Tarsus

September 2008

Issue No. 583

CIRCULAR OF THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES Inc

Next Meeting of the Entomological Society of NSW Inc

Where: Meeting Room 2, Ermington Community Centre, River Road, Ermington
When: 7.30 pm on Wednesday, 3 September 2008

Speaker: Associate Professor David Emery
Faculty of Veterinary Science, University of Sydney.

Cicada capers with an amateur entomologist

Each year from September until February, Sydneysiders are regaled with a multitude of cicada songs whose intensity and persistence vary regionally with season and year. The phenology of cicada species and their plant associations have been a local fascination (and diversion) for David and his offspring since 1990, coinciding with the release of "Australian Cicadas" by Max Moulds at the AM. However, even within the Sydney Basin, new species await detection by the eager amateur entomologist. From longitudinal surveys throughout the Sydney Basin, David will discuss species phenology, approaches to the unsolved seasonal "cues" that regulate the periodicity of our larger cicadas species as well as present some of the newer species from the region.

Also of interest in the near future

Our Society will again promote insect admiration and knowledge in this popular nature conservation oriented Festival the Ku-ring-gai Wildflower Garden, **420 Mona Vale Road, St Ives**.
Members that wish to join our stall, please phone Gith Strid-Nwulaekwe on 0418-206622
http://www.kmc.nsw.gov.au/www/html/536-festival-of-wildflowers.asp

http://www.aes2008.org/

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July Meeting Talk

TESTING HOUSEHOLD PEST CONTROL PRODUCTS

Graeme Smith, Reckitt Benckiser

PESTS, PRODUCTS AND EXPECTATIONS

Mosquitoes are the most important insect pest problem for consumers. While acknowledging the mosquito's role as a serious disease vector, most consumers are more concerned about getting a good night's sleep, free from annoying buzzing in the ears, biting and associated itchy lumps. Several different consumer product types may be used including most importantly passive mosquito repellents such as mosquito coils or electrically heated mat or liquid electrical devices. Some consumers prefer aerosol spray cans for direct "hunting" of mosquitoes, for clearing the room of mosquitoes before going to bed and in some cases spraying surfaces frequented by mosquitoes (as in government malaria campaigns).

As consumer disposable income increases there is an increased interest in controlling other pests such as cockroaches and ants. While these pests would be killed by aerosols used for hunting mosquitoes, efficient control is best achieved by products specifically developed for the purpose. Such products are based on specific active ingredients such as those delivering fast knockdown on cockroaches or which remain active for several weeks on surfaces frequented by crawling pests.

Even more efficient are bait formulations which attract the insect to the active ingredient rather than relying on accidental contact. Some baits may even allow the active ingredient to be transferred from one insect to another. While sounding simple in concept, such products are quite demanding in terms of developing attractive bait matrices and selecting active ingredients that do not quickly upset the behaviour of the target insects. Bait products are much narrower in the spectrum of pests they can control.

Professional applicators (PCOs) value highly effective safe products that work under the toughest conditions even if the products require specialist skill and equipment. In contrast, consumers value safe products that are easy to use, flexible and fast acting, but most importantly all at a low cost. Consumers accept that the products they use and the knowledge they have may limit the level of result they achieve. Nevertheless, consumers still expect the product to deliver in line with the claims on the label or in advertising.

TESTING CRITERIA

Reckitt Benckiser's pest control R&D group is based in Sydney, Australia but develops products for use throughout the world, especially Asia. Reckitt Benckiser's chemists and entomologists develop formulations using active ingredients developed by major chemical manufacturers. The formulations are optimised for safety, convenience, handling and stability as well as for biological performance.

Most of the bio-efficacy work is conducted by external contract companies or universities according to protocols developed in conjunction with Reckitt Benckiser researchers. The type of protocol used depends on the stage of the project and the knowledge required to move to the next stage.

TRIAL TYPES

Screening studies. Usually small scale trials designed to look for large differences between a large number of formulations. The protocols used have a track record of being able to give a simple assessment of basic product performance but they could not be considered as yielding high quality information. Such trials could include small glass chamber knockdown studies with coils or residual studies confining crawling insects onto surfaces. While showing differences between products such protocols do not always give data on critical aspects of performance.

For example, in practice most coils work by interfering with a mosquito's ability to locate a potential host and bite. Mosquitoes are rarely knocked down in the real world so one could ask if such a small chamber protocol is really that useful (see photo to right). Our experience however with larger scale laboratory and field trials has given us some degree of confidence that that knockdown in small chambers is a good indicator of bite inhibition potential. Such work can quickly compare reasonably large numbers of active ingredients, doses and formulations at a low cost.

Similarly, confining crawling insects on treated surfaces gives basic toxicity and knockdown data but does not indicate whether the surface is repellent to the insects at a level that causes them to minimise their exposure.

Detailed laboratory efficacy studies. To gain a deeper understanding of how a product performs, larger scale laboratory studies are required which take into account both pest and consumer behaviour. These more elaborate lab trials can be carried out under controlled conditions so that natural environmental variation is minimised; variation which could otherwise cloud the results.

Mosquito coils are tested in larger purpose built test chambers (20 m^3) where a wide range of performance parameters such as biting inhibition, knockdown and mortality are measured (photo to right). Trials are moderately expensive and time consuming so it is generally only possible to test a smaller range of products. Detailed trials are very important in establishing the real performance parameters of products and provide the necessary data to support the claims made on the labels as well as regulatory data.

