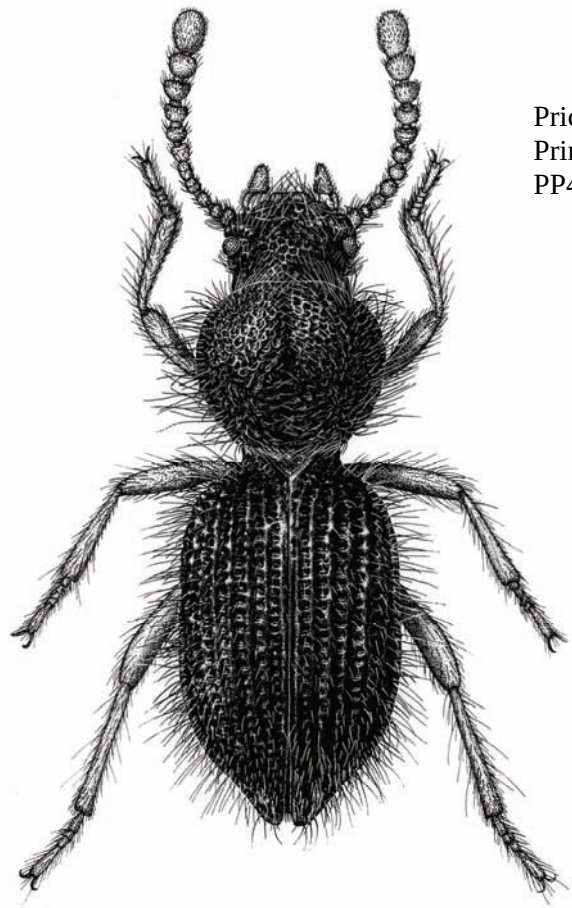
ENTOMOLOGICAL SOCIETY OF QUEENSLAND INC

NEWS BULLETIN



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THE ENTOMOLOGICAL SOCIETY OF QUEENSLAND

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Front Cover Illustration: *Apocryphodes thompsoni* Matthews, 1998 (Tenebrionidae; Adeliini). This specimen is a paratype illustrated by Geoff Thompson for the original description; collected from leaf litter in 1984 on one of Geoff Monteith's North Queensland field trips by Val Davies, Geoff Thompson and Julie Gallon, at Gayundah Creek on Hinchinbrook Island.

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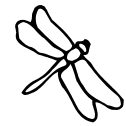


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The **ENTOMOLOGICAL SOCIETY OF QUEENSLAND INC.**, since its inception in 1923, has striven to promote the development of pure and applied entomological research in Australia, particularly in Queensland. The Society promotes liaison among entomologists 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 Monday of each month (March to June, August to December), or on Tuesday if Monday is a public holiday. 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. It is restricted to the rainforests of northern Queensland.

Minutes of General Meeting

Held in Seminar Room 1– ground floor, Ecosciences Precinct, Boggo Rd, Dutton Park, Tuesday, April 10 at 1.00pm.

Chair: Geoff Thompson,

Attendance: Justin Bartlett, Bradley Brown, Stephen Cameron, Pat Collins, Lyn Cook, Li Xin Eow, Alexandra Glauerdt, Tim Heard, Judy King, Simon Lawson, Stephen Lawson, Lance Maddock, David Merritt, Penny Mills, Chris Moeseneder, Geoff Monteith, Bill Palmer, Brenton Peters, Vanessa Ryan, Don Sands, Desley Tree, Federica Turco.

Visitors: Yuvarin Boontop, Lynne Griffin, Tim Lee, Hector Urbina, R. Zhy

Apologies: Matthew Purcell Ross Kendall, Gio Fichera, Morris MaKee

Minutes: The minutes of the last General Meeting were circulated in News Bulletin Vol. 39, Issue 10 January/February 2012.
Moved that the minutes be accepted as a true record: Don Sands.
Seconded: Stephen Cameron.
Carried unanimously.

Business arising
None.

Nominations for Membership:
General Membership: Peter Negus, Wishart, Qld. Nominated by Alisha Steward, seconded by Ross Kendall.
Student Membership
Lyndy Marshall, Gayndah, Qld. Nominated by Judy King, seconded by Brenton Peters.
New members were elected unanimously.

