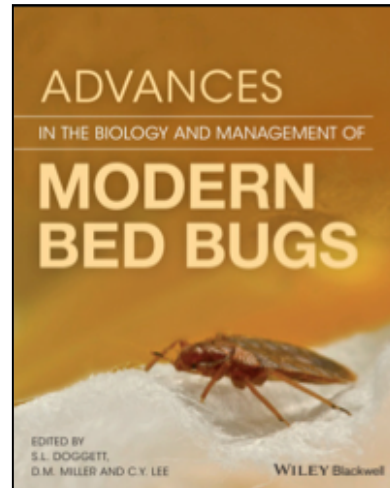
I have been a member of the Entomological Society of Queensland for decades. I'm currently on Long Service Leave from the BCC in transition to retirement. However, I am maintaining my interest in the world of mosquitoes and arboviruses for a little while yet. I am the Secretary of the Mosquito and Arbovirus Research Committee Inc., a member of the National Arbovirus and Malaria Advisory Committee, and a member of the committee of the Mosquito Control Association of Australia. But obviously I have also just stepped into the Presidency of the Entomological Society of Queensland for 12 months, and I am acutely aware of the stature of those who have held this position before me over the 95 years of the Society's history, and I am privileged to be in such company. I am grateful for the support of a fantastic and efficient Council and delighted that all the members have continued in their positions for another year. And I hope to meet many of our ESQ members over that time.

-- Mike Muller.



New Book

Advances in the Biology and Management of Modern Bed Bugs



Editors:
Stephen L. Doggett,
Dini M. Miller &
Chow-Yang Lee
46 chapters, 60+
contributors, ~470
pages
Due March 2018,
Wiley-Blackwell
Publishing

Advances in the Biology and Management of Modern Bed Bugs incorporates extensive new information from a wide range of basic and applied research, as well as the recently observed medical, legal and regulatory impacts of bed bugs. Stephen Doggett, Dini Miller, and Chow-Yang have assembled more than 60 contributing authors who are highly experienced and widely recognised as experts in their topic areas. The contributing authors offer new information on basic science and advice on using applied management strategies and bed bug bioassay techniques. The authors also present cutting edge information on the major impacts that bed bugs have had on the medical, legal, housing and hotel industries across the world, as well as their impacts on public health.

This is the most comprehensive compilation yet produced about this bug that includes historic, technical, and practical information. It will certainly be the most thorough single reference on bed bugs for many decades to come. This is an essential reference for anyone who is engaged in managing bed bugs, be it in an academic, basic or applied scientific setting, or in a public outreach, or pest management role, worldwide.

More information: www.abmmbb.com



Entomology News

from Queensland and beyond...

Visiting venom hunters

*Kathy Ebert
University of Queensland*

A group of 25 international students from Lewis & Clark College in Portland, Oregon, recently spent a week camping at Lamington National Park as part of a semester study program with Global Education Design. The focus of the week was biodiversity: the students looked at rainforest plants, birds, mammals and most importantly, invertebrates!

Accompanying the students was Associate Professor Greta Binford, a researcher in spider venom diversity and evolution at Lewis & Clark College. While I was able to demonstrate to the students several invertebrate collecting techniques, Dr Mike Rix (Queensland Museum) and Dr Mark Harvey (Western Australian Museum) were specially invited along to add their expertise on arachnids and biogeography.

Mike and Mark were able to find a variety of interesting spiders, including a net-casting spider (*Menneus* sp.; Family Deinopidae), large numbers of cribellate twig-dwelling spiders (*Paramatachia* sp.; Family Desidae), and a suite of burrowing mygalomorph spiders including spiny trapdoor spiders (Idiopidae: *Arbanitis*, *Euoplos*, *Cataxia*), open-holed trapdoor spiders (Nemesiidae), and funnel-web spiders (Atracidae: *Hadronyche*).

After the students left Lamington, they were able to use their new-found insect collecting skills to collect assassin bugs with Dr Andrew Walker from the University of Queensland's Institute of Molecular Biology. The assassin bugs were taken to the venom



Fig. 1. L to R, Arachnid hunters: Mark Harvey, Mike Rix and Greta Binford.