Other examples include the use of tray studies to examine the performance of cockroach and ant sprays or baits. In such protocols the insects are allowed to behave more or less normally so that they have the option of exposing themselves to the insecticide or not, just as would be the case in the field. While knockdown times and kill percentages may be less impressive than would be observed in screening type trials, the data is much more representative of the real world and allows us to discriminate between products and formulations much more effectively. In some protocols we can even determine affects on the colony when only a small percentage of the population actually comes in direct contact with the pest control product. Detailed laboratory studies comprise the bulk of our studies and are key to our understanding of product performance parameters and form the basis of our registration dossiers.

Field trials. Field trials add the complexities of environmental variation and population biology to the measurement of performance so it is very difficult to measure small differences between treatments. Field studies are carried out in conjunction with universities in Australia or Malaysia. The trials are conducted in selected domestic houses where infestation levels are found to be very high (see photo). Timing is restricted by season and finding sufficient homes with high pest populations can be difficult, limiting the number of products that can be tested. While such highly infested homes do not represent the usual consumer experience, a good result is a significant confidence booster. Results also serve as a reality check on the data being generated using detailed laboratory study protocols.

Field trials are used to determine performance against pest populations where constant reinfestation occurs. Good methods are established for the efficacy of cockroach baits and "repellancy" of passive mosquito devices. Field studies are not appropriate to test "hunting mode" use patterns against individual insects. The expense of field trials and their lack of precision limits their usefulness in regulatory areas. They are however the ultimate test of a product's performance in the real world and a benchmark against which results from detailed laboratory protocols can be compared.

Consumer use studies. While scientists can measure the various biological parameters in a range of replicated trials, the ultimate question to be tested is whether the consumer has the same opinion. Companies can make many claims on their

labels or in their advertising to encourage the consumer to buy a product for the first time, however if the product fails to live up to the consumer's expectation there will be no repeat purchase.

Reckitt Benckiser use a number of different testing techniques in co-operation with various market research companies. These companies will enlist several hundred consumers with a certain pest problem within specified demographics. These consumers will be quizzed about their problems and existing methods of controlling pests. They are then shown a concept of the new product and asked for their opinion and whether they would be likely to buy the product at a certain price. Those showing interest are given product samples to use for themselves.

After use they are re-questioned about their opinions and purchase intent. Ideally a product lives up to the promise of the initial concept but more often than not the consumer identifies certain handling or performance issues that were not expected. We then have to either modify the product or to moderate the marketing concept so that the expectations for the product are more aligned with that which the consumer will experience.

Such studies are expensive in the extreme and not carried out until the company is reasonably confident that the product is ready for the consumer. Consumer studies serve as a double check that the investment involved in launching a product will be justified by consumer satisfaction and that the advertising promise offered to the consumer will be on target.

DISCUSSION

No one trial type is appropriate for all stages of consumer product development. Established protocols are valuable because of their apparent consistency from year to year but this benefit needs to be balanced with an open mind. Protocols should be challenged from time to time and modified if new findings indicate the need. Discrepancies between laboratory and field trial data or new active ingredients with novel modes of action can render an existing protocol inappropriate. Protocols need to keep a focus on what the consumer wants.

A consumer product is only commercially successful when the initial trial purchase is followed up by repeat purchases. A product must therefore satisfy all consumer expectations such as safety, convenience, handling, performance and price. Protocols that do not provide a true picture of all aspects can result in expensive commercial mistakes.

Members correspondence

Dear Graeme

thank you for the recent Tarsus newsletter and meeting notification. I have not been able to attend meetings due to personal circumstances however I appreciate the Entomological Society of NSW work.

Recently I was shown a book which has superb insect pictures and natural history commentary which I wanted to share with members - perhaps you could mention it at the next meeting or details to interested persons. The book is called 'Close to Nature' - A naturalists diary of a year in the bush. By John Landy. Published (1985) by Penguin Books Australia Ltd. pp1-150.

Once again thank you for the correspondence.

Regards from

Ilse Stolzenberger

Graeme,

This week there is an article on 'eating bugs' in Time. The website is worth visiting:

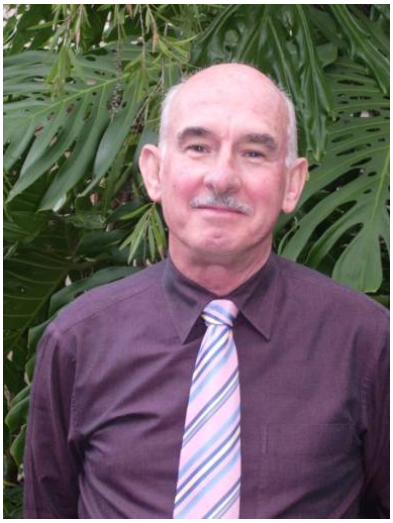
http://www.time.com/time/magazine/article/0,9171,1810336,00.html

regards,

Martin Horwood

Veteran Consultant Fumigator

After forty years as a protected species, Bob Ryan is “home & alone” starting an independent Fumigation Consultancy Business. A postgraduate industrial chemist and former teacher of the Government TAFE Pest Control Course, Bob has been granted international patents based on using liquid and gaseous pesticides. A Government licensed Pest Controller & Registered Fumigator from 1975 to date, Bob has been involved with World Bank projects [China], UNIDO projects [Vietnam & Indonesia] and large fumigation projects in the Middle East and Cyprus. Bob’s unique background in specialty gases assisted in developing alternative fumigants for methyl bromide.



