

Family Corduliidae. Medium-sized hawkers with distinctly metallic bodies – usually bronze or green. Triangles of the two wings differ in shape, that of the forewing having front and basal sides about equal. Claspers usually well developed in both sexes. Male abdomen distinctly narrowed in the front half.

△s **Downy Emerald** *Cordulia aenea*. Shiny green thorax, densely clothed with golden hair. Abdomen dark bronze with sides of 2nd segment clear yellow in male. Inferior anal appendage of male deeply forked and resembling an extra pair of claspers. Hindwing triangle undivided. Female stouter than male. Flies swiftly over lakes and ponds and rarely settles. 4-8. Most of Europe, but rare in S.

△ **Brilliant Emerald** *Somatochlora metallica*. Thorax much less hairy than *Cordulia* and abdomen much brighter green – detectable even in flight. Claspers much longer than in *Cordulia*, especially in female. Inferior anal appendage of male unforked. Triangle of hindwing 2-celled. Female stouter than male and easily identified by a sharp spine under the abdomen just before the tip. Still and slow-moving water in lowlands and mountains. Flies rapidly. 6-9. Most of Europe, but not Iberia. Two distinct populations in B: one in SE England and one in NW Scotland.

△n **Northern Emerald** *S. arctica*, a similar but more northerly species, has strongly curved claspers in male and no abdominal spine in female.

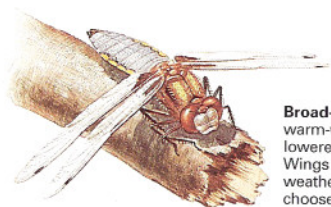
Family Libellulidae. A large family of darters in which triangles are of different shapes in the two wings: that of the forewing has front side very much shorter than basal side. Body not metallic in European species. Mature males often have pale blue pruinescence. Claspers sometimes prominent in females. Often perch on exposed twig or reed and rest with body horizontal. In hot weather the wings may be lowered to shade the thorax (see below). Most of the European species belong to the genus *Sympetrum*, in which the last antennodal vein (see p 22) is usually incomplete.

△ **Black-tailed Skimmer** *Orthetrum cancellatum*. Wing bases completely clear. Pterostigma black. Only mature male is blue; young male resembles female. Marshes, ponds, and lakes. 5-9. Absent from far north.

△ **Keeled Skimmer** *Orthetrum coerulescens*. Wing bases clear. Shorter and more slender than *cancellatum*; pterostigma yellowish brown. Only mature male is blue; young male resembles female. Mainly on bogs and marshes. Male commonly rests on ground. 6-9. Absent from far north. Several similar species in S.

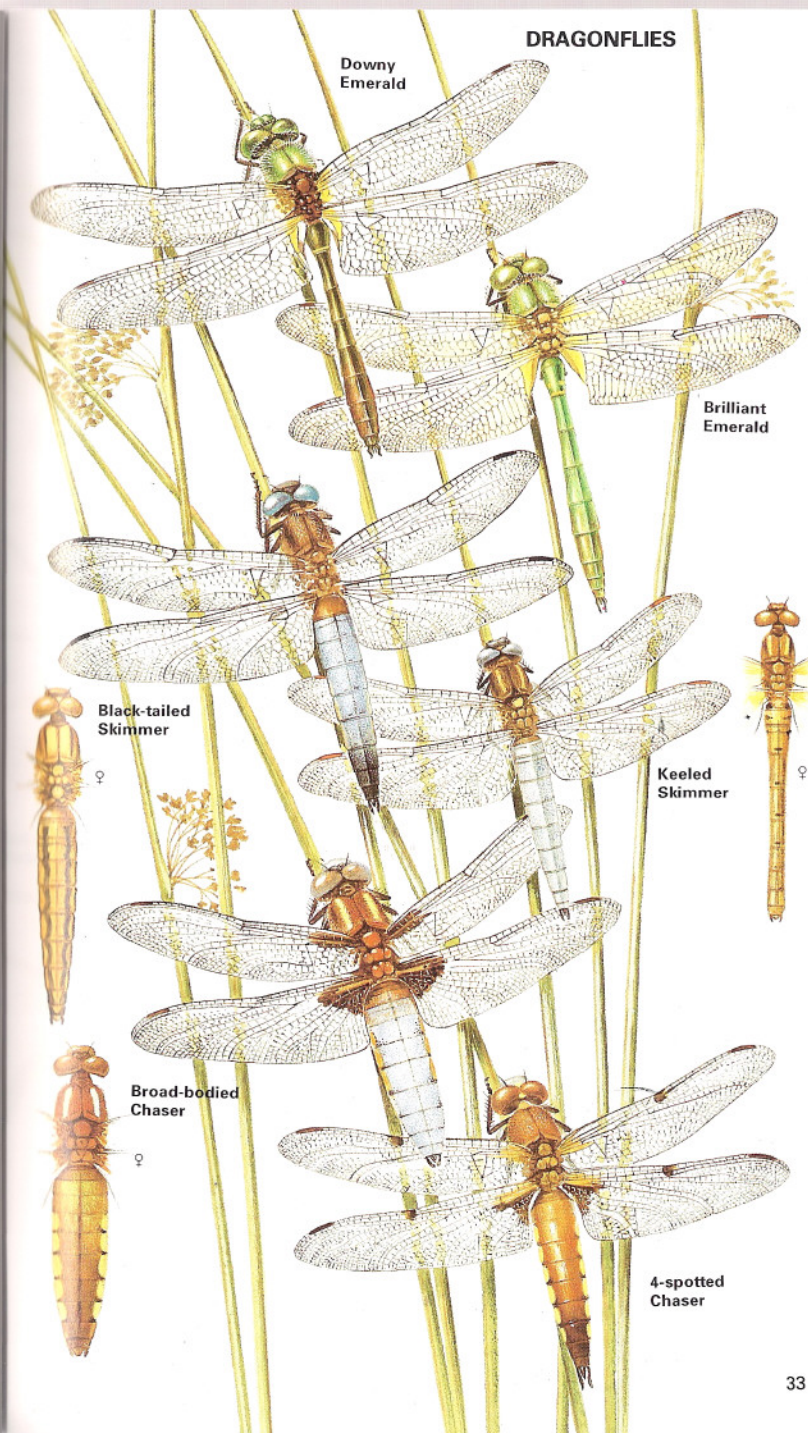
△ **4-spotted Chaser** *Libellula quadrimaculata*. Named for the prominent spot on each nodus. There may also be a brown patch near each wingtip. Always a triangular brown patch at base of hindwing, with amber shading at base of forewing. Sexes alike: female claspers about as long as those of male. Male never becomes blue. Bogs and marshes, often high in mountains and by the sea. 4-9. All Europe, often migrating in swarms.

△ **Broad-bodied Chaser** *Libellula depressa*. All wings brown at base. Abdomen very broad, blue only in mature males; young males resemble females. A very fast darter, often perching on bushes. Frequents ponds and slow-moving streams and often breeds in garden ponds and similar small bodies of water. 4-8. The much rarer △s **Scarce Chaser** *L. fulva* is similar but lacks yellow spots and has much less dark shading on wing bases, especially on forewing. Abdomen is marked with black at the rear.



Broad-bodied Chaser in typical warm-weather pose, with wings lowered slightly to shade thorax. Wings are horizontal in cooler weather, when the insects often choose to rest on the ground.

DRAGONFLIES



Crocothemis erythraea. Resembles *Sympetrum*, but broader: last antenodal vein may or may not be complete. Body yellow or brown at first, becoming red with age; especially vivid in male. No trace of black on upper surface apart from a very thin black line along the abdomen, and even this is not always visible. Costa and radius red; other veins black. Patch on hindwing orange or red in male, yellow in female. Likes to perch on bare twig or reed. Still water, including Mediterranean rice fields. 5-10. S & C, with two broods in southernmost areas.

▲ **Common Darter** *Sympetrum striolatum*. Commonest member of the genus. Legs dark with a yellow stripe. Black band across the head just in front of eyes does not continue down the side of each eye. Thoracic sutures well marked with black. Female is orange-brown with dark marks on end of abdomen. Still waters. 6-10. All Europe: a great migrant. There are several similar species. ▲s **Vagrant Darter** *S. vulgatum* has black line on head running down side of each eye. **S. meridionale** has no black sutures on sides of thorax; legs almost entirely yellow. ▲ **Ruddy Darter** *S. sanguineum* has entirely black legs; male abdomen deep red. ▲n **Highland Darter** *S. nigrescens* has a very broad dark stripe on side of thorax.

△ **Red-veined Darter** *Sympetrum fonscolombei*. Distinguished from *striolatum* by yellowish pterostigma sharply edged with black. Many veins are red or yellow, especially near base. Female body sand coloured. Still waters, including Mediterranean rice fields. 5-11. Resident in S, with two broods per year: migrates to C each spring.

Sympetrum pedemontanum. The only European *Sympetrum* species with clouding in outer part of wing. Marshland. 7-10. S & C.

▲ **Black Darter** *Sympetrum danae*. Black triangle on top of thorax clearly identifies female and teneral male. Mature male is jet black. Mainly on peat bogs. 7-9. N & C.

▲ **Yellow-winged Darter** *Sympetrum flaveolum*. Extensive yellow patch at base of each wing identifies this species. Pterostigma red. Bogs and marshes. All Europe. A strong migrant.

△ **White-faced Darter** *Leucorrhinia dubia*. White face. Pterostigma short and broad: reddish brown in male and black in female. Female has yellow markings instead of red, and dark wing bases are surrounded by a yellow cloud. Teneral males also have yellow body markings. Rarely far from peat bogs or wet heaths. 5-8. Most of Europe: mainly montane in S.

Leucorrhinia caudalis. Pterostigma short and broad: pale in male and brown in female. Abdominal segments 6-9 enlarged. Female and immature male lack blue in middle of abdomen. Bogs and marshes. 5-7. C.



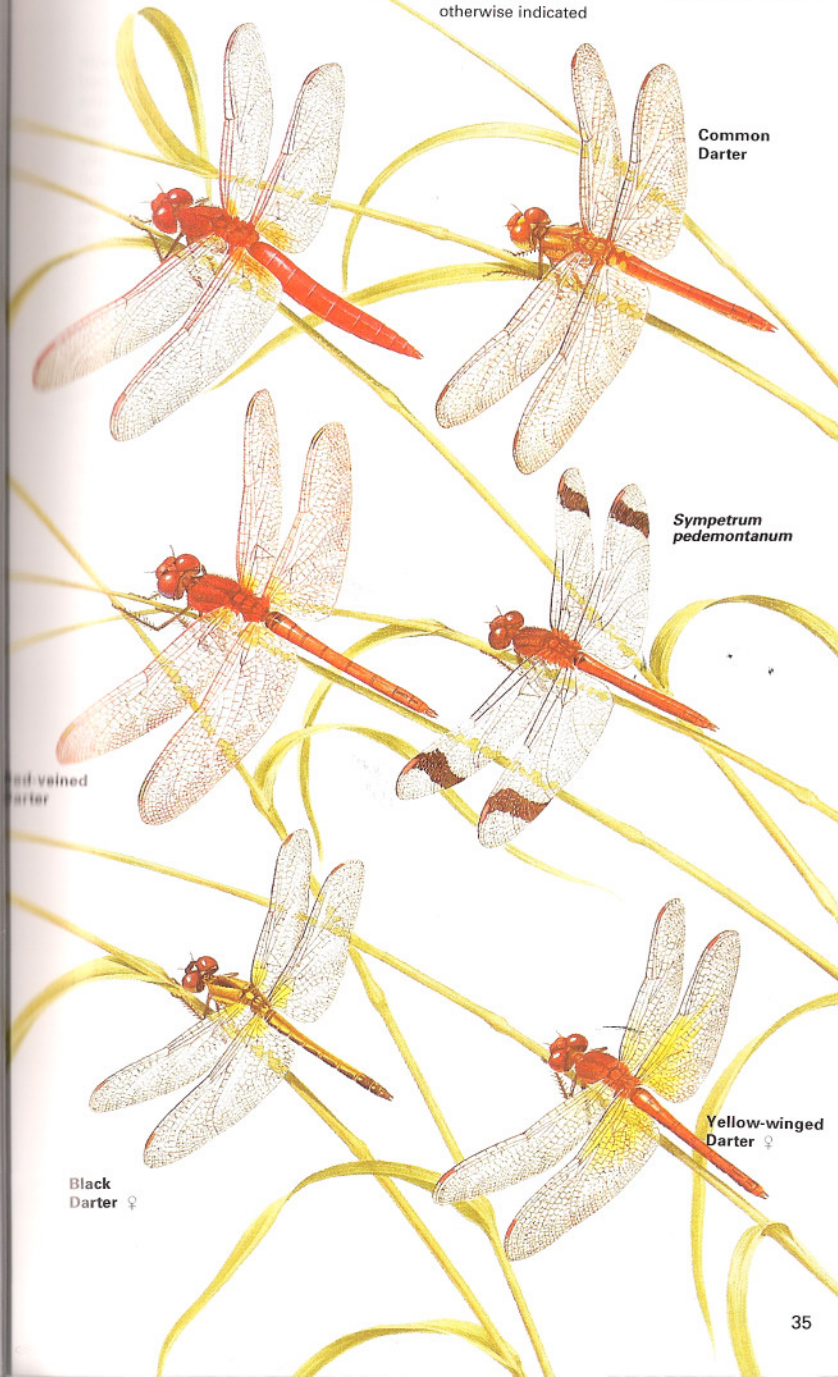
White-faced Darter

Leucorrhinia caudalis

Crocothemis erythraea

All males unless otherwise indicated

DRAGONFLIES



Common Darter

Sympetrum pedemontanum

Yellow-winged Darter ♀

Black Darter ♀

STONEFLIES Order Plecoptera

Weak-flying or flightless insects with rather soft and flattened bodies: often with two long cerci. Never brightly coloured. Wings folded flat over body or wrapped around it at rest. Forewings often with two prominent rows of cross-veins forming a 'double ladder'. Hindwings usually much broader than forewings. Venation very variable, even within a species. Males commonly smaller than females and often with very short wings. Nymphs (p. 296) are aquatic and usually prefer cool, running water. They crawl on to waterside stones ready for adult emergence. Adults rarely move far from water, usually crawling on stones and tree trunks close to the streams. Some scrape algae or nibble pollen, but many do not feed at all. There are about 3000 known species, but less than 150 occur in Europe.

▲ **Leuctra fusca** Leuctridae. One of many similar species known as needle flies because wings are wrapped tightly round body at rest. Cerci very short. Stony streams and lake shores, including chalk streams. Lowlands and uplands. 4-11, but most commonly 7-9; probably all year in S.

Members of the family Nemouridae are similar but they have an oblique vein in apical cell of forewing, and the wings are less tightly rolled around the body. Members of the Taeniopterygidae are also similar, but their tarsal segments are about equal in length: Leuctridae and Nemouridae have 2nd tarsal segment very short.



▲ **Isoperla grammatica** Perlodidae. Anal region of hindwing much enlarged, with 2 prominently forked veins. One of several very similar species, but the only large yellow species in B (commonly called yellow sally by anglers). Stony and gravelly streams: very common in limestone regions. 4-9.

▲ **Perlodes microcephala**. Distinguished from most other large species by the irregular network of veins near the wing-tips. Male normally has very short wings. Stony streams and rivers: the only large stonefly commonly found in chalk streams. 3-7. Several similar species in Alps and Pyrenees.

▲ **Capnia bifrons** Capniidae. Forewing has no 'double ladder' of cross veins. A single cross-vein in apical space. Hindwing distinctly shorter than forewing and more rounded. Male has very short wings - no more than 2.5mm long and often just minute stumps. Basal tarsal segment about as long as third segment - distinguishing the Capniidae from other families with long cerci, in which basal tarsal segment is always shorter. Common by stony rivers and lake shores. 2-5. Mainly S & C. A few similar species occur mainly in N and on mountains.

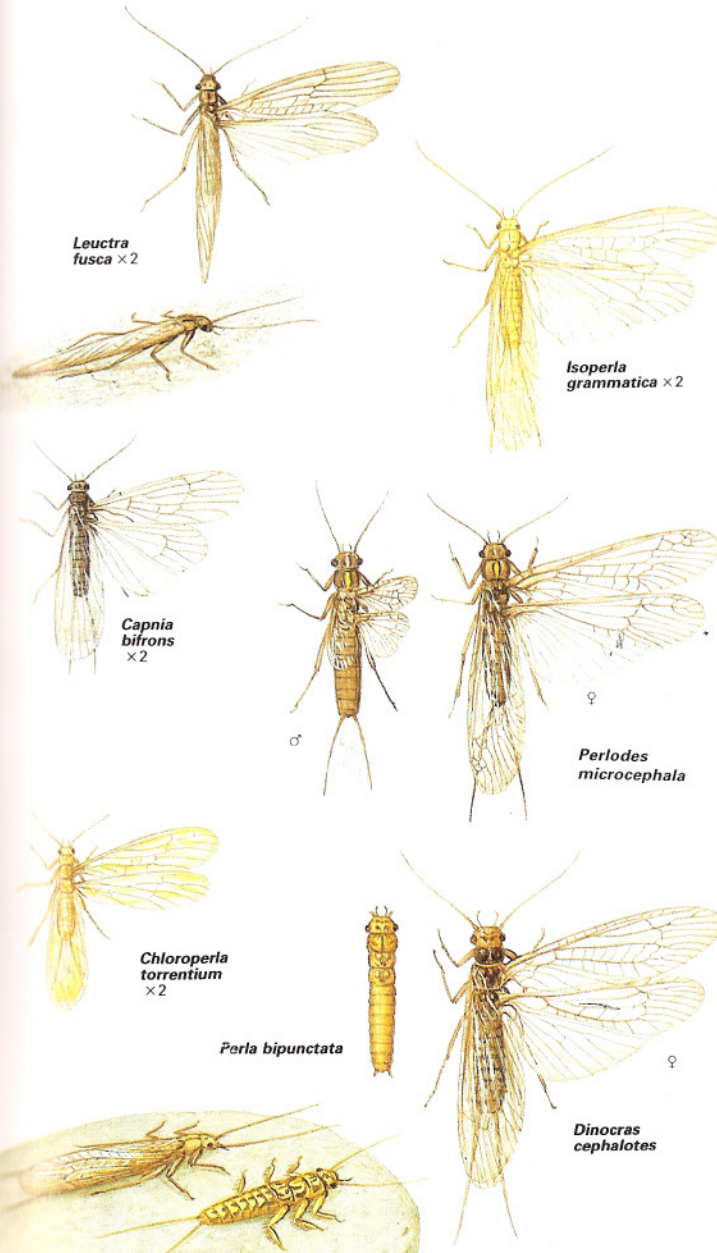
▲ **Chloroperla torrentium** Chloroperlidae. Anal area of hindwing small, with no forked veins. Lake shores and sandy or gravelly streams, mainly in upland areas. 4-8. Called small yellow sally by anglers. One of several similar species.

▲ **Dinocras cephalotes** Perlidae. One of the largest stoneflies. No network of veins near wing-tip. Three long cells are prominent near middle of hindwing, and hindmost of these has 1-3 cross-veins (often very faint and occasionally absent). Pronotum black. Male no more than half size of female. Common on stony rivers with firm beds and fixed, moss-covered stones: especially in upland regions, where it may reach 2000m. 5-8.

▲ **Perla bipunctata**. Resembles *D. cephalotes* but has a paler body. Pronotum yellowish with dark central stripe and dark borders. Hindwing lacks cross-veins in hindmost long cell. Cerci extend well beyond wings at rest. Male 1/2 to 3/4 size of female. A very common species, preferring rivers with beds of loose stones. Mainly uplands, but not as high as *Dinocras*. 5-7.



Forewing of NEMOURIDAE showing cross-vein in apical space



Perla bipunctata at rest, together with mature nymph. Empty nymphal skins are common on waterside stones in summer.

GRASSHOPPERS and CRICKETS Order Orthoptera

There are some 17,000 known members of the order, of which more than half are grasshoppers. Over 600 species occur in Europe, but the great majority of these are confined to the south – notably in Iberia and Greece – and only about 250 species extend into central Europe. Only 30 occur in the British Isles. The main groups of European Orthoptera may be distinguished with the key opposite.

Orthopterans are mostly rather stout insects, with hind legs enlarged for jumping. There is a prominent, saddle-shaped pronotum, the top (known as the disc) often with a central keel. There may also be side keels where the disc joins the side flaps of the pronotum. A transverse groove, known as the sulcus, normally runs across the centre of the disc, and there may be other grooves in front of it. The forewings (tegmina) are thicker and tougher than the hindwings and usually quite narrow. They may completely cover the abdomen at rest, but many species have very short forewings and some have none at all. The hindwings are similarly variable, but when fully developed they are broad and membranous. Flight is normally weak, although some species fly very well. The jaws are of the biting type.

The males of most species 'sing' by rubbing one part of the body against another. This is known as stridulation and serves to bring the sexes together. Allowing for differences in pitch and volume, the sounds may be likened to sewing machines and other pieces of machinery. In the presence of females, many males produce special courtship songs.

The orthopterans all begin life as eggs, and the great majority of European species pass the winter in the egg stage. There is no pupal stage and the youngsters pass through several nymphal stages before reaching maturity. Older nymphs are easily distinguished from adults of short-winged species because their wing buds are twisted and the front edges are uppermost: in adults the front edge of the forewing lies along the side of the body.

Grasshoppers (Family Acrididae) are almost entirely vegetarian and the majority are active only in sunshine. The males usually stridulate by rubbing the hind legs against the forewings. One of these surfaces bears a row of tiny pegs and the other a hard ridge. Moving one over the other produces a buzzing sound, just like that produced by running a finger nail over the teeth of a comb. The pitch varies with the number of pegs and also with the rate at which the legs are moved. Each species has its own characteristic song, but some species do not stridulate at all. Some female grasshoppers can stridulate, but their pegs are small and their songs are usually very soft. Hearing organs are on the sides of the body.

In one major group of grasshoppers the stridulatory pegs are carried on the inner face of each hind femur, with the ridge running along the centre of the forewing. In the other major group the pegs are borne on the forewing and the ridge is on the femur. The songs of this last group are usually rather weak. Their heads tend to be blunter than those of the first group, although there are some exceptions.

Colours are very variable and cannot always be relied on for identification. The shape of the pronotum and the arrangement of the keels are often of greater use.



male



female

Grasshopper sexes are easily distinguished because the hind end of the male turns up like the prow of a boat.

Locusts are large grasshoppers which assume gregarious habits from time to time and build up huge populations, although this rarely happens in Europe. Insects of the gregarious phase differ from the solitary insects in several anatomical features.

Bush-Crickets (Family Tettigoniidae) are mostly omnivorous, eating other insects as well as plant material. A few are entirely carnivorous. Long antennae readily distinguish them from the grasshoppers, and females are further distinguished by the blade-like ovipositor. Species with short, curved ovipositors normally lay their eggs in plants, after cutting slits with the saw-like teeth at the tip of the ovipositor. Other species lay eggs in the ground. During mating the male produces a large, jelly-like spermatophore, which is then attached to the hind end of the female. Sperms enter her body from it, but she eats most of the jelly. Many bush-crickets are crepuscular or nocturnal. They sing by raising the forewings and rubbing their bases together. The songs are often much higher-pitched than those of grasshoppers and often more prolonged. Both sexes sing in some species. The hearing organs are on both sides of the front tibiae.

True Crickets (Family Gryllidae) resemble bush-crickets in many ways but the forewings are usually broader across the top and the female ovipositor is needle-like. The songs are produced in the same way except that the right forewing overlaps the left one – the reverse of the bush-cricket condition. True crickets are either vegetarians or omnivores.

Key

Front legs greatly enlarged for digging



Mole Crickets, p. 58

Front legs normal

Antennae shorter than body

Pronotum extends back over abdomen



Groundhoppers, p. 46

Pronotum does not extend back over abdomen



Grasshoppers, pp 38-47

Antennae longer than body

Palps very long; always wingless



Cave-crickets, p. 56

Palps not particularly long; usually with at least traces of wings

Tarsi 4-segmented

Bush-crickets, pp 48-57



Tarsi 3-segmented

True Crickets, p. 58



GRASSHOPPERS Family Acrididae. Essentially diurnal, sun-loving insects with short antennae. Shape of pronotum and arrangement of keels often help to identify species. Female usually larger than male: sometimes much larger. Songs described are those of isolated males (p. 38). Unless otherwise stated, the stridulatory pegs are on the hind femur.

Arcyptera fusca. Female heavy and flightless. Song up to 8 short, croaky notes followed by harsh rustle which becomes very loud for 2-3 secs and then dies away with 2 or 3 more short notes. 7-9. Montane grassland, mainly in Alps & Pyrenees.

Pyrgomorpha conica. Head conical with rather stout antennae. Male grey or brown, often tinged with green; female green. Hindwings slightly pink at base. No stridulation. Dry grassy places. 3-9. S.

△s **Large Marsh Grasshopper *Stethophyma grossum.*** Stridulatory pegs on forewing, but male's normal call is a soft ticking made by tapping tip of forewing with hind tibia. Marshy areas, especially peat bogs with extensive sphagnum cover. 7-10. N & C: very local.



▲ **Mottled Grasshopper *Myrmeleotettix maculatus.*** Brown, green, or black: always mottled. Tip of antenna less swollen in female. Song a series of 10-30 short chirps, increasing in volume over 10-15 secs and rather like the sound of winding a clock: repeated at irregular intervals. 6-10. Heathland and other dry places.



▲ **Rufous Grasshopper *Gomphocerippus rufus.*** Normally brown: female sometimes purple. Antenna tipped with white. A small bulge on front edge of forewing. Song a soft chirp, fluctuating in volume like a sewing machine and lasting about 5 secs. 7-11. Mainly on limestone.



▲ **Field Grasshopper *Chorthippus brunneus.*** One of many similar species. Grey, green, brown, purple, or black. A small bulge on front edge of forewing. Very hairy below thorax. Song 6-10 short chirps, like time-signal pips at a lower pitch: sequence repeated irregularly. Female sings before mating. Mostly dry and often sparse grassland. 6-10. ***C. biguttulus*** is very similar, but front edge of forewing is strongly curved, especially in male. Song loud and metallic, like an old-fashioned dentist's drill, in chirps of 1-1.5 secs: chirps often in threes. Most of Europe, but not B.



▲ **Meadow Grasshopper *C. parallelus.*** Green, brown, or purple. A small bulge on front edge of forewing. Hindwings absent (the only flightless grasshopper in B.) Song like a sewing machine in bursts of up to 3 secs, getting louder: repeated every 5-15 secs. All kinds of grassland, but especially where moist. 6-10.



▲ **Lesser Marsh Grasshopper *C. albomarginatus.*** Green and/or brown. Female has a small bulge on front edge of forewing, and usually a white stripe near the front edge. Side keels of pronotum virtually straight. Song like *brunneus* but softer and slower: 2-6 chirps, each under 1 sec and separated by about 2 secs: series repeated at irregular intervals. Dense grassland, both dry and moist: mainly low-lying. 7-10.



▲ **Common Green Grasshopper *Omocestus viridulus.*** Green or brown in any combination, but female always green on top and sometimes with purple sides. Forewing often dark towards tip. Abdomen yellowish green below. Song a fluctuating hiss lasting 10-20 secs and getting louder - rather like an approaching moped - before ending abruptly. Full volume is reached about halfway through song. 7-10. Mainly on the lush grasslands. Absent from far south.

▲ **Woodland Grasshopper *O. rufipes.*