Fig. 2. Large female trapdoor spider (*Arbanitis* sp.; Family Idiopidae) poised at the entrance of her burrow at night. Species in the genus *Arbanitis* are unusual among Idiopidae in that they do not build a hinged lid to their burrows.

lab at UQ where the students were able to get hands-on experience in venom extraction.

Greta will be presenting a seminar at UQ School of Biological Sciences on Friday the 4th of May: “Using integrative, evolutionary approaches to better understand patterns of diversity in spider venoms.”

(Seminar in Goddard Bldg., Rm 139 at 3pm).



Fig. 3. Above: Greta holds the door of a trapdoor spider (*Euoplos* sp.; Family Idiopidae) burrow open with her thumb. **Top right:** close-up of the door. **Bottom right:** view with the door shut.



Fig. 4. Mark and Greta found a leaf tailed gecko while searching for spiders.



Fig. 5. One of the students found a large Lamington earthworm *Fletcherodrillus unicus* inside a rotting log. Apparently they glow in the dark!

UQ students get a taste of insect ice cream

Students waited in long lines at UQ last week for a chance to try ice cream with insects in it! The ice cream stall marketing, set up by *The Economist*, encouraged students to subscribe to learn more about feeding the future. Ice cream flavours included ‘Scurry Berry’, ‘Choc Hopper’ and ‘Nutritious Neapolitan’. The ice cream contained ants, grasshoppers and mealworms.



Two students enjoy insect ice cream.

Mrs Scorpion all aglow about having babies at the Queensland Museum

Geoff Monteith, Queensland Museum

The Discovery Centre at the Queensland Museum is a section in the public galleries staffed by some keen naturalists who can answer questions and identify specimens and objects that the public bring in. They also maintain live displays of a variety of insects, arachnids and few reptiles. The giant burrowing cockroaches and the phasmids are always a great hit and this is the place to bring kids who might like some baby stick insects to raise at home.

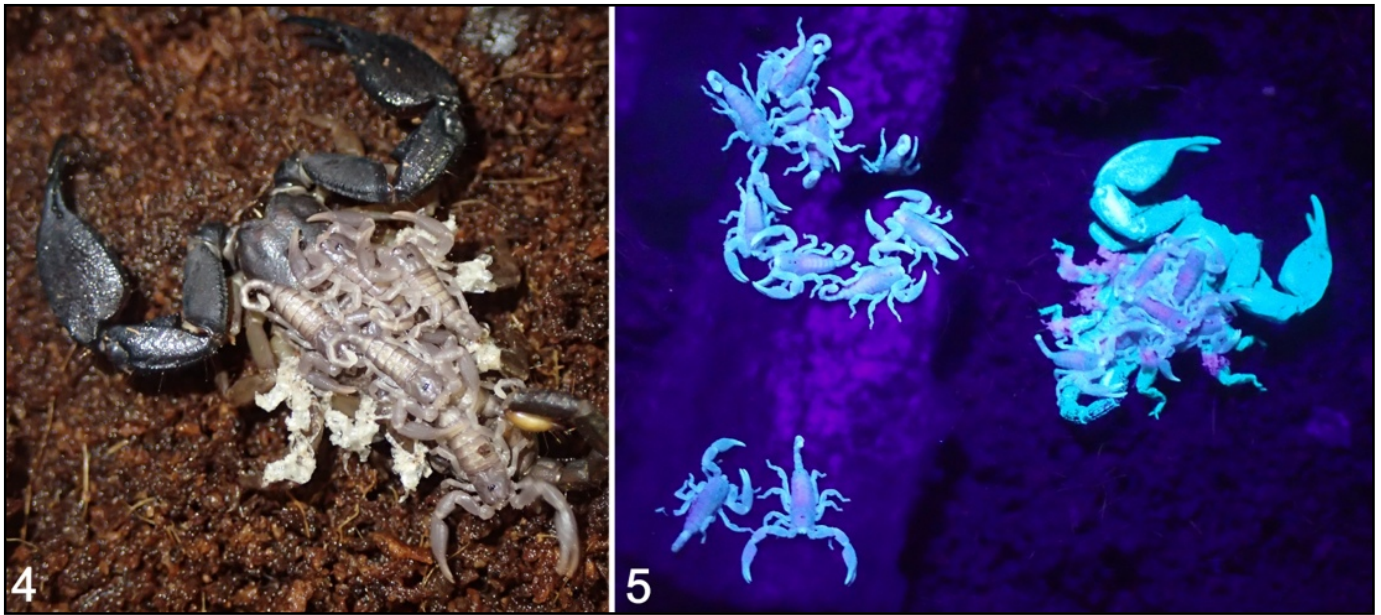
One of the Discovery Centre pets is a fine female rainforest scorpion, *Hormurus waigiensis* (Gervais 1844), which museum Visitor Service Officer, Chris Low, found when it wandered into their kitchen at Mt Nebo. It's the common broad, flattened greenish-grey species that occurs in flat spaces under rocks, loose bark, and in other crevices in rainforest all the way from northern NSW up though eastern Queensland to New Guinea and through the islands as far as Sulawesi and the Philippines. Its species name indicates that the original specimens came from Waigeo Island, off the NW coast of New Guinea. It's one of those scorpions which have very large, powerful pincers (pedipalps) at the front end and only a weak little stinging tail at the other end with rather weak venom. They are quite reluctant to sting when handled but are happy to give a good strong nip. It's the species with big tails