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- ***specialist applications for the control of pests, microbes & malodours***
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Graeme,

When are you going to come to Darwin to get rid of the household ants, cockroaches and silverfish? I would ask this if I could make it to your talk.

Also a correction for Barbara's photo - the fly is a calliphorid, *Amenia sp*., not a tachinid.

Thirdly, I don't recall seeing a login and password for the website.

Regards,

Graham Brown

Hi Graeme,

Here are a couple of photos to use as you wish from our recent travels. The cicada is from the ancient Roman city of Hieropolis in Turkey, and the ground beetle from the desert near Dubai.

Dinah Hales

Society web site

www.entsocnsw.org.au

The number of "hits" on the web is now approaching 4000 since its inception. I hope you are among them and have used the site to download Tarsus a week or two before it is emailed out to members. A couple of incorrect links have been pointed out by members and corrections made, so hopefully all is in order now.

A few people have told me that they haven't received notification of their logion and password. Please contact me on le_gbsmith@optusnet.com.au and I will rectify this.

Any suggestions for improvements or submissions of photos for posting would be appreciated.

Pdf files of the latest journal (vol. 37) are also now available to members only on-line. Pdf files of papers from volumes 13-36 are available on-line to anybody.

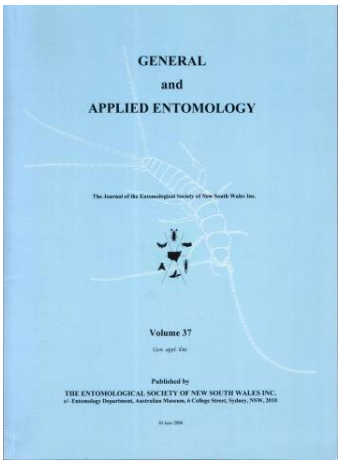
For any problems (e.g. lost passwords), submission of photos for publication or suggestions for improvement get in contact with Graeme Smith. (0421 617 377)

Insect of the Month

As this issue of Tarsus is already very full, I have decided to preserve the limited number of submissions to "Insect of the Month" this time.

I would really love to receive contributions from members, especially those that can't attend meetings. Surely you have some insect that motivates you enough to pen some words. If you don't have a photo, don't worry as we can often find one from somewhere.

General & Applied Entomology



The latest issue of General & Applied Entomology was mailed out to members in July. It has 47 pages and contains 7 scientific papers and 3 book reviews. Pdf files of these can also be downloaded by members only when they log onto the Society website.

However, at least one member somehow received an empty envelope. If this also happened to you, please contact Gith Strid-Nwulaekwe on 0418-206622 or at gstrid@ryde.nsw.gov.au

Show & Tell - July meeting

The photographer had yet another bad night of confusion over photos etc. Maybe somebody else would be happy to take over the job of "How & Tell" reporter at future meetings? Apologies to those whose items have slipped between the cracks.

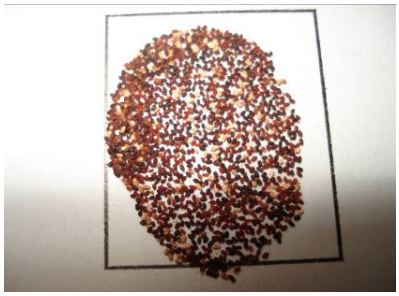
Howard Greening bought along the largest spiny leaf insect (*Extatasoma tiaratum*) that I had ever seen. It was too heavy to lift itself.

Howard tells me that it weighed 33 grams and was 160 mm long. It came from a batch of eggs that hatched on the 31 January 2007 and it died shortly after the meeting (10 July) at the ripe old age of 17 months. Howard obviously knows the right sort of food and conditions.

Barbara reported on a male stick insect that waited on a female for a week until she finally moulted into adulthood, only to find himself so confused by the whole process that he was unable to mate with her.

Fred Swindley bought along a photo of an orange fruit borer moth (*Isotenes miserana*) that emerged from a navel orange on 27 June. The pupal stage lasted 10-14 days.

Ted showed a letter from Qld DPI on drywood termites (*Cryptotermes brevis*). With the letter was a card showing samples of frass (the only obvious sign of an infestation), a very innovative educational idea.



There was also an example of a hairy anthelid(?) grass caterpillar but I was so busy trying to take photos I forgot to write down who bought it along.

A website www-staff.mcs.uts.edu.au/~don/larvae/butter.html was recommended as it contains some great Lepidoptera photos

Come along to meetings and bring books, live insects or anything else of entomological interest. There's bound to be somebody present who is interested in the topic or who can help identify the insect.

University Student Presentation Day

The Student Presentation Day run by the Society on Saturday 21st June 2008 was a very successful event. The venue was the Orange campus of Charles Sturt University and our local host was Professor Geoff Gurr, Professor of Applied Ecology. Thirteen students from four universities gave presentations. Universities represented were Charles Sturt University (Wagga Wagga and Orange Campus'), University of Wollongong, Macquarie University and the University of Sydney. The list of participants appears below.

