Entomological Society of Queensland

NEWS BULLETIN

Price $3.50
Print Post Approved
100001946

Volume 46, Issue 2, April 2018

Entomological Society of Queensland

Website: www.esq.org.au
Address: PO Box 537, Indooroopilly QLD 4068

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 develop 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.*

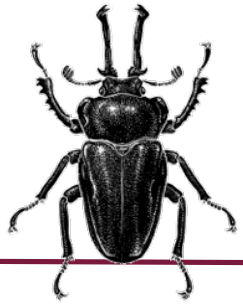
ISSN 1037-2989

Entomological Society of Queensland

Table of Contents

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.



Entomological Society of Queensland
Minutes for General Meeting

Tuesday, April 10th, 2018
Held in the Seminar Rooms, Ecosciences Precinct, Boggo Rd, Dutton Park.
Meeting open: 1:05 pm

Attendance (39):

Members (32): Mark Schutze. Andy Hulthen, Katharina Merkel, Vivian Eliana Sandoval, Mona Morandi, Zara Hall, Simon Lawson, Richard Zietek, Kathy Ebert, Colleen Foelz, Natalia Medeiros de Souza, Brogan Amos, Jessa Thurman, Michael Jeffries, William Arnold, Lui Lawrence-Rangger, Jane Royer, Ting Wei, Justin Bartlett, Tim Heard, Rajeswaran Jagadeesan, Rebecca Nagy, Shannon Close, Penny Mills, Cate Paull, Don Sands, Chris Lambkin, Liam Bromley, Geoff Monteith, Andrew Walker, Mike Muller

Visitors (7): Myrna Constantin, Brendan Missenden, Lara Senior, Marianne Eelkema, Alex Phillips, Jan Tilden, Tony Popic, Nicole Forrest.

Minutes: The minutes of the last meeting were circulated in News Bulletin 46[1] March 2018. Moved the minutes be accepted as a true record: Penny Mills; Seconded: Christine Lambkin. Carried: all

Nominations for membership approved by council:

General members :

David Schlipalius

Student members:

Jessa Thurman - Fulbright Scholar (Washington State University) based at UQ

Stefanie Oberprieler - Charles Darwin University

Rebekah Nagy - UQ

General Business:
Mike reintroduced himself as the 2018 President, and in turn requested each of the present 2018 Officer Bearers to stand so those present knew who they were.

Main Business:
Andy Walker (UQ) presenting on *"Exploring insect venoms and silk"*. Vote of thanks provided by Mike.

Next meeting: The next meeting will be on 8th of May, presented on the topic of "*The history of* Aedes aegypti *in Southeast Queensland and novel techniques for its surveillance and control*' by Brendan Trewin (Postdoctoral Fellow, Vector Ecology, Health & Biosecurity, CSIRO).

Meeting closed: 14:03.

Kit Prendergast, an ESQ member from Western Australia, shared her photo of a native bee *Megachile* (*Eutricharaea*) *chrysopyga* from southwest Western Australia. The *Megachile* are solitary bees that nest in pre-existing natural cavities. Many *Megachile* species are called leafcutter bees because they cut pieces of leaves with their strong mandibles to line their nest. See page 38 for more information about these bees.

At our next meeting...

"The history of Aedes aegypti *in southeast Queensland and novel techniques for its surveillance and control."*

presented by Brendan Trewin
CSIRO Health and Biosecurity Unit

Australia has a rich history of scientific discovery in the fields of medical entomology and mosquito control. Scientists from Brisbane were the first to isolate Ross River virus, to identify the mosquito responsible for transmitting dengue fever, and to uncover the virus blocking potential of *Wolbachia*. Did you know that Brisbane also has a dramatic history involving large epidemics of dengue fever and *Aedes aegypti?* In this seminar I will present my PhD work on the risk that *Aedes aegypti* could return to Brisbane through the thousands of rainwater tanks now installed in our backyards. I will also outline some of the exciting work happening in the mosquito control space including use of *Wolbachia* as a sterilizing agent and the implications of invasive mosquitoes for the future of Brisbane and elsewhere in Australia.

Dr. Brendan Trewin is a Postdoctoral Fellow at CSIRO Health and Biosecurity Business Unit.

Tuesday 8th May at 1 pm

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

Looking ahead...

Out June meeting is not far away! This is one of our

Notes and Exhibits

meetings when we hear from our student award winner but also welcome short presentations from members. Have you got something you'd like to share? Contact Mike Muller muller36@bigpond.net.au

Exploring the world of insect venoms

Presented by
Dr Andrew Walker
Institute for Molecular Biosciences
The University of Queensland

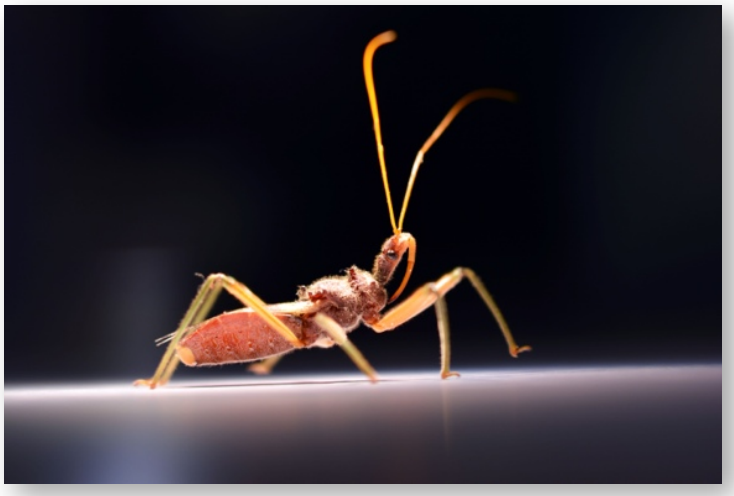


Figure 2: The assassin bug *Pristhesancus plagipennis*. Photo: Jiayi Jin.

Animal venoms are the focus of much current research, and not only in the ways you might imagine. Most people are aware of clinically important areas such as development and improvement of antivenoms to combat venoms produced by those species of snake, arachnid, and jellyfish capable of inflicting human fatalities. While these clinical applications will always be of paramount importance, today venoms are also of interest to biologists due to their outstanding molecular complexity and diversity. Due to their ability to modulate specific activities of the nervous and blood systems of both vertebrates and invertebrates, venom toxins are now being used to develop new medicines, scientific tools, and bioinsecticides (Dutertre and Lewis, 2010; King, 2011; King and Hardy, 2013). In addition, the unique way in which venoms are used to mediate life-or-death interactions between different species can produce accelerated evolution (positive selection) and molecular 'arms races' between predator and prey (Jansa and Voss, 2011; Sunagar and Moran, 2015).