Fig. 3. The new-born baby scorpions on the female's back on the day they were born, clinging firmly to their mother, or to one another.



Fig 1-2. The female *Hormurus waigiensis* before she gave birth at the Queensland Museum. In Fig. 1 she is in indoor fluorescent light with a UV torch also on her, giving her that bluish glow. In Fig. 2 she is in darkness with only UV illumination.



Figs 4-5. Moulting from first to second instar took place on the female's back two weeks after birth. The shrivelled white skins are visible in Fig 4. The second instars leave their mother and head off for independent lives, as the UV picture in Fig. 5 shows. Do scorpions see in UV? Write and tell us, with a reference, if you know!

and small pincers that you need to worry about.

The Discovery Centre folk were never quite sure about its sex and it was dubbed the neutral 'Chris', after its collector, until January 22 when SHE gave birth to at least 18 live babies ('at least' is used advisedly, because there were 18 still going strong when they were first formally counted on February 10). Scorpions, of course, don't lay eggs and the babies did what scorpion babies do and clambered on their mother's back. Two weeks later, on February 14 they commenced to moult to the second instar. As is now well known, scorpions glow brightly under ultra-violet light, and this method is often used to collect scorpions, especially in desert areas where scorpions roam around at night on open sandy areas. Katie Hiller and Marisa Giorgi from the Discovery Centre have been keeping an eye on her progress and have provided some photographs: with and without UV.

The growing juveniles are feeding readily on both mealworms and slaters as shown by our pictures.



Figs 6-7. Second instars having their first meals of slaters (6, in UV light) and mealworms (7, in natural light on Vivian Sandoval's phone!)

ESQ Member, George Hangay, receives Frivaldszky Memorial Plaque

The Frivaldszky Memorial Plaque (Silver) was recently awarded to Dr. George Hangay making him the first Australian entomologist to receive this prestigious award from the Hungarian Entomological Society.

George was born in 1941 in Budapest, Hungary. He became interested in beetles at an early age, focusing on scarabs. He came to Australia in 1967, became an Australian citizen in 1970, and worked as a self-employed sculptor, model maker and taxidermist until joining the Australian Museum in 1972.

George specialised in creating natural history and anthropological exhibitions. As Chief Preparator and later Exhibition Project Manager, he was involved in many rewarding exhibition projects. Apart from scientific study and planning, he has practiced model-making, taxidermy, zoological preparations, sculpting and graphic arts. He conducted numerous expeditions looking for suitable museum specimens and visiting tribal societies.

He has also worked in the Denver Museum of Natural History and in the Port Moresby National Museum. His private interest in insects inspired him to further travels, and together, with his wife Katherine, has visited many countries on five continents, collecting and studying scarabs, especially. He has co-authored "A guide to beetles of Australia" and "A guide to stag beetles of Australia".

About the Plaque:

The Plaque has three grades: Gold, Silver and Bronze. The Gold is granted to the most outstanding, internationally recognised entomologists; the Silver is to those who make significant contributions to entomology through publications, teaching and collecting, while the Bronze is to those who are active members of the Hungarian Entomological Society and contributed significantly to the knowledge of the insect fauna of the country. The



George Hangay



The three Frivaldszky Memorial Plaquettes: gold, silver and bronze.