The order of presentations was determined by draw from a hat and students had up to 20 minutes to present their work with additional time allocated for questions. Overall, the standard of presentations was excellent with a broad variety of subjects covered. Students varied in the stage to which their studies had progressed with some at the beginning of their research program and others nearing completion. For some the day provided an opportunity to hone presentation skills in preparation for upcoming participation at the ***International Congress of Entomology***.

The Society was represented by councillors Barbara May (President), Ted Taylor (Treasurer; accompanied by his wife Mary-Lynn), Garry Levot (Editor, *General and Applied Entomology*) and local members Bernie Dominiak and Peter Gillespie. It was particularly pleasing to see Dr. Sarah Mansfield (University of Sydney), Dr. James Wallman (University of Wollongong (and also a Society member)) and Associate Professor Geoff Gurr (Charles Sturt University) who had not only encouraged their students to participate but were there to support their students as well.

The emphasis of the day was on participation and on providing positive feed-back to up and coming entomologists but we considered it important to recognise excellence by providing prizes for the best presentations. While Barbara, Ted and Garry were engaged in the difficult job of choosing the best scientific presentation Mary-Lynn provided the students with suggestions to help improve their presentation skills.

Sagrario Gamez-Virues from Charles Sturt University (Orange) was voted as having delivered the best scientific presentation (*Conservation of biodiversity using shelterbelts: consequences for biological control at local and landscape scales*) and received a cheque for $200, a book prize and certificate.

Sagrario Gamez-Virues (right) receiving her book prize, cheque and certificate for Best Scientific Presentation from Barbara May.

Leigh Nelson from the University of Wollongong was voted runner-up for her presentation *'DNA-based approaches to the identification of forensically important Australian* Chrysomya *(Diptera: Calliphoridae)*'. Leigh received her choice of the book prizes on offer.

Each of the students received a book prize, a certificate for participating and honorary membership of the Society until 31st December 2009. The abstracts submitted by each of the participants appear below.

Leigh Nelson receiving her certificate and book prize for 'runner-up' Best Scientific Presentation.

Most of the participants (students, councillors and academic staff) re-grouped at the Orange Hotel for a relaxed dinner. Feedback to the Society was that the day had been both enjoyable and beneficial. One very positive outcome was that Cathy Carr (Charles Sturt University, Wagga Wagga) and Philip Allen (Macquarie University) found a kindred soul working on millipedes. Perhaps the best indication of the success of the event was the offer from James that University of Wollongong would like to host the next one! On behalf of the Society we welcome these 13 new honorary members and congratulate them for their initiative and progress on their respective research projects.

Participants in the 2008 Student Presentation Day.

Student	University
Sagrario Gamez-Virues	Charles Sturt University
Leigh Nelson	University of Wollongong
Willy Heimoana	Charles Sturt University
Louise Allen	Macquarie University
Philip Allen	Macquarie University
Wayne Robinson	Charles Sturt University
Cathy Carr	Charles Sturt University
Kelly Meiklejohn	University of Wollongong
Marja Simpson	Charles Sturt University
Bryan Lessard	University of Wollongong
Greg Murdoch	University of Sydney
Aidan Johnson	University of Wollongong
Kris Le Mottee	Charles Sturt University

CONSERVATION OF BIODIVERSITY USING SHELTERBELTS: CONSEQUENCES FOR BIOLOGICAL CONTROL AT LOCAL AND LANDSCAPE SCALES

Sagrario GÁMEZ-VIRUÉS
Charles Sturt University

As a result of biodiversity lost in farmlands, shelterbelts and related non-crop habitats have become a refuge and source of food for wildlife. The effects of shelterbelts and landscape composition on arthropods within shelterbelts and adjacent pastures were investigated. Pitfall and sticky traps were used to assess diversity of arthropods within 18 shelterbelts of different characteristics (plant diversity, habitat structure and groundcover vegetation). Arthropods were also collected along transects from shelterbelts to adjacent pastures using vacuum sampling. Arthropod predation was measured using sentinel baits along these transects. The effects of shelterbelts and other woody non-crop elements (scattered trees and remnant vegetation) on abundance of arthropods within shelterbelts were analyse at three landscape scales. The effects of shelterbelt characteristics on the abundance of arthropods varied between species. However, diversity of arthropods was not significantly different between shelterbelts when using Shannon's diversity index. The abundance of parasitic wasps such as Mymaridae and Trichogrammatidae decreased when the distance from shelterbelts into the adjacent pastures increased, but the abundance of arthropods such as the predatory Aeolothripidae and Formicidae increased. Predation of pest arthropods significantly decreased when the distance from shelterbelts increased. Finally, the effects of landscape composition on the abundance of arthropods varied between species showing contrasting responses with respect to the spatial scale and to the direction of the correlation. In conclusion, the conservation and establishment of shelterbelts, and other woody non-crop elements, and the manipulation of these habitats offer the possibility to improve biological control of arthropods in farmlands.

DNA-BASED APPROACHES TO THE IDENTIFICATION OF FORENSICALLY IMPORTANT AUSTRALIAN *CHRYSOMYA* (DIPTERA: CALLIPHORIDAE)

Leigh NELSON
University of Wollongong

A DNA-based approach shows potential for the identification of taxa for which the use of morphology, or the association of different life stages, is problematic. The identification of several forensically important Australian *Chrysomya* species is hampered by their similar morphologies, even as adults.

