

Grasshoppers, Crickets and Katydid - Orthoptera

of Belair National Park and Adelaide Hills



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The order name **Orthoptera** comes from Greek roots: ‘orthos’ meaning ‘straight’, and ‘pteron’ meaning ‘wing’. So **Orthoptera** literally means ‘straight wings’. This refers to the fact they have straight, leathery forewings or tegmina that lie flat along the body (see anatomy diagram on the next page). These toughened forewings protect the more delicate hind wings underneath, which unfold like hand-held fans when the insect takes flight.

Orthoptera is the insect order that includes **grasshoppers, crickets and katydids**. They are found on every continent except Antarctica and occupy habitats ranging from deserts and grasslands to forests and caves.

A defining feature of many **Orthoptera** is sound production, or stridulation. Crickets rub their forewings together, grasshoppers scrape their hind legs against wings, and katydids use finely toothed files on their wings to create high-pitched ticks and buzzes. A few species are silent, but most use sound for courtship or territorial displays, creating the familiar evening chorus that I frequently hear out of my bedroom window!

Beyond their sound production another defining feature is their impressive jumping power. Even small grasshoppers can launch themselves up to 20 times their body length thanks to a catapult-like mechanism on the hind femur. Frequently I have been photographing an Orthopteran when it has launched itself into the air and I haven’t been able to find it again.

Orthoptera are essential to our environment: they are major herbivores in many ecosystems, prey for birds and reptiles, agricultural pests in some regions, and even food sources for humans.

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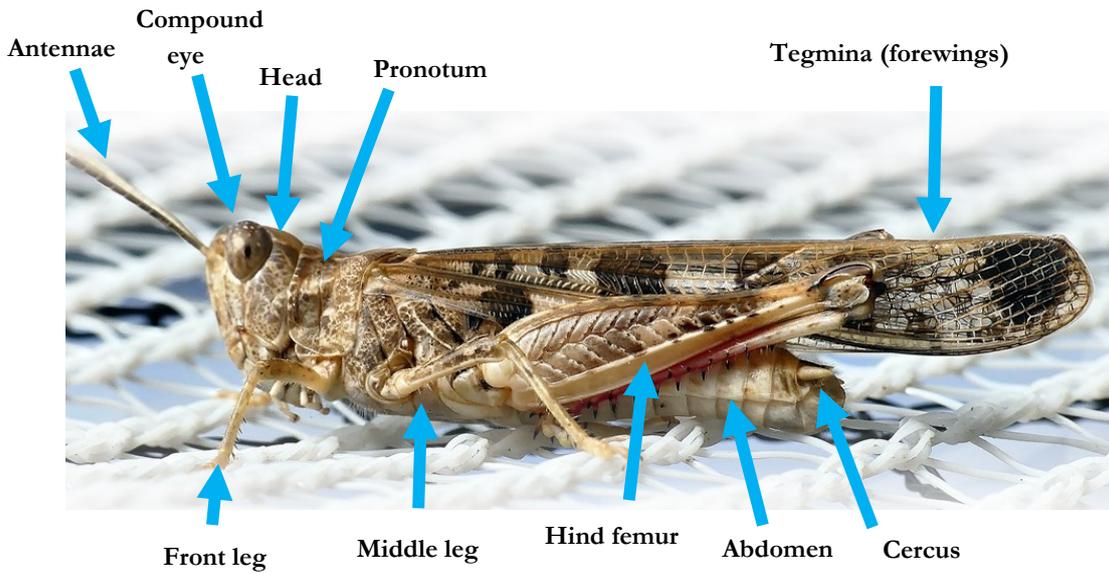
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Front cover image: Wingless Grasshopper, *Phaulacridium vittatum*.