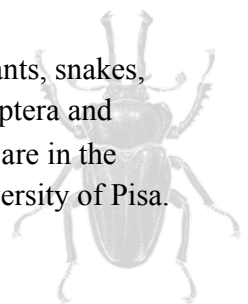
Plaquettes are awarded once a year to society members who are nominated and accepted by the majority of the society.

About Imre Frivaldszky:

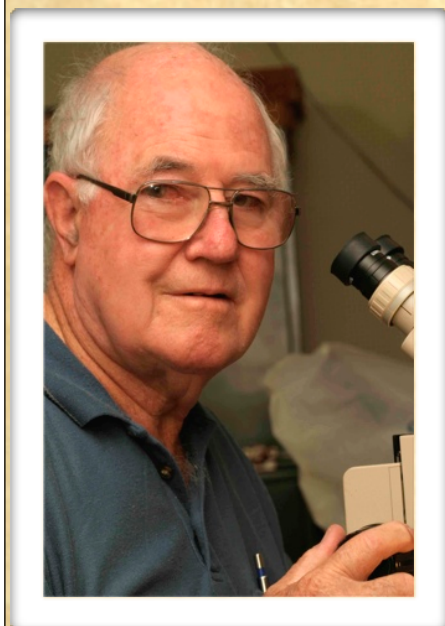
The Plaque commemorates the life and work of Imre Frivaldszky (1799-1870), the Hungarian doctor of medicine, botany and zoology who pioneered entomological studies and established a national insect collection. He worked in the Hungarian National Museum in Budapest from 1822, where he served as curator until his retirement in 1851. In 1824 he abandoned the practice of medicine and spent the rest of his life as a botanist and zoologist. He made many collecting trips throughout Hungary (including present day Slovakia and the Banat), Bulgaria, Turkey and Italy.

Frivaldszky wrote extensively on plants, snakes, snails and especially insects (Lepidoptera and Coleoptera). Many of his specimens are in the Natural History Museum at the University of Pisa.

Congratulations, George!



The History Corner...



Harry STANDFAST (1930-2012)

Born Ipswich and attended Ipswich Grammar School. Started as cadet in the State Health Department laboratory in 1949 and completed a B.Sc. majoring in biochemistry at UQ. Ian Mackerras, then director of QIMR, encouraged interest in insect borne disease and he served 1955-1962 as malaria control officer in New Guinea and the Solomons where undertook large scale insecticide trials against malaria vectors. Joined QIMR in Brisbane as research entomologist in 1962 to work under Ralph Doherty on surveys of arboviruses and their vectors which led to first isolation of Ross River virus from *Aedes vigilax*. Collaboration with CSIRO's Alan Dyce on livestock midge and mosquito borne diseases led to his move to the CSIRO Long Pocket Laboratories in 1970. Following recognition of the sheep bluetongue virus in Australia in 1975 Harry led the insect side of a 10-year study involving surveys across northern Australia and lab work at Long Pocket. After retirement in 1990, undertook consultancy work on local government mosquito control programs in SEQ and livestock and dengue issues in the South Pacific. Became a QIMR Fellow in 1982 and received an Order of Australia in 1998. He was President of ESQ in 1965 and foundation Secretary of the Australian Entomological Society in the same year.

Obituary: Muller, M. 2013. *New Bulletin of the Entomological Society of Queensland* 40(10):164-166.

Biography: Park, W. 2010. *Beyond Adversity* pp 264-266. Bigspy Publishing, Newport NSW

