FAUNA

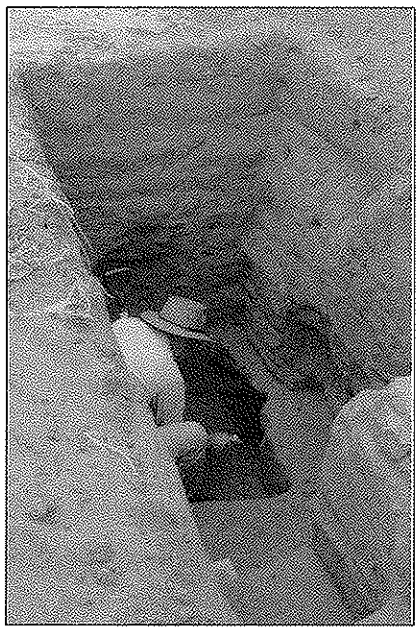
UNEARTHING THE SECRETS OF SANDGROPERS

Terry Houston

Longer-term readers of *Western Wildlife* will remember that in April 2003 I contributed an article on sandgropers, the extraordinary burrowing insects that share their name with all Western Australians. I described what we knew about the animal at that time (which wasn't much!) and explained that I was hoping to study them for a few years and so learn more about their natural history. I finished by asking readers if they could tell me where they had seen the animals or, even better, send me specimens. Many people did contact me, and I have now found out a bit more about the secret lives of sandgropers.

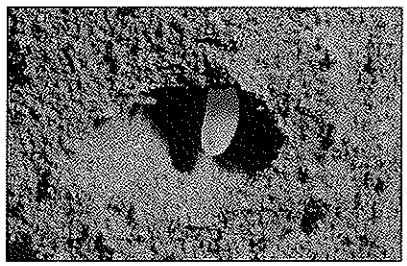
Just to recap quickly – sandgropers are related to short-horned grasshoppers, and are in their own family (Cylindrachetidae) with 16 species in 3 genera. Two of the genera and 14 of the species are restricted to Australia. The most common species in the south-west is *Cylindraustralia kochii*, but I also made some observations of *C. tindalei* and two unnamed species. They live an almost entirely subterranean existence and have adaptations that include loss of wings, reduced eyes and antennae and forelegs modified into powerful digging tools.

Originally I searched for animals by looking for their raised trails on bare sandy roads after rain but nearly all specimens found this way proved to be adult males. I needed females in order to learn more about the reproductive biology. This meant I would have to dig! Fortunately, some farmers in the Mid West had alerted me to large populations of sandgropers on their properties, and permitted me to excavate in their pasture paddocks.



One of the first questions I wanted to answer was "How deep do sandgropers burrow?" Some serious spadework on a property near Dandaragan found that they burrow to at least 1.9 metres. I also obtained up to 100 specimens per square metre of surface, a much larger population density that I had thought.

Dissecting some females showed that the eggs were large for an insect – up to 7.5mm long – and had an odd little appendage on one end. It wasn't long before I turned up eggs while excavating and the appendage proved to be for attaching the egg to the substrate. Each egg was hung in its own little chamber 40-190 cm below the ground surface. The eggs hatch into an odd little creature (termed the 'larva') that is enveloped



in a transparent membrane and neither moves nor feeds. After a while they shed this covering and become first stage nymphs, which are like miniature adults. They eat some of their eggshell, burrow out of their chambers and commence solitary lives of tunneling and feeding. Hatching occurs in mid to late summer, and it seems sandgropers must have a life cycle extending over several years.

The gut contents of 162 animals were analysed under the microscope to find out what they ate. Mostly they eat plants, but will also consume fungi and other invertebrates. The plant parts eaten included root, seed, leaf and flower material (the latter showing that presumably they do sometimes browse at the surface). A wide variety of insects and arachnids were also present in the gut contents – Tindale's sandgroper seemed particularly fond of eating worker termites. As expected, animals collected in summer had less food in their intestines.

I was surprised to find no insect parasites on or in the sandgropers. Perhaps their subterranean lifestyle protects them against such enemies. However, they are very prone to parasites known as gregarines (single-celled organisms that live passively in the lumen of the gut). Nematode worms were found frequently in the genital tracts of adults and mites were often found clinging to the outside of the insects, but both worms and mites were non-feeding dispersal stages just hitching rides, apparently.

The insects had a distinctive, somewhat pungent odour. I could not determine whether it was for defence or some other purpose. Certainly it did not deter ravens from

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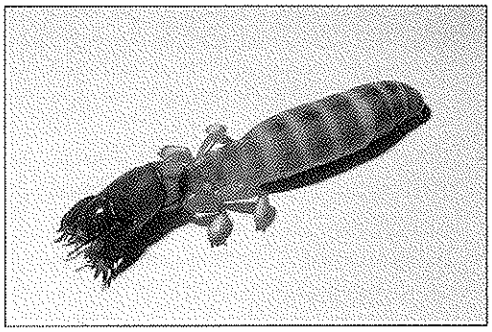
Sandgropers

eating sandgropers turned out of the soil during ploughing.

My study leaves several questions unanswered: how long is the complete life cycle? How long do adults survive? Where, when and how do sandgropers mate? How many eggs do females produce in their lifetime? Are there any insect predators or parasites not discovered in my study? At what rate do sandgropers burrow near the surface and at depth? Do they continually burrow into new soil or do they return to home burrows? Do they exhibit daily patterns of activity? These and other questions could provide a basis for university student projects.

Thank you to all the people who helped in this study by providing information and locations for collection. I am still very interested in any new observations that might be made. You can contact me by email at: Terry.Houston@museum.wa.gov.au



Tindale's Sandgroper

{This article is based on one which first appeared in the Newsletter of the WA Insect Study Society in June 2007, which in turn is based on the publication: Houston T.F. (2007). Observations of the biology and immature stages of the sandgroper *Cylindraustralia kochii* (Saussure), with notes on some cogeners (Orthoptera: Cylindrachetidae). Records of the Western Australian Museum **23**: 219-234.}

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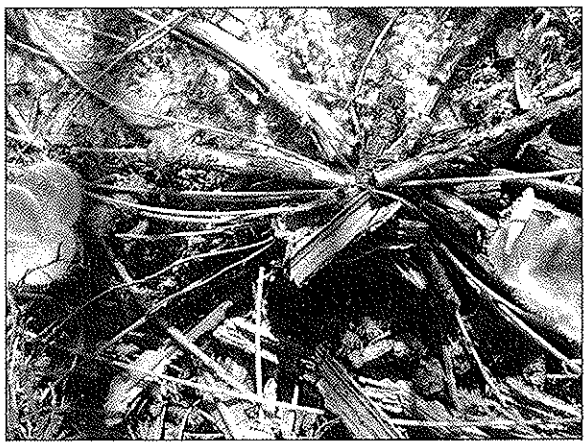
Please note:
back copies of Western Wildlife are now on the website, so if you would like to read Terry's earlier article, go to 7/2 page 1.
Go to www.naturebase.net and follow the links though 'off-reserve conservation' to Land for Wildlife.

Bush Detective

Patterns in the litter. random or by design?



Close scrutiny of a ground layer of leaf litter in some coastal woodland in Beecham Reserve, City of Mandurah, reveals a fan-like arrangement of some leaves and twigs. How has this pattern come about – was it just by accident, perhaps through the shift of wind or water – or has there been an architect manipulating the detritus?

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Baudin's cockatoo – an endangered pest!

Unfortunately, there are sometimes conflicts of interest between native species and primary production. One such example is Baudin's cockatoo, which has been considered a pest of apple and pear orchards since the 1900s. It is also an iconic species that is declining in numbers. In the past, birds have been killed to minimize damage to orchard crops, but when it was listed as a threatened species in 1996, this was no longer a legal option. However, some growers state that non-lethal deterrents (such as scary noises) are not effective. Tamra Chapman surveyed growers to assess their attitude toward the conservation status of the cockatoo and the cost of damage and damage control *.

When the responses were analysed, it showed, for example, that Pink Lady apple was the most commonly and severely damaged fruit variety. It also showed non-lethal scaring techniques are effective for protecting against damage from Baudin's cockatoo and that shooting to kill cannot be justified in terms of the damage the cockatoos cause or the costs of damage control incurred by the growers.

For deterrent methods, read: "Reducing fruit damage by Baudin's Cockatoo". T. Chapman & M. Massam. CALM Fauna Note 2/2005. Available on the DEC website.

* Chapman, T.F. 2007. An endangered species that is also a pest: a case study of Baudin's Cockatoo *Calyptorhynchus baudinii* and the pome fruit industry in south-west Western Australia. J. Royal Society of WA, **90**: 33-40.