The venom of each species is a complex cocktail of multiple toxins comprising small molecules (e.g., alkaloids), peptides, pore-forming proteins and enzymes. When injected into another animal, these disrupt normal physiological processes by binding to multiple different proteins and modulating their activities (Fry et al., 2009). Rapid paralysis and death are the classic symptoms of venoms used to capture prey, but the effects of venom on the injected animal's physiology and behaviour are diverse, and highly adapted to the way venom is used in the natural environment. For example, male platypuses use venom not for prey capture but for mate competition during the breeding season. Their venom does not cause paralysis but instead excruciating pain (Fenner et al., 1992). Another animal that uses venom during reproduction is the jewel wasp *Ampulex compressa*. This time, it is the mother who injects venom, into a cockroach that will provision her growing larva. Careful delivery of venom into the cockroach brain produces disorientation and loss of escape behaviour, but does not kill the roach (Piek et al., 1989). After the mother wasp has buried the roach, on which it has laid a single egg, it will remain alive for much of the time it takes the larva to eat its internal organs and grow into a pupa.

My main current interest is in understanding the evolutionary history of venoms, and how the way they are used in nature has shaped their molecular composition and physiological effects. Deep understanding of this issue is greatly aided not only by detailed investigations on single species, but also comparison of different animal groups in which venom use has evolved independently. Separate

evolutionary origins of venom use occur across the tree of life, including the reptiles, mammals, amphibians, fish, molluscs, cnidarians, and of course arthropods. However, currently available information about venoms is heavily biased in taxonomic terms, limiting a comparative approach. Among arthropods, the vast majority of studies have focused on mygalomorph spiders and buthid scorpions, and those that have focused on insects mostly deal with aculeate Hymenoptera. Of course, these trends are completely explicable, and due to a combination of clinical relevance combined with the logistics of acquiring suitable quantities of venom for experiments. Among insects, Hymenoptera are of high medical importance due to their tendency to cause anaphylaxis in sensitive individuals. Moreover, they are well-represented in many environments, and include many large and social species.

For this reason, I am interested in expanding knowledge about venoms produced by non-hymenopteran insects. I estimate envenomation has evolved ~22 times among eight orders of the insects (Figure 1). In this count I have included oral secretions delivered through a wound to facilitate blood-feeding, such as those produced by march-flies (Diptera: Tabanidae) and kissing bugs (Hemiptera: Reduviidae: Triatominae), because we know these secretions have overlapping molecular composition and physiological effects compared to venoms used for prey capture or predator deterrence (e.g., Takáč et al., 2006).

The first group I examined in detail, starting in 2014, was assassin bugs (Hemiptera: Reduviidae). Although I started out collecting a taxonomically diverse range of assassin bugs, the harpactorine bee-killer or common assassin bug *Pristhesancus*

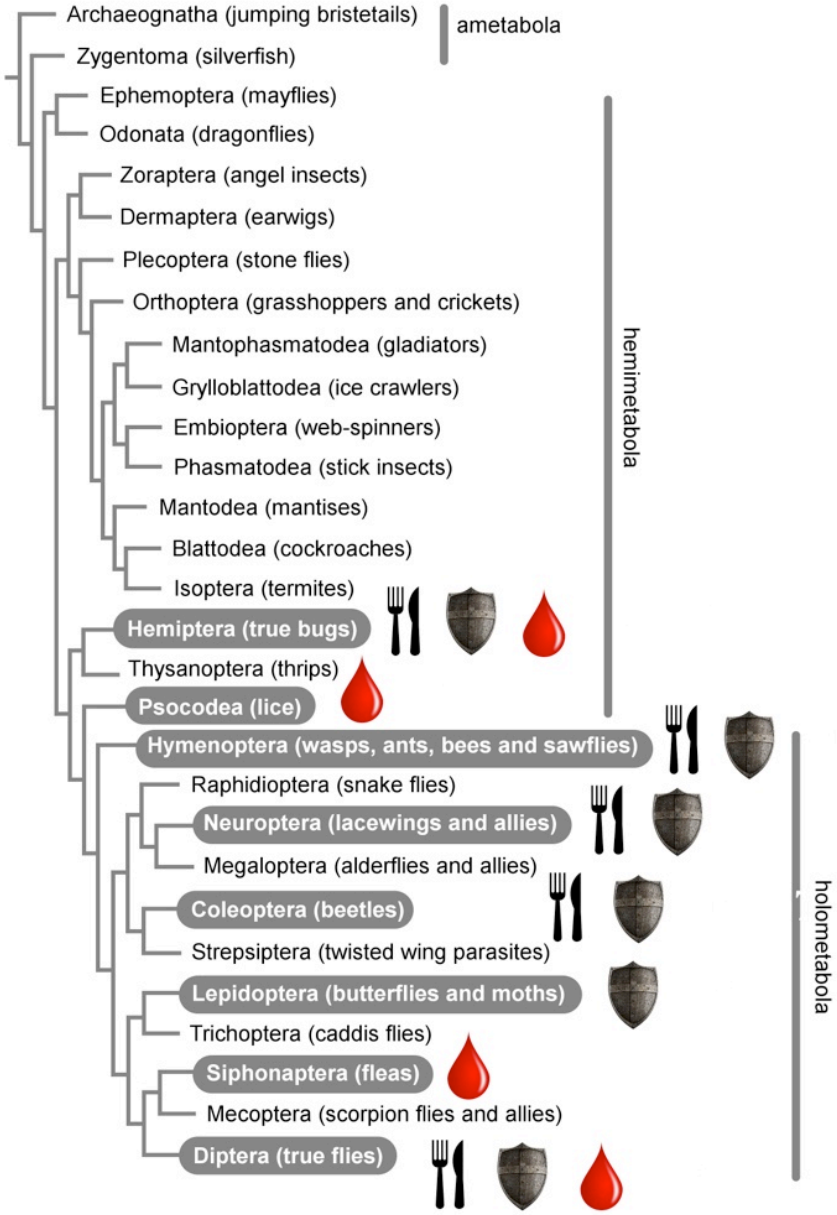


Figure 1: Cladogram of insect orders with orders containing venomous species highlighted in grey. Venom use for hunting is indicated by a knife-and-fork, for predator deterrence by a shield, and for blood-feeding by a drop of blood.

plagipennis (Figure 2) has become our main study species due to its large size, abundance in Southeast Queensland, and habit of congregating near native beehives. I started out harvesting venom from *P. plagipennis* using small electric shocks (as is done for spiders), a non-lethal procedure that typically yields ~5 microliters of venom per individual. Injecting this venom into prey insects leads to instantaneous loss of escape behaviour and