General Business:
1. The President spoke about the suggestion that the meeting day should be changed from the second Monday of the month to the second Tuesday, to avoid overlap with seminars at the Herbarium. A note will be published in the Bulletin, and members can provide feedback to the President or the secretary.
2. The President reminded members about the Student Award and asked that students be encouraged to enter before the looming deadline.
3. The next meeting, May 14th, will be held in the Library on the ground floor of the Ecosciences building instead of the ground floor seminar room. Members must sign in and collect a visitor's pass at Reception.

Main Business

Insect Evolutionary Genomics

Stephen L. Cameron

Advances in DNA sequencing technology over the last two decades have put ever increasing quantities of molecular data at the disposal of evolutionary entomologists and made the study of evolutionary genomics a reality. The most widely studied insect genomic system is mitochondrial genomics. Mitochondria are the descendents of alpha-proteobacteria which became associated with the ancestor of eukaryotes in a permanent symbiosis over 1 billion years ago, and as degenerate bacteria retain a degenerate bacterial-like genome (circular, no histones, no introns, genes transcribed polycistronically) (Lane 2005). The mitochondrial genome of all metazoans, including insects, is the smallest extant genome averaging just 13-15,000 bp in size. With a few exceptions in highly derived groups such as some nematodes, the gene complement is fixed across metazoa, with just 37 genes (13 protein-coding genes, 2 ribosomal RNA genes, 22 transfer RNA genes) and the arrangement of those gene within the genome is often fixed for large taxonomic groups such as phyla or classes (Boore, 1999). Mitochondrial genomes are now available for a wide variety of taxa including over 300 insects and representatives of all orders except the Zoraptera. Broadly speaking research on mitochondrial genomics has covered a wide range of

topics including mitochondria-related diseases and aging, inheritance dynamics, as data sources for population genetics, phylogenomics and use as a genomic model-system. My own work has mostly concentrated on using mitochondrial genomes in phylogenomics (as a source of sequence characters for the reconstruction of insect phylogenetic trees) and in using insects as model systems for understanding the evolution of mitochondrial genomes themselves.

Mitochondrial genomes are the largest molecular data source which has been used widely in insect systematics. Full nuclear genomes are available for representatives of just 7 insect orders with transcriptomes available for several additional orders, however for neither data source does sampling extend beyond two or three lineages within each order and for most orders only a single species has been sequenced (Yeates et al. *in press*). By contrast, in almost all insect orders multiple mitochondrial genomes have been sequenced and in many instances these represent multiple suborders or the major lineages identified within the order rather than oversampling of a few lineages. Phylogenomic studies of insect using mitochondrial genomes as their data source have addressed phylogenetic questions at the interclass (e.g. hexapod monophyly: Cameron et al. 2004), interordinal (e.g. relationships within Polyneoptera and Neuropterida: Cameron et al. 2006; 2009), and intraordinal levels (e.g. Diptera, Orthoptera, Hymenoptera, and Coleoptera: Cameron et al., 2007a; Fenn et al. 2008; Dowton et al. 2009; Song et al. 2010) plus within families (e.g. Calliphoridae: Nelson et al. *in prep*.). The mitochondrial genome has proven to be a reliable source of phylogenetic data across a broad range of evolutionary time scales and at multiple phylogenetic levels. In parallel, these studies have also investigated issues associated with the analytical methods used to reconstruct phylogenies with mitochondrial genome data and analytical artefacts specific to this data type.

The examples discussed in the presentation highlighted some of these issues. An analysis of the holometabola with an emphasis on understanding relationships within the Neuropterida revealed that phylogenetic modelling was crucial to accurate reconstructions (Cameron et al. 2009). Utilising methods which did not account for among site rate heterogeneity (e.g. parsimony reconstruction) resulted in a polyphyletic Neuropterida with Megaloptera+Neuroptera sister to flies and the Raphidioptera sister to all Holometabola except Hymenoptera. In contrast model based approaches which incorporate among-site rate heterogeneity (e.g. Bayesian analysis but not LogDet transformations) resulted in more "conventional" relationships – a monophyletic Neuropterida which was the sister group of beetles. The second example (Cameron et al. *in review*) concerning the phylogeny of termites found that dramatic differences in base composition, termites are 7% more G+C rich than other insects, 15% richer at third codon positions, resulted in artefactual relationships within the non-termite dictyopterans included in the study. When third codon positions were included Mantodea was derived from within Blattodea and the Polyphagidae were the sister-group of all non-termite dictyopterans. When third codon positions were excluded again we find more "conventional" relationships, Mantodea as sister to remaining Dictyoptera and Polyphagidae as sister to the termites+*Cryptocercus*. In both instances mitochondrial phylogenomics provided robust resolution of regions of the insect tree of life which have proven difficult to address with morphological or multi-gene molecular phylogenies however care needs to be taken in the use of these data to avoid artefactual relationships.