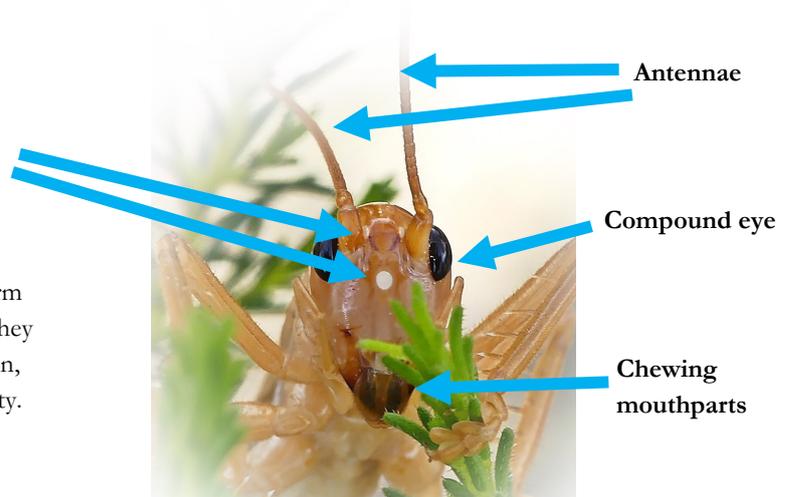
Anatomy



Head

Simple eyes (ocelli) in middle of head and between antenna.

This is the typical configuration of ocelli for grasshoppers and crickets. The ocelli cannot form distinct images but are effectively light meters. They are very good at detecting the line of the horizon, thus helping with flight coordination and stability.



Life stages

Incomplete Metamorphosis

Although none of these photos are from the same species, and there is immense variation between species, they still give a good idea of the life stages of Orthoptera. Eggs are usually very difficult to see or find, many being laid underground.



Adults mating (wingless species)



Female laying eggs in the ground



Early instar nymphs



Late instar nymph (advanced wing buds)



Adult (fully winged)

Grasshoppers, Locusts and Allies

- **Caelifera** (suborder)

Caelifera is a suborder that includes grasshoppers and locusts.

The name comes from Latin 'caelum' meaning 'heaven' or 'sky', and 'fera' meaning to 'bear' or 'carry'. So **Caelifera** literally means 'sky-bearers' referring to their powerful jumping and flying abilities that launch them into the air.

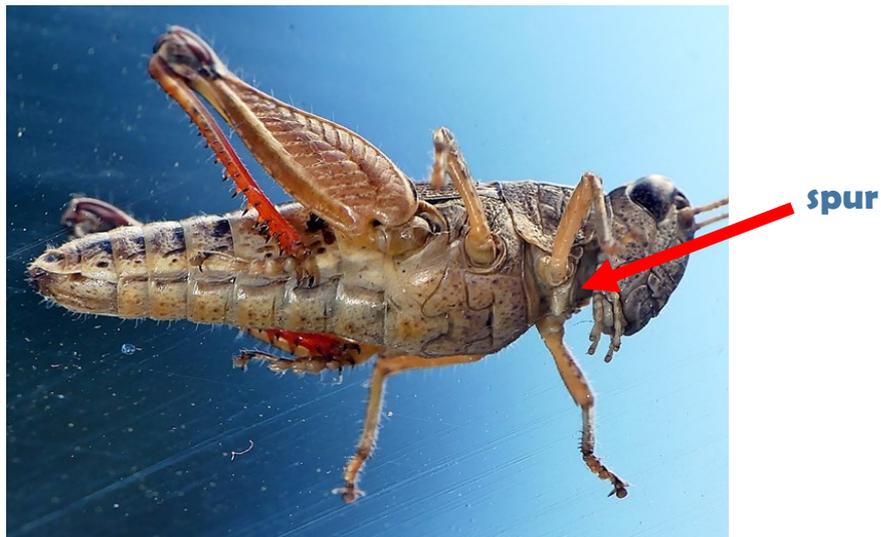


Short-horned Grasshoppers - Acrididae

The name **Acrididae** comes from the Greek 'akris' meaning 'grasshopper'. It is the largest family of grasshoppers. Their common name Short-horned Grasshoppers, refers to their antennae, which are shorter than their body. Their body is stout and robust and they have powerful hind legs for jumping. Most species have two pairs of wings: the narrow forewings or tegmina and the broad membranous hind wings. Many males produce sounds (stridulation) by rubbing their hind legs against their wings to attract mates. They are primarily herbivorous, feeding on grasses and other plants. I have found them literally everywhere: at home, in the bush, on paths, on trees, on grasses, on foliage. I've divided this family into two subfamilies.

Spur-throated Grasshoppers - Catanopinae (subfamily)

A key identifying feature of this subfamily is a 'spur' or projection on the underside of the thorax between the two front legs (arrowed below). This Grasshopper was on my windscreen and I took the opportunity to photograph it.



Entire page: Wingless Grasshopper, Phaulacridium vittatum. Also called Vittate Grasshopper.