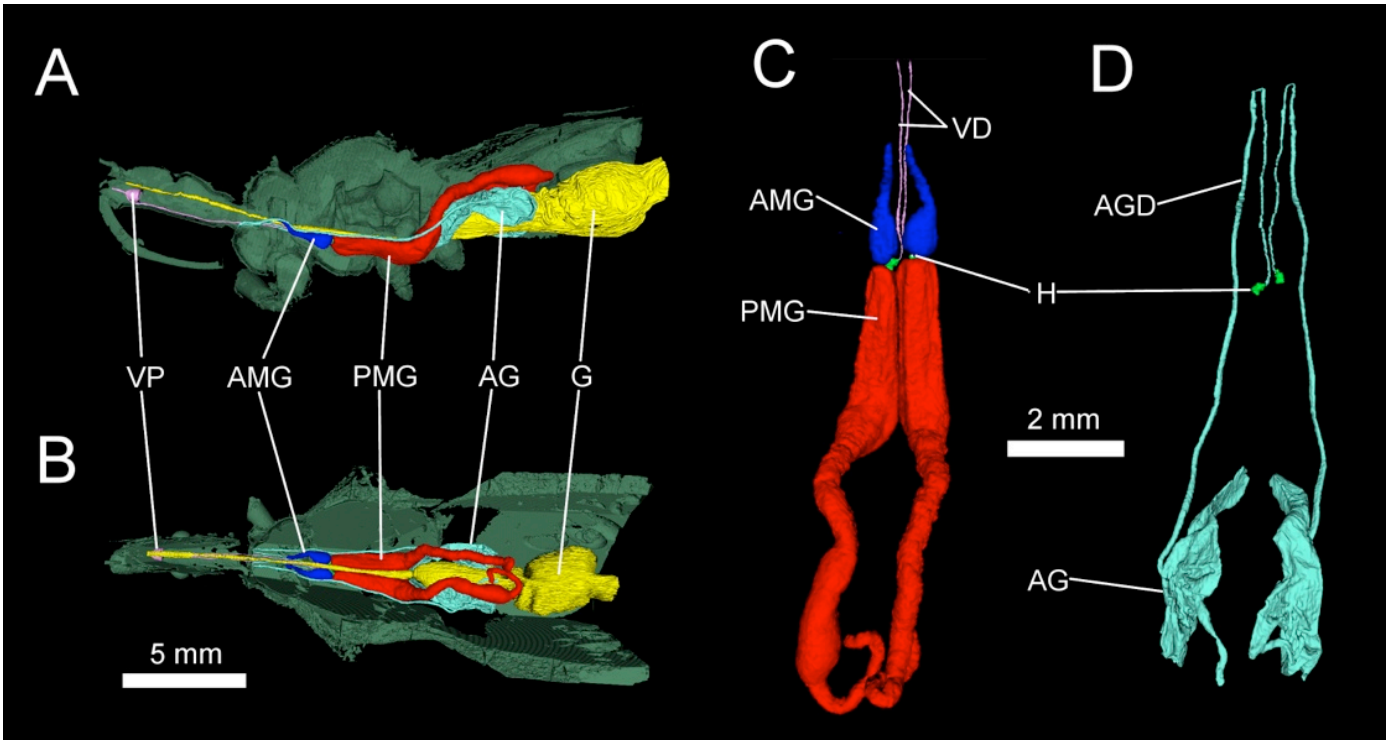


Figure 3: 3D reconstruction of venom glands of the assassin bug *P. plagipennis* from magnetic resonance imaging. (A) Lateral view and (B) dorsal view. AMG, anterior main gland (dark blue); PMG, posterior main gland (red); AG, accessory gland (light blue); G, gut (yellow); VP, venom pump (pink); olive green, external surface of bug. (C) Main venom glands. H, hilus; VD, venom ducts. (D) Accessory glands. AGD, accessory gland ducts.

coordination, followed by death within a few minutes. I also performed detailed experiments to determine the blueprints (amino acid sequences) of each of the peptide and protein toxins in the venom, by sequencing the mRNA produced by the venom glands and comparing the resulting sequences to the mass signatures of toxins obtained by mass spectrometry. As well as peptides with similar 3D structure to most spider venom peptide neurotoxins (the 'inhibitor-cystine-knot' structure), *P. plagipennis* venom contains abundant proteases and pore-forming proteins (Walker et al., 2017). These larger proteins may assist in liquefying prey, allowing it to be sucked up through the bug's needle-like mouthparts.

The next question was to determine where the venom was produced, which is an issue due to the morphological complexity of the venom glands. These are paired structures comprising a main globe with two separate compartments (anterior and posterior) as well as an accessory gland (Figure 3). By comparing the mRNA produced in each compartment as well as the protein and peptide toxins accumulated in the lumen of each gland, we were able to show that the venom we had been collecting by electrostimulation was produced in the posterior main gland (Walker et al., 2018). A more surprising result was that our data indicated the anterior main gland was producing another secretion that we had not previously observed, containing a distinct set of proteins and peptides. After some experimenting, we found that we could induce the bugs to produce this venom from the proboscis too. This is achieved without electrostimulation, by aggravating the bugs by touching them repeatedly with tweezers. Although we hypothesise the venom produced in the anterior main gland has a defensive role, we are still characterising its activity. Overall, we found that the venom system of assassin bugs is a highly sophisticated structure that allows them to inject one of two different complex secretions depending on external stimuli.

Another group of insects that uses venom to subdue prey and then liquefy its tissues are the robber flies (Diptera: Asilidae). Asilids are unique among

Diptera for practising predatory envenomation in both the larval and adult stages. Adults will take a wide range of prey, including many large and venomous arthropods, typically catching them on the wing and envenomating them in the back of the head (Whitfield, 1925). Recently we have investigated the composition of the venom produced by the giant robber fly *Dolopus genitalis*, again using RNA sequencing and mass spectrometry. As well as being used in similar ways, we found molecular convergence between assassin bug and robber fly venom: *D. genitalis* venom comprises enzymes, unknown proteins as well as numerous peptide toxins. What was really striking is the diversity of robber fly venom peptides: whereas we found only one or two putative 3D folds for assassin bug venom peptides, the robber flies feature several peptide families, including the insect defensin family that underlies the neurotoxic activity of scorpion venoms and the inhibitor-cystine-knot family that underlies the neurotoxic activity of spider venoms. However, both assassin bug and robber fly venoms show a much greater proportion of larger proteins in their venoms compared to scorpions or spiders. Most likely, this is because of the extra-oral digestion role of the venom. Scorpions and spiders practice extra-oral digestion too, but both groups do so using glandular secretions entirely separate from the venom apparatus. In assassin bugs and robber flies, we think the one secretion performs both prey capture and digestion roles, leading to the abundance of enzymes and other proteins in the venom.

