



NEWSLETTER



OCTOBER 2009



WESTERN AUSTRALIAN INSECT STUDY SOCIETY INC.

COMMITTEE OF MANAGEMENT 2009-2010

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**Contributions to the Newsletter by members are welcome:
tell us about your entomological activities, observations, or concerns**

The Society gratefully acknowledges the support
of the Western Australian Museum

Cover illustration: Caterpillar of the Banksia Moth, *Danima banksiae* on *Hakea florida* at Cape Riche. The caterpillars feed on a variety of proteaceous plants including *Banksia*, *Hakea*, *Grevillea* and *Dryandra*. Photo: Geoff Byrne.

Coming Events

NEXT MEETING

Wednesday 14 October 2009
commencing 7.30 pm
Kings Park Administration Centre

Main features:

“South American Insects”
Palenque Blair and Damon Annison
&
“Dragonflies and other Insects in Mexico”
Jan Taylor

Insect in focus:

“Tear-sucking Moth”
David Knowles

Excursion:

No excursion is planned for October.

Report on the August Meeting

Main address:

“The Ecology and Behaviour of Dung-Beetles:
dung is not just dung.”

Dr James Ridsdill-Smith spoke about the wonderful world of dung beetles. He retired from CSIRO Entomology (WA) where he directed the dung beetle program in the 1970s and 80s. We eagerly look forward to James' book on dung-beetles which he is in the process of writing.

James told us that 30% of all non-microscopic animals in the world are beetles and beetles comprise 40% of all insects. Beetles evolved over 200 million years ago and dung beetles were around during the time of the dinosaurs.

Dung beetles, both adults and larvae, are specialised to feed on dung and competition for dung pads can be very high. Dung beetles are in the family Scarabaeidae, subfamilies Aphodiinae and Scarabaeinae. The Aphodiinae live and feed in dung. The Australian Scarabaeinae mainly feed on quadruped dung, but some species use fungi, carrion or saprophytes. The life cycle of the Scarabaeinae

begins when the adult is attracted to fresh dung: it cuts out a ball which it rolls away, buries and deposits an egg upon. The egg hatches into a larva which feeds on the dung, growing until ready to pupate. After a pause the young adult emerges.

A rich dung beetle fauna is present in much of Africa where there are some very big species. These large beetles need a high temperature to be active and so only occur in warmer areas. Dung beetles are described as ‘dwellers’, ‘tunnelers’ or ‘ball rollers.’

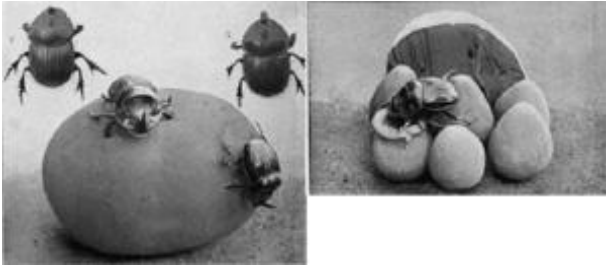
The beetles have many different strategies for dealing with dung. Different species bury the dung at different depths and burying rates differ from 1-2 days to 10-12 days, depending on the species. We were impressed with the statement that “dung is not just dung” as the quality varies. Dung beetles fly at different times, some in the daytime others during the night. Some do not fly at all because they do not have wings, but for all, the ability to find fresh dung is crucial to their survival.

Before exotic dung beetles were introduced into SW Australia during the 1980s, cow dung accumulated in pastures, smothering grass and breeding billions of bush flies. The introduced beetles were mainly from Africa and Europe. A total of 43 species were released, 23 of which became established. These have made a significant improvement in nutrient cycling on pastureland as well as a huge reduction in the populations of dung-breeding flies.



Bushflies covering cowdung prior to the release of dung beetles. Photo: James Ridsdill-Smith.

Classic amateur naturalist Jean Henri Fabre (1823 – 1915) had a passion for life in all its forms. Charles Darwin described him as ‘that inimitable observer.’ Fabre wrote ‘Souvenirs entomologiques’ in ten volumes, which took nearly 30 years to complete and his humanistic style and close observations lead to the popularisation of the science of insects.