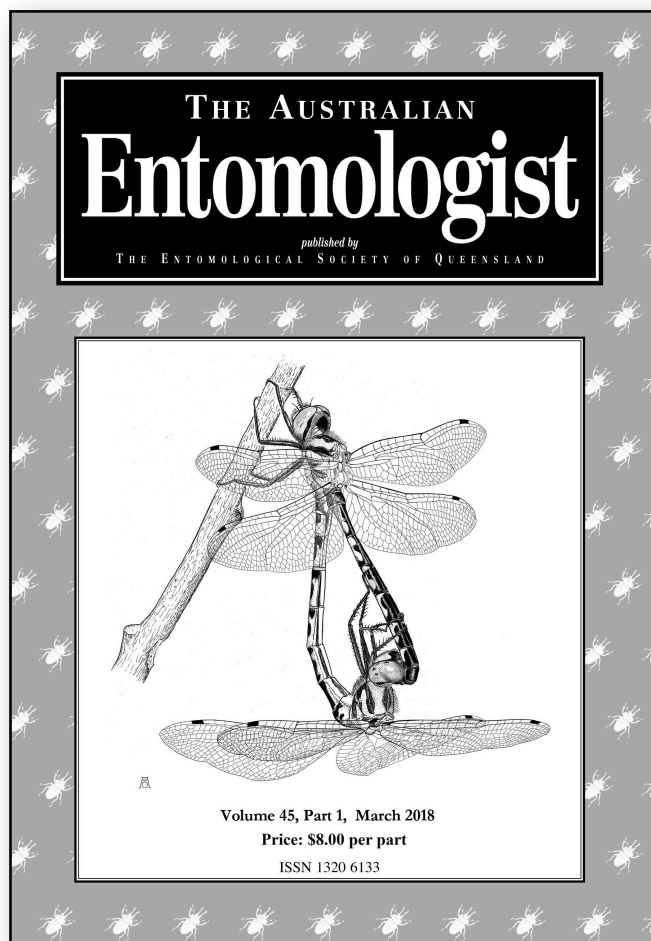
The Australian Entomologist AN INVITATION TO SUBSCRIBE

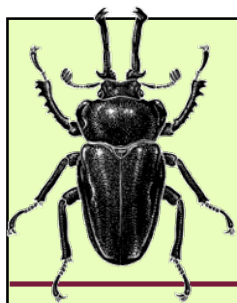
"The Australian Entomologist": A quarterly scientific journal devoted to entomology of the Australian-Pacific Region. This journal was commenced in Sydney in 1974 by Max Moulds and is now published by the Entomological Society of Queensland. It is one of the leading outlets for research on native insects in Australia and adjacent areas.

Our regular cover artist is journal subscriber and ESQ member Dr Albert Orr who lives at Currimundi. He has produced a very inventive design of a pair of dragonflies in the mating position for the 2018 issues.

Annual subscription for individuals is \$33 in Australia, \$40 in Asia/Pacific and \$45 elsewhere. Electronic (pdf) version available for \$25 (Institutions: \$30). To subscribe, see our website:

www.esq.org.au/publications.html





S-t-r-e-t-c-h your Ento knowledge

Answer to last month's mystery photo:

Well done to Christine Lambkin and Mike Muller who both guessed correctly! The photo was a close-up of a male robber fly (Asilidae) face showing the short, stout, sclerotised proboscis and the **mystax**, the usually dense moustache of stiff bristles, between the large compound eyes. ESQ member and PhD student, James Dorey, has very kindly shared this photo. To see more of his absolutely stunning photography see:



<http://www.jamesdoreyphotography.com.au>

Word of the month: pulvillus

Noun. (Latin, *pulvillus* = small cushion. PL, Pulvilli.) 1. Membranous, pad-like structures between tarsal claws.

These pads have adhesive properties, including the use of an adhesive fluid, and this helps the insect stick to the surface on which it is standing. Between the **pulvilli** there is often a spine called the empodium. They can be seen here on the foot of the robber fly.

Definitions from:

Gordh G & Headrick D. 2011.

A dictionary of entomology. CSIRO Publishing. and <https://www.amentsoc.org/insects/glossary/terms/pulvilli>

Have you got a photo that could be used for the mystery photo challenge?

This month's mystery photo:

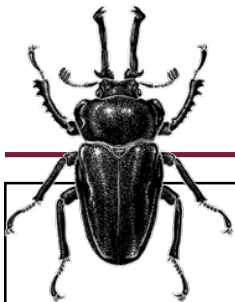


Any guesses?

If you think you know what it is, send me an email!