To put this hypothesis to the test, I decided to examine a venom that is used in an entirely different way from venoms of reduviids or asilids. After reviewing the possibilities, I settled on caterpillars. Some lepidopteran larvae are unusual among insects for producing venom that is used only for predator deterrence, rather than prey capture or parasitism. As far as I am aware, this is a feature that only occurs in hymenopterans such as bees (where it represents a highly derived state), one species of cerambycid beetle (Berkov et al., 2008), and the soldier castes of some communal aphids (Stern and Foster, 1996). Caterpillar venom previously investigated has been from South American saturniids, *Lonomia* sp., that occasionally cause human fatalities through interference with blood and organ systems (Carrijo-Carvalho and Chudzinski-Tavassi, 2007). We also have caterpillars in Queensland that inject liquid venom for defense, especially from a family that is phylogenetically distant to *Lonomia*, which is the Limacodidae (Zygaenoidea). So far, I have collected venom from four Queensland species, *Doratifera vulnerans* (Figure 4), *D. casta*, *D. quadrigutta*, and *Anaxidia lozogramma*. Consistent with our previous speculation, we found that venoms produced by limacodid caterpillars hav a different molecular weight profile to the oral venoms produced by assassin bugs and robber flies: like spider and scorpion venoms, it consists almost entirely of peptide toxins. Currently, we are working to elucidate the structure of the limacodid venom gland and the detailed composition of the venom. While we hope that assassin bug and robber fly venom might contain molecules capable of inspiring new, environmentally friendly bioinsecticides, limacodid toxins may help us probe mechanisms of pain signalling in humans (e.g., Osteen et al., 2016), towards new treatments for conditions such as chronic pain.

Figure 4: Nettle caterpillar *Doratifera vulnerans* showing rosettes of injecting bristles which are everted when threatened. Photo: Jiayi Jin.

Collection note

I am currently welcoming any information about, or donations of, species of Limacodidae with venomous larvae. Most especially, I am looking for *Calcerifera ordinata*, *Anaxidia lozogramma*, and other venomous species outside genus *Doratifera*. As well as caterpillars, I would welcome donations of adult moths collected at lights that might include gravid females. Donations attract a finder's reward of a bottle of wine/block of chocolate/$15 donation to a charity of your choice.

Left: *Anaxidia lozogramma*. Photo: Peter Woodall. Right: *Calcerifera ordinata*. Photo: Peter Chew.

References

Berkov, A., Rodriguez, N., Centeno, P., 2008. Convergent evolution in the antennae of a cerambycid beetle, *Onychocerus albitarsis*, and the sting of a scorpion. Naturwissenschaften 95, 257–261.

Carrijo-Carvalho, L.C., Chudzinski-Tavassi, A.M., 2007. The venom of the *Lonomia* caterpillar: An overview. Toxicon 49, 741–757.

Dutertre, S., Lewis, R.J., 2010. Use of venom peptides to probe ion channel structure and function. J. Biol. Chem. 285, 13315–13320.

Fenner, P.J., Williamson, J.A., Myers, D., 1992. Platypus envenomation—a painful learning experience. Med. J. Aust. 157, 829–832.

Fry, B.G., Roelants, K., Champagne, D.E., Scheib, H., Tyndall, J.D., King, G.F., Nevalainen, T.J., Norman, J.A., Lewis, R.J., Norton, R.S., Renjifo, C., de la Vega, R.C., 2009. The toxicogenomic multiverse: Convergent recruitment of proteins into animal venoms. Annu. Rev. Genom. Hum. Genet. 10, 483–511.

Jansa, S.A., Voss, R.S., 2011. Adaptive evolution of the venom-targeted vWF protein in opossums that eat pitvipers. PLoS One 6, e20997.

King, G.F., 2011. Venoms as a platform for human drugs: Translating toxins into therapeutics. Expert Opin. Biol. Ther. 11, 1469–1484.

King, G.F., Hardy, M.G., 2013. Spider-venom peptides: Structure, pharmacology, and potential for control of insect pests. Annu. Rev. Entomol. 58, 475–496.

Osteen, J.D., Herzig, V., Gilchrist, J., Emrick, J.J., Zhang, C., Wang, X., Castro, J., Garcia-Caraballo, S., Grundy, L., Rychkov, G.Y., Dekan, Z., Undheim, E.A.B., Alewood, P.F., Brierley, S.M., Basbaum, A.I., Bosmans, F., King, G.F., Julius, D., 2016. Subtype-selective spider toxins implicate $Na_V1.1$ voltage-gated sodium channels in mechanical pain. Nature 534, 494–499.

Piek, T., Hue, B., Lind, A., Mantel, P., van Marle, J., Visser, J.H., 1989. The venom of *Ampulex compressa*—effects on behaviour and synaptic

transmission of cockroaches. Comp. Biochem. Physiol. C 92, 175–183.

Stern, D.L., Foster, W.A., 1996. The evolution of soldiers in aphids. Biol. Rev. 71, 27–79.

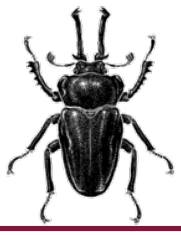
Sunagar, K., Moran, Y., 2015. The rise and fall of an evolutionary innovation: Contrasting strategies of venom evolution in ancient and young animals. PLoS Genet. 11, e1005596.

Takáč, P., Nunn, M.A., Mészáros, J., Pecháňová, O., Vrbjar, N., Vlasáková, P., Kozánek, M., Kazimírová, M., Hart, G., Nuttall, P.A., Labuda, M., 2006. Vasotab, a vasoactive peptide from horse fly *Hybomitra bimaculata* (Diptera, Tabanidae) salivary glands. J. Exp. Biol. 209, 343–352.

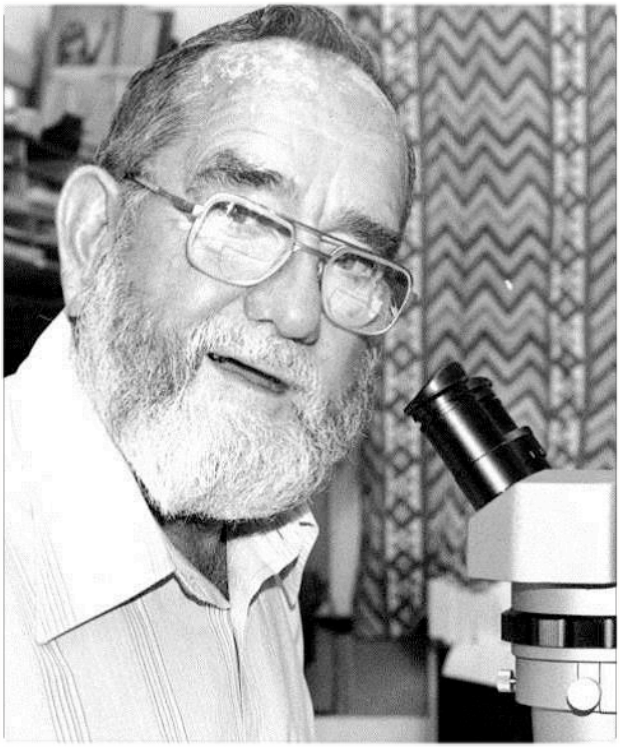
Walker, A.A., Madio, B., Jin, J., Undheim, E.A., Fry, B.G., King, G.F., 2017. Melt with this kiss: Paralyzing and liquefying venom of the assassin bug *Pristhesancus plagipennis* (Hemiptera: Reduviidae). Mol. Cell. Proteomics 16, 552–566.