Four DNA regions were tested for the identification of members of this genus, collected from the east coast of Australia: 1) the ribosomal 28S, 2) the second ribosomal internal transcribed spacer (ITS2), 3) the mitochondrial control region and 4) the 'barcode' region of the first subunit of the mitochondrial cytochrome oxidase I (COI).

With the exception of the COI 'barcode', difficulties were experienced with amplification and sequencing, attributable to high intra-individual sequence variation (heteroplasmy) in those regions. The 658 bp fragment of the COI gene was sequenced from 56 specimens, representing all nine Australian *Chrysomya* and three calliphorid outgroups. The COI sequence divergences were calculated using the Kimura-two-parameter distance model, and a bootstrap neighbour-joining (NJ) tree was generated to provide a graphic display of the patterns of divergence among the species. The COI barcode successfully identified the Australian *Chrysomya*, with all species resolved as reciprocally monophyletic groups on the NJ tree, with strong bootstrap support. Intraspecific sequence divergences averaged 0.097% (range = 0-0.612%), while interspecific divergences averaged 6.499% (range = 0.458-9.254%). The overlapping sequence divergences for the *Chrysomya* is attributable to the low sequence divergence (mean = 0.484%) between the sister species *Chrysomya megacephala* and *Chrysomya saffranea.*

THE EFFECTS OF DIET ON THE DEVELOPMENT OF AN INDIGENOUS BROWN LACEWING *MICROMUS TASMANIAE* AND AN EXOTIC LADYBIRD *HIPPODAMIA VARIEGATA*

Kris LE MOTTEE
Charles Sturt University

The effects of five different pest species on the developmental biology of *Micromus tasmaniae* and *Hippodamia variegata* were investigated under laboratory conditions. Development time (days) from egg to pupal stage was significantly affected by different prey treatments. Significantly less *M. tasmaniae* survived to adult stage under a diet of western flower thrips or two-spotted mites. In the context of biological control, *M. tasmaniae* shows promise against aphids, whitefly and thrips, but may not be useful against two-spotted mites. Preliminary results for *H. variegata* are also discussed.

SPATIAL AND TEMPORAL DYNAMICS OF PREDATORS OF BRASSICA PESTS

Willy HEIMOANA
Charles Sturt University

The ladybird beetle, *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae), a recent arrival in Australia, and a native brown lacewing, *Micromus tasmaniae* (Walker) (Neuroptera: Hemerobiidae), are being investigated as potential biological control agents for arthropod pests in brassica crops. Monthly surveys of various habitats on vegetable farms in the Central West of New South Wales, Australia have shown that both species are an important numerical component of the natural enemy fauna. Numbers increased during spring but were not uniformly high over summer months possibly reflecting broad-spectrum pesticide use and lack of available prey. Predator densities in non-crop habitats are relatively high in the period leading up to brassica crop planting and may be an important source of natural enemies. Findings from mark/recapture studies of the predators will be presented with results from the use of DNA identification of their gut contents. Results will be integrated to formulate habitat manipulation strategies suitable for maximising the impact of natural enemies in brassica field crops.

THE ECOLOGY AND MATING BEHAVIOUR OF PRAYING MANTIDS (MANTODEA)

Louise ALLEN
Macquarie University

The world of praying mantids is both exciting and intriguing. There has been a recent burst of interest in mantid ecology with a special focus on their renowned sexually cannibalistic nature. However out of the 2300 of species described, the mating behaviour has been described in only 2%. Furthermore, descriptions of mating behaviour have focused on a few cannibalistic species. A recent study of a non-cannibalistic mantid suggested that there is a rich diversity in behaviours, but also curious similarities between mantids that do and do not cannibalise. This research aims to review the current state of understanding of mantid biology, focusing on their ecology and mating behaviour. The study will then examine a relatively new concept to consider for mantid behaviour, mate guarding. Mate guarding would presumably be a useful reproductive strategy for male mantids. Pre-copulatory mate guarding may be absent in cannibalistic mantids due to males mainly reacting to chemical cues, which females will not release until after the final moult. Additionally, there is a trend of males attempting copulation as soon as there is a receptive female present. Based on field observations, it is possible that *Sphodropoda tristis* may exhibit mate guarding during or after copulation. Males have been seen pressing themselves closely to the female without the genitalia inserted. In these situations females appear quite relaxed. Therefore the risk of cannibalism may not be the only cause for this behaviour, instead it could be mate guarding.

