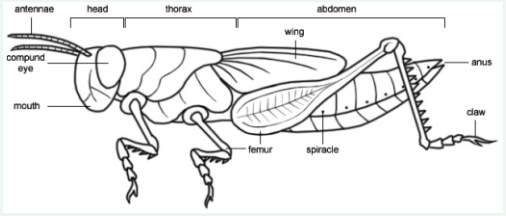
Hands On Learning
with Reading Museum Service

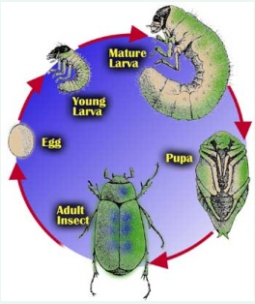
GRASSHOPPERS & CRICKETS Z42

Grasshoppers and crickets are insects. They belong to the group (order) of insects called orthoptera, which are characterised by having large hind legs for jumping. Most of them also have a pair of wings and can fly. Their other distinctive feature is that they make a noise by rubbing one part of their body against another, like a comb being scraped over a piece of cardboard.

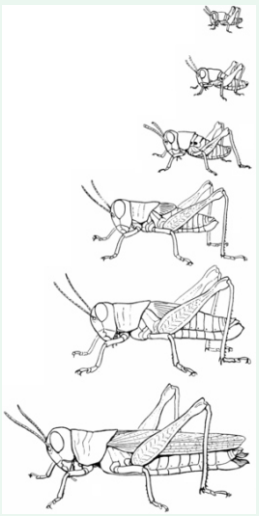
One way of telling them apart is that in crickets the scraper is on the leg and the other part is on the wing, while in grasshoppers it is the other way round. However, you usually need a microscope to see this! A more useful way of telling them apart is that crickets have antennae which are longer than their body, while the antennae of grasshoppers are smaller.



Like all insects, the bodies of grasshoppers and crickets are divided into three parts the **head**, the **thorax** and the **abdomen** (right). The head supports a pair of sensory antennae, a pair of compound eyes and the mouthparts. The thorax has six legs and two pair of wings. The abdomen contains the creature's guts, reproductive and breathing mechanisms.



Most insects have a four-part life cycle (left). They begin life as an **egg**, which hatches to produce a **larva**. The caterpillar-like larva eats and grows and eventually becomes a **pupa**, a stage sealed within a cocoon (chrysalis). In the pupal stage, the insect undergoes considerable change in form to emerge as an imago, or **adult**.



However, grasshoppers and crickets have a modified life cycle (sometimes called incomplete metamorphosis, or even hemimetabolism!), in which there are three stages - **egg**, **nymph**, and the **adult** stage, or imago. Nymphs resemble the adult but are smaller and, if the adult has wings, lack wings. They gradually feed and grow in size. As they get bigger they have to shed their skin on several occasions, to allow for their increasing size. The period between each moult is called an **instar**. After a sequence of instars maturity is reached. The diagram on the right illustrates a sequence of six grasshopper instars.

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British Grasshoppers & Crickets

There are more than 15,000 known species worldwide, but only 30 of these live in Britain and several of these only live in southern Britain. Part of the reason for this maybe that although they have wings few of them are good fliers. The English Channel therefore acts as a barrier to them spreading from the continent. Another factor is that they do not like cool climates, so the number of species diminishes northwards or with height above sea-level. Most species are confined to warm sunny places on heaths and grasslands, or along sunny hedgerow and wood edges.



Grasshoppers feed primarily on grass, but crickets are omniverous and feed on almost anything including decaying plants, grass, fruits, fungi and even dead animals. The oak bush-cricket (*Meconema thalassinum*), is entirely carnivorous and eats caterpillars and other insects they find in oak trees.

Grasshoppers and crickets sing or stridulate, as it is more properly known in order to attract a mate. Their rasping song comes in bursts. The pattern of the song varies from species to species. The common green grasshopper (*Omocestus viridulus* - see photograph below) produces a continuous chirp for 20 seconds or more - their whole body quivers as the legs move up and down as much as 20 times a second. On the other hand, the common field grasshopper (*Chorthippus brunneus*) produces a series of 6-10 half second chirps, spread evenly over about 12 seconds.



Among crickets stridulation is confined to males. With grasshoppers, the females of many species can sing, although their songs are normally quieter than those of males. When a female indicates her presence, the males change their song to a courtship song in order to try to attract them. Among grasshoppers the song length changes with the surrounding temperature, whereas crickets will chirp indefinitely in warm weather.

Photographs: Top - a female dark bush cricket (Pholidoptera griseoaptera), showing her ovipositor (egg-laying tube) Female dark bush crickets have no wings.
Bottom - a male common green grasshopper (Omocestus viridulus).

