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MOLE CRICKETS

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IN biology, as in any branch of science, a line of investigation can often lead the researcher into other avenues of investigation, sometimes with unexpected results. This happened at the WA Museum in 2002, the year I began studying the secret lives of sandgropers (see Western Wildlife Vol.7 No.2, pages 1 and 3).

In order to obtain specimens of sandgropers for my research I launched a public appeal via the electronic and print media. This resulted in a flood of telephone calls, nearly all from the Perth metropolitan area with people claiming they could offer me "any number of sandgropers" from their gardens. While a few calls related to the genuine article, most of the so-called 'sandgropers' proved to be mole crickets. Mole crickets are only distant relatives of sandgropers but they resemble them in certain respects, particularly in having the fore legs highly modified for digging. Like sandgropers, they burrow by simply forcing soil to the sides, creating an open gallery. They don't excavate and throw out soil like most burrowing creatures.

According to many callers, these insects had appeared in their gardens only in the past year or two, infesting lawns, shade-houses and potted plants and often drowning themselves in swimming pools or entering houses. Once I began receiving specimens of these insects it was apparent that two species were dominant in suburban gardens. I referred to these as the 'matt brown striped wing' and 'shiny black striped wing' species based on the appearance of their fore body and short fore wings, respectively (Figs 1, 2). Oddly, neither species was represented in the Museum's extensive mole cricket reference collection. A check of the Agriculture Department's insect collection, too, revealed only a few recently collected specimens of these 'invasive' species from suburban localities. It looked suspiciously like these garden-infesting species were recent arrivals from somewhere else, and thus began my interest in the mole crickets of Western Australia.

Fig. 1 Gryllotalpa matt brown. *Female of the 'matt brown' invasive species from Perth (the folded hind wings can be seen extending over the end of the abdomen).*

Fig. 2 Gryllotalpa shiny black. *Male of the 'shiny black' invasive species from Perth (the short fore wings hide the vestigial, non-functional hind wings).*

Whereas sandgropers are descended from the diurnal grasshopper and locust clan, mole crickets are descendants of the mainly nocturnal true crickets (family Gryllidae). The two groups are thus classed in separate suborders of the order Orthoptera. Their similarities are superficial and have arisen independently as adaptations to a burrowing mode of life.

As in the true crickets, males of mole crickets (with some exceptions) are songsters, producing chirping or trilling songs by stridulation (i.e. they rub their shortened fore wings together so that a 'scraper' on one wing rubs over a series of teeth on the other). Males sing in the funnel-shaped entrances to their ground burrows and their

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songs are amplified as a result, being audible for tens or even hundreds of metres away. Generally, too, the mole crickets sing only at dusk and for one to two hours afterwards. Their songs are lower in pitch than those of most other crickets and many people mistakenly attribute them to frogs.

Mole crickets are not as well adapted for life in the soil as are the sandgropers. Their mid and hind legs are quite well developed and they can run about on the ground quite rapidly. Their antennae are whip-like (though shorter than true crickets) and a pair of long slender 'feelers' (cerci) extend rearwards from the end of the abdomen. While hind wings are often reduced or absent in males, they are usually well developed and functional in adult females (they fold like fans and lie along the mid-line of the abdomen, often hanging over the end). Females emerge at night and fly in search of mates, locating the males in their burrows by their songs. The hearing organs, as in other crickets and katydids, are located inside openings on the fore legs. Females are commonly attracted to lights at night.

Apart from having modified fore legs, mole crickets differ from their true cricket relatives also in lacking a needle-like ovipositor in the female. True crickets inject their eggs into the soil using the ovipositor but mole crickets, living underground, lay their eggs in special chambers and are reputed to brood over them.

Mole crickets can be safely handled but they do have a defence mechanism which can be unpleasant – they expel a foul-smelling, dark brown liquid from the anus when disturbed. Some species also expel a clear, colourless, viscid liquid which doubtless serves to entangle attacking ants and other small predators.

Judging by studies overseas, the diet of mole crickets can vary from species to species, some being strictly herbivorous, feeding only on roots or other parts of plants, while others are carnivorous or omnivorous. The diet of Australian

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Fig. 3 *Gryllotalpa Wanneroo. In this native species from the Perth area the fore wings are reduced to tiny discs and hind wings are completely absent.*

mole crickets seems to have been little studied but my observations have shown some WA species to be predacious.

In the northern hemisphere, some mole crickets are serious pests of turf, pastures and crops causing damage costing millions of dollars. One in particular, the Changa Mole Cricket, a native of South America, was accidentally introduced into the USA and also appeared in eastern Australia (Rentz 1995). Fortunately, the invasive mole crickets from Perth gardens proved not to be this exotic pest species. Nevertheless, it appeared that because of their large size (body length up to 36 mm) and powerful fore legs, they were capable of causing some damage to lawns and plants simply by breaking their roots as they tunnelled around. Generally, though, Australia's native mole crickets have not caused any serious problems in agriculture.

In an attempt to identify the 'invasive' species, I turned to the most recent revision of the Australian mole crickets: Otte & Alexander (1983) included the mole crickets in their revision of the Australian gryllid crickets. They recognized 10 described species of the genus *Gryllotalpa*, noting that perhaps as many as ten more species awaited description and naming. I tentatively matched Perth's invasive species to two eastern states species, *G. australis* and *G. pluvialis*. Given their readiness to make homes in the soil of well-watered potted plants, the insects might have been transported to Perth and other urban areas via the interstate plant trade.

In the early days of my sandgroper study I attempted to collect specimens for study using intercept traps to snare the insects as they burrow along just beneath the surface of the sand. This near-surface tunnelling produces raised trails on the surface of bare sand during the wet winter months and I had seen plenty of such trails in bushlands in and around Perth. My traps, however, yielded not sandgropers but mole crickets. Two different species were found, one in coastal dunes and adjacent bushland reserves and the other in *Banksia* woodlands on Bassendean sands. Both of these mole crickets were notable for the great reduction or virtual absence of wings in the adults (Fig. 3) and the absence of the hearing organs on the fore legs. Clearly these are songless species and the question arises as to how the sexes find one another to mate. These two native species were misidentified by Otte & Alexander and are clearly yet to be named and described. A couple of Museum specimens of a handsome species from the extreme South-West were also misidentified as an eastern states species and represent yet another undescribed species.

How many mole cricket species are out there in the wild waiting to be discovered is a moot point, but even for those we know about, distributional information is scant indeed. Not being particularly attractive insects, they are not popular with amateur collectors and tend to be scarce in collections. The reader could assist the WA Museum build a better picture of the taxonomy and distribution of our local mole crickets by forwarding any specimens excavated or captured. Particularly desirable are specimens from outside the Perth metropolitan area, whether from bushlands, farms or regional centres.

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A further reading list is available from the Editor.