Tarsus

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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, 5 July 2006
Speaker: Dr. Garry Levot, NSW DPI
Title: Insecticidal control of Small Hive Beetle - progress towards practical options for bee-keepers

The Small Hive Beetle, *Aethina tumida* has the potential to cause apiarists significant economic losses by damaging wax comb, consuming pollen and brood and by tainting stored honey. It has already caused great concern for bee-keepers on Australia's eastern seaboard. Garry Levot will describe the research he has conducted into the potential use of an insecticide-treated refuge trap that is designed for use inside bee hives. The talk will describe the search for an appropriate insecticide, the behavioural characteristics of the beetle that made a refuge trap the preferred method of control and the challenge of trying to kill one insect (the beetle) without harming another (the bee) that shares the same space.

Photos by:
Maryann Frazier

TARSUS is prepared for ESNSW by Simone McMonigal Email: smcmonigal@hotmail.com

LAST MEETING

SUMMARY OF THE TALK GIVEN IN JUNE 2006

APPLICATION AND MANAGEMENT OF AUSTRALIAN STINGLESS BEES
IN
THE GREENHOUSE ENVIRONMENT

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INTRODUCTION

Australian Stingless Bees

There are approximately 2000 species of Australian bees of which approximately 10 species from two genera, *Trigona* and *Austroplebeia*, are stingless. The most common species are *Trigona carbonaria*, *Trigona hockingsi* and *Austroplebeia australis*[2]. They are eusocial bees with three castes, a queen, male drones and female workers[2]. Colonies are found in hollow logs or dead branches on trees and their nests contain honey and pollen pots, cerumen, batumen and a brood chamber[2].

Trigona carbonaria

Trigona species construct a structure called the involucrum which is reticular in form and surrounds the brood chamber to add strength and ventilation to the nest. Their distribution is from the tropical far north of Australia through to the east coast and as far South as Bega NSW (149° 54' E x 36° 42' S) and they will thrive in areas where the European honeybee Apis mellifera will struggle[5].

Austroplebeia australis

The nests of *Austroplebeia* species do not contain an involucrum. Their broods are situated centrally within the nest with the natal cells dispersed amongst honey and pollen pots. This species is found in the tropical north of Australia and as far south as Dungog, NSW (151° 45' E x 32° 24' S). Australia's indigenous people, who call the bees sugar bag, have used their honey for food and the resins for tools and weapons for centuries. They also used the wax for coating the rough mouthpiece of the didgeridoo[2].

THE ROLE OF AUSTRALIAN STINGLESS BEES IN AGRICULTURE

Application of Australian Stingless Bees on Open Field Crops

Trigona species are important pollinators of Australian native plants[2] and they are now being used in commercial crop pollination to a limited extent, however, there has been little research in aspects of crop pollination, honey production and the value of *T. carbonaria* to agriculture and industry[5]. Following a study performed by Heard in 1994, he concluded that stingless bees pollinated macadamia flowers better than *A. mellifera*[4].

In central Queensland, hives of *T. carbonaria* have been placed in watermelon fields and Hass avocado orchards for pollination by the bees. Pollination by *T. carbonaria* doubled the number of fruit harvested for the watermelon crop and resulted in a surprising 400% increase in avocado fruit harvested (Shepherd, pers comm., 2003). There has however been no research undertaken on Austroplebeia species in agricultural crops. The early results from *T. carbonaria* indicate that research in crop pollination by Australian stingless bees should be continued.

Application of Australian Stingless Bees in the Greenhouse Environment

Research on stingless bees for greenhouse crop pollination is increasing. Cauich et al. 2004, conclude that the use of the stingless bee *Nannotrigona testaceicornis Rondani*, for pollinating greenhouse tomatoes in tropical climates, could be an alternative to the use of highly defensive African-derived *A. mellifera* or non-native bumble bees (*Bombus spp.*) [1] and *N. testaceicornis* has been used successfully to pollinate strawberries in a greenhouse in Japan[7].

Australian stingless bees visit many different types of flowers (polylecty), are opportunistic feeders, exhibit floral constancy and are stingless[5]. These traits make them ideal candidates for working together with humans in the greenhouse environment. Their pollination services within the greenhouse environment may be of great benefit for improving crop yields. During a glasshouse trial with *Capsicum annuum* plants at UWS in 2000 it was shown that *T. carbonaria* acclimatised well within the glasshouse and that overall fruit yield increased[3].

CURRENT REASEARCH ON AUSTRALIAN STINGLESS BEES IN THE GREENHOUSE ENVIRONMENT

Greenhouse Crop Pollination

Trials currently being conducted at UWS with *T. carbonaria* and *A. australis* are demonstrating that the species behave differently from each other in greenhouses under the same environmental conditions. These differences such as flight activity and foraging strategies impact on the bees' ability to pollinate crops in the greenhouse. *T. carbonaria* can improve fruit yield on *C. annuum* plants grown in greenhouses by increasing fruit weight by more than 18% whereas *A. australis* shows no improvement in fruit yields. The research is indicating that when fruit yields are lower than on the control plants (no bees present) there is evidence of stigma bruising by the bees' foraging activities. Microscopic analysis of styles and ovaries of flowers with stigma bruising have confirmed a reduction in the number and length of pollen tubes. There is a need for further research to continue in this area, particularly on a range of different crops and on the determination of appropriate plant/bee stocking ratios.

