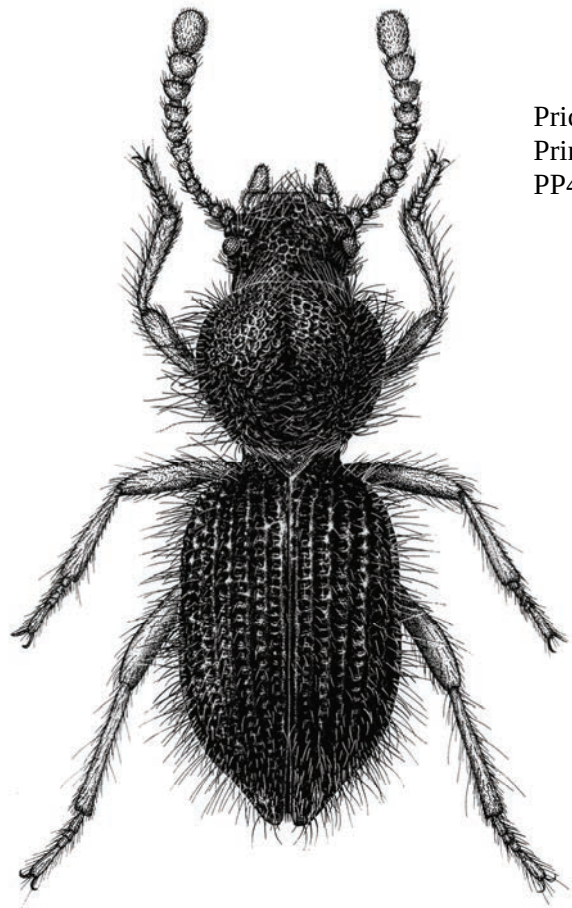
ENTOMOLOGICAL SOCIETY OF QUEENSLAND INC

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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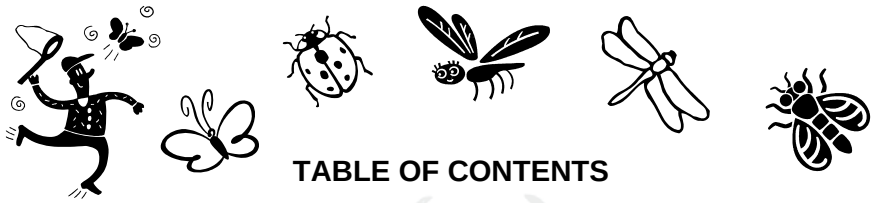

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The **ENTOMOLOGICAL SOCIETY OF QUEENSLAND INC.**, since its inception in 1923, has striven to promote the development of pure and applied entomological research in Australia, particularly in Queensland. The Society promotes liaison among entomologists 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

Meeting held at Seminar Room 1, Ecosciences Precinct, Boggo Rd, Dutton Park, on Tuesday, 12th June 2012, 1 pm.

Chair: Geoff Thompson

Attendance:
Bradley Brown, Stephen Cameron, Robert Constantine, Lyn Cook, Kathy Ebert, Alexandra Glauerdt, Manon Griffiths, Tim Heard, Cassie Jansen, Christine Lambkin, Simon Lawson, Lance Maddock, Gunter Maywald, Penny Mills, Geoff Monteith, John Moss, Bill Palmer, Brenton Peters, Vanessa Ryan, Desley Tree, Federica Turco.
Visitors: Nick Appleton, Christopher Buckingham, Ian Buckingham, Mary Chun, Ian Ferrier.

Apologies: Justin Bartlett, Graham Forbes, Ross Kendall, Judy King, Don Sands.

Minutes: The minutes of the last General Meeting were circulated in News Bulletin Vol. 40 Issue 3, May 2012.
Moved the minutes be accepted as a true record: Geoff Thompson
Seconded: John Moss

Nominations for Membership: The following nominations for Membership were received and approved by Council, and are put forward for election:
1. Martin Shivas, Geebung, Qld. Nominated Mike Muller, seconded Lance Maddock.
2. Susan Cully, Beechmont, Qld. Nominated Geoff Monteith, seconded Judy King.
3. Katherine Thomson, Dutton Park, Qld. Nominated Desley Tree, seconded Brenton Peters.
4. Phil Hugenholtz, St. Lucia, Qld. Nominated Christine Lambkin, seconded Geoff Thompson.
5. Nancy Lachner, St. Lucia, Qld. Nominated Christine Lambkin, seconded Geoff Thompson.
6. Dyana Abdul Rahman, Taringa, Qld. Nominated Christine Lambkin, seconded Geoff Thompson.

All proposed members were elected unanimously.

Main Business

Notes and Exhibits

1. Queensland Entomological Society Student Award Presentation.
2. Talk by Student Award recipient Nicholas Appleton (University of Queensland), "The Genomic Response to Natural and Sexual Selection during Adaptation to a Novel Environment".
3. Talk by Ian Ferrier and John Moss, "A Ghost Moth Story – Notes on Aenetus scotti (Scott, 1869) Lepidoptera: Hepialidae".
4. Talk by Christine Lambkin, Ted Edwards and Christopher Buckingham, "Another *Enispa* for Brisbane?".
5. Talk by Geoff Thompson, "Butterfly Image Zoom In".
6. Talk by Geoff Thompson, "Maria Fernanda Cardoso 'Museum of Copulatory Organs".
7. Talk by Geoff Monteith, "A new Cooloola Monster from Carnarvon Gorge".

Student Award / Notes & Exhibits

The President announced University of Queensland student, Nick Appleton, as the winner of this year's ESQ Student Award and presented him with a certificate and cheque for $500. Nick gave the following talk on his thesis project to the meeting.

The Genomic Response to Natural and Sexual Selection during Adaptation to a Novel Environment

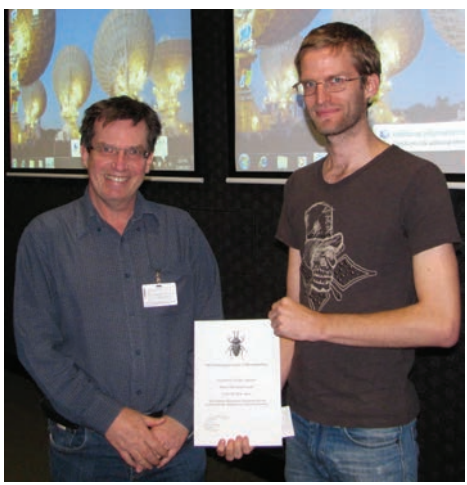
Nick Appleton, University of Qld

Selection, as a process directing adaptation, can be divided into two modes: sexual and natural selection. Sexual selection affects traits like mate choice and mate competition, i.e. traits important to sexual fitness. While natural selection operates on traits

relating to survival: fecundity, productivity, longevity, viability, etc. (traits important to nonsexual fitness). But there is also an interaction between these two modes of selection and this interaction is what my project aimed to study.