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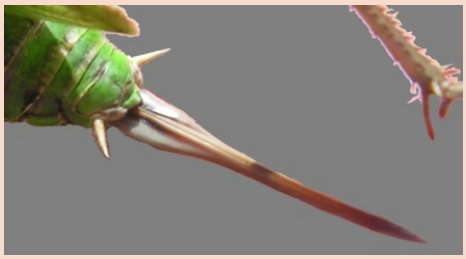
Most British species complete their life cycle in a single year, the adults dying in the autumn and leaving only eggs to survive the winter. A few species take two years to mature, spending one winter as a nymph.



Eggs are laid through an ovipositor (left), which is used to seek out or cut a suitable hole. They are laid in the soil, in plant tissue or in crevices. When the eggs hatch the young grasshopper is worm-like, but this transitional stage only lasts until the creature reaches the open air. There the shroud-like covering is thrown off to reveal a miniature grasshopper. There are normally 5-6 nymphal instars in the grasshoppers, but crickets undergo up to 10 or more moults before reaching the adult stage.

1. Great Green Bush Cricket (*Tettigonia viridissima*)



This box contains a male and female specimen. The female can be distinguished by her fearsome-looking broad-bladed ovipositor. The colour of these crickets makes them extremely difficult to locate, even when aided by their distinctive song, a shrill buzzing call that carries for about 100 m or more in still conditions. Young nymphs spend most of their time in coarse grassland whilst older nymphs and adults, as their name suggests, are more frequently found in clumps of brambles and shrubs. The males call through the afternoons and into night during warm weather from late July onwards. The great green bush cricket is omnivorous with insects making up the bulk of its diet, although grass, and other vegetation is also eaten. The female lays her eggs in late summer directly into the ground. After over-wintering as an egg, the nymphs emerge from Mid-May onwards and are mature by late July.

2. Oak Bush Crickets (*Meconema thalassinum*)



This is a woodland species, spending most of its time in the foliage of trees including, but not only, oaks and so is rarely encountered. Single eggs are laid on the trunks of various deciduous trees and the nymphs emerge in June, only maturing into adults in late July or August.

The oak bush cricket is nocturnal and usually not noticed during the day. At night it becomes active and is attracted to lights and so may be found in houses, on windows and under street and other bright lights. It is almost entirely carnivorous, feeding on smaller insects. It does not have a normal song but drums on leaves with a hind foot. It is just about audible to humans at about 1 metre.

The box contains a male, female and a juvenile, as well as eggs, all of which were found in the Reading area. In life they are pale green with a pale line running down the centre of the head and thorax and abdomen, which is pale yellow in immature specimens, turning brown in adults. The long ovipositor of the female is upturned with a brown tip.

3. Dark Bush Cricket (*Pholidoptera griseoaptera*)



The dark bush cricket is very active and spends most of the day in scrub and overgrown grassy areas from which it chirps incessantly throughout the day and well into dusk. It is an omnivorous species eating both leaves and other invertebrates. Males, when not sunbathing, are aggressive and defend their territories against intruding males. The wings are very small in males. Females are entirely wingless and have a large ovipositor - a photograph of one can be seen on page 2, while the photograph to the right is of a male. They lay their eggs in late summer into rotting wood or bark crevices where they overwinter. Nymphs emerge in late April or May and reach maturity in July.

The box contains a male, female and juvenile, all of which were found within 10 miles of Reading. In life the nymphs have a very characteristic dark-edged, yellow or golden line running the length of their bodies from the head to the tip of the abdomen, contrasting with the dark brown flanks.

4. Common Green Grasshopper (*Omocestus viridulus*)



The common green grasshopper is found throughout Britain. It is usually all, or predominantly, green but may have brown sides. Its song consists of long churrs starting quietly and getting louder and lasting between 10 and 20 seconds. It is found in rough grassland, generally in lush situations. It is our earliest grasshopper to appear. The adult makes an appearance in June but survives no later than September. Eggs are laid in summer in the soil, hatching the following April.

The box contains a male and a female, both of which were found at Silchester Common, Hampshire.

5. Common Field Grasshopper (*Chorthippus brunneus*)



The common field grasshopper is a very active, sun-loving species found wherever the conditions are suitable. It is a gregarious species and the adult males can frequently be observed courting females with a brief single chirp, repeated at short intervals. This call is often taken up by other males which join in the chorus. It is a good flier. In good years, this species can produce mini swarms that can travel a few hundred yards. Eggs are laid in pods into the soil during late summer and hatch the following May. Mature adults appear during late June to July.

The field grasshopper is typically a very variable mixture of shades of brown and cream. The mature male becomes reddish orange at the tip of the abdomen, while that of the female becomes a more subdued yellow or orange. Specimens that are almost entirely white, orange, yellow, purple and green occur from time to time. The box contains a male, a female and a juvenile, which were all found close to Reading.