TEMPERATURE AND HUMIDITY FACILITATES COMPETITION BETWEEN NATIVE ANTS AND *PHEIDOLE MEGACEPHALA* (HYMENOPTERA:FORMICIDAE) ON FRASER ISLAND, AUSTRALIA

Wayne ROBINSON
(Charles Sturt University)

My PhD investigates the ecology of native and invasive ants on Fraser Island with focus on impacts of the Coastal Brown *Pheidole megacephala*. This presentation will look only at one chapter. *Pheidole megacephala* is one of the world's worst invasive ants and can be common in urban areas in coastal Australia and occasionally in native bushland. Anecdotally, there appears to be a few native species that are consistently able to coexist with *P. megacephala*, and this research investigates the mechanisms of their success. I performed a small scale field experiment on Fraser Island, Queensland, Australia where shade cloth was used to adjust the temperature and humidity on a series of baits that were monitored through a 72 hour period. The experiment was fully crossed between areas with low and high native vegetation cover and areas where *P. megacephala* invasions were long established or at the invasion front. *Iridomyrmex bicknelli* and *Monomorium sydneyensis* were able to exist in *P. megacephala* infestations by partitioning foraging to suitable temperature and humidity conditions. *P. megacephala* were dominant however and displaced the native ants when environmental conditions suited their foraging. Without shade, *P. megacephala* could not forage above 40^{o}C (ground temperature) or below 20 % humidity. Vegetation that offers more shade and moister conditions can be readily invaded by *P. megacephala*. However *P. megacephala* will forage at cooler times of the day when invading hotter drier areas and hence can still invade or at least cross drier habitats readily. I also present details of a large scale experiment currently in progress that manipulates environmental factors and native ant communities to further investigate the role of biotic resistance in *P. megacephala* invasions.

WHERE DO YOU GO TO MY LOVELIES, WHEN YOU'RE ALONE WITH YOUR LEGS? NEW SOUTH WALES PARADOXOSOMATID MILLIPEDES: THEIR TAXONOMY AND DISTRIBUTION

Cathy CAR
Charles Sturt University

Despite being the most speciose native millipede group in Australia, the family Paradoxosomatidae is largely unknown. This study, combining examination of pre-existing specimens and further collection of specimens with pitfall traps and by hand, increased the number of species known from approximately 50 to 150 in New South Wales alone. There appears to be a complex pattern of species distribution, with some species being extremely localised and others relatively widespread. Several factors, such as altitude, that may influence species distribution, are being investigated. In keeping with previous studies, this study concluded that the structure of the male genitalia or gonopods is still the most reliable single morphological feature for separating species. One genus, *Dicladosomella*, has been examined in detail. Gonopod structure indicated that there are possibly 15 new species to add to the original two. The species in this genus are, however, relatively uniform in appearance, and it seems also that there are few other morphological features that can be used in conjunction with the gonopods to separate species. In addition, some species appear to have overlapping geographical ranges. On going DNA analysis will, it is hoped, corroborate taxonomic findings and validate the new species.

SYSTEMATICS OF AUSTRALIAN SARCOPHAGINAE (DIPTERA: SARCOPHAGIDAE)

Kelly MEIKLEJOHN
University of Wollongong

The Sarcophagidae (flesh flies) are a widespread fly family with morphologically distinct characteristics. However, identification of a species from any developmental stage is very difficult. The carrion-breeding habits of many species of the subfamily Sarcophaginae make them forensically important. As a result they are commonly associated with a corpse. Despite this, their use in forensic investigations, especially in Australia, has been limited. This is due to the difficulties inherent in their identification and the lack of relevant developmental data, which are both required for estimating minimum time since death. Current research is aimed at producing preliminary development data for Australian Sarcophagidae. Additionally, the effectiveness of DNA 'barcoding' is being assessed for species-level identification. It is expected that the barcoding approach will supplement the use of taxonomic keys for species identification, and allow for recognition of a species at any development stage. The information gained by the current research will hopefully alleviate the present limitations on the use of flesh flies in forensic investigations in Australia.

ATTRACT AND REWARD - A NOVEL APPROACH TO ENHANCING CONSERVATION BIOLOGICAL CONTROL OF CROP PESTS

Marja SIMPSON
Charles Sturt University

In response to feeding by arthropods plants have evolved to emit, as a form of indirect chemical defence, complex blends of volatile compounds that attract natural enemies of the attacking herbivore known as herbivore induced plant volatiles (HIPV's). Although HIPV blends emitted from different plant species are very complex several common compounds have been identified. Research has demonstrated that synthetic versions of common HIPV's, when deployed directly into the crop, have the potential to be used as a tool to attract natural enemies, thus improving efficacy of conservation biological control (CBC).

This project is aiming to enhance CBC by exploring this novel approach. The efficiency of six synthetic HIPV compounds (methyl salicylate, methyl anthranilate, methyl jasmonate, benzaldehyde, cis-3-hexenyl acetate, cis-hexen-1-ol) mixed with Synertrol®, a canola oil formulation, to attract natural enemies are being tested in the field at three concentrations (0.5, 1.0 and 2.0%) and in three crop species (winegrapes, broccoli and sweet corn). HIPV's will also be tested in combination with habitat manipulation techniques aiming to maintain populations of recruited natural enemies in the crop by rewarding them with alternative food sources in the case of low or absent prey and shelter.

Preliminary data from field trials that tested the attract approach of HIPV's in the three crop species suggest positive correlations between some beneficial arthropods and HIPV's.

NOCTURNAL ACTIVITY IN CARRION-BREEDING BLOWFLIES (DIPTERA: CALLIPHORIDAE) IN SOUTH-EASTERN AUSTRALIA

Bryan LESSARD
University of Wollongong

The incidence of nocturnal activity in carrion-breeding blowflies is unclear. Limited studies, so far restricted to the northern hemisphere, have produced contradictory results. However, clarification of this topic is important because it is often assumed in forensic entomological casework that flies are not active and thus cannot oviposit at night. Estimates of time since death could be substantially affected in cases where such an assumption is incorrect.