My second major area of investigation has been into the use of insects as model systems for understanding the forces which shape mitochondrial genome evolution. Much of this work has focused on lice which are distinctive amongst insect

mitochondrial genomes in breaking so many "rules". All species of lice examined to date have highly rearranged mitochondrial genomes with at most 3 of the 37 gene boundaries conserved from the ancestral insect (Covacin et al. 2006). In contrast, few insects have more than 1 or 2 genes rearranged and most of those are close relatives of the lice (members of the Paraneoptera). Secondly, pseudogenes are relatively common in lice and include both tRNA and protein-coding genes, whereas they are almost unknown in non-lice (Cameron et al. 2007b). Third, heteroplasmies (differences between different copies of the same genome within a given individual) are common especially single nucleotide heteroplasmies and variable length polynucleotide runs within protein-coding genes (Cameron et al. 2011). While text book discussions of mitochondrial inheritance deny the possibility of heteroplasmies (the mitochondria is haploid is the dogma), they are known in other insects in which, however, they only concern non-coding regions of the mitochondrial genome. Finally, mitochondrial genome deletions are common having been found in the majority of louse genomes sequenced to date. This is most extreme within the sucking lice (the Anoplura) and mammal lice (the Trichodectidae) where the mitochondrial genome has broken up into up to 18 minichromosomes each with only 1-3 genes (Shao et al. 2009). This is the most significant departure from the canonical mitochondrial genome structure of a single chromosome with 37 genes found in the entirety of animals.

The sequencing of the body louse (*Pediculus humanus*) nuclear genome in 2007 provided the opportunity to study the interaction between the nuclear and mitochondrial genomes and how gene encoded on the former are involved in the maintenance of the latter (Kirkness et al. 2010). Annotation of the nuclear-encoded, mitochondrially targeted genes in the *Pediculus* genome demonstrated that most of the metabolic functions of the louse mitochondria were maintained despite a radically different genome structure (Cameron et al. 2011). High similarity homologues were identified for over 90% of the oxidative phosphorylation, mitochondrial metabolism, protein synthesis and membrane transport proteins previously identified from *Drosophila*. In contrast the mitochondrial DNA replication genes of *Pediculus* were highly modified with the loss of one of the four components (mitochondrial single-stranded binding protein: mtSSB) found in all mitochondrial replisomes studied to date, and significant domain-modification of the other three proteins (Twinkle, Polymerase Gamma A and Polymerase Gamma B) (Cameron et al. 2011). Comparison with other paraneopteran nuclear genome datasets (*Acyrthosiphon* pea aphid, *Echmepteryx* bark louse) suggests that the loss of mtSSB may be responsible for the formation of minichromosomes in lice but that it was unrelated to mitochondrial genome rearrangements as they were found in *Echmepteryx* which possesses a functional copy of this gene. Considerable additional nuclear genome sequencing is necessary to unravel the relationships between each of the replisome proteins and the "broken rules" of louse mitochondrial genomics.

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Vote of Thanks: Geoff Thompson
The meeting closed at 2.05pm

NOTICE OF NEXT MEETING

Monday 14th May 2012, 1pm

~

Dr Bill Palmer (Qld DAFF)

Weed biocontrol - where to now?

Abstract : Since the miracle of *Cactoblastis* against prickly pear eighty years ago, Queensland and Australia have been very active and successful with classical biological control of invasive weeds. Queensland successes have included Harrisia cactus, Noogoora burr, rag weed, rubber vine, salvinia, water hyacinth and groundsel bush. With the recent publication of *Biological Control of Weeds in Australia* plus the very significant infrastructure investment at the Ecosciences Precinct in Queensland and the Centre for AgriBioscience in Victoria, weed biocontrol is set to enter a new phase. New issues such as the difficulties of 'foreign exploration', the dearth of taxonomists and timely approval for release are also emerging.