Walker, A.A., Mayhew, M.L., Jin, J., Herzig, V., Undheim, E.A.B., Sombke, A., Fry, B.G., Merritt, D.J., King, G.F., 2018. The assassin bug *Pristhesancus plagipennis* produces two distinct venoms in separate gland lumens. Nat. Commun. 9, 755.

Whitfield, F.G.S., 1925. The relation between the feeding-habits and the structure of the mouth-parts in the Asilidæ (Diptera). Proceedings of the Zoological Society of London 95, 599–638.



The History Corner...



Douglas WALLACE (1923-2012)

Born Brisbane and grew up in Rockhampton. Served in PNG during WWII and qualified as a trade carpenter on return and lived 60 years in Rockhampton house he built. Strong interest in spiders. Assisted Queensland Museum surveys and sent many specimens to QM. Several species named in his honour. Formed local arachnology society and edited its newsletter for many years. Acted as local spider expert, gave talks to schools and assisted ambulance with identifications. His collection now on display at Rockhampton Botanical Gardens. Received an Order of Australia Medal in 2004 and awarded an Honorary M.Appl.Sc. from Central Queensland University in 2005.

Obituary: Wallace, Diane, 2013. Douglas Wallace OAM (1923-2012), *Australasian Arachnology* 85:13-15.

Entomology News

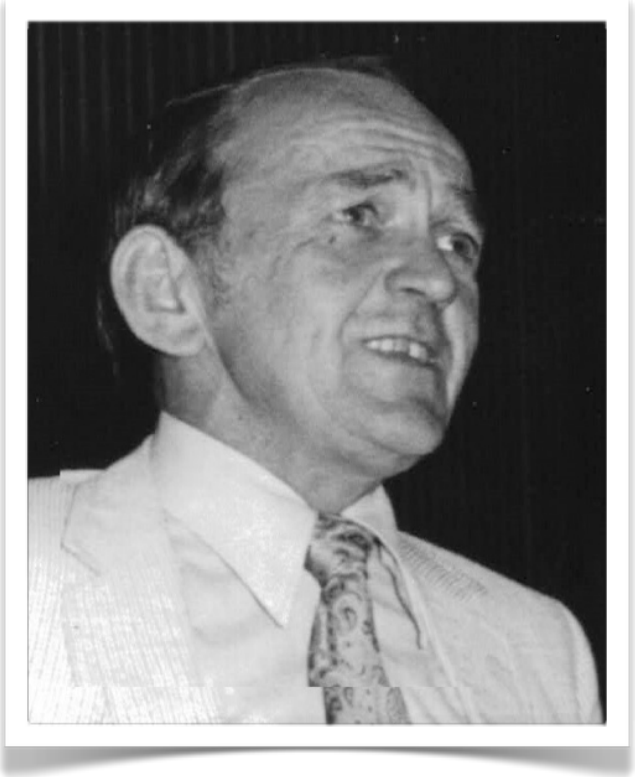
from Queensland and beyond...

Beetles and butterflies on the bridge

The World Science Festival is a public entertainment concept conceived in New York where it has run for more than a decade. Since 2016, the Queensland Museum has coordinated an annual series of companion events under the title *World Science Festival Brisbane*. This year's festival took place in March and it had ancillary events running in the country centres of Gladstone, Ipswich, Chinchilla, Townsville and Towoomba. All the QM entomology and arachnology staff were busy running displays, talks, demonstrations and behind-the-scenes tours during this time. Insects got a special Festival guernsey when a laser light show was held projecting Geoff Thompson's giant insect images on to the sides of the William Jolly Bridge in downtown Brisbane. They included ESQ's famous logo insect, the NQ stag beetle, *Phalacrognathus muelleri.*

Noel Starick brought the wonderful world of insects to the World Science Festival, Regional Program in Chinchilla. Photo credit: Queensland Museum.

William Jolly Bridge over the Brisbane River. Photo credit: David Sandison, Brisbane City Council Publicity Dept.



Valé THOMAS 'TOM' PASSLOW

1 November 1927 – 31 December 2017

Tom Passlow grew up in the Riverina District of New South Wales around the towns of Wagga Wagga and Grong Grong. After completing high school, Tom enrolled in an agriculture course at the University of Sydney; after graduating B.Sc.Agr he moved to Queensland when he was appointed as Assistant Entomologist in the then Department of Agriculture and Stock, Science Branch, in early 1950. He was stationed in Toowoomba, where he was mentored during his formative years by cotton pest entomologist, Alan May, of subsequent fruit fly fame. May was then researching the relationship between leaf hairiness and susceptibility to cotton jassid; so it comes as no surprise that Tom also worked in cotton initially, with a focus on the pest status of heliothis moths.

Following a transfer as entomologist-in-charge of the Rockhampton field station, Tom's focus shifted from cotton to sorghum, but his interest in defining pest status continued as he investigated the relationship between pest population density and damage by sorghum midge. This research formed the basis of his M.Sc.Agr. thesis and gave him a thorough understanding of the principles of integrated pest management (IPM) with its focus on incorporating cultural and ecological control methods in lieu of previous reliance on calendar chemical applications to control crop pests. This was the vanguard of the era of phasing out chlorinated hydrocarbon chemicals such as BHC, Chlordane and DDT.

Tom was later promoted to entomologist-in-charge back at Toowoomba, where he remained until being appointed as Director of Entomology Branch of by now, the Department of Primary Industries (DPI), in Brisbane in 1973, a position he held until his retirement in 1987. While this role had a significant administrative content, Tom's knowledge of chemical control was utilised as a member of the oddly-named Agricultural Requirements Board; this Board, part of the function of DPI Standards Branch, required Tom to assess applications by chemical companies for registration of insecticidal products for use in Queensland. Tom also served as Queensland representative on various national agricultural committees and was President of the Entomological Society of Queensland in 1975.