We investigated nocturnal oviposition in south-eastern Australia using piglet carcasses placed in the field. Night time experiments were carried out under conditions of new moon, full moon, and artificial light. Nocturnal oviposition did not occur on any carcass. Interestingly, the carrion beetle, *Ptomophila perlata* (Silphidae), was active at night in dense vegetation under both the full moon and artificial lighting. Even in the absence of flies, this species could therefore be a potential indicator of nocturnal corpse placement. Laboratory studies were also done to monitor diurnal and nocturnal blowfly activity under differing light intensities. A significant association was found between the time of day and degree of activity for all light intensities, as well as between activity and light intensity irrespective of time of day. We also investigated the influence of time of day and light intensity on oviposition in the laboratory.

Overall, our results support the general assumption that nocturnal oviposition is unlikely to occur in the field under typical circumstances in south-eastern Australia. However, laboratory data suggest that this may still be possible under certain scenarios.

MANAGEMENT TOOLS TO MINIMIZE THE IMPACT OF THE ELEPHANT WEEVIL BORER *ORTHORHINUS CYLINDRIROSTRIS* IN BLUEBERRIES

Greg MURDOCH
University Of Sydney

The elephant weevil borer (EWB) *Orthorhinus cylindrirostris*, Fabricius (Coleoptera: Curculionidae), is native to Australia. Over the past 10 years the weevil has become a pest of cultivated blueberries. Adults feed upon the bark of the plant and larvae tunnel within the crown, disrupting the vascular system and causing a reduction in vigor. The use of synthetic chemicals and biological insecticides as possible control options for the management of EWB is evaluated.

Bioassays to test the efficacy of insecticides against EWB were conducted. The bio-insecticides: *Beauveria bassiana* var. BFA (Balsamo) Vuillemin, *Metarhizium anisopliae* var. BFA (Metschnikoff) Sorokin and the commercially available Nutritech® - Mycoforce® (*Verticillium lecanii* (Zimmermann) Viegas, *B. bassiana*, *M. anisopliae)* were evaluated and compared to the chemical insecticides Avatar® (Indoxacarb 400g/kg), Entrust® (Spinosad 800g/kg), PestOil® (Petroleum oil 20g/l), Clothianidin 200SC® (Clothianidin 200g/l) and Confidor 200SC® (Imidicloprid 200g/l) against EWB adults and larvae on blueberries stems growing at the University of Sydney.

The insecticides Avatar®, Clothianidin® and imidicloprid proved highly efficient against adult EWB, achieving >90% mortality in 8 to 12 days after exposure. Clothianidin® and imidicloprid were the only insecticide to have efficacy against larvae with a mortality of 45% and 70% respectively. The performance of *B. bassiana* BFA, Mycoforce® and *M. anisporium* BFA was equally efficacious against EWB adults however time from inoculation to mortality increased to 18 days. Potential utilization of these insecticides as control methods for EWB in blueberries will be discussed.

CLIMATIC AND BIOTIC INFLUENCES ON THE DISTRIBUTIONS OF *CALLIPHORA AUGUR* AND *CALLIPHORA DUBIA* (DIPTERA: CALLIPHORIDAE)

Aidan JOHNSON
University of Wollongong

Documenting the known and potential distributions of insects is crucial to understanding their quarantine risk and role in agriculture, pest management, epidemiology and forensic entomology. This study focused on determining and interpreting the distributions of two endemic Australian blowflies, *Calliphora augur* (Fabricius) and *Calliphora dubia* (Macquart).

I examined the effect of climatic factors on the maximal distributions of *C. augur* and *C. dubia*. Comparative laboratory and field experiments were used to derive parameters defining the distributions of these sister species, particularly in relation to temperature and moisture. The results showed that *C. dubia* had an increased tolerance to dry stress and high temperatures in comparison with *C. augur*. No difference was seen between species in the impact of cold temperatures on the development of maggots to the pupal stage. CLIMEX software was used to model the distributions of *C. augur* and *C. dubia* in relation to climate. Model parameters, determined from the literature, fieldwork and laboratory work, were entered into CLIMEX. The results accorded with those of a bait trapping transect extending from Berry (New South Wales) to Adelaide (South Australia). The distributions generated also greatly overlapped with distribution maps derived from insect collections and the literature, and extended these distributions significantly. Discrepancies are probably due to the inability of CLIMEX to accommodate non-climate related parameters, such as competition.

This study showed that distribution modelling software, such as CLIMEX, has great promise as a tool in forensic entomology.

MATING BEHAVIOUR IN GIGANTOWALES CHISHOLMI)

Philip ALLEN
Macquarie University

Scramble competition is a common animal mating system but has to date received relatively little empirical study from behavioural ecologists. Animals in which males scramble for females are likely to be influenced by strong selection through sperm competition. In many species, males show responses to increased density of rivals by investing more into mating efforts to reduce the risk of sperm competition. This research continues work on the native millipede species *Gigantowales chisholmi*, a species in which males actively search for females, but do not appear to compete aggressively for access to them. Previous research has shown a strong influence of density on male searching behaviour and mating success. In this study we maintained males in the laboratory in two density treatments (single or groups of four) and observed the effects upon mating interactions. Mate search time, copulation duration, mating success and other notable behaviours were compared. As male density is likely to have a strong influence on sperm competition, our results are significant in assessing the likelihood of sperm competition in this species and its probable influence on the evolution of the *Gigantowales* mating system.