~

ESP Library
Ground Floor, Ecosciences Precinct
Boggo Road, DUTTON PARK

More venue details available at
http://www.esq.org.au/meetings.html

ALL WELCOME
(please sign in at security desk)

News from Qld DAFF Entomology

Just when you were beginning to get used to DEEDI……...yet another name change!!! First DPI, then DEEDI and now, just to keep things simple, DAFF (not to get confused with the other DAFF). The staff of the former DPI Insect Collection are now employed by the Queensland Department of Agriculture, Fisheries and Forestry, working within Biosecurity Queensland, a subdivision of that department. Well, at least it makes more sense than DEEDI ever did. Other than that, it's business as usual.

Desley Tree has been busy revising the genera of Australian fungivorous thrips for a three year ABRS-funded project, while also working on a Lucid key to Australian Terebrantia, both in collaboration with Lawrence Mound (CSIRO). Desley is also continuing her DAFF-funded training in scale insect diagnostics with Penny Gullan (ANU). During early-mid April **Justin Bartlett** accompanied visiting researcher **Hector Urbina** (PhD student, Blackwell lab, Louisiana State University) during his field collection of passalid beetles in far north (Cairns to Cape Tribulation) and southeast Queensland (Lamington NP, Mt Glorious, Goomburra SF). Hector's PhD work is on identification and characterisation of gut yeasts associated with passalid beetles. **Owen Seeman** from the Qld Museum, who is interested in the passalids and their associated mites, joined them on the Goomburra trip and also assisted Hector with identification of the passalids.

The insect art of Maria Fernanda Cardoso

A recent episode of the ABC programme Artscape, which aired on April 24th, featured the visual artist Maria Fernanda Cardoso who creates artworks about, and from, nature. Columbian born Cardoso is known for her visual works constructed from animal bones, furs and whole specimens of smaller animals including insects (1990-present) and for her performance piece 'The Cardoso Flea Circus' (1994-2000). The Artscape episode focused mainly on her recent sculptural works based on male genitalia of insects and arachnids, which cross the boundary between art and research. One such exhibition, entitled 'It's not size that matters, it's shape', featured supersized male genitalia of Tasmanian harvestmen rendered in latex which were based on SEM images.

Cordoso now resides in Australia. More about her and her work can be found at her website : http://mariafernandacardoso.com/

The Artscape episode can be viewed online: http://www.abc.net.au/arts/

Justin Bartlett

Example of Maria Fernanda Cardoso's work using butterfly wings from her 2003 'Zoomorphia' exhibition.