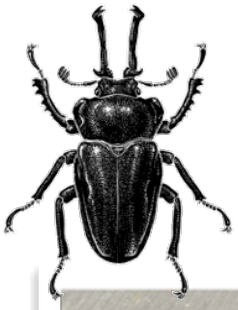
Tom is remembered fondly by all entomologists who served under his leadership; he was a staunch discipline advocate who strongly encouraged professional development of his staff, an attitude that resulted in most entomologists gaining higher degrees as an adjunct of their entomological research. He was ahead of his time in encouraging networking with entomologists researching common crop problems interstate, in an era when Queensland Government vehicles could not be taken interstate without special permission.

Tom nurtured a generation of entomologists appointed in the 1960's and 1970's, working throughout Queensland in the development of IPM systems in both horticultural and agricultural crops and in the post-harvest field; he was also a strong

supporter of the taxonomists providing diagnostic identifications to assist IPM.

As all who knew Tom will attest, he also took an interest in the family lives of his staff, always ready to 'bend the rules' as required to enable staff to attend to emergent family needs. This aspect mirrored Tom's own belief in family; he is survived by his wife Margot and children Simon, Mark, Tim, Lisa and their partners as well as 8 grandchildren. Another son, Paul, predeceased Tom in infancy.

--Bryan Cantrell



Dung beetle "Haute couture": A *Sisyphus spinipes* covers herself in the 'finest attire' prior to rolling a ball to lay her egg in. Is it to protect herself from predators or is it to attract a mate? *Sisyphus spinipes* are native to central and eastern Africa, but were introduced to Australia in the late 1970's. They are now found throughout SE QLD and northern NSW. Photo: K. Ebert

PHOTO CAPTION: Tom Passlow with other DPI entomologists at a workshop at the Nambour Field Station in 1968. 1. Lindsay Rigby, 2. David Ironside, 3. Ian Galloway, 4. Dan Smith, 5. Don Rossiter, 6. Rod Elder, 7. Barry Ingram, 8. Merv Bengston, 9. John Turner, 10. Frank Page, 11. John Barrett, 12. Bruce Sabine, 13. Bill Yarrow, 14. Arthur Smith, 15. Alf Brimblecombe, 16. Tom Passlow, 17. Bernie Franzmann, 18. Jack Davis, 19. Ian Cunningham.

Australian Fritillary listed as critically endangered

Fritillaries are familiar nymphalid butterflies in the northern hemisphere and most species have a spotted pattern of orange and black, with distinctive silvery markings on the underside of the hindwings. One of the few fritillaries to occur in the southern hemisphere is the Australian Fritillary, *Argynnis hyperbius inconstans* Butler, 1873 (Fig. 1) which is known from just a few localities in SE Queensland and NE New South Wales and breeds on the native arrowhead violet, *Viola betonicifolia* (Fig. 2). On August 15, 2017, the species was added to the "Critically Endangered" category under the federal *Environmental Protection and Biodiversity Conservation Act 1999.* Details of the criteria under which it was listed are available at http://www.environment.gov.au/biodiversity/threatened/species/pubs/88056-conservation-advice-15082017.pdf The species is also listed as "Endangered" under state conservation legislation in both NSW and Queensland.

Fig 1. Upperside (left) and underside of an Australian Fritillary from Woondum, near Gympie (ex Lambkin 2017).

Soon after its listing, ESQ member Trevor Lambkin (Fig. 3) published a comprehensive review of the collection history and biology of the Australian Fritillary in our scientific journal, *Australian Entomologist.* At 46 pages, Trevor's paper is the longest to be published in the 45 year history of the journal. His paper reviews all literature and gives a detailed and thorough chronological account of the specimens known in Australian collections, their collectors and the localities from which they came. The earliest specimens known are two, without localities, located in a case of assorted animal specimens sent by Governor Macquarie to Scotland in 1822 and repatriated to the NSW State library in 2004. The species was not named until 1873 on the basis of specimens from "Moreton Bay" (=Brisbane) and "Australia". It was later collected at Bulimba and Indooroopilly within the Brisbane area but has not been taken near Brisbane for more than 50 years.

Fig 2. *Viola betonicifolia,* foodplant of the Australian Fritillary (ex Lambkin 2017).

The Australian Fritillary has shown a pattern, over the years, of appearing in quite strong colonies in discrete localities of favourable habitat, persisting for a year or two, and then mysteriously vanishing. Trevor's paper documents in detail these occurrences which have taken place at many sites and he pays special attention to the colony that Doug

Fig 3. Trevor Lambkin (left) and his grandson Alexander Davies with Australian Fritillaries (top left group in drawer) in Trevor's collection.

Binns discovered just south of Gympie in 1976 and which yielded more than 100 specimens before disappearing completely after the site was bulldozed the following year. Other colonies have appeared near Coolum and Caboolture in Queensland, and near Condong, Coraki and Port Macquarie in northern NSW. However the last specimen to be recorded in Queensland was 25 years ago in 1988 and the last specimen taken anywhere was one collected by John Moss 5 km N of Port Macquarie in April 2001. Trevor's grandson, Alexander (Fig. 3), himself an enthusiastic naturalist, prepared a drawing of that last specimen for Trevor's paper (Fig. 4).

There is a distinct possibility that the species has slipped into extinction and there is an urgent need to locate a surviving colony that might provide stock for artificial breeding of this unique member of Australia's butterfly fauna.

REFERENCE

LAMBKIN, T. A. 2017. *Argynnis hyperbius inconstans* Butler, 1873 (Lepidoptera: Nymphalidae: Heliconiinae): a review of its collection history and biology. *Australian Entomologist* **44**(4): 223-268.

DIY Go Extinct!

Celebrate the creativity of science with game design!

Be the first to try an all-new free online game design platform that allows kids to design their own science board game about evolution and Australia's biodiversity. **DIY Go Extinct!** is a new game design platform created to inspire a greater diversity of kids to pursue science. The interactive platform features Australian flora, fauna and fossils. Join us for the launch!

When: Sunday, 29 April, 9am-noon
Short speeches will start around 9am
Walk in anytime for game designing

Where: The Edge (State Library), South Bank, Brisbane

Who: curious humans age 8+

Cost: Free!

Learn more at: www.steamgalaxy.com/launch/

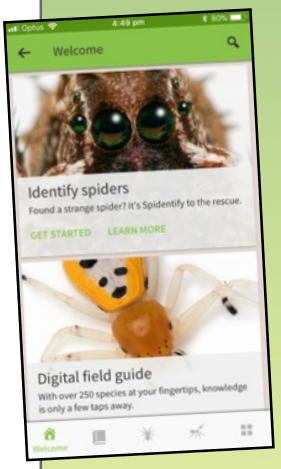
DIY Go Extinct! was created by Ariel Marcy, a current PhD candidate at the University of Qld.