Brood care in *Copris hispanus*. J. H. Fabre

After describing the influence of Jean Henri Fabre, James then led us into the amazing variety of dung beetles and their varied lives.

***Scarabaeus sacer*.** In this species there is male and female cooperation. The females dig a tunnel up to one metre deep and, after making a small hole in the brood mass and spitting into it, lay an egg there. These dung beetles are found all around the Mediterranean but since the 1980s have become less common. This species is the sacred scarab from ancient Egypt. It was noticed that these large beetles come out of the soil in spring during times of rains, so they were associated with reincarnation. They also make perfect spheres of dung which they roll, just like the god Khepera or Ra rolls the sun around the sky.



The Sacred Scarab, *Scarabaeus sacer*.

***Copris hispanus*.** They bury a huge ball of dung as big as a cricket ball. The females cut up this big dung mass into small balls and lay eggs. The females stay with the balls until the following year, tending the balls by picking off fungi, for example. This enormous parental input into protecting the offspring doubles their survival rate. This species is from Spain, and has been very successfully introduced into SW Australia.

***Onthophagus ferox*.** This is quite a large native dung beetle found around sheep dung. There is only one egg in each dung ball and the larva has a hunched back which is believed to allow it to move around within the dung ball. Around the month of May there is a massive emergence of these beetles and they are only seen for a short while.

***Onthophagus binodis*.** This species was introduced to SW Australia from South Africa. James reported how someone on a surf ski had caught herring which had eaten introduced dung beetles flying out to sea when dispersing.



Cowpat with swarms of introduced *Onthofagus binodis*.
Photo: James Ridsdill-Smith.

***Pachylomera femoralis*.** This is a large African ball-rolling species 45mm long. Africa presently has large animals and when dung beetles evolved there was megafauna everywhere. Cows do not produce enough dung for this species so it may not survive. Wildebeest, Black Rhinoceros, and Cape Buffalo are all important sources of dung for dung beetles.

Native dung beetles. We know practically nothing about our native dung beetles and the 28 or 29 species in the SW are all endemic. Half of the Scarabaeini of the SW are flightless although other species can fly. Kangaroos are the main providers of dung.

Introduced species are not interfering with native species as they occupy different habitats, natural bushlands mainly having native species while introduced species are largely confined to pasture land.

Native dung beetles have not had the egg, larva or nest burrow described, so James said to keep our eyes open and describe it if you should happen to see any. They are primitive species and probably push small pellets of dung along the ground. For example the adult male *Tesserodon tenebriodes* collected by Harry Butler from Barrow Island is the only specimen collected.

Dung beetles may be important for getting fungal spores to the roots of native trees. At Rottneest, quokkas eat the fungal fruiting bodies, and when the quokkas pass out the contents, dung beetles bury their dung, transporting the fungal spores to the roots.

During the question time we discovered that there is a dung beetle with hooks on its legs so that it can hang onto the back region of wallabies. By doing this, it is in a prime place to find fresh dung and drops off when the wallaby defaecates – Margaret Owen.

ooOoo

Insect in focus:

“An unusual diet in a flightless trogid beetle”
Terry Houston

Entomology is so full of surprises that we should expect the unexpected and not assume that all species in a particular group will behave similarly. The beetle species forming the subject of this story provides a case in point: it is a desert-inhabiting beetle belonging to the worldwide family Trogidae (one of

several families comprising the scarab-group, superfamily Scarabaeoidea). Trogids are usually associated with carrion and are known as ‘carcass beetles’ or ‘hide beetles’. Australia is home to 53 known species in a single genus, *Omorgus* (formerly in the genus *Trox*).

These beetles are usually dull black, warty, dust-covered and range from about 10 to over 30 mm in length. Most species are associated with vertebrate carrion, adults and larvae feeding on the hair or feathers and dried skin and muscle. Larvae of these carrion-feeders are white curl-grubs as in most other ‘scarabs’ and live in burrows in the soil beneath carcasses. Some other trogids have been found breeding in vertebrate burrows and nests, on the castings of predatory birds and in bat guano. One American species has been reported to feed on dead insects.



Normal winged trogid beetles showing dirt-stained bodies and separation of the wing cases.
Photo: Terry Houston

Carrion-feeders depend on scattered and temporary resources for feeding and breeding. Presumably, adults of such species seek out animal carcasses by their odour while on the wing. Their wing covers (elytra) can be spread apart quite easily exposing the (hind) wings. Some trogid species, however, are flightless, having the elytra fused and the hind wings vestigial. Flightlessness (accompanied by increased size) is common in desert beetles

and scarab specialist Clarke Scholtz (1981) suggested that it probably helps to reduce water loss. Flightlessness suggests a very different biology but, until now, no information has been available on the feeding and breeding habits of such species. Nine of the largest Australian *Omorgus* species are flightless and *O. rotundulus*, the subject of this talk, inhabits arid regions of northern Australia.



A flightless trogid beetle, *Omorgus rotundulus*, from the Little Sandy Desert. Photo: Terry Houston

Several years ago, a collection of thousands of wet-preserved trogids was donated to the Western Australian Museum by the (then) Western Australian Department of Conservation and Land Management. The material was collected during 1995-1997 in the Little Sandy Desert of northern Western Australia. The beetles were pitfall-trapped using 10 litre buckets containing ethylene glycol and formalin as a preservative. The traps were deployed in pairs at 15 trapping sites distributed across an area of varied soil and vegetation types.

The bulk of the material (87%) consisted of *O. rotundulus* adults (body length usually 18-22 mm) while the remainder consisted about equally of three smaller, winged species. I was curious as to why hundreds of specimens restricted to walking would drown themselves in ethylene glycol and formalin and dissected a specimen to see what was in its intestine. I was

surprised to find the gut packed from end to end with the remains of small black ants. Subsequently, I commissioned dissection of fifty further specimens selected at random from jars representing several of the survey sites. Of these, 41 were *O. rotundulus* (7 males and 34 females) and the remaining nine represented three winged species. No recognizable food material was found in the intestines of the winged species but the intestines of most specimens of *O. rotundulus* contained at least some solid matter, the bulk of which consisted of bits of chitin from insects and other invertebrates. The quantity of chitinous material varied from just a few bits to the gut being solidly packed with it from end to end, causing the abdomen to bulge.

Ants and termites were the most commonly recognised invertebrates in gut contents and all parts of these insects were found, including the wings of termite reproductives. Several genera of ants were distinguished and termites were represented by bits of soldiers (nasute type), workers and alates. Other invertebrates identified included burrowing bugs (Cydnidae), beetles and arachnids.

Minor amounts of plant tissue along with copious amounts of partly digested soft animal tissue and thin chitinous membrane suggested moth caterpillars were also ingested occasionally.

O. rotundulus were trapped in each of the four sampling periods but numbers varied significantly. Relatively few occurred in the 1996 samples but, the following year, particularly large numbers were present in the April samples with up to 250 beetles per bucket. Monsoonal rains had occurred through the desert in the summer preceding that sample and probably accounted for the increased numbers of beetles.

Notes on habitat accompanying the collections indicated that *O. rotundulus* was most abundant at sites having deep sandy soils (dune crests and slopes and swales between dunes having deep consolidated red sand).

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Lesser but still substantial numbers were also trapped at sites with harder soils. The vegetation at *O. rotundulus* sites varied accordingly, including 'heath', shrubland and open woodland but spinifex (*Triodia* sp.) was the dominant grass at most sites.

The large numbers of specimens of *O. rotundulus* captured in some pitfall traps, particularly those in deep sandy soil areas, indicate that dense populations were present during the post-summer trapping period. The fact that ants and termites form the bulk of the beetles' diet helps to explain how such numbers could occur. There could be no more numerous insects in the Little Sandy Desert than ants and termites. A question our study has not been able to answer is – do the beetles capture and eat live prey or do they scavenge dead specimens? Adults of *O. rotundulus* are slow-moving, possess short, blunt mandibles and do not have the appearance of predacious beetles. If they eat live prey, perhaps the beetles feed where the prey is concentrated and its movement restricted, for example at ant nest entrances, termite foraging gallery exit holes or along foraging trails. Scavenging would be more in line with the known habits of Trogidae although Clarke Scholtz has noted African and/or American species feeding on living locust eggs and fly maggots. If *O. rotundulus* eats dead insects, it is difficult to explain where the beetles would find such large quantities as was observed in the intestines of some individuals. Direct observation of the beetles' feeding habits will be required to resolve these questions.

Flightless *Omorgus* specimens have been collected while wandering on the ground surface and I have excavated some from burrows up to 20 cm deep in yellow sand. Other than that, nothing else was known of the behaviour of the flightless species until just recently when photographer and WAISS member Jiri Lochman produced photographs of flightless *Omorgus* beetles with herbivore droppings. Jiri had watched the beetles roll these pellets across sand dunes. This raises questions that will only be resolved by further

careful observation. Hopefully someone will one day find themselves in the right place at the right time.

Further reading:

Houston, T.F., Zhang, J. & Hanich, B.P. (in press). Diet of the flightless trogid beetle *Omorgus rotundulus* (Haaf) (Coleoptera: Trogidae) in the Little Sandy Desert of Western Australia. *The Australian Entomologist* **36**(4).

Scholtz, C.H.1981. Aptery in *Trox* (Coleoptera: Trogidae): morphological changes and their relationship to habitat. *Journal of the Entomological Society of Southern Africa* **44**: 83-87.

Excursion:

Herdsman Lake, 16 August 2009
by Otto Mueller

It was a wet August, in fact the wettest August for fourteen years. The signs were not good but, surprise, surprise, there was little wind, no rain and the sun shone all morning. The equipment handlers were on the job early. Some preparations were needed: the Environment Centre had to be opened via padlocks, gates, main doors, keys, and the security systems needed disabling - we do live in a complicated society. Tables were brought out and enamel trays set up. Helpers from Murdoch University eventually set up about five microscopes inside the building and, by then, some fourteen people including juniors had arrived to see what lived in the lake. But specimens had to be caught first. Despite the cold water, the variety was quite impressive. There were those fast, but colourful water mites. How to make them slow down? Eventually some small freshwater shrimps turned up as well. The trays were alive with daphnias, copepods with egg cases and some ostracods. Caddis fly larvae walked around with their abdomen well hidden in their cases. We also caught damselfly and dragonfly nymphs. The occasional *Gambusia* also managed to get swept up, but the larger aquatics like the beetles, back-swimmers and boatmen were very scarce. Maybe the season was too early yet. Many a participant had never seen the adaptations necessary for any organism to survive all or part of its life-cycle under water. It was midday by the time we had

all questions answered, creatures returned to their habitat and all utensils removed. The general response was: "a Sunday morning well spent". I thank those who brought books, knowledge and equipment, especially Dr Karin Strehlow (Murdoch Uni.) and her assistants.

News, Notes & Announcements

New Member

Welcome to Jill Davy-Warren (Unley, SA; interested in butterfly ecology).

WAISS membership now stands at 138

WAISS 20th Anniversary December

It is planned to have a special anniversary edition of the Newsletter in colour, which will feature photographs of insects by WAISS members. Members are asked to send their favourite photos (print, slide or digital) to me by 11 November, or give them to me at the October meeting (only 2/person please). The photos selected will depend on numbers received, quality and interest. – Jan Taylor

Fancy hat competition: To help celebrate the WAISS 20th anniversary, members are invited to design and wear an insect-theme hat to the December general meeting. A prize will be awarded for the best design.

Bug-Eye

(Observations of insects in the field.
Members' contributions welcomed)

Notes on insects featured in the June edition of the Newsletter - Tom Burbidge

This wood-boring beetle on page 9 is most likely to be *Atactrocerus kreuslerae* or *A. crassicornus*, the Eucalypt Pinhole Borer or Pinworm, as it is commonly known. I used to find the beetle in question in light traps covered in moth scales as it is pictured. When you clean the moth scales off with a damp brush you will find the actual adult beetle in its

natural colour which is black. As the CSIRO's *Insects of Australia* has drawn it, the larvae are long and thin and usually white or creamy in colour. They are very common in all our forest tree species and also in the introduced species that have been used in plantations and in the small experimental plots found in the forest areas. They tend to put out a lot of frass when they are active. I noticed this when I was working out in the forest areas for Steve Curry. He was trying to catch them using traps he had tacked over their active holes. We caught some this way but not many. However, we did breed a good number out of pieces of timber put in cages. This was by far the most successful breeding method, so much so there are 2 or 3 trays of them in the DEC collection.

The other thing was the Limacodidae larva (featured on page 10). We regularly ran foul of these larvae earlier in my career at CALM (DEC) when we were tracing Jarrah leaves in various plots, especially on regrowth plots as the caterpillars tended to hide on the under surface of the leaves close to where we were tracing. I seem to remember that the beast we encountered the most was *Doratifera quadriguttata*. Yes, it did have quite a painful sting which, after a while, abated but tended to become quite itchy and then disappeared all together.

Some South Coast insects – Geoff Byrne

A toad bug was found to be common on the sand plain around Cape Riche. This one had several parasites, probably erythraeid mites.



Toad bug, *Nerthra* sp. from Cape Riche.
Photo: Geoff Byrne.

This native bee was feeding on the triggerplant, *Stylidium scandens* and became trapped under the trigger. The plant was flowering late at Cheyne Beach in December.



Native bee on triggerplant flower. Photo: Geoff Byrne



Bee trapped under trigger. Photo: Geoff Byrne.

Flightless cossid moth

This moth was found and photographed in August by Melissa Cundy on a road north of Wubin.



Female cossid moth with short wings.
Photo: Melissa Cundy

Flies on grass-tree flower spike – Margaret Owen

In early September I went to Inglewood Triangle, a small area of remnant bushland in Inglewood. Flies were present on the emerging grass tree spikes and this spike had about 25 flies on it. The flies have a marvellous likeness to jumping spiders, due to the markings on the wings and the colouration of the head appendages, which look like the abdomen of a spider. I wonder what was attracting the flies to the grass tree spike.



Flies on a grass tree flower spike.
Photo: Margaret Owen.

Flying Ants – Margaret Owen

These ants, *Anonychomyrma itinerans perthensis*, I am told, are very common in Perth bushlands, but they do not normally persist in disturbed areas.



Ants, *Anonychomyrma itinerans perthensis*, preparing for nuptial flight. Photo: Margaret Owen.

At times conditions will be right for dispersal and mating to start new colonies. Dr Heterick of Curtin University surmised that good conditions are when there are suitable air currents (particularly for ants that will fly well above the ground), warmth (for energetic activity in the ant's muscular system) and humidity (presaging rain and consequent plant growth).

This was the case on 2 August 2009 in Underwood Avenue Bushland. Thousands of ants were engaged in a massed nuptial event designed to lead to mating and to interbreeding. The large winged ants are the unmated queens, many of which were trying to climb fragile grass leaves to gain a height advantage to take flight. As the grass bent over with the weight of the queen ants, it was difficult to gain height. The very small ants in huge numbers were the workers which frantically groomed the queens, encouraging them to fly off. The smaller winged ants were the males which also flew off to try to mate with a queen.

These nuptial flights are often synchronised so that predators cannot eat all the ants. So, all over the bushland, ants were on the move.

Jewel beetle seen on Geraldton Wax –
Margaret Owen



Jewel beetle, *Castiarina picta*. Photo: Margaret Owen.

BUGHUNTER'S CORNER

What's in a name?

Mayflies are beautiful insects with long trailing tails. They get their name because a particularly large attractive kind flies mainly in the month of May – in England. Here swarms of mayflies can sometimes be seen flying over rivers in November – the equivalent month in the southern hemisphere as well as in other months.

Mayflies belong to the Ephemeroptera. It's a long name meaning live-for-a-day-wings. That is because they have a very short lifespan as winged adults. Usually the males form swarms and females fly in to mate, and then lay their eggs in the water soon afterwards. It is usually all over within a day of hatching. They could not feed, even if they wanted to, because they do not have any mouthparts.

The main part of the life of mayflies is in the nymphal, or larval stage, which lives in ponds and rivers. Most are active swimmers, and cling onto sticks or stones where they graze on algae.



Adult mayfly with long trailing tails. Photo: Jan Taylor