--the Editor

k.ebert@uq.edu.au



Announcements

ESQ Student Award for 2018

Don't forget that we have the 2018 Student Award coming up! This is a **\$500 award** by the Society to encourage entomological research. Honours, Diploma and 4th year Degree students who received their qualification from any Queensland tertiary education institution in 2016 or 2017 may submit their entomology based thesis or report for consideration. Entrants *need not be Society members*. Entries are judged by a panel of entomologists appointed by the President of the Society. The winner will be announced at the May General Meeting and is then invited to present a summary of their research at the June Notes and Exhibits meeting of the Society. **Deadline to apply is 6 April 2018.** That's less than one month away! We didn't receive *any* submissions last year, so let's make sure we get those theses in for 2018! Head over to our 'Awards' webpage to read more and to download the application form: <https://www.esq.org.au/awards.html>

2018 ESQ Small Grants Scheme

We are pleased to inform you that the deadline for ESQ Small Grants Scheme submissions has been extended to **April 15!**

What's the Small Grants Scheme again? I hear you ask...

Answer: It's a fantastic opportunity open to ALL members of the Entomological Society of Queensland, offering up to **\$2000** in funding towards an entomological endeavour that will be undertaken over 2018/19. Discrete stand-alone projects with well-defined objectives are recommended, addressing anything from lab-based to field; pure to applied. Applications from students building upon and supplementing existing research projects are also considered!

Head over to our 'Awards' webpage to read more and to download the application pro forma: <https://www.esq.org.au/awards.html>



Don't hesitate any longer – download that form and get your applications in now!

Deadline to apply is 15 April 2018

PhD Project Scholarships at Hawkesbury Institute for the Environment (HIE)

The HIE is a research institute within *Western Sydney University* that has rapidly become a research leader in environmental and ecological research, with a strong reputation for delivering research outcomes of the highest quality. We are home to a team of over 50 academic research scientists and more than 60 PhD students, with access to a unique suite of world-class research facilities, world heritage national parks and robust industry connections.

Stingless Bees as Crop Pollinators – 4 scholarships:

https://www.westernsydney.edu.au/graduate_research_school/grs/scholarships/current_scholarships/current_scholarships/hie_stingless_bees_as_crop_pollinators

These projects will investigate the potential of stingless bees as pollinators of temperate, tropical and glasshouse crops

Insect Pollination of Almonds – 1 scholarship:

https://www.westernsydney.edu.au/graduate_research_school/grs/scholarships/current_scholarships/current_scholarships/hie_insect_pollination_of_almonds

This project will study insect pollinators in almond orchards with the aim of improving pollination services for industry

Applications close 8 April 2018.

Meetings & conferences

67th Entomological Society of New Zealand Conference

10-13 April 2018
Whanganui, New Zealand
<http://ento.org.nz/conferences/conference-2018/>

XI International Symposium on Pollination

April 16–20
Botanic Garden and Botanical Museum, Berlin, GERMANY
<https://www.entsoc.org/event-calendar/xi-international-symposium-pollination>

10th International Symposium on Fruit Flies of Economic Importance

23-27 April 2018
Tapachula, Chiapas, Mexico
<http://www.10isffei.org>

2nd International "Insects to Feed the World" Conference

May 15–18, 2018
Wuhan, CHINA
<http://ifw2018.csp.escience.cn/dct/page/1>

8th International Conference on the Biology of Butterflies

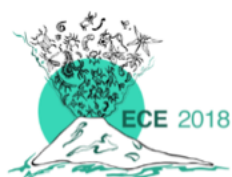
June 11–14, 2018
Bangalore, INDIA
<https://in.eregnow.com/ticketing/register/biologyofbutterflies>

1st Australian Native Bee Conference

July 1–2, 2018
Gold Coast, Queensland, AUSTRALIA
<https://www.eventbrite.com.au/e/the-first-australian-native-bee-conference-tickets-41204382417>

XI European Congress of Entomology

2-6 July 2018
Naples, Italy
www.ece2018.com



International Union for the Study of Social Insects

5-10 August 2018
Guarujá SP, Brazil
<http://www.iussi2018.com>



EVOLUTION 2018

Joint Congress between the American Society of Naturalists (ASN), The Society of Systematic Biologists (SSB), the Society for the Study of Evolution (SSE) and the European Society for Evolutionary Biology (ESEB)

August 19–22, 2018
Montpellier, FRANCE
<http://evolutionmontpellier2018.org/>

XXVII Brazilian Congress of Entomology and XV Latin American Congress of Entomology

September 2–6, 2018
Gramados, BRAZIL
<https://www.cbe2018.com.br/pt/>

XV International Congress of Acarology

2-8 September 2018
Antalya, Turkey
<http://www.acarology.org/ica/ica2018/index.html>