Fig 4. Alexander Davies' drawing of the last fritillary collected in Australia, by John Moss near Port Macquarie in April 2001 (ex Lambkin 2017).

Valé JOHN HEMINGWAY BARRETT

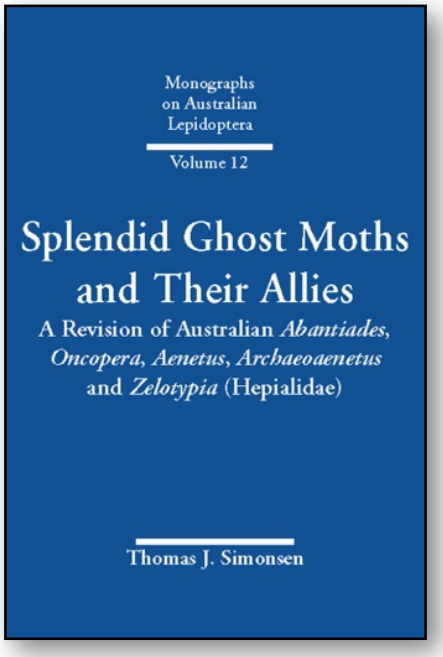
Born late 1927, died 6 Nov 2016, Atherton

John Barrett was born in 1927 and raised on a dairy farm near Biggenden, in the Maryborough hinterland, and did a Horticulture Diploma at Gatton College in the 1940s. He initially worked for Qld Dept of Agriculture and Stock at Stanthorpe and then took a position with the Agriculture Department in Papua New Guinea, based at Goroka. The PNG government supported him to do a BAgSc at UQ majoring in entomology in the mid-1950s. Always an adventurous free spirit, John was co-conspirator with John Leslie, in a daring nocturnal prank during this period to paint footprints up the outside of Gatton College's tall water tower, a feat that is now part of College folk lore. He returned to PNG and was based at Aiyura in the Highlands for 5-6 years where he researched and published on pasture pests and coffee pests. He also published the first paper on the biology of the spectacular giant weevil, *Vanapa oberthuri,* a native insect which was becoming a pest in hoop pine plantations in PNG. John had interests in all insects and made substantial collections of native PNG insects for the Department collection which was then growing in Port Moresby. Among other discoveries, he reared and published on the first PNG record of the strange and rare wasp family Sclerogibbidae which parasitise Embioptera. John also hosted many visiting collectors during his PNG years. Around 1964-66 he was sponsored by PNG to do an MSc at UQ in Brisbane and was Treasurer of ESQ for three years at that time. He gave a talk to ESQ on entomology of the NG Highlands in April 1964 which was published as a lengthy 12-page article in ESQ News Bulletin No 2. John returned to PNG for a short time after completing his MSc but then took an appointment as entomologist with the Qld DPI and was based at Brisbane before transferring to Atherton in the 1970s. He dealt mainly with pasture insects. With his field assistant John Brown he did a lot of survey work on termites, and had a fascination with the giant grass-eating termite mounds of Cape York Peninsula, compiling statistics on their size and orientation. He later returned to the DPI Indooroopilly Lab before retiring and then returned to live out his last years in the tropics at Tolga, near Atherton. He helped the giant papaya fruit fly eradication campaign in NQ in the 1990s by running monitoring traps. John had vast knowledge of insects and their life histories and great enthusiasm for field work.



A new App to help identify Australian spiders

Alan and Caitlin Henderson from Minibeast Wildlife have developed a new App called "Spidentify". The App combines fantastic photography with detailed descriptions and behavioural information. The identification steps lead you to a range of photos of likely identifications. There's even a "bite rating": a guide to the relative toxicity of the spider's bite. The App includes information and photos on over 250 species of Australian spiders. Find out more at identify-spiders.com or www.minibeastwildlife.com.au/resources/spider-identification



Book Review

***Splendid Ghost Moths and Their Allies. A revision of the Australian* Abantiades, Oncopera, Aenetus, Archaeoaenetus *and* Zelotypia *(Hepialidae). Monographs of Australian Lepidoptera.* Vol. 13.**

By Thomas J. Simonsen

CSIRO Publishing, Clayton South. Vic. 300pp.

48 col. plates. Hardback, cloth. $195.00.

Australia is blessed with an abundance of large and often spectacular Ghost Moths. These attract a dedicated and active following of collectors whose numbers have greatly increased during the preparation of Thomas' book. This has been aided by John Grehan, a New Zealander based in the USA who runs a newsletter service for those enthused by these splendid moths. Splendid they are and this book does them full justice.

Thomas' book deals with the subfamily Hepialinae which includes the most colourful genus of all, *Aenetus*, now with 18 species (three new ones are described in the book) with its brilliant, sometimes opalescent, colours of blue-green, green, pink, white and brown and with some mauve and rose colours unstable after death. I remember a flight of males of *Aenetus mirabilis* coming to light, one after the other, over about a minute, a sight I'll never forget. Then there is the massive, magnificent, *Zelotypia stacyi*, probably the largest hepialid in the world.

The book contains a very detailed section on morphology which reflects Thomas' training in Denmark with the world's foremost insect morphologist and also the work of the late Ebbe Nielsen who started the hepialine project before his untimely death. There is a significant section on biology followed by a checklist of species and then the taxonomic section which incorporates keys to genera and species. Each species is described, diagnosed, the genitalia described and illustrated and detailed distribution recorded with a map. Type specimen and synonymic details are given. All species are illustrated in colour from museum specimens and there are many colour images of live moths and localities.

Ever since John Lewin in 1805 described and illustrated the adult and larva of *Aenetus ligniveren,* Australian Lepidopterists have been excited by these gorgeous moths and *Aenetus* and *Zelotypia* have been reared by many people and this is the main way they are collected because they come only reluctantly to light. Lewin was followed by A. Walker Scott in the 1860s who reared and described more of the eastern-coast species. *Aenetus* and *Zelotypia* are woody-stem boring species. *Abantiades* (37 species and which now incorporates *Trictena* and *Bordaia*) is the largest genus treated in the book. The adults fly with the autumn rains and, like *Oncopera*, the larvae live underground and the adults come to light readily. These two genera were well studied by Norman Tindale in the 1930s and Thomas' book adds many new species. Discovery of the biology of *Archaeoaenetus,* newly described in Thomas' book, will now become the holy grail of hepialid connoisseurs.

This magnificent book is manna from heaven for all Australian Lepidopterists. Technical, yes, accurate and comprehensive, yes, but you can extract that which suits your taste and revel in the glory of these wonderful moths. Hang the expense.

--Ted Edwards.