In the literature two models of interaction have been described. The first identifies an aligned model, whereby increased sexual fitness confers with increased nonsexual fitness. Aligned selection has been shown toenhance adaptation and, by the same process, hasten the purge of deleterious traits/alleles (Whitlock and Agrawal 2009). The second model describes an antagonistic relationship between natural and sexual selection. This model usual affects display traits, e.g. a peacock's tail – a larger tail is more attractive to females (increased sexual fitness), but is detrimental when escaping predators (decreased nonsexual fitness). Hence the two selection modes are in opposition, keeping the trait/allele in a genetic tug-o-war, and hindering adaptation. As each model generally applies to a single trait/allele, both models are likely acting upon differing parts of the genome.

Separating the effects of the two models has taken several forms (Skroblin and Blows 2005; Fricke and Arnqvist 2007), the most recent of which (Hollis, et al 2010) examines the fitness of a single gene across multiple generations. My study aimed to expand on this approach by utilizing next generation sequencing (NGS) and experimental evolution to identify markers SNPs throughout the genome. This allowed me to look at the relative contribution of each model to the process of adaptation.



Geoff Thompson, presenting Nick Appleton with his cheque and certificate.

I obtained DNA samples from *Drosophila serrata* flies from the following experimental evolution methodology (described in Chenoweth, *et al* 2008). Lab-adapted, yeast-fed flies were transferred to a corn-based diet to encourage a selection response. From here they were then split into four treatments, each with three replicates. One treatment allowed both natural and sexual selection; one treatment allowed natural selection, but reduced sexual selection; one treatment allowed sexual selection, but reduced natural selection; and one treatment reduced both natural and sexual selection.

Natural selection was allowed to operate by pooling all the offspring from all females of the current generation and randomly selecting 55 of each sex to become the following generation. This ensured that females tended to contribute to the next generation in proportion to the number of offspring that they produced - offspring from high productivity females were more likely to have their offspring sampled than low productivity females via the random sampling procedure. Natural selection was reduced by equalising each female's contribution to the next generation to two offspring – one male and one female. Once the next generation was selected they were passed to a mating treatment that controlled the opportunity for sexual selection to operate. Sexual selection was permitted by placing all individuals in a single bottle, allowing both mate choice and male-male competition to occur. Sexual selection was reduced by randomly assigning a single male to a single female in a vial for mating. Females were then transferred to individual vials to lay their eggs. This process was repeated for sixteen generations.

For this project, flies from generation thirteen were utilised. Female flies from each of the twelve populations were split into three pools of eight for DNA extraction to maximize yield and decrease sequencing error. The DNA samples were then sequenced for Single Nucleotide Polymorphisms (SNPs) identification using Restriction-site Associated DNA (RAD) sequencing techniques. The process works by initially digesting the DNA with the restriction enzyme SgrAI. This enzyme cuts only at a unique sequence in the genome. A small barcode sequence (distinctive to each population) is then attached to the unique sequence. The DNA is then broken into small (~80 base pair (bp) long) fragments for sequencing. Due to the unique barcodes attached to the RAD tags, all twelve pools can then be collated and sequenced in a single lane of a flow cell on an Illumina GAII Genome Analyser. From this, Floragenex Inc. (Oregon, USA) constructed a RADtag sequencing library, which I received in the form of a raw data file that contained 23.8 million 80bp tags and quality measures for each.

The data needed to be transformed into SNP frequencies for each treatment. To do this I parsed the data through a pre-made programming pipeline: RADtools. The output from these programs still contained data not relevant to my project. I further parsed the data with custom PERL scripts to isolate sequences containing a single bi-allelic SNP that were represented in all pools with a total coverage greater than or equal to six and with a minor allele frequency of 10% or more.

Analyses for the experimental evolution studies using NGS data are not fully developed, and so it was instructive to compare different approaches to data analysis. Broadly, I took a twofold approach to data analysis: the first is a classic population genetic approach, using pairwise population genetic parameters (i.e. FST); the second was purely statistical and used both Fisher's Exact tests, and also a more comprehensive generalised linear modelling approach using Bayesian methods (MCMC glmm). Ultimately I concluded that the MCMC glmm approach was most accurate for the dataset as it accounts for variation among lines within treatments that may be due to stochastic processes such as genetic drift, as well as the usual fixed effects (natural selection, sexual selection and the interaction between the two).

After correction for multiple tests, MCMC glmm (q-value false discovery rate of 0.05) identified 116 SNPs that were significant for at least one coefficient: the main effect of natural selection (N); the main effect of sexual selection (S); or the effect of the interaction between the two processes (N:S). Only a few SNPs were affected by a single main effect (16.38%), and only one SNP (0.86%) was significant at both main effects but not N:S. Hence, the majority of SNPs had a significant interaction effect (82.76%). 74.51% of the SNPs with a significant N also had a significant N:S. And similarly for sexual selection: 78.38% SNPs significant for S also had significant N:S. This implies that, for most SNPs, the interaction between natural and sexual selection is more important than either process in isolation.

The MCMC glmm output also contains information as to the direction of selection (i.e. positive values signify selection for the minor frequency allele, and negative values signify selection against the minor frequency allele). SNPs only significant at one of the coefficients, display a roughly even distribution of positive and negative selection. This result is to be expected; some SNPs will be advantageous whilst others detrimental and the specific SNP modelled, in this case the minor frequency SNP, is ultimately an arbitrary choice. However, the sign of the coefficient (i.e. whether the SNP is selected for or against) is not directly important to this analysis. What is relevant is whether the direction of selection at one coefficient coincides with (aligned model) or opposes (antagonistic model) other significant coefficients.

The main relationship observed is an antagonistic one where only one main effect (*N* or *S*) and the interaction effect (*N:S*) are significant, and opposing in directionality. In these cases, the second main effect is non-significant and hence not directly affecting selection. But due to a relationship with the significant main effect (as observed through *N:S*), it indirectly opposes the overall strength and direction of selection. One example, presents a non-significant effect for *N*, a negative effect for *S* and a positive effect for *N:S*. On its own, sexual selection is *against* the minor allele of this SNP, but after taking into account the interaction between the two modes of selection, the overall selection is *for* the minor allele of the SNP. In this example, *N*, whilst not significant in its own right, affects the overall direction of selection through *N:S*. SNPs fitting this pattern describe the classic antagonistic model described earlier.

One SNP displays aligned divergence between the two selection processes, with no interaction effects. This SNP is the sole representation of the aligned model of selection. For this particular SNP, both *N* and *S* are coordinated in their negative selection of the minor allele and *N:S* is non-significant to this process. This SNP demonstrates the enhanced purging processes of aligned selection as described by Agrawal (2001) and Whitlock and Agrawal (2009). One would expect instances of aligned selection, such as this, to be rare due to the enhanced selection they are subjected to; therefore, it is a testament to the strength of the aligned model, as a purging process, that only one example was found. It would be less likely to observe this aligned selection response in a population that had reached equilibrium because these variants reached equilibrium because these variants would already be purged from (or fixed within) the population.