This is a very common grasshopper I see everywhere. It is small to medium-sized (10–20 mm). Adults are flightless with no wings or very short wing buds. They are varied in colour as shown in the comparison photos on the left. They have pale longitudinal stripes ('vittate' means striped) which can be seen even on the tiny nymph on the right.

Below is a mating pair, notable for the variation in size and colouring



Comparison

Two species from one genus, Gumleaf Grasshoppers, *Goniaca* sp.

In the left column is the Mimetic Gumleaf Grasshopper, *Goniaca opomaloides* and right is the Common Gumleaf Grasshopper, *Goniaca australasiae*.

The obvious difference between the two is that the pronotum (the shield-like plate behind the head) in *Goniaca australasiae* is strongly carinate, meaning it has a raised (curved) median ridge running along its length. This makes it look very 'leaf-like' and provides good camouflage. The upper two photos in both columns are the nymphs (with wing buds) and the lower four photos are winged adults, showing their variation in colouring.



Below: Common Stonehopper, *Cratiplopus* sp. A very distinctive grasshopper commonly found in arid and semi-arid environments. It has a very robust body and coloration that blends with dry or rocky surroundings - shades of brown, grey or red. The wings in the adults may be reduced or well-developed. I thought this grasshopper looked almost pre-historic!



Grasshoppers, Crickets and Katydid - Orthoptera

Below: **Bark-mimicking Grasshopper, *Coryphistes ruricola*** is notable for its exceptional camouflage on bark and trees. It is a medium to large grasshopper 30–40 mm. Like other grasshoppers shown here, its colouring is very variable with greys, browns and various mottled colours. Adults are fully winged. Nymph (wingless) is shown bottom left.



Common Urnisa, *Urnisa guttulosa*. Colouring is mottled and can be quite reddish as seen right in an individual missing a hind leg. Wings are also quite mottled compared to the other grasshoppers on the following page, and have no particular dark smudges or spots. Body is quite broad with no 'X' markings on the pronotum.



Bandwing Grasshoppers - Oedipodinae (subfamily)

Band-winged Grasshoppers are named for their brightly coloured hindwings, which are typically hidden under their forewings but flash with a 'band' of colour when in flight. All photos below show only the forewings or tegmina.



Australian Plague Locust, *Chortoicetes terminifera*.

Significant for forming large and destructive swarms. Of note is the distinctive dark spot on the tip of the wing (circled).



Southeastern Austroicetes, *Austroicetes vulgaris*.

The colours of this species vary greatly including splashes of green and yellow. It features an 'X' mark on the pronotum (circled).



Long-legged Bandwing, *Heteropternis obscurella*.

Colouring can be dark grey/brown almost black. Tip of hind wing has a general dark smudge (circled) not a distinct circle as the **Plague Locust** (top).



Common Bandwing Grasshopper, *Pycnostictus seriatus*.

Very variable species but a couple of features remain constant. The lower rear corner of the pronotal lobe is nicely rounded and extends back a little. The white mark on the side of the pronotum is constant (both circled).

Pygmy Grasshoppers - Tetrigidae

Tetrigidae are tiny (10-20mm), ground-dwelling Orthopterans instantly recognisable by their elongated pronotum, which extends all the way back to cover the abdomen and sometimes the wings, and ends in a point. Although they may have wings, these may be small and functionally flightless. They have cryptic colouring to help with camouflage. I have twice seen these tiny grasshoppers (right).



Australian Matchstick and Monkey Grasshoppers - Morabidae

The etymology of the name **Morabidae** is unknown. Members in this family are long and thin (like matchsticks), and have never developed flight. They are also called 'monkey' grasshoppers because their legs stick out like a monkey holding onto a branch - see photo on the right below in which the grasshopper was playing hide-and-seek with me! The only member of this family I have seen is the **Matchstick Grasshopper, *Vandiemena viatica***. It is a very common small grasshopper, often seen low down on grasses and small bushes. The name 'Vandiemena' references Tasmania (Van Diemen's Land) as it is the only genus found there. 'Viatica' means 'journeying' or 'wayfaring' and likely refers to its distribution through the rest of Australia. As with other grasshoppers, there is enormous variation in its colouring as shown below left.



Gaudy Grasshoppers - Pyrgomorphidae

The name **Pyrgomorphidae** comes from the Greek 'pyrgos' meaning 'tower' which may refer to the raised pronotum in some species. Many species are brightly colored, often in yellow, red, orange, or green patterns. This coloration can serve as a warning (aposematism) since some species are toxic.