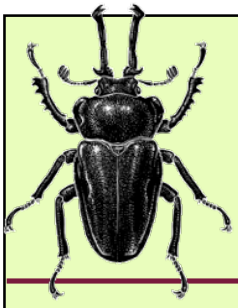
Aenetus mirabilis Rothschild, 1894
Photo from ***Splendid Ghost Moths and their Allies.***

Aenetus scripta (Scott, 1869) Photo from ***Splendid Ghost Moths and their Allies.***

Mysterious termite behaviour

Recently, the Queensland Museum entomology staff received an interesting photo and query from Mr. Michael Nardella of Wakerley. Michael photographed the curious behaviour of a number of termites parading around a galvanised bolt in his backyard. Someone suggested that perhaps they were magnetic termites, however this is questionable given the uneven distance around the bolt. Another suggested they were bolting....

Has anyone else seen this sort of behaviour before??



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

Answer to last month's mystery photo:

The mystery photo is of one of our native bees in the Family Megachilidae. Well done to Judy King and Kit Prendergast who both guessed correctly! Kit, a postgrad student studying native bees at Curtin University, very kindly offered to tell us a bit more about *Megachile*.
The photo shows a male megachilid, *Megachile lucidiventris*, showing his modified, expanded fore tarsi (believed by some to cover up the eyes of the female whilst they're mating so she doesn't get distracted or see another male she likes the look of better!) Bees in the family Megachilidae are important pollinators as the females have their **scopae** (pollen carrying hairs) on the underside of the abdomen, which is an ideal location for pollen to be brushed off onto the stigma of flowers they visit. In nature, most species nest in pre-made cavities created by wood-boring beetles, and many species readily adopt "bee hotels", giving the public a great opportunity to observe these endearing bees.

Megachile lucidiventris Smith, 1853 Photo credit: Mark Newman

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

Word of the month: corbicula

Noun. (Latin, *corbicula* = little basket. PL, corbiculae.) Found in some types of bees (Apoidea): a concave, smooth area of the hind tibia surrounded by a fringe of hairs along the margin. The corbicula collects and holds pollen and other materials for transport to nest.

Definition from:
Gordh G & Headrick D. 2011.
A dictionary of entomology. CSIRO Publishing.

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

Announcements

Butterfly Dome

Volunteers needed!! Ekka 2018

--Cancelled--

This year's Ekka theme is "***In our backyard***".

In the grounds of the Old Museum Building there will be a w[illegible]k-th[illegible]ugh butterfly dome. This will be sponsored by a collabora[illegible]ve [illegible]for[illegible]ated by Horticultural Training P/L.

This magnificent exhibit will be an [illegible]at[illegible]al [illegible]erience for all visitors linking science, education, nature and art with a gold co[illegible]na[illegible] Ca[illegible]Research. Inside the 8 metre dome there will be free flying butterfly species mo[illegible] likely s[illegible]n [illegible]ur local backyards - adults and immatures, together with their host plants and interpreta[illegible]e si[illegible]age. There will also be hands-on activities nearby.

The plannin[illegible] of this exhibit is in the early stages, and there are lots of fantastic ideas being floated around however any suggestions or ideas for activities are most welcome. Volunteers will be needed to man the dome during the days, Friday 10 August to Sunday 19 August, possibly in 2 hour shifts. If you would like to help us make this an amazing experience for all ages with all profits going to Cancer Research, please email Desley Tree – treefamily@bigpond.com

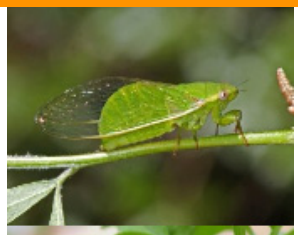
BOIC BUTTERFLY AND OTHER INVERTEBRATES CLUB

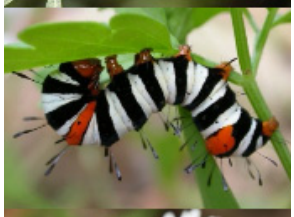
$250 cash prize & more

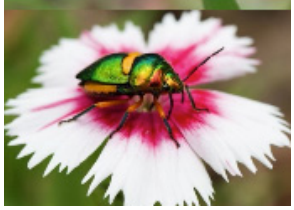
Invertebrate Photo Competition

Calling all Year 9-12s

Capture your best video or snapshot and enter the Butterfly and Other Invertebrate Club photo competition for your chance to win some great prizes. First prize includes $250 cash, a book of your choice, one year membership to BOIC and a complimentary full day visit to the award-winning **Toohey Forest Environmental Education Centre** for you and your class.







To Enter:

Email your authentic invertebrate photo with details including location and date, and description of the subject (max.500 words) by 26 June 2018.

Submit your entry to principal@toohforeeec.eq.edu.au

The BOIC, in conjunction with the Toohey Forest Environmental Education Centre, is sponsoring the competition to encourage interest in invertebrates by young people.

Meetings & conferences

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/

10th International Workshop on the Molecular Biology and genetics of the Lepidoptera
19-25 August 2018
Orthodox Academy of Crete
Kolympari, Crete, Greece
https://web.uri.edu/lepidoptera/

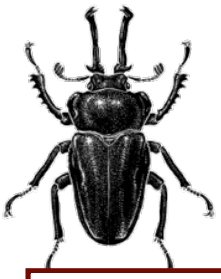
XXVII Brazilian Congress of Entomology and XV Latin American Congress of Entomology
September 2–6, 2018
Gramados, BRAZIL
https://www.cbe2018.com.br/pt/

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

9th International Congress of Dipterology
25-30 November 2018
Windhoek, Namibia
https://icd9.co.za/



Diary Dates for 2018

Meetings held on the second Tuesday of the respective month

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

SOCIETY SUBSCRIPTION RATES

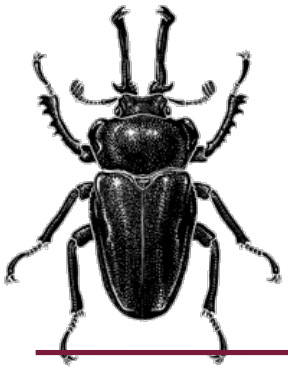
GENERAL	Person who has full membership privileges	**$30pa**
JOINT	Residents in the same household who share a copy of the *News Bulletin*, but each otherwise have full membership privileges.	**$36pa**
STUDENT	Student membership conveys full membership privileges at a reduced rate. **Free the first year**, $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, 8 May 2018, 1:00 pm

Dr Brendan Trewin

Postdoctoral Fellow

CSIRO

Health & Biosecurity Business Unit

will present:

"The history of Aedes aegypti *in southeast Queensland and novel techniques for its surveillance and control"*

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 3 (May 2018)

CONTRIBUTIONS WELCOME

Deadline Thursday May 17th, 2018.

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