Another interaction observed between the selection effects presents a complicated response. It occurs in SNPs that are significant at all coefficients where *N* and *S* are concordant in their direction of selection, but *N:S* is in opposition. I suggest that these SNPs may correlate to areas of the genome affected by condition. It is well known that condition affects an individual's sexual fitness; males with more resources will be more capable to compete with other males for a female (Agrawal 2001; Cotton *et al.* 2004). Most genes in the genome contribute to overall health/condition; therefore sexual selection has the opportunity to act on most of the genome, through these genes (genic capture: Whitlock and Agrawal 2009). Since my thesis was completed, my supervisor has done preliminary studies into the effects of condition on sexual success. He found that high sexual and non-sexual fitness in a female fly correlated with increased sexual harassment from male flies, which ultimately decreased the fit female's contribution to the next generation.

Mating pair of *Drosophila serrata* (Photo: courtesy of A. Morin).

As demonstrated, these results show a variety of different selection interactions acting upon the genome. In looking at these, it becomes clear that, individually, neither the aligned nor the antagonistic model adequately describe the complex interactions that are observed in this analysis. However, both models are identified to be acting on the genome during adaptation to a novel environment, each with a relative contribution to the overall effect. From the data, it is clear that the antagonistic model of selection is most prevalent. The overall implication is that sexual selection (through the interaction effects of the selection models) plays a significant role in effecting genetic change throughout the genome.

In conclusion, this study has presented a powerful approach in the analysis of genetic change during adaptation to a novel environment. The study utilised a genome-wide selection of SNP markers to draw comparisons between varying experimental treatments of natural and sexual selection from an experimental evolution study. The author has developed a custom PERL pipeline for parsing the large outputs from NGS that is able to be utilised in further analyses of RADtag sequencing data. This study also trialed alternate methods of analyses, ultimately using a generalised mixed effects model that accommodated for the problem of genetic drift among lines within treatments, whilst allowing for detailed breakdown of the processes of natural and sexual selection and the interactions between them. The results revealed that the interaction between natural and sexual selection was more important than either individual effect in the process of adaptation. In examining two models of interaction between natural and sexual selection, it was discovered that the vast majority of results fit the antagonistic model, where the two modes of selection were in opposition. These results confirm theories suggesting that the role of sexual selection (particularly its interaction with natural selection) is important in the process of adaptation. Finally, an individual's condition was suggested as a possible explanation for some of the complicated interactions observed between natural and sexual selection.

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A Ghost Moth Story – Notes on *Aenetus scotti* (Scott, 1869) Lepidoptera: Hepialidae

John Moss and Ian Ferrier

John Moss and Ian Ferrier gave a presentation on the splendid ghost moth *Aenetus scotti* in which they summarised its biology and, more significantly, confirmed lantana as a host plant (an association previously known from one published record; see Common 1990). Photographs, including that of a larval shelter of *A. scotti* on lantana (Fig 1) and of the newly emerged adult (Fig. 2), taken by the authors, were also presented. A full account of the details of their presentation was published in volume 63 of the Butterfly and Other Invertebrates Club Magazine (Moss & Ferrier 2011).


1

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MOSS, J.T. & FERRIER, I. 2011. A ghost moth story – notes on *Aenetus scotti* (Scott, 1869) Lepidoptera: Hepialidae. *Metamorphosis Australia* **63**: 4-6.


2

Another *Enispa* (Walker) (Lepidoptera: Erebidae: Aventiini) for Brisbane?

Chris Lambkin[1], Ted Edwards[2], Chris Buckingham[3]

1 Queensland Museum, Brisbane, 2 ANIC CSIRO Ecosystem Services, Canberra, 3 Yeronga, Brisbane.

In March 2012 Christine Lambkin (Curator of Entomology Queensland Museum) received an inquiry via Dr Steve Van Dyck (QM Senior Curator of Vertebrates) for an identification of a caterpillar. This was from a photo sent in by eight year old Christopher and his mum Mary. Christine suggested that it was probably a caterpillar of *Anisozyga* (Geometridae: Geometrinae) whose young caterpillars have no flanges on the sides, but attach debris onto their backs symmetrically and mature caterpillars have these flanges.

Christopher who found the caterpillar was not convinced as he thought web images of *Anisozyga* looked very different from the one on his Dwarf Jade tree. Christine suggested Christopher raise the caterpillar and see what emerged. About a month later Christopher let Christine know that the caterpillar had turned into a pupa and that a moth had emerged which did not look like *Anisozyga*.

Christine sent Christopher's images of the larvae, pupa, and moth to Dave Britton (Australian Museum Sydney) and Ted Edwards (ANIC, Canberra). Dave Britton considered it may be *Enispa parva* (Noctuidae: Acontiinae) although having no idea what the larvae look like and stating that some larvae of this subfamily have weird diets as predators on scale insects, while some overseas species have been recorded feeding on lichens. Christopher and Mary were happy with this identification especially as online images showed a moth clearly with white forehead and the same pattern on the wings.

Caterpillar on Dwarf Jade Plant stem (photo C. Buckingham).

However Ted Edwards considered that while the adult moth was a species of *Enispa* known from southern Qld (Brisbane) and northern NSW (rainforest or near rainforest localities), it was possibly not described. Also little was known of the biology, larvae and pupae of *Enispa*. A possible close relative of *Enispa* is *Heterorta* which has very different larvae but does have a suspended pupa and no cocoon (see Monteith, 2009). From the photos it was difficult to tell whether the pupa was really suspended or to have a precise idea of size as *Enispa* is small, less than half the size of *Anisozyga*.

Christopher and Mary brought in larvae, pupae, and adult specimens, photographs were taken at QM by Geoff Thompson on the Visionary Digital BK-plus lab, and the specimens sent to Ted in Canberra. Ted considered that it was an unnamed but recognised species of *Enispa* found from Brisbane to Maclean, NSW especially as it has a white head and the discal "spot" on the forewing is linear, different to *E. violacea* described by TP Lucas from Brisbane. The holotype of *E. violacea* is recorded as missing. On the basis of the description, *E. violacea* has a coloured head, a distinctly violet tint to the pink of the wings, and has a differently shaped discal spot. *E. violacea* is found from Yeppoon QLD to Batemans Bay, NSW and inland as far as Miles QLD. There are four other *Enispa* species with white heads so the species determination needed to be checked.

Ian Common and Densey Clyne (Moths of Australia, 1980: 455, Fig. 55.7) recorded *Enispa plutonis* larvae on spider webs feeding on detritus, the leaves and remains of spider prey (also see detailed report by Monteith, 2009). *Enispa plutonis* was placed in the genus *Heterorta* Warren, 1913 in the "Checklist of the Lepidoptera of Australia" 1996.

On the web there are images of *Enispa bimaculata* larvae from Japan found on a Cherry tree and feeding on lichen that look like Christopher's at http://www.jpmoth.org/Noctuidae/Acontiinae+Eustrotiinae/Enispa_bimaculata.html.

Sugi (1987) indicated that Japanese species currently in *Enispa* feed on lichens, the larvae camouflaging themselves with a covering of lichen fragments that are used later to form their cocoons. Holloway (2009: 140) says "Robinson *et al*. [2001] listed old records ...attributed to *Enispa* with larvae feeding on lichens".

Enispa in the old classification was placed in the family Noctuidae and subfamily Acontiinae. The modern classification for *Enispa* is Family Erebidae, Subfamily Boletobiinae, Tribe Aventiini. The current family Erebidae contains the old Lymantriidae and Arctiidae, plus part of the old Noctuidae.