Greenhouse Honey Production

Honey produced by bees during greenhouse pollination regimes is normally monitored by weighing the hive at progressive intervals and confirming the presence of honey stores by visual inspection. An effective non-invasive method to assess honey production is x-ray computerised tomography (CT), which can also be employed for assessing internal nest structures including brood volume as a measure of colony health.

In the controlled environment of the greenhouse, honey production can continue all year as it does with stingless bee colonies in the tropics. The provision of appropriate nectar-producing plants in the greenhouse will enable excess honey to be harvested.

Stingless Bee Hive Designs

Current stingless bee hive designs are simple but commonly designed to suit tropical or sub-tropical environments. For the purpose of better management programs, investigations are underway to better define the abiotic requirements of Australian stingless bees and to improve hives which will suit a range of Australian climates including temperate climates. The key aspects are to emulate the natural nest, be easy to manage for the beekeeper and to optimize colony health. Field evaluation of one design is currently being conducted in a temperate climate location at Austral NSW (150° 48' E x 33° 56' S).

Micro/Nanno Assessment of Australian Stingless Bee Morphology

Research has commenced on 3D visualisation of external and internal morphological characteristics of Australian stingless bees using Micro and Nanno CT scanning. This new technique achieves similar image accuracy to SEM and TEM[6] yet requires little sample preparation. The images are initially captured using an x-ray energy source and then visualised in 3D using reconstruction imaging software. The researcher can then "virtually dissect" the specimen using the software's visual segmentation features. The research will focus on developing the new technique as well as providing new information on the internal morphology of Australian stingless bees.

REFERENCES

[1]Cauich, O., et al. 2004. **J. Economic Entomology** 97(2): 475-481.
[2]Dollin, A. 1996. **Introduction to Australian Native Bees**.
[3]Dollin, A. 2000. **Aussie Bee** 13: 15.
[4]Heard, T.A. 1994. **J. Apicultural Research**; 33(4):191-198.
[5]Heard, T.A. 1999. **Annu. Rev. Entomol**; 44: 183-206.
[6]Hornschemeyer, T., et al. 2002. **J. of Morphology** 252: 298-314.
[7]Slaa, E. J., et al. 2000. **Apidologie** 31: 141-142.

INSECT OF THE MONTH

Argentine Ant - *Linepithema humile*

There was a moderate panic when Argentine ant was found to have been introduced into Australia in Melbourne in 1939. It is a fairly small ant (approximately 2mm) and invades houses, penetrating food containers and annoying householders. It also overruns bushland, displacing native species which may perform important tasks such as seed dispersal, with on-going disastrous consequences for Australian ecosystems.

Argentine ant gradually extended across metropolitan Melbourne, and started colonies in Sydney, Adelaide, Hobart and Perth. They dominate because of their sheer numbers and aggression, even though they do not sting like imported crazy ant or fire ants or natives such as bull-dog ants.

Argentine ant became well known as *Iridomyrmex humilis*, but there are sufficient differences from other *Iridomyrmex* to place it now in a different genus.

There were long-term attempts to wipe out Argentine ant, by councils and local authorities, but these have been abandoned.

Leaflet from around 1973

Recently researchers have been looking into the reasons for Argentine ant's success and found that all in Victoria and possibly all in Australia are genetically identical. This results in no fighting between neighbouring colonies, as would have occurred between separate colonies in Argentina. It was suggested that importing more queens from Argentina to cause warfare between different colonies might be a solution, but this might be hard to sell to the public.

Written by Barbara May

MAY MEETING

SUMMARY OF THE TALK GIVEN IN MAY 2006

Maroga melanostigma – just another boring insect?

Susan Marte
NSW DPI - Young

The problem

Maroga melanostigma (Wallengren) is a native lepidopterian pest which is known to attack many native and ornamental trees. Although first recorded in acacias in the 1800s, over time this insect has broadened its host range to include ornamental and fruit trees. In Young NSW, Australia, *M. melanostigma* is a recognised pest of prune trees (also cherries, plums and apricots). Larvae tunnel into main limbs, secondary limbs and the trunk of the tree. Infestation can lead to ring-barking and death of limbs. There is no cost effective control of this pest and no insecticide is registered for spraying prune trees. Current practice by growers is to either leave the damage or infiltrate the borer workings with a thin wire to pierce the larva. Injecting the tunnels with a non-registered insecticide is also practiced. These treatments are labour intensive. Fruit industries need a sustainable and less intensive means of management for this destructive pest. Although no studies have been done on the financial impact of *M. melanostigma* damage in prunes, it is estimated that this damage results in about a 5% production loss per tree in areas where insecticides are not used. In orchards where a large percentage of the trees are affected by this pest, there can be a substantial decrease in production and therefore a significant loss of income.