Remembering some old colleagues

George Hangay

Mr. Phil Colman, a friend and ex-colleague of mine has shown me a few old slides. These somewhat faded and damaged pictures proved to be most interesting and valuable as they depicted a number of entomologists who played major parts in the establishment of the Wau Ecological Institute in Papua New Guinea. The hitherto unpublished images of Grissett, Straatman, Sedlacek, Szent-Iványi and others have historical value by now and I think it is appropriate to share these with those who are interested in the history of Australian (and New Guinean) entomology.

József Gyula Hubertus Szent-Iványi – better known as Joseph Szent-Iványi – played a significant role in Australian entomology. As this year marked the 20th anniversary of his passing, it is fitting to give here a short account of his life and work.

Dr Szent-Iványi and others

He was born in Budapest, on the 10th of November, 1910 and received his tertiary education in Vienna and Budapest. In 1936 he completed his doctorate in zoology, geography and mineralogy. In the same year Szent-Iványi became a scientist in the Hungarian Natural History Museum. His main interest was lepidopterology and in the following 8 years he has significantly increased the museum's collection. During the same period he was the Editor of *Folia Entomologica Hungarica*, the journal of the Hungarian Entomological Society. In 1938 he established a new zoological journal, the *Fragmenta Faunistica Hungarica*. In 1944, when Budapest was bombed regularly, he transferred the museum's Lepidoptera collection at his own cost to the small country town of Tihany, where it was safer through the remaining years of WW II. The war ended his scientific career in Hungary, as he was drafted into the army and eventually ended up in Western Europe. For a few years he made a living as a translator and by teaching languages. In 1950 the Szent-Iványis migrated to Australia. For a while he earned his living as a linguist but soon he found employment with the government. He was sent to Papua New Guinea as an entomologist and worked there for 12 years. Szent-Iványi was a very prolific worker and achieved a great deal in PNG. One of his outstanding projects was to create a large (with over 100 000 specimens) insect collection. This collection served as a starting point in the establishment of a Central Research Insect Collection (CRIC) in Konedobu (in Port Moresby) at the department of Agriculture, Livestock and Fisheries (DAL). Later this collection was transferred to Kila Kila and was named the National Insect Collection (NIC). Dr.Szent-Iványi also had a major role in laying the foundations of the Wau Ecological Institute. With the help of the Bishop Museum this field station grew into a major natural history institute of PNG, hosting as well as employing a number of scientists. Many of them are well know to the entomological community, although most of them passed away by now.

Maria Sedlacek,Joe Sedlacek Jnr.Wau 1967 with mammal and bird study skins

Ray Straatman, Peter, Abid, Phil with Waluk birds, Wau, VIII.1967

The name of "The Szent-Iványi Laboratory" at the Wau Ecological Institute still commemorates its founder.

Mrs. Maria Szent-Iványi lives in Athelstone, South Australia.

Mr and Mrs Joe Sedlacek, Phil, Remmie and python. Wau, III.1968

Bi-monthly Meetings

The Society meets **BI-MONTHLY** unless otherwise advertised. General meetings with a speaker will generally be held only on the "odd numbered" months (March, May, July, September, November) while the Council will meet more frequently. Speakers tentatively scheduled for the coming general meetings are shown below.

This timing allows us to alternate meetings with the Society For Insect Studies (SFIS) which meets at the Australian Museum at 7.30 on the second Tuesday of the "even numbered" months.

Future Events

Date	Speaker	Title
30-31 Aug, 2008	Gith Strid-Nwulaekwe	Kur-ing-gai Festival of Wildflowers Society exhibition stand
3 Sept, 2008 7.30 pm	Assoc. Prof. David Emery	Cicada capers with an amateur entomologist
5 Nov, 2008 7.30 pm	Alex Roach	Museum Pest Control
4 Feb, 2009 7.30 pm	Garry Webb (Sumitomo)	Pest ants

Venue:
Meeting Room 2
Ermington Community Centre
10 River Road Ermington

Meetings start at 7:30 p.m. (directly following the Council meeting)
Talks run for around 45 minutes, with 10 minutes for questions, followed by a light supper. Guests are most welcome.

Getting there:

By Car: From Victoria Rd turn into Spurway St (head towards Parramatta River). Turn right into Jackson St then left into River Rd. If heading north on Silverwater Rd, turn right into Victoria Rd then proceed as above. If heading south on Silverwater Rd take the Parramatta off ramp, cross Victoria Rd and proceed into River Rd. If you miss the off ramp, turn left into South St, then left into River Rd.

By Bus: Routes 525, 523 and L20 depart from Argyle St near Westfield shopping centre near Parramatta station. Routes 523 and L20 depart from West Ryde station. Get off at the Ermington shops. River Rd passes between the supermarket and the hotel.

SOCIETY POSTAL ADDRESS
C/- ENTOMOLOGY DEPARTMENT
THE AUSTRALIAN MUSEUM
6 COLLEGE STREET
SYDNEY NSW 2010

MEMBERSHIP FEES 2008

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COMPANY ASSOCIATES	$60
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