6. Common Groundhopper (*Tetrix undulata*)

Groundhoppers are relatives of the grasshoppers. Three species are found in Britain. They can be distinguished by their smaller size, more heavily armoured appearance and by the extended pronotum (armoured plate that covers the top and sides of the thorax), which reaches back to cover the abdomen. Groundhoppers have no audible chirp.

The common groundhopper is widespread throughout Britain in areas of bare ground and short vegetation such as woodland tracks, disused railway lines, bare peat and sand dunes. It has a very variable appearance. A mottled colour-patterning means that it can be light grey, sandy, dirty greenish, various shades of brown to almost reddish or black. It cannot fly. The example in the box is typically small and inconspicuous!

Egg laying takes place throughout the spring and summer. Those eggs laid early in the year produce nymphs which mature in late summer and overwinter as adults. Eggs laid late in the season produce nymphs which overwinter before maturing the following year. All adults die off in mid-summer.



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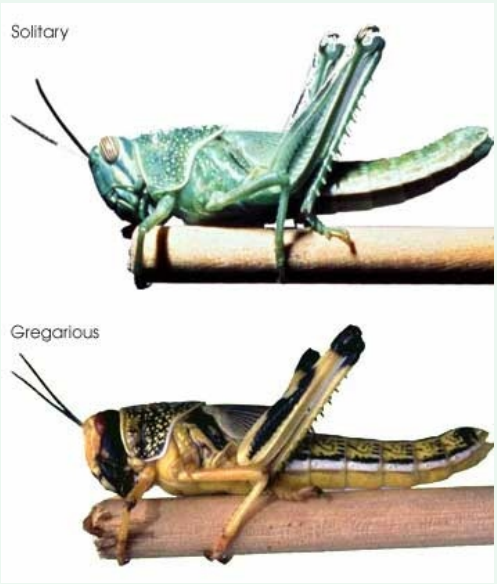
Tropical Grasshoppers & Crickets

The tropical grasshoppers and crickets in this collection are largely unidentified, with the exception of boxes 7 and 8 which contain adults and a juvenile of *Schistocera gregaria*, the desert locust. Locusts belong to the acrididae family - the grasshoppers - and most of the tropical specimens in this collection described as 'grasshoppers' are probably locusts. The only difference between the two types of insects is that locusts can exist in two different behavioural states (solitary and gregarious) whereas grasshoppers do not.

Desert Locust (*Schistocera gregaria*)

The desert locust lives a solitary life until it rains. Rain causes vegetation growth and allows the female to lay eggs in the sandy soil. The new vegetation provides food for the newly hatched locusts and provides them with shelter as they develop into winged adults.





When locusts are present in low densities they are unorganised and go their separate ways. But when the group's density increases they begin to cluster and travel in the same direction. Being touched by others, especially on the outer surfaces of the hind leg results in locusts being attracted rather than repelled by them, and so they form groups - they are transformed from the **solitary** form to the **gregarious** form. If crowded, insects become isolated and they revert to solitary behaviour. The Latin name of the desert locust refers to this tendency to swarm. When they are gregarious the adults change colour (left).

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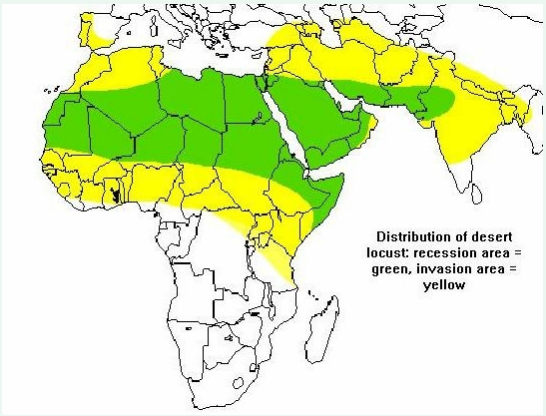

Locust swarms can cover from 100 to 200 kilometres in a day and will fly up to about 2,000 metres above sea level (above that height it becomes too cold). A single swarm can cover up to 1200 square kilometres and can contain between 40 and 80 million locusts per square kilometre. During quiet periods desert locusts are confined to a belt that extends from Mauritania across the Arabian Peninsula and into northwest India. Under optimal conditions they can move as far north as Spain and Turkey and as far south as Nigeria and Kenya. As many as 60 countries can be affected within an area of 32-million-square-kilometres, or approximately 20 percent of the Earth's land surface.



Swarms of desert locusts are described in the bible and they are associated in people's minds with the destruction of crops. Desert Locusts can consume the approximate equivalent of their body mass each day (2 g) in green vegetation. This doesn't sound much, but the generally accepted figure for an average medium-density settled swarm is about 50 million locusts per square kilometre. Swarms commonly come to an end through a combination of natural and human factors such as being blown into unfavourable habitats, failure of seasonal rains resulting in lack of food and human pest control measures.