



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, 6 September 2006

Speaker: Greg Holwell, Postdoctoral Research Fellow, Behaviour Ecology Lab,
Department of Biological Sciences, Macquarie University

Title: Mating behaviour in *Ciulfina* praying mantids: Who needs cannibalism?

Most people are familiar with the sexually cannibalistic behaviour of praying mantids. Although cannibalism is of great interest to behavioural ecologists, it is not as widespread in the Mantodea as one might think, and many praying mantid species display behaviours that are equally fascinating. Mantids in the genus *Ciulfina* (Mantodea: Liturgusidae) are small cryptic insects that live on the bark of trees throughout northern Australia. They are found in diverse habitats from primary rainforest to eucalypt woodland and mangroves.



Although *Ciulfina* do not display cannibalistic behaviour, a number of aspects of their ecology, morphology and behaviour are unique and intriguing. Among these novelties are visually-based mate location, spermatophore feeding, complex antisymmetric genital morphology and parapatric distributions. Such intriguing biology highlights how little we know about the majority of Australia's (approximately) 200 praying mantid species.

Photo: Greg Holwell

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LAST MEETING

SUMMARY OF THE TALK GIVEN IN AUGUST 2006

SILVERFISH AND JUMPING BRISTLETAILS (THYSANURA) - MORPHOLOGY, BIOLOGY AND OTHER TRIVIA

Graeme Smith M.Sc (agric)

The name silverfish derives from the grey or silvery appearance of some peridomestic species which are covered in scales move in an undulating fashion. However, in nature, there is much greater diversity.

Modern silverfish and bristletails are collectively referred to as belonging to the Thysanura but in the past this term has been used much more widely to also include many of the apterygote groups. Recent workers tend to avoid this term, using Archaeognatha for the jumping bristletails and Zygentoma for the “true” silverfish.

Jumping bristletails

The members of the order Archaeognatha are all fairly similar in appearance. They have a unique jumping escape mechanism where the abdomen is raised, before slamming into the surface catapulting the insect forwards for several times its body length. They also have unique mandibles which articulate at only one condyle. Rather than chewing these mandibles are employed in a rotating, scraping fashion to chisel algae etc off the surface,

which are then sucked into the mouth. They are fully eyed and have ocelli. They display many primitive

features such as the styles on the coxa of the legs, long series of abdominal stylets and exsertile vesicles (used for water absorption off surfaces) and the abdominal sternites are divided into central sterna and large lateral coxal plates.

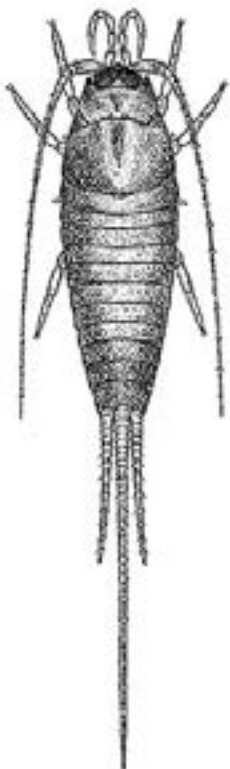
Little is known of the biology of Australian species, but several European species have been investigated. For example, *Dilta littoralis*, from southern England, is found around the base of low plants in heath land. It feeds predominantly on algae and lichens but other vegetable matter and insect exoskeletal material (usually their own) has been found in the gut. Eggs are laid at the end of summer and hatch at the end of the following spring. Adults live for about two years.

One Australian species *Allomachilis froggatti* inhabits southern Australian coastal cliffs (similar to the biology of *Petrobius* in the northern hemisphere). *Machilioides granulatus* was collected under limestone rocks in the hills south of Mudgee, NSW. Other Australian species have been collected from forest areas or grass tussocks.

Some 10 species in four genera have been described from Australia; they all belong to the Meinertellidae.



Jumping Bristletail (Archaeognatha: Machilidae)
photograph © Alex Wild 2003



Allomachilis froggatti
- CSIRO



Lepismatidae: *Ctenolepisma longicaudata*

“True” silverfish

The Order Zygentoma is more diverse in both appearance and biology. One family (Lepidotrichidae), originally described from Baltic amber material, was found to have a single extant member living in redwood forests in California. It retains many primitive features. Another small relic family (Maindroniidae) closely related to the Lepismatidae has a very disjunct distribution e.g. Turkey and Chile.

The remaining families all have representatives in Australia. The best known are the Lepismatidae which includes all the peridomestic forms. Lepismatids thrive under dry conditions, taking in water from the atmosphere through their anus. They are easily found in leaf litter and under stones in desert areas. Some 15 species in 7 genera are described from Australia but there is a lot of material still waiting to be examined in museum collections.

The biology of some “pest” species has been well studied. The most common Australian pest (*Ctenolepisma longicaudata*) undergoes a large number of moults requiring about 2-3 years to reach sexual maturity. It then continues to moult 3 -5 times per year for another 3 or 4 years. It will mate and lay eggs between each moult.

Mating involves the indirect transfer of sperm. Males undertake an elaborate “dance” with the female before depositing a spermatheca on the ground or on a silken thread. The female (perhaps with guidance from the male) positions herself over the spermatheca and takes up its contents.

Silverfish from the family Nicoletiidae have been found in soil and in caves. Unlike the Lepismatids, these silverfish lack eyes and are unpigmented. Fourteen species in three genera are described from Australia; all lack scales.

Little is known of the biology of this family. One species *Nicoletia phytophila*, is known from greenhouses around the world. It can be reared on a simple lettuce leaf diet and probably feeds on plant detritus in nature. Females can reproduce by parthenogenesis but in most other species males are collected in similar numbers to females.

Finally, ‘silver’fish from the family Ateluridae are actually golden in colour. They are often highly specialised as inquilines (uninvited guests) with ants or termites, however the live specimens shown during the meeting (*Australiatelura* sp.) can often be collected under stones around Sydney with no obvious association with any other insect species. This species has been kept alive in a glass container with soil/leaf litter for just over a year.

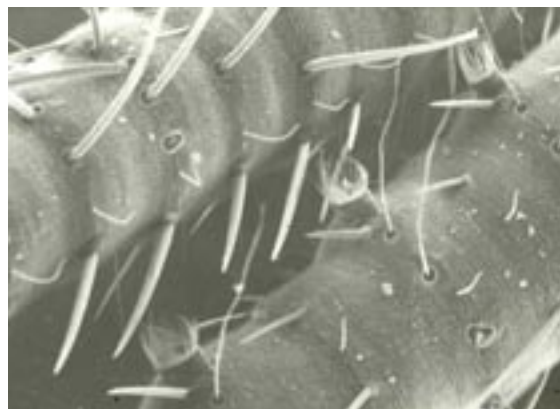
Atelurids probably avoid capture through their agility and speed, combined with their streamlined shape and dense cover of scales. Any ant biting a fleeing silverfish would probably just end up with a mouthful of scales. Reports on the behaviour of Atelurids in their host colonies are rare, one suggests that the silverfish steal droplets of food as they are passed from one ant to another. Another comments that silverfish were ignored as they walked over the queen termite.



Ateluridae: *Australiatelura* sp.

Seven species from 4 genera have been described from Australia but there are many undescribed species in museum collections. Most have been collected by ant or termite workers when sorting whole colonies.

Like the Nicoletiids, there is often quite pronounced sexual dimorphism. Males often have enlarged and unusual shaped pedicella on their antennae. They may have enlarged spines on the cerci or modifications the last abdominal tergite. Reliable identification often requires male specimens. A few Australian nicoletiid species have very unusual anemone-like structures on their cerci.



Anemone-like structures on cerci of males of *S. anemone*



Nicoletiidae: *Subtrinemura anemone* Smith from caves in the NSW Southern Highlands

Collection & Preservation

Thysanura are fast moving and relatively soft bodied. One really needs to be looking for these insects as a first priority as they quickly disappear into cracks once disturbed. A reliable collection method includes the use of a plastic wash basin where silverfish are unable to climb up the walls. The basin can be held beneath insects that are clinging to the underside of rocks or vegetation before they are lightly brushed off with a small paint brush. Rocks, bark or logs can be lifted and held over the basin for inspection so that silverfish hiding underneath fall into the basin as they try to escape. Should a silverfish bolt into the soil, it is possible to pick up a handful of soil around it and deposit it in the basin for later searching. A drop of alcohol applied by paint brush to the silverfish in the bowl will quickly immobilise it without damage.

Other successful collection sources include pitfall traps and Berlese extraction.

Silverfish are best preserved in 75% ethanol/water. It is recommended to change the alcohol within a week of first collection, especially with larger specimens that can contain a large amount of water. Museum specimens remain in good condition even after more than one hundred years in alcohol.

Specimens in alcohol are best examined under a microscope in a petri dish with black sand. The body of the silverfish can be gently pushed into the sand to provide the required orientation. Lighting is best directed through the side of the petri dish.

Control of pest species

Silverfish are more of a nuisance than a major pest. They will damage starchy papers and fabrics as they chew at the material to obtain the starch. CSIR carried out extensive work on the control of *Ctenolepisma longicaudata* in Canberra. These large slow growing species were found to mostly inhabit cupboards and wall or ceiling cavities, entering into rooms at night. Control was best achieved by treating cupboards and skirting boards, but most importantly also treating the ceiling cavities. This latter activity is much harder these days due to the extensive use of insulating materials in ceilings. The silverfish live beneath the insulation, well protected against chemical treatment. In general however they are quite sensitive to most insecticides. Long lasting chitin synthesis inhibitors have shown very good results against this oft moulting pest.

INSECT OF THE MONTH

Fiddler beetle - *Eupoecila australasiae* - Garry Levot

It is funny how things stick in your mind but I still recall noticing in 1975 that the University of New South Wales insect collection contained quite a few specimens of the Fiddler beetle, *Eupoecila australasiae* (Coleoptera: Scarabaeidae) and that just about all of them had been collected at Como, in southern Sydney. This irritated me a bit because back in the mid-1970s when I was studying entomology at the University of New South Wales I put in a fair effort to produce an insect collection as part of the second year unit, Insect Structure and Classification. Most weekends you could find me in the bush near



them to fly more swiftly and more accurately than many other beetles. The larvae inhabit the soil where they eat decaying wood. Pupation occurs in the soil.

my parent's home in Como, insect net in hand and carrying a back-pack full of glass vials. I never saw a single Fiddler beetle! I secretly cursed the collector who had caused their obvious local extinction prior to my collecting trips. On more sober reflection, perhaps I did not look in the right places or at the right time.

This handsome beetle is shiny black with distinctive bright yellow-green markings. Despite my false impression they remain fairly common in eastern Australia where they can be found among the blossom of flowering trees (eg. eucalypts) and shrubs (eg, *Angophora*). Belonging to the sub-family Cetoniinae, *Eupoecila* has a 'cut-away' in the sides of the elytra that allows them to use their hind wings while barely raising their forewings. This allows



Photo credits:

Top: http://www.geocities.com/brisbane_beetles/SCARA-BAEIDEA.htm

Middle: www.amonline.net.au/factsheets/images/fiddler.jpg

Bottom: Denis Crawford - Graphic Science 2005. In P. Horne and D. Crawford *Backyard Insects*, The Miegunyah Press

SEMINAR SERIES 2006

Date	Speaker	Title
6 September	Greg Holwell Behaviour Ecology Lab Department of Biological Sciences Macquarie University	Mating behaviour in <i>Ciulfina</i> 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	Christmas Meeting	

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)



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COUNCIL MEMBER PROFILE

Martin Horwood - President

Martin Horwood is a native of Sydney and received his bachelor's degree in entomology from Sydney University in 1980. He earned his Master of Science with a specialisation in insect parasitology from Macquarie University in 1992.

From 1980 to 1992, Martin worked as a Technical Officer at the Biological and Chemical Research Institute at Rydalmere, working for entomologists studying the ecology of grasshoppers and locusts and methods for controlling soil insect pests and pests of lucerne. In 1992 Martin took on the role as the Department's urban entomologist. It was in this capacity that he commenced his association with termites, which continues today.

In 1994 Martin's duties changed to cover Queensland fruit fly. He coordinated the Department's first use of the sterile insect technique in the MIA, the reintroduction of roadblocks to detect illegally imported fruit and the introduction of signage on roads entering the MIA.

When the Carr Government closed the BCRI in 1996, Martin left the Department and went to work for the chemical company AgrEvo. At AgrEvo his responsibilities included product registration and technical development of the company's environmental health portfolio.



In 1998 Martin left AgrEvo and went to work on timber preservation research with Forests NSW at West Pennant Hills. Much of his time is spent on industry funded projects concerned with the protection of wood power poles from termites and decay.

Martin lives in Epping with his wife Christine and beautiful daughters Sally (13) and Rachel (10).

2006 COUNCIL MEMBERS

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C/- ENTOMOLOGY DEPARTMENT
THE AUSTRALIAN MUSEUM
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SYDNEY NSW 2000

MEMBERSHIP FEES 2007

ORDINARY MEMBERS	\$50 (\$45 if paid by 1/1/07)
STUDENT MEMBERS	\$25 (\$20 if paid by 1/1/07)
CORPORATE MEMBERS	\$50
COMPANY ASSOCIATES	\$60

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