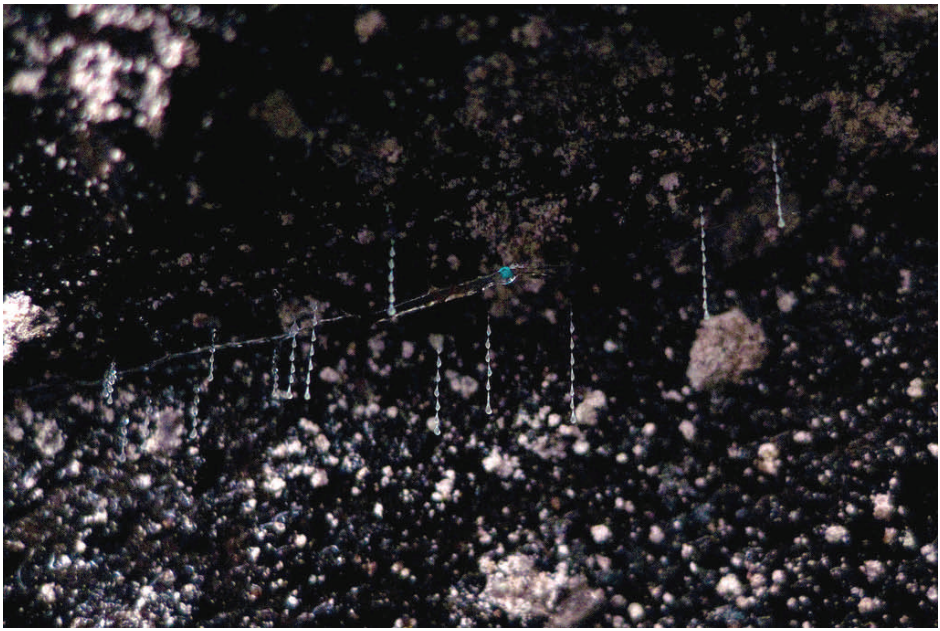
Glow-worm tunnel, Newnes, NSW

Every year, the Cook Lab from UQ meet up with the Crisp Lab from ANU for an annual lab retreat. The fifth "Bootstrap Camp", as the lab retreat has become to being known as, took place between 11th – 16th December 2011 in Newnes, New South Wales. Newnes is located about 100km north-west of Sydney, on the western side of Wollemi National Park. The first full day at Newnes was spent visiting the "glow-worm tunnel". A disused railway tunnel, abandoned over 70 years ago, has become a home for a colony of glow-worms *Arachnocampa richardsae*. There are also glow-worms that can be found in the rainforest outside of the tunnel, but are harder to find and only glow at night. It took us several hours to reach the entrance of tunnel (partly because we we took our time exploring the path and taking in our surroundings).

We edged our way through the tunnel, mindful of keeping our lights pointed downwards so as not to disturb the glow-worm colony unnecessarily. After a bend in the tunnel, the firsts of the glow-worms could be seen. There were only small patches of lights from the glow-worms to begin with. As we made our way into the heart of the tunnel, the number of glow-worms increased, until it was like staring up at the Milky Way on a clear night. It was a magnificent sight, and well worth the time spent to witness the glow-worm colony in the railway tunnel.

Text: **Penny Mills**
Photos: ***Andy Wang***

30 second exposure taken inside glow-worm tunnel at Newnes.



Typical glow-worm snare (there is a glow-worm in there too).

Close-up of above photo showing detail of glow-worm and sticky threads of snare.

NOTICES

Insect Collection at Immanuel Lutheran College, Buderim

Help is needed to identify the insects in this collection which has been systematically accumulated by the school since around the mid-1980's as part of their ongoing science teaching classes. Locations are labeled, and the collection has been maintained in a reasonable condition by the school staff. It is housed in 13 insect cabinet drawers.

The main interest lies in the fact that much of the collection has been accumulated during the time when the original vegetation of Buderim and surrounding areas was still partially intact, most of which has now disappeared. The College itself still possesses a small but significant area of original coastal rainforest and, on the higher slopes, open forest. If anyone living on or near the Sunshine Coast is interested in examining the collection and helping in identification, please email Tony Ewart (a.ewart@westnet.com.au).

Proposed change of day for ESQ General Meetings

Entomological Society of Queensland General Meetings play an important role in the Society in providing a forum for information exchange and social interaction for members and non-members, and professional and non-professional entomologists, alike. These meetings are currently held on the second Monday of the month (or Tuesday when Monday is a public holiday), nine months of the year.

A society member recently approached council with a request to investigate the possibility of changing the General Meeting day from Mondays to Tuesdays due to a clash with meeting days of another Society of which they are a member. There has been no objections to this change by Council members when their request was discussed during the last couple of Council Meetings. In fact, it was generally thought to be a good idea as Tuesday General Meetings will be much less affected by public holidays (with the exception of the occasional Anzac day).

Members are invited to comment on the proposed change. Please indicate your preferred meeting day by contacting the President, Geoff Thompson, by email (geoff.thompson@qm.qld.gov.au) by 9:00am Monday 14th of May.

The decision whether to adopt the change to Tuesday General Meetings, based on the response from members, will be announced at the next General Meeting held at 1pm, on Monday 14th May, at the Ecosciences Library, Dutton Park (see page 18 for details).

Upcoming conferences

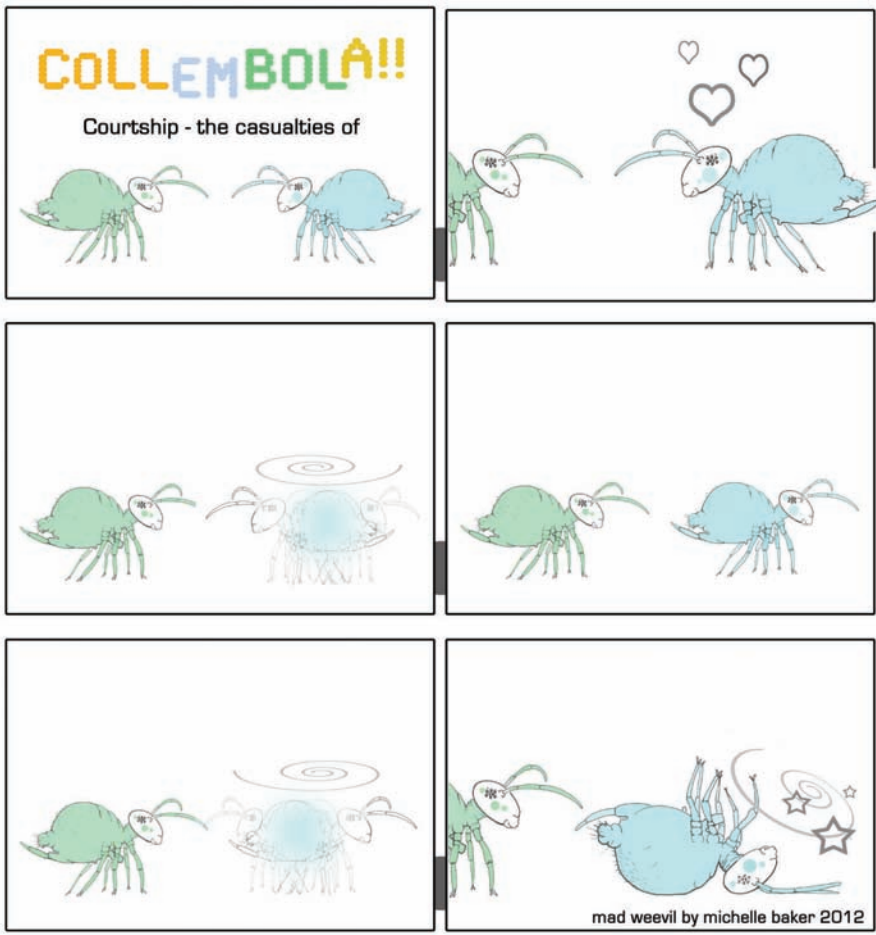
25-28 November 2012
Combined Australian Entomological Society 43rd AGM & Scientific Conference and Australian Arachnological Society Conference. Hobart, Tasmania.
http://www.cdesign.com.au/aes2012/

19-25 August 2012
ICE 2012 - The XXIV International Congress of Entomology. Daegu, South Korea.
http://www.ice2012.org/

4-8 August 2013
6th International Symposium on the Ecology and Biology of Galling Arthropods and Associated Endophytes. O'Reilly's Rainforest Retreat, Queensland.
http://6isbegia.org/

Clarification of ESQ Student Award sponsor

The ESQ Student Award is presently sponsored by the Society itself, not by the Tropical Fruit Fly Research Group, Griffith University (who were former sponsors of the Award), as indicated on page 10 of Volume 40, issue 1, of the News Bulletin. The editor takes full responsibility for this error.



The artist behind "Collembola", Michelle Baker, is a Research Assistant with Dustwatch Australia (Griffith University) and designs insect-themed stationary which can be purchased from her Etsy store (www.etsy.com — search for Mad Weevil).

Entomological Society of Queensland
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DIARY DATES 2011

Meetings held 2nd Monday of the month (or Tuesday if Monday is a public holiday)

MAR—Monday 12th	Lyn Cook	AGM and President's Address
APR—Tuesday 10th	Stephen Cameron	Insect Evolutionary Genomics
MAY—Monday 14th	Bill Palmer	Weed biocontrol. Where to now?
JUN—Tuesday 12th		
AUG—Monday 13th		
SEP—Monday 10th		
OCT—Monday 8th		
NOV—Monday 12th		
DEC—Monday 10th		

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:	Students and others at the discretion of the Society Council	**$18pa**

Student membership conveys full membership privileges at a reduced rate.

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	Institutions	**AU$45pa**
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	Institutions	**AU$50pa**

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THE ENTOMOLOGICAL SOCIETY OF QUEENSLAND

NOTICE OF NEXT MEETING

Monday 14th May 2012, 1pm

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Dr Bill Palmer (Qld DAFF)

Weed biocontrol - where to now?

~

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More venue details available at
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NEXT NEWS BULLETIN

Volume 40, Issue 3 (May 2012)
due early June

CONTRIBUTIONS WELCOME

DEADLINE - Thursday May 31st, 2012
Send your news/stories/notices to the editor
(justin.bartlett@deedi.qld.gov.au)