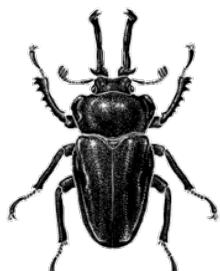
Australian Entomological Society (AES) 49th AGM and Scientific Conference

September 23–26, 2018
Alice Springs, Northern Territory, Australia
https://www.austentsoc.org.au/Web/Events/49th_AGM_and_Scientific_Conference.aspx

Joint Entomology Conference 2018 (Ent. Soc. of America (ESA), Ent. Soc. of Canada (ESC) and Ent. Society of British Columbia (ESBC))

November 11–14, 2018
Vancouver, CANADA
<https://www.entsoc.org/events/annual-meeting>





Diary Dates for 2018

Meetings held on the second Tuesday
of the respective month

MARCH 13	Tim Heard	AGM and Presidential Address: <i>"Stingless Bees, their journey from obscurity to insect ambassadors"</i>
APRIL 10	Andy Walker	<i>"Exploring insect venoms and silk"</i>
MAY 8	Brendan Trewin	<i>"The history of Aedes aegypti in Southeast Queensland and novel techniques for its surveillance and control."</i>
JUNE 13	Notes and Exhibits	Notes & Exhibits
AUGUST 14	Mike Rix	<i>"Life down under: evolution and conservation of Australia's trap door spiders"</i>
SEPTEMBER 11	Brian Montgomery	<i>"Zika Mozzie Seeker - exploring Citizen Science as a tool to monitor invasive and urban mosquitoes"</i>
OCTOBER 9	TBA	<i>"TBA"</i>
NOVEMBER 13	Irene Terry	<i>"Wacky world of cycads: Thermogenesis, volatiles and pollinator interactions"</i>
DECEMBER 11	Notes & Exhibits	Notes and Exhibits/Christmas Afternoon Tea

SOCIETY SUBSCRIPTION RATES

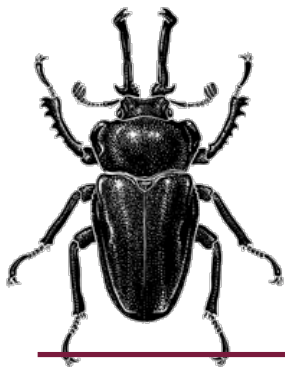
GENERAL	Person who has full membership privileges	\$30pa
JOINT	Residents in the same household who share a copy of the <i>News Bulletin</i> , but each otherwise have full membership privileges.	\$36pa
STUDENT	Student membership conveys full membership privileges at a reduced rate. Free the first year , \$18pa subsequent years. Students and others at the discretion of the Society Council.	\$18pa

ESQ membership subscriptions should be sent to the Treasurer, PO Box 537, Indooroopilly, QLD 4068
<http://www.esq.org.au/membership.html>

THE AUSTRALIAN ENTOMOLOGIST SUBSCRIPTION RATES

AUSTRALIA	Individuals/Institutions	AU\$33pa/AU\$37pa
ASIA/PACIFIC	Individuals/Institutions	AU\$40pa/AU\$45pa
ELSEWHERE	Individuals/Institutions	AU\$45pa/AU\$50pa
ELECTRONIC	Individuals/Institutions	AU\$25pa/AU\$30pa

Journal subscriptions should be sent to the Business Manager, PO Box 537, Indooroopilly QLD 4068
<http://www.esq.org.au/publications.html>



Entomological Society of Queensland



Notice of next meeting:

Tuesday, 10 April 2018, 1:00 pm



Dr Andrew Walker

Postdoctoral Fellow

Institute for Molecular Bioscience

The University Queensland

will present:

“Exploring insect venom and silk production”

All welcome! Join us after the meeting for tea and coffee.

Ground floor Seminar Room, Ecosciences Precinct, Boggo Road, DUTTON PARK

More venue details available at <http://www.esq.org.au/events.html>

Next News Bulletin:

Volume 46, Issue 2 (April 2018)

CONTRIBUTIONS WELCOME

Deadline Thursday April 19th, 2018.

Send your news/stories/notices to the editor at: k.ebert@uq.edu.au