Maroga melanostigma

This species has undergone several name changes since it was first recorded in 1890. Before being known as *M. melanostigma*, the most common nomenclature was Cryptophasa unipunctata. Although *M. melanostigma* follows a typical moth life cycle, it also follows a typical wood boring insect life cycle. This indicates that it stays in its tunnel until climatic conditions are favourable for its emergence. While there was some indication from previous research of this pest in pecan trees, that the life cycle was completed in one year, this was not the experience in Young, where the life cycle was thought to be at least two years. A point to consider is that the Young district has been in drought for the entire period of this research project so the life cycle studies undertaken may not be typical. To help clarify the life cycle in Young, field cages containing borer infested limbs were placed in the orchards to gauge moth emergence. When moths began emerging, light trapping in orchards began at night.

Biological control

One of the benefits of growing prunes in Young is that they are grown with minimal insecticide inputs. This makes them a viable candidate for biological control. *Trichogramma spp* was the likely biological control agent for *M. melanostigma*. *Trichogramma* are a minute egg parasitoid wasp, growing to about 0.5 mm in length. *Trichogramma* are known to parasitise over 200 moth species, whose larvae attack crops. They lay their eggs inside the host egg and the developing wasp feeds on the immature moth larvae. They therefore eliminate the pest before it has a chance to do any damage. *Trichogramma carverae* were used in this project and released at the rate of 120,000 wasps per hectare.

The project

Trichogramma releases were done over two seasons. Before the first release year, a damage assessment was carried out on all trees in the trial. There were three orchard trial sites, with four blocks on each orchard (two release and two non-release blocks) with approximately 200 trees in each block. Each tree was recorded as either having borer damage or not. If there was damage, then where in the tree it was located was noted (limb, crotch, trunk) as well as if the damage looked old or new (ie inactive or active). This information was mapped into excel and served as a basis for the next two years to compare damage levels after Trichogramma releases.

After two *Trichogramma* releases in the first season, damage assessments were again carried out on the same trees, using the same parameters. There was an increase in borer damage in all blocks except one, but there was no significant difference in damage levels between release and non-release blocks.

In the second release season, six *T. carverae* releases were made. Damage assessments have not yet been carried out for this season. The results will once again be statistically analysed to note any differences.

Before, and during, *Trichogramma* releases, *Helicoverpa spp* egg cards were placed in the orchards. These were used to test any parasitism which might already be present in the field, as well as giving some indication of *Trichogramma* movement. The cards were placed in specific trees, left for 24h, brought into the office and any parasitised eggs were reared through for identification. In the first season, only *T. carverae* was identified. In the second season, *T. carverae, T. nr brassicae* and *T. pretiosum* were all identified.

Image © South Australian Museum
http://www.ento.csiro.au/aicn/images/cain2149.jpg

Photo: courtesy of the South Australian Research and Development Institute
http://www.usyd.edu.au/macleay/larvae/oeco/mel.html

Erratum: in the June edition of Tarsus, the aphids illustrated on page 25 were named incorrectly. As Dinah stated in the meeting, they are banana aphids (*Pentalonia nigronervosa*), not rose aphids, and the plant is *Caladium sp*.

Dinah Hales with some banana aphids found on a recently purchased seedling of *Caladium sp*.

Close up of the banana aphids, *Pentalonia nigronervosa*

SEMINAR SERIES 2006

Date	Speaker	Title
5 July	Garry Levot NSW DPI	Insecticidal control of Small Hive Beetle - progress towards practical options for bee-keepers
2 August	Graeme Smith	Silverfish and jumping bristletails (Thysanura) - morphology, biology and other trivia
6 September	Greg Holwell Behaviour Ecology Lab Department of Biological Sciences Macquarie University	Mating behaviour in *Ciulfina* praying mantids: Who needs cannibalism?
4 October	To be advised	
1 November	Dr Cameron Webb Medical Entomology Department Westmead Hospital	Mosquito Surveillance Techniques
6 December	To be advised	

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

Meetings start at 7.30pm
Talks run for around 45 minutes, with 10 minutes for questions.
Afterwards a supper is provided.
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.

(Information: Martin Horwood martinh@sf.nsw.gov.au phone 02 9872 0111)

COUNCIL MEMBER PROFILE

Robin Parsons - Councillor

I have been a member of the Entomological Society almost continuously since 1975 and this is my first official role.

I am not an Entomologist by training or profession but have always had an interest in nature and all creatures great and (especially) small.

In my youth both in England and in Australia I spent time observing, collecting and photographing insects and other arthropods.

The diversity and richness of Sydney's insect life fascinated and amazed me from the time I arrived in Australia in 1970.

I no longer collect specimens (not for many years) but I am concerned with the appreciation and conservation of invertebrates and the fostering of these attitudes through societies, photography, native plant gardens and public education.

We can help our insect fauna with native plants and the odd log or stone.

My hope is that native insects and other invertebrates become appreciated, integral and cherished in the community environment as much as flowers, gardens and birds.

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