Christopher agreed to co-present this story of his discovery to the Entomological Society of Queensland Notes and Exhibits meeting.

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SUGI, S. (ed.). 1987. *Larvae of the larger moths of Japan*. Kodansha, Tokyo.

Top left: Adult moth (photo C. Buckingham); **top right:** Pupa suspended from Dwarf Jade leaf (photo G. Thomson); **bottom:** Christopher & Christine at the ESQ meeting (photo G. Monteith).

Butterfly Image Zoom in

Geoff Thompson, Queensland Museum

The Atlas of Living Australia's (ALA's) contract with Queensland Museum is ending and images are currently being delivered. Two teams of hardworking volunteers have photographed 850 drawers in three months and recorded all the necessary image metadata. The Hasselblad H4D-200MS system was used in 50 megapixel or 200 megapixel mode to produce images with great colour accuracy, clarity and depth of field. ALA will upload Zoomified tiffs to Morphbank under family names, as they have already done for some of CSIRO's Satscan images.
http://morphbank.ala.org.au/?id=2075552

The bottom left hand specimen in Fig 3 (on next page), a paratype of *Hypochrysops theon johnsoni*, was used by the author as a subject for an Australian Professional Photographers Awards entry. This entailed using the Hasselblad in 6-shot, 200 megapixel mode on the Visionary Digital BK-plus system, to take 12 successive source images from top to bottom of focus. The images were then converted to 16-bit tiffs, cropped a little and focus-stacked with Zerene Stacker to extract and combine all the sharp pixels into one image.

A print of the full image won a silver with distinction award at the Canon Australian Institute of Professional Photography Awards. This and other smaller images can be viewed in Zoomify mode at http://visionarydigital.com/Galleries/QueenslandMuseum/QueenslandMuseumGallery.html

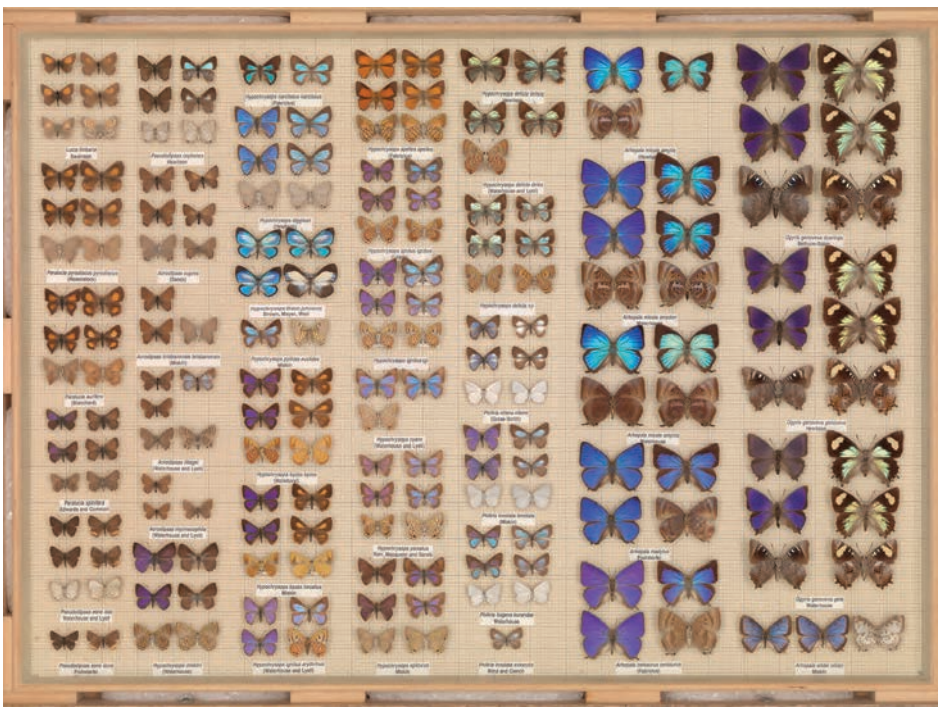
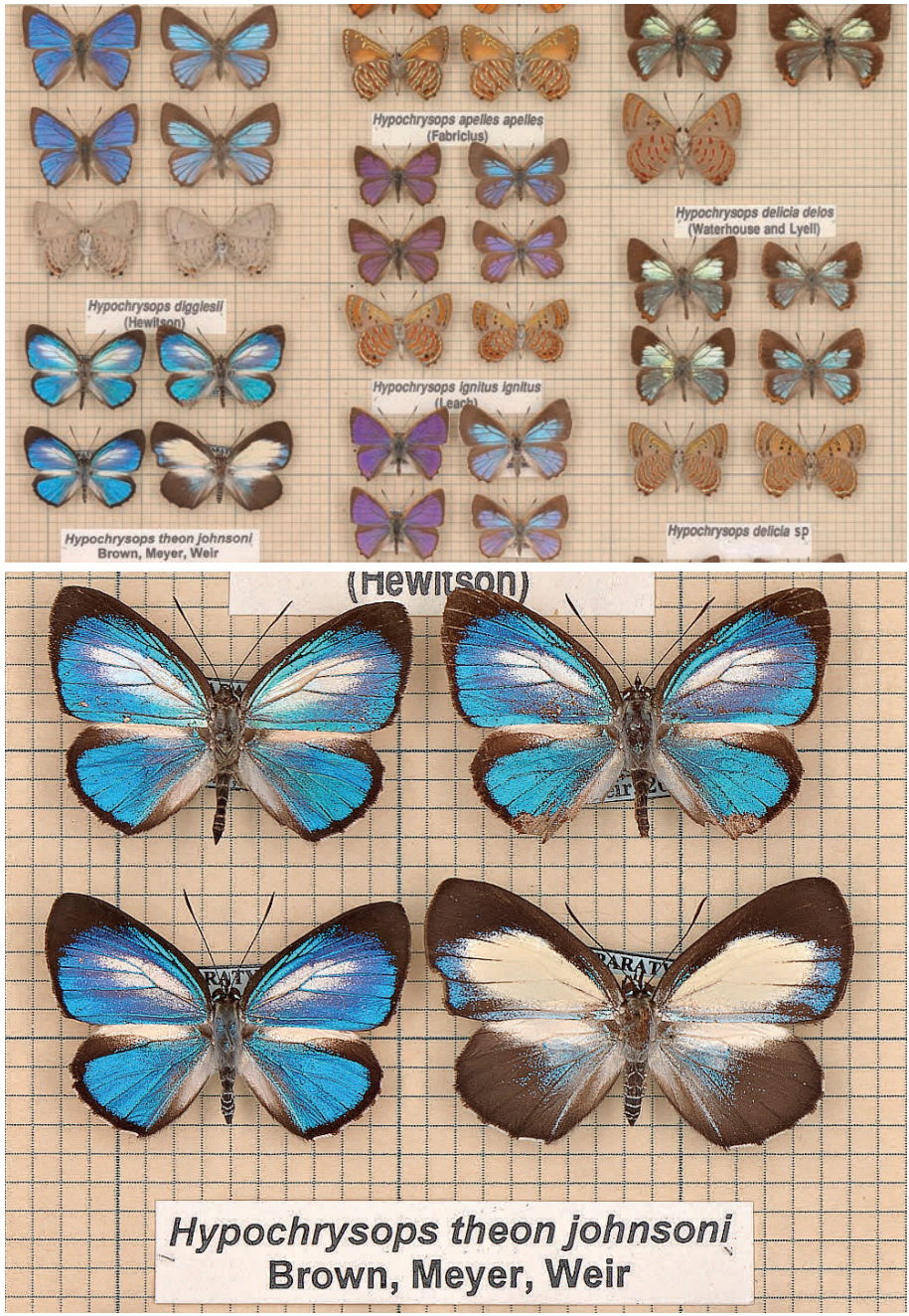


Fig. 1. 50 megapixel image of a drawer of lycaenids from the Knight Collection.



Figs 2 (top). Zoom-in crop of Fig 1 image. **Fig 3 (bottom)** Further zoom-in of same image.

Fig. 4 (top). Paratype of *Hypochrysops theon johnsoni* photographed with the Hasselblad in 200 mp mode on the Visionary Digital BK-plus lab system and focus stacked from 12 source images with Zerene Stacker. **Fig 5 (bottom).** Zoom-in crop from the same image.

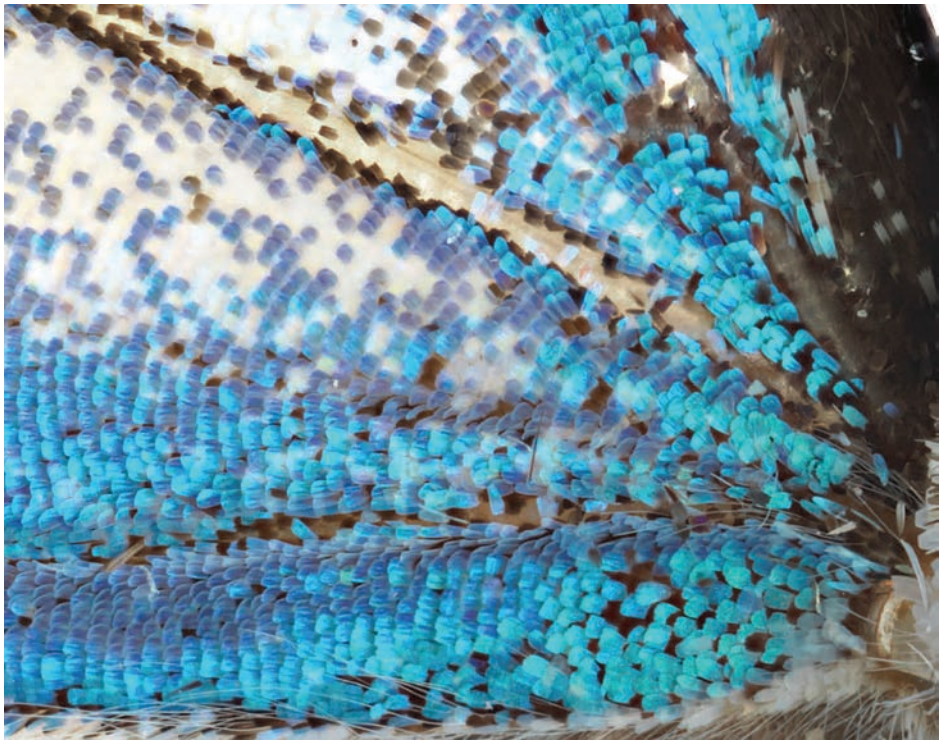


Fig. 6. 100% Zoom-in crop from the same image

Acknowledgements

Thanks to Atlas of Living Australia for equipment funding; to Roy Larimer and Les Walkling for technical advice. I am extremely grateful to the great team of colleagues and volunteers who have moved, placed on the floor and photographed up to 70 heavy drawers per day, or have taken deep-focus specimen images processed from up to 200 source images, as well as entering and editing metadata for them all. They are: Maria Barragan, Margaret Innes, Karin Koch, Chris Lambkin, Kathleen Nugent, John Purdie, Noel Starick, Federica Turco and Susan Wright.

~

Maria Fernanda Cardoso 'Museum of Copulatory Organs'.

Geoff Thompson, Queensland Museum

Maria Fernanda Cardoso is an international artist of major standing, born in Columbia and currently living in Sydney. She holds a Masters in Sculpture and Installation from Yale University. Insects have been a recurring theme in much of her work.

She is most famous for her Cardoso Flea Circus (1997-2000), a lost 19th Century tradition, which she revived and developed into a modern performance artwork. It has recently been acquired by the Tate Gallery London. Prior to that it showed at major world galleries like the Pompidou Centre in Paris and was a big hit at the 2000 Sydney Festival.

Maria has an installation at this year's Sydney Biennale entitled "The Museum of Copulatory Organs". According to Gary Warner, creative director of CDP Media in Sydney , "it is a serious project, not intended to be salacious or sensationalist, wherein she presents to the viewer a large collection of sculptural reproductions of various animal genitalia, with an emphasis on insects and other invertebrates." The project is ongoing and the plan is to tour it to venues here and overseas.

Maria has collaborated with scientists and microscopists to produce great images of the microstructure of complicated invertebrate genitalia. She also has access to the skills of a digital 3D modeller and to a 3D printer. The resultant resin sculptures, mounted on metal bases and protected by glass sheaths, are beautiful objects.

Maria is keen to make contact with entomologists and microscopists who are interested in collaborating on this project. Contact can be made through her website. http://mariafernandacardoso.com/

Top: SEM 3-d model and 3-d print of Opiloine genitalia; **bottom:** display of mounted Opiloine genitalia models.

Another New Cooloola Monster

Geoff Monteith, Queensland Museum

Those of us who were around in Queensland in 1979 will remember the great excitement that accompanied the discovery of a remarkable new kind of Orthoptera that turned up in an unsorted pitfall trap residue that had been collected near Poona Lake at Cooloola by Queensland Museum arachnologist, Valerie Davies. Orthoptera jump, don't they? But this was a chunky, powerfully-built insect with all legs massively modified for digging and none specialised for jumping. Though obviously belonging to the Ensifera section of the Orthoptera, which usually have multi-segmented antennae much longer than the whole body, this beast had tiny ten-segmented antennae, much shorter than the head. It eyes were tiny round discs and its wing were strange little functionless vestiges. Its long jaws and powerful maxillae gave it a predatory look. We had just a single male.

We sent it off to David Rentz, who had just arrived from California to take up the position of Curator of Orthoptera at CSIRO's Australian National Insect Collection in Canberra. After getting over his initial suspicion that he was being subjected to the initiatory ridicule of an Aussie leg-pull, Dave dubbed the beast the "Cooloola Monster" and announced that it was the first new family of Orthoptera to have been discovered worldwide for more than a century.

The press seized on the catchy name and the story went around the world. This just put pressure on us all to get more specimens so it could be described. Dave came up from Canberra several times and we spent weeks digging in the Cooloola sandhills and trying every trick in the book...but to no avail.

Fig 1. The probable new species of *Cooloola* from Mt Moffatt.

Eventually we made up a "WANTED" poster, featuring a big photograph of our quarry, and plastered this in every shop, servo and ferry in the Cooloola/Fraser Island region. Soon specimens started to trickle in, mostly picked up among the fore-dunes at night by fisherman and campers. One day in 1979, at the old Queensland Museum, I was summoned to speak to a very excited couple who had just driven in from Fraser Island with a genuine specimen. They had the best collection story of all. Now that some time has passed, it needs recording, anonymously of course. They'd been camped on the beach on the northern half of Fraser Island. On departure morning, she'd wandered into the dunes for that particular activity for which National Parks regulations requires one to dig a hole at least 20 cm deep. While digging, she had unearthed and injured a strange creature. Not giving it much thought, she pushed it back in as she refilled the hole at the end of the operation. Later, driving back down the island beach, homeward bound, they stopped for an ice cream at the Eurong shop. On the wall she saw our poster, picturing the same creature she'd seen an hour earlier. They hopped in the vehicle and drove 10 km back up the beach, located the hole and dug up the creature. They then drove five hours, almost non-stop, to Brisbane to get my confirmation of its

identity. I admired her frankness in relating the story...but then, I suppose she knew I was a biologist! That specimen is now one of the paratypes.

Dave Rentz described the species as *Cooloola propator*, the type genus and species of the new family Cooloolidae in 1980. In fairly short succession another three new species were discovered, all in unusual circumstances. I found one between my feet as I dropped my duds before hopping into my sleeping bag while camped at Blackdown Tableland, west of Rockhampton, in 1980. A farmer ploughed some out of his sugar cane paddock near Bundaberg in 1983 and BSES entomologist Richard Bull recognised what they were. Then Steve Pearson, who had been NP Ranger at Blackdown Tableland when we found them there, picked one up on the beach of remote South Percy Island while culling feral goats in 1991. Following our frantic digging and trapping forays to each place to get more, Dave Rentz went on to describe those three, respectively, as *Cooloola dingo*, *Cooloola ziljan* (Rentz 1986), and *Cooloola pearsoni* (Rentz 1999).

There have been two extra new species turn up since the last publications. In 2000, Chris Burwell and I were collecting on a little-known plateau NE of Gayndah called Gurgeena. We spent the morning doing our thing in separate directions and both found a nymphal monster. We met back at the car at lunch time, both inwardly gloating with pride and excitement about our discovery, only to have one of those moments where we simultaneously blurted out "You'll never guess what I found...!!". It's clearly another new species, but we need more material.

Now Christine Lambkin and Noel Starick have scored another new one, a giant male taken in a pitfall trap in the Mt Moffatt Section of Carnarvon National Park (Fig 1) during a BushBlitz expedition. The area is a one of deep sandy soils derived from weathering of the extensive Precipice Sandstone formations which give Carnarvon its character. This is prime monster habitat, but the area is 250 km further inland than the previously known western extent of monsters at Blackdown Tableland, so a very significant discovery. Blackdown has similar geological origins, and is the closest other locality, so the gut feeling would be that its little species, *Cooloola dingo*, might be closest to the new one from Mt Moffatt. But the new one seems nearest to the big Bundaberg species, *Cooloola ziljan*, and may rival its status as the largest known monster.

We've got plans to round up more material of these two new ones next summer and expect to be disturbing Dave Rentz from his Clayton's retirement at Kuranda in due course.

References

RENTZ, D.C.F. 1980. A new family of ensiferous Orthoptera from the coastal sands of southeast Queensland. *Memoirs of the Queensland Museum* 20(1): 49-63.

RENTZ, D.C.F. 1986. The orthopteran family Cooloolidae, including descriptions of two new species and observations on biology and food preferences. *Systematic Entomology* 11:231-246.

RENTZ, D.C.F. 1999. Pearson's monster, a new species of *Cooloola* Rentz from Queensland (Orthoptera: Cooloolidae). *Journal of Orthoptera Research* 8:25-32.

Vote of thanks by Lyn Cook.

Any other business:

There is no meeting in July. The next meeting will be on Tuesday 14th August, and the speaker will be Ross Wiley: "Queensland's fire ant war - who is winning?".

NOTICE OF NEXT MEETING

Tuesday 14th August 2012, 1pm

~

Dr ROSS WYLIE

DAFF—Biosecurity Queensland

Queensland's fire ant war : upping the ante

Abstract: Red Imported Fire Ant, *Solenopsis invicta*, is a native of South America and is believed to have entered the United States via shipping cargo in the 1930s. Since then, the US has fought three fire ant wars, all unsuccessful, the last ending in 1979. *S. invicta* was discovered in Brisbane in February 2001 and now Queensland is involved in its own fire ant war. The eradication program has so far been successful in eradicating two of the three known incursions of the ant here and in drastically reducing and fragmenting populations of the third. However the enlarged 'footprint' of the remaining population is stretching the resources of the program to survey and treat. In the last few years, considerable investment has been made in developing new approaches for finding and killing the ant – significantly upping the ante. These new developments including cutting-edge remote sensing technology, genetic tracing and habitat targeting are discussed in this talk.

~

ABOUT DR WYLIE: Ross Wylie is a forest entomologist whose career, spanning 45 years, commenced in 1967 with the Department of Forests in Papua New Guinea then, since 1974, with forestry in Queensland. He has worked in more than 20 countries throughout Asia and the Pacific and has a particular interest in invasive species; being involved in establishing pest early warning systems in several countries in the region. His association with the Red Imported Fire Ant (RIFA), *Solenopsis invicta*, began with its discovery in Brisbane in 2001, and he chaired the Scientific Advisory Panel on RIFA for six years. He is currently Science Manager with the Biosecurity Queensland Control Centre, Department of Agriculture, Fisheries and Forestry at Oxley in Brisbane.

Seminar Room 1
Ground Floor, Ecosciences Precinct
Boggo Road, DUTTON PARK

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

ALL WELCOME

News from Queensland Museum Southbank - Entomology Section

Changes are afoot here in the Queensland Museum with **Geoff Thompson**, after 30 years, moving across to a new role and out of Entomology. He is extending his imaging role as the Museums new Digital Imager. This is on the back of his work for the ALA with the montage and Hassellblad setups. We all extend our best wishes to Geoff in his new endeavours.

Susan Wright has now returned full-time to her position of Collection Manager, taking on sole responsibility for the collection. Thanks go to **Karin Koch** who has been standing in for Susan while she was away on maternity leave. Karin will be continuing with us working on the UQIC database and type collection for two days a week. The two curators, **Chris Burwell** and **Chris Lambkin**, will of course continue in their current roles. We are also welcoming a new lot of volunteers to assist now that we have dropped to one collection manager.