The only species I have seen is the absolutely stunning rainbow-coloured grasshopper, **Variable *Pseudna*, *Pseudna nana*** below. It is an adult, even though wings are extremely small. This specimen produced much excitement among experts and has been featured in a number of publications.

Rare and exciting



Katydids, Crickets and Allies

- **Ensifera** (suborder)

Ensifera is a suborder that includes crickets and katydids.

The name comes from Latin 'ensis' meaning 'sword', and 'fera' meaning to 'bear' or 'carry'. So **Ensifera** literally means 'sword bearers'. This refers to the elongated, sword-like ovipositor of females, which is used to lay eggs.

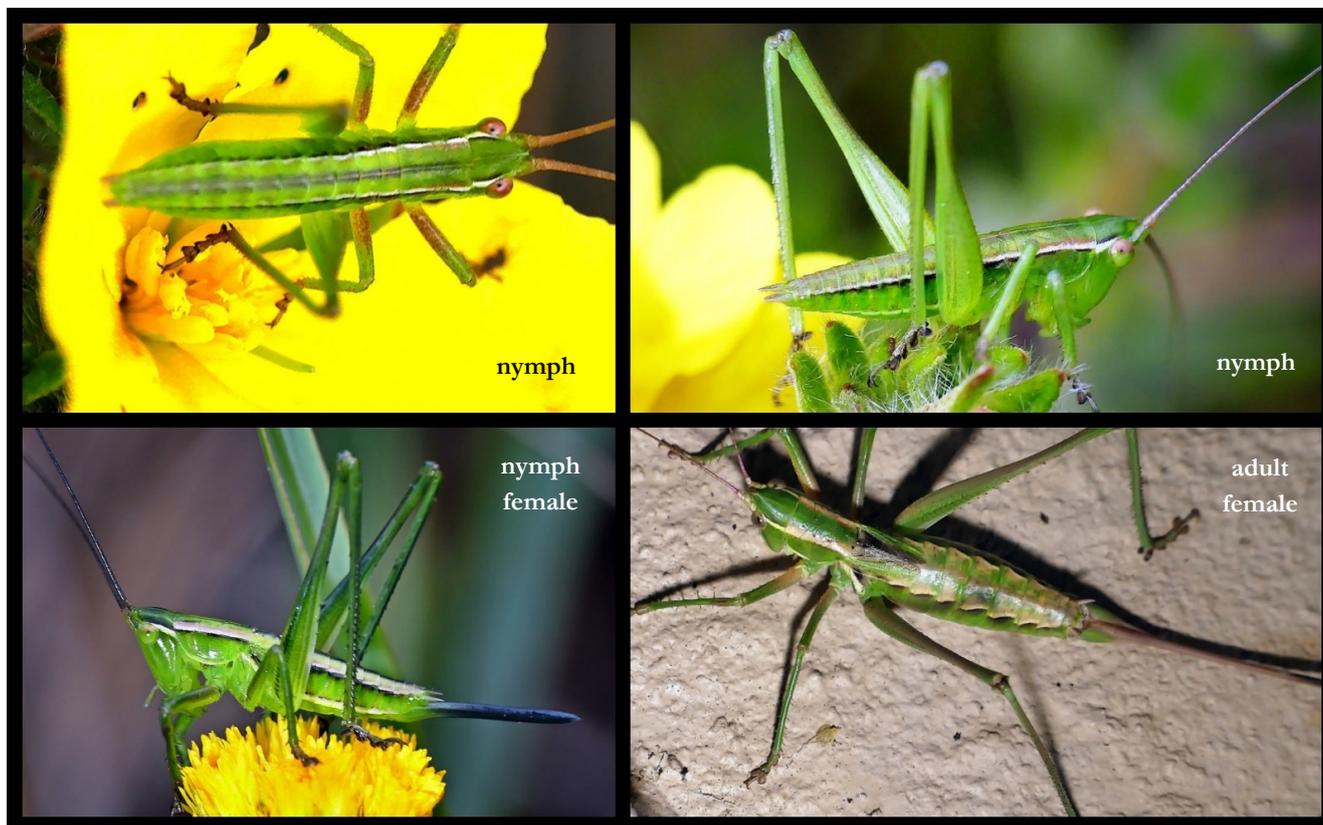
Ensiferans are distinguished from **Caeliferans** by their elongated, threadlike antennae, which are often longer than the length of their bodies and have over 30 segments.



Katydid - Tettigoniidae

The name **Tettigoniidae** comes from the Latin 'tettigonia' which means 'cicada/grasshopper-like insect'. The common name **Katydid** is an onomatopoeic interpretation of the sound made by certain species.

Tettigoniidae are a large family characterised by long antennae, often longer than the body. They are closely related to crickets but have more laterally compressed bodies and leaf-mimicking wings. Males produce sound by stridulation (rubbing forewings), often making sharp rhythmic ticking calls. Most live on foliage or trees. They are omnivores, not just herbivores, often eating other insects opportunistically.



Above: Four photos of **Adelaide Marauding Katydid, *Metaballus sagaeformis***. They are medium to large predacious Katydid that are found around Adelaide and into Victoria. They live in grassy habitats, like roadside verges and fields of long grass, but I have also seen them many times on flowers. The male is 20-35mm, and the female is 40-65mm

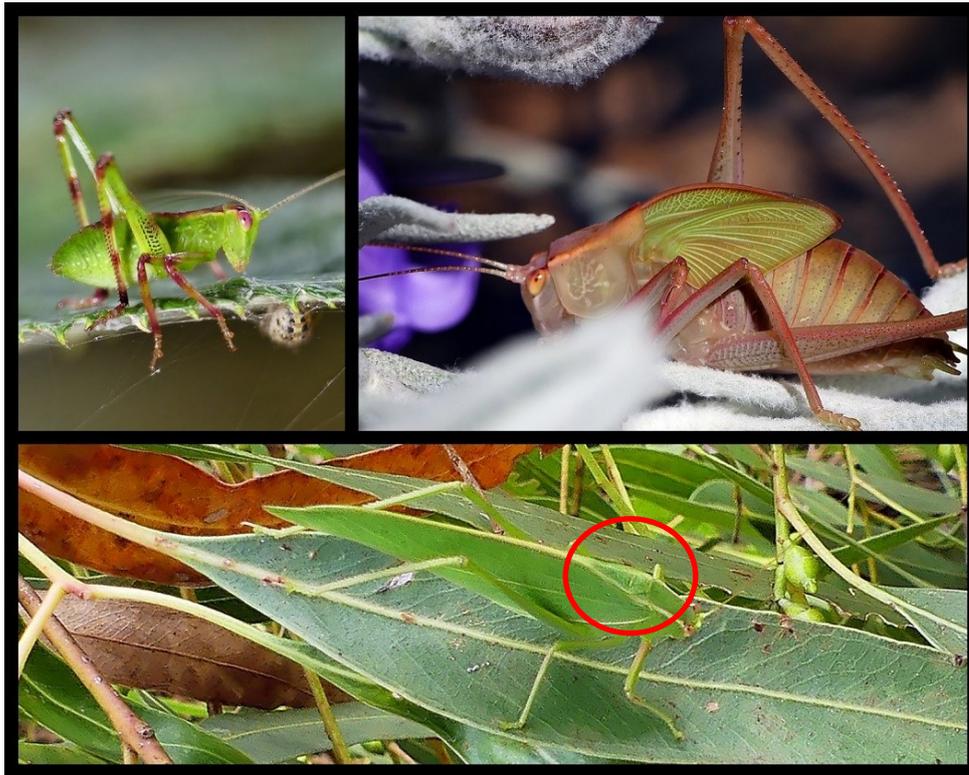
The first three photos are of nymphs and the bottom right is a female adult with ovipositor. The adults of this species can have very short wings as seen here! A good way to distinguish adult wings from the wing buds of nymphs is that wing buds almost never overlap each other like the wings here, and they also lack crossveins.



Left: A brief sighting of a **Small Shieldback Katydid, *Nanodectes harpax***. Their colouring is muted with greys and browns, which offer good camouflage. This is an adult male.

Shieldback Katydid are in the subfamily **Tettigoniinae**. The key feature for which they are named is the enlarged pronotum which often covers part of the abdomen and wings. Many species have short wings and are flightless.

Below: Common Garden Katydid, *Caedicia simplex*, showing a very early nymph, a later instar nymph and a very well camouflaged adult on a *Eucalyptus* leaf.



The feature to best differentiate between *Caedicia simplex* above and the *Torbia viridissima* nymphs below is to look for the lateral lobes of the pronotum. In *Caedicia simplex* they are relatively rounded whereas in the *Torbia* nymphs below they have a flatter bottom and are more rectangular.

For the adult male, pictured above, the stridulatory region, the little triangle behind the pronotum where the wings overlap (circled) is only ever green whereas in *Torbia viridissima* (below) it is very dark. Unfortunately I have yet to see an adult *Torbia*.



Left: Various nymphal instars of Gumleaf Katydid, *Torbia viridissima*, from very small to quite large.

True Crickets - Gryllidae

The name **Gryllidae** comes from Latin 'gryllus' which unsurprisingly means 'cricket' or 'grasshopper'! These are the crickets that most people think of when they hear crickets chirping at night. They have long antennae, cylindrical bodies that are dark brown or black, strong hind legs for jumping, well developed tegmina (forewings) for stridulation, prominent cerci (rear appendages) and are mostly nocturnal.

The ovipositor in females is long and straight. They are omnivorous.



Above: *Lepidogryllus comparatus* (female). It has various common names including **Mottled Field Cricket**, **Slow-chirping Mottled Field Cricket** or **Brown Bush Cricket**. Males and females are approx. 18mm in body length, with antennae that are longer than the body.

Scaly Crickets and Allies - Mogoplistidae

The etymology of the name **Mogoplistidae** is not clear, although may refer to the fact that the body of these crickets is covered in dense, overlapping scales, which gives them a dusty or flaky appearance. When I first saw them, I thought they had perhaps been in dusty crevices or similar but it was actually their characteristic appearance. They usually have very long antennae, reduced wings, and a tendency to live in leaf litter or under bark. They are nocturnal and attracted to light: all my sighting were on walls first thing in the morning.



All three specimens shown here are unable to be identified. They are a notoriously difficult family to identify accurately. Directly above and right are males, with reduced wings. Bottom is a female showing an ovipositor between the two cerci. Adult females do not have wings so the only indicator of maturity in females (nymph or adult) is the development of the ovipositor.



Raspy Crickets - Gryllacrididae

The name **Gryllacrididae** also comes from the Latin 'gryllus' as do the True Crickets (previous page). The addition of 'acrididae' means 'locust' or 'grasshopper'. They are quite distinct from True Crickets (Gryllidae) and Katydid (Tettigoniidae). They are nocturnal with many being wingless or short-winged. They have a characteristic hunched posture, long legs and very long antennae. They lack stridulatory organs, so are silent. Many species use silk to make retreats or roll leaves. They are primarily omnivorous or predatory, and often found in leaf litter, bark, caves, or soil crevices.



Above and left: A very fresh **Raspy Cricket** of unknown species seen on *Calytrix tetragona*. The three photos above show its wings unfurling and front legs going up as a defensive posture when I started to photograph. Left shows a front-on view. The white spot in the middle of its face between its two compound eyes, is a third ocellus or simple eye. The other two are either side of the antennae.

Below: An identified **Raspy Cricket** nymph on *Bursaria spinosa*. Regardless of the fact that it is a nymph, it is a short-winged species.



Left: An identified **Raspy Cricket** that I saw in my garden. It is an adult female (note the ovipositor) and she was intent on laying eggs, pushing her ovipositor over and over into the soil. Note how she has arched her body up to push the ovipositor into the ground.



Mole Crickets - Gryllotalpidae

The name **Gryllotalpidae** also comes from the word 'gryllus' but with the addition of 'talpa' which is Latin for 'mole'. This refers to their mole-like and highly modified forelegs which are used for tunnelling. They are very robust and powerful, and like moles, are adapted for life underground.



Above: **Southern Mole Cricket, *Gryllotalpa australis***. I have only seen **Mole Crickets** a couple of times and both times they tried to disappear underground as quickly as possible making photography difficult.

Trigs, Sword-tailed Crickets, and Ground Crickets - Trigonidiidae

The name **Trigonidiidae** refers to the Greek word 'trigonon' which means 'triangle'. This references a small, sharply tapered triangular region in the male forewing (tegmen). This is not observable in my photos. **Trigonidiidae** are small Crickets usually found in grassy habitats or on the ground. They typically have elongated and sword-like cerci, and are noted for producing high-pitched, squeaky calling songs. Many species are nocturnal and are more often heard than seen.

Below: Two individuals from ***Bobilla sp.***, Ground Crickets in the subfamily **Nemobiinae**. Left is a female that has lost one of her back legs, and right is a freshly moulted male, which accounts for his lighter colour and the fact that his wings are still very fresh and have yet to dry.