Entomology received another very substantial and significant collection of mainly dragonflies (and some butterflies); the Reeves collection, donated to the Queensland Museum by Joan Bryan and Dennis Reeves. This privately owned collection includes over 6,000 dragonfly specimens (4,876 from Australia and a further 1,345 from elsewhere, mostly the Solomon Islands and New Guinea). The dragonflies are by far the most significant part of the collection. **Melanie Schneemilch** (grant funded temporary employee) has entered all their associated data into an excel spreadsheet to facilitate the registration and incorporation of this part of the collection into the museums database. The collection contains 190 Australian dragonfly species, representing about 58% of the known Australian fauna. The main geographical focus of the collection is Queensland, particularly south-eastern Queensland although there are specimens from most other Australian states and territories. The Reeves collection represents the largest and most representative privately-held collection of Queensland dragonflies and will significantly add to the Museums geographical coverage of the Queensland fauna. The collection is being donated under the Cultural Gifts Program and QM Entomology staff are currently expediting the valuation process.

We have also accepted Don Franzen's collection of 74 store boxes containing approximately 6800 specimens of Lepidoptera (Moths and Butterflies) and Coleoptera, family Buprestidae (Jewel Beetles). It has been collected over three generations of the Franzen family. The earliest specimens were collected and mounted in 1898 by Ludwig Franzen. His son, Clarence Franzen also contributed to the collection followed in turn by his son, Don Franzen, the current donor. The collection also contains specimens from many notable collectors including F.P. Dodd, D. Waterhouse and others, and is primarily comprised of species collected from south-eastern Queensland in the 1950's. All of the material is Australian and the majority from Queensland.

We would like to add that if collectors are thinking of donating their collections to the Museum could they please get in contact with either the two curators or the collection manager as soon as they can. We have space issues and would like to be able to plan for any collection that may be donated in the future. We would also like to give people some certainty as to whether we would accept a collection or not.

Results from the IBISCA – Queensland project in Lamington NP has been published in the form of '**Biodiversity, altitude and climate change in an Australian subtropical rainforest. Results from the IBISCA-Queensland project 2006-2010'.** Chris J. Burwell, Akihiro Nakamura & Roger L. Kitching (eds), Memoirs of the Queensland Museum - Nature (2011) 55(2). Papers from this issue are available from the web at the following link: http://www.qm.qld.gov.au/About+Us/Publications/Memoirs+of+the+Queensland+Museum/MQM+Vol-55

Susan Wright

News from Biosecurity Queensland (DAFF) Invasive Plant Science group

The Weed Biocontrol Group at the Ecosciences Precinct have received news that two agents are fully approved for release in Australia. The big day is July 18th, when both will leave the quarantine facility for glass houses where they will be mass reared and released in the field. The two agents are the eriophyiid bud mite *Aceria lantanae* that is being released for lantana and the leaf mining jewel beetle *Hylaeogena jureceki* for cat's claw creeper. We are expecting great things from both agents which represent years of work by Dhileepan, Mariano Trevino, Di Taylor for *Hylaeogena* and Mike Day and Natasha Riding for *Aceria.*

Bill Palmer showed the new Minister of Agriculture, Fisheries and Forestry, John McVeigh, the Director-General, Jack Noye around the biocontrol facilities when they visited the Ecosciences Precinct recently. Both men took a keen interest in the research being undertaken against Queensland's weeds and the modern quarantine facility.

Bill Palmer

News from Queensland University of Technology

The fruit fly student group at QUT remains busy. **Ema Vueti** (working on the dispersion of fruit flies around Bundaberg) and **Sakuntala Muthuthantri** (*Bactrocera tryoni* citrus use) are both deep into thesis write-up mode and should complete before the end of the year. At the other end of the PhD story, **Yuvarin Boontop** has recently completed her three month 'Stage II" process and will be working on population structuring of *Bactrocera cucurbitae*, while **Ahmed Eid** has just started on an Endeavour Fellowship and will compare biological attributes of *B. tryoni* and *B. neohumeralis* to explain the invasiveness of one but not the other. In the middle of their PhDs, **Craig Marsden** (working on tephritid ovipositor wear) and **Kumaran Nagalingam** (*B. tryoni* and cue-lure) continue experimentation and are writing papers.

Mark Schutze and **Solomon Balagawi** have both had successes with papers recently, including some in high impact journals. The Dacine systematics paper of former team postdoc, **Matt Krosch**, has appeared in Molecular Phylogenetics and Evolution with the important finding that species broadly classified as *Bactrocera* (*Zeugodacus*) – which includes the economically important *B. cucurbitae, B. tau*, and *B. cucumis* – are a sister group to the true *Dacus* and should be in their own genus; in short, they are not *Bactrocera*. Mark has won two back-to-back 'best conference' talks in the last six weeks for presentations on the *B. dorsalis* complex project, given to the CRC National Plant Biosecurity Science Exchange in May (Perth) and the 2nd Tephritid workers of Europe, Africa and the Middle East (TEAM) meeting in July (Crete), and is now back in Vienna on a four week placement funded by the International Atomic Energy Agency to continue that work now focussed on *Bactrocera invadens*.

Mark Schutze

News from the USDA ARS Australian Biological Control Laboratory

Recently **Raghu Sathyamurthy** and **Matthew Purcell** travelled to China and Hong Kong to conduct demography studies and search for biological control agents of Downy Rose Myrtle, *Rhodomyrtus tomentosa*, a serious weed in Florida, USA. The surveys were carried out in collaboration with staff from the Chinese Academy of Sciences based at the Wuhan Botanic Gardens. In June **Jeff Makinson** conducted surveys for biological control agents of several US weed species in Hong Kong. **Jeff and Ryan Zonneveld** travelled to Cape York in July to search for stemboring moths on the climbing fern, *Lygodium microphyllum* and to locate stands of latherleaf, *Colubrina asiatica*, for future surveys. **Bradley Brown** and **Kumaran Nagalingam** initiated host testing of *Cryptophasa* sp. moths for the biological control of *Casuarina* spp.

Insects on Brisbane's Traffic Signal Boxes

Geoff Monteith, Queensland Museum

This is the latest in our irregular series on the use of insects in public art projects.

Visitors to Brisbane will have noticed the brightly painted metal boxes that can be seen on footpaths throughout the city and suburbs. They have an incredible array of designs and patterns - some humorous, some making social comment, many with environmental motifs, and many just wild and wonderful artistic designs – all painted by the public. These are the end result of a highly successful public participation art project called "Artforce" run by the Brisbane City Council. The boxes are actually Traffic Signal Boxes which contain the electronics for the traffic lights, so there is one at every controlled street intersection. so far 900 have been painted. The BCC has a website at http://210.247.175.168/artforce/painting.asp which has searchable images of every painted box in Brisbane. Just type in either the box's number, or the names of the streets which intersect, and up pops images of the box together with details of the artist, etc. You can vote for ones you like and there are annual prizes for the most popular boxes. Unpainted boxes are listed and anyone can submit a design for approval to paint them. If they approve your design you are issued with a painting kit (including paint- and safety vest, of course!) and away you go. Interestingly, they don't want designs with too much white (because it attracts graffiti vandals) or too much black (because the box overheats in summer).

As boxes fade they become available for repainting with new designs. The BCC website archives all old and current designs for the 900 painted boxes and these total no less than 1662 different designs. Only about 20 have insects or spiders as a major theme, and most have been kindergarten-type pictures of imagined butterflies and ladybirds. The ones that are currently up that show recognisable insects include: Fig 1: an accurate image of the overseas ladybird, *Coccinella septempunctata*, painted by Alison Peeler on Box B0749 at intersection of Manly and Whites Rds , Manly West. Fig. 2: a *Catopsilia* butterfly at ti-tree blossom painted by Cathy Leet on Box B0593 at the intersection of Creek and Richmond Roads, Cannon Hill. Fig. 3: a somewhat morphologically challenged mosquito painted by Anthony Spinaze on Box B0785 at intersection of Creek Rd and Pickwick St, Cannon Hill. Fig. 4: stylized dragonflies painted by Kylie Stapleton on Box B8030 at intersection of Settlement and Kaloma Roads, The Gap.

But the most spectacular and interesting insect-painted box of all is a recently completed one featuring our endangered

butterfly, the Richmond Birdwing, *Ornithoptera richmondia* (Figs 5 and 6). It was painted by Jessica Fittock on Box B0701 which is at the corner of Bridge and Wharf Streets at Chelmer. Just take the first turn left after crossing the Indooroopilly Bridge outbound, drive to the end of the block, and there it is. In a continuous, wrap-around design, which covers all four sides of the box, it shows every part of the insect's life cycle including adult male, a courting pair, eggs and larva, as well as good representations of flowers and foliage of the butterfly's foodplant, *Aristolochia praevenosa*.

So remember, next time you are stuck at the traffic lights at rush-hour, look around for the painted box! And start planning your own insect motif design. Twenty insect designs out of 1662 just isn't good enough!

Figs 1-6. Insect designs painted by the public on the Brisbane City Council's Traffic Control Boxes. See text for details.

Australian Honour to Ted Edwards AM

Heartiest congratulations to our member, Ted Edwards of the Australian National Insect Collection, CSIRO Canberra, who was made a *Member of the Order of Australia* in the Queen's Birthday honours list in June. It was made to honour his lifetime service to entomology, especially the four decades looking after the Lepidoptera collections at the Australian National Insect Collection at CSIRO, Canberra.

Ted was born into a country family in the southern highlands of NSW and picked up the moth and butterfly bug from his father, E. O. Edwards, who was a well-known butterfly collector who made a great contribution to knowledge of butterflies of the dry western areas of both Queensland and NSW. Ted started his career with an agriculture degree from Sydney University and worked in Agriculture for a few years a Yanco until 1970 when the dream vacancy opened up as Murray Upton moved on from managing the ANIC Lepidoptera collection. Ted moved to Canberra and had the privilege of working for years with the hero of Australian moths, Ian Common, and later with Ebbe Nielsen and Marianne Horak, not to mention scores of visiting lepidopterists who came from all round the world to study the fabulous collections at ANIC.

Ted Edwards AM with a case of *Aenetus* moths (Hepialidae) at the ANIC

Ted's meticulous knowledge of the literature made him a vital part of the gigantic ANIC project to catalogue the whole Lepidoptera fauna of Australia. Later on he co-authored *A Guide to Australian Moths* which won a Whitley Award the year it was published. He had a special interest in the grass/sedge feeding, day-flying castniids, many of which were endangered due to loss of native pasture habitats.

But Ted's main contribution has been just to be there at ANIC as the patient, reliable person everyone could turn to when stuck with a mothy problem. Moths are notoriously diverse (20-30,000 Australian species) and formidably difficult to identify. Anyone who has ever (and thousands have) sent a humble, unknown moth off to Ted Edwards with the plaintive appeal: "Ted, have you any idea what on earth this is?... …and, by the way, what does it eat? ....and what does its caterpillar look like? ....and is it a pest..?" and then received a meticulous reply, covering all bases, with a bit of nomenclature and wry humour thrown in, and probably some chat about the type locality.....everyone of those people knows how richly deserved this Australian Honour is. They also know in their gut that Ted could have probably done the same, before smoko, for almost any of the many thousands of other Australian moths had they been sent in place of their own humble offering. Congratulations, Ted, you're a hero!

Geoff Monteith

NOTICES

The EWQ Membership Nomination form was omitted from this issue to make room for content.

The form can be accessed from the society's website — www.esq.org.au

Weekend Visit to Queensland Museum Collection – Saturday 18th August, 1.00pm. Leaders - Geoff Thompson, Christine Lambkin, Owen Seeman and Geoff Monteith.

The next Bug Catch will have to wait till the warmer months. So we are offering an indoor entomological outing, a weekend visit to the **Queensland Museum insect and arachnid collections** (now incorporating the University of Queensland Collection); **Saturday 18th August, 1.30 pm till 3.30 pm**, **for a maximum of 20 people**. Members and their families only please, with no children under 12 years old.

The insect collection now comprises over three million specimens with some dating back to the 1860s. The arachnological collection comprises over a million specimens with about 120,000 slides. Stars of the show are some live funnelwebs and other spiders. Visitors can also see the Visionary Digital BK-plus imaging system and we will lead you through other biological collection areas en route to the spirit collection.

Bookings are essential and no more than 20 can be accepted. Since the compactus was installed to accommodate the University of Queensland Collection space is limited and only one aisle of the compactus can be accessed at any one time. Butterflies and some UQ cabinets can be accessed separately. Be aware there is a strong smell of naphthalene in the collection area.

Please book with Christine Lambkin, **preferably by email** christine.lambkin@qm.qld.gov.au or if you don't have email ph 3840 7699.
Booked visitors will meet in the main entrance foyer (level 2) at 1.15 pm for a 1.30 pm start.
For general visitor locality and transport information see
http://www.southbank.qm.qld.gov.au/Visit+Us/Museum+Location

DIARY DATES 2012

Nine general meetings held per year on the 2nd Tuesday of the respective month

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	Notes & Exhibits / Student Award Presentation	
AUG—Tuesday 14th	Ross Wylie	Qld's fire ant war—upping the ante
SEP—Tuesday 11th	Ken Walker	Bowerbird—Citizen Science Portal
OCT—Tuesday 9th	Jonathan Darbro	QMIR — mosquito control
NOV—Tuesday 13th	Owen Seeman	
DEC—Tuesday 11th	Xmas BBQ	

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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$37pa**
ASIA/PACIFIC:	Individuals	**AU$40pa**
	Institutions	**AU$45pa**
ELSEWHERE:	Individuals	**AU$45pa**
	Institutions	**AU$50pa**

Subscriptions should be sent to the Business Manager,
The Australian Entomologist PO Box 537, Indooroopilly QLD 4068.

THE ENTOMOLOGICAL SOCIETY OF QUEENSLAND

NOTICE OF NEXT MEETING

Tuesday 14th August 2012, 1pm

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Dr ROSS WYLIE

DAFF—Biosecurity Queensland

Queensland's fire ant war - upping the ante

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Seminar Room 1
Ground Floor, Ecosciences Precinct
Boggo Road, DUTTON PARK

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

ALL WELCOME

NEXT NEWS BULLETIN

Volume 40, Issue 5 (August 2012)
due early September

CONTRIBUTIONS WELCOME

DEADLINE - Monday August 20th, 2012
Send your news/stories/notices to the editor
(justin.bartlett@deedi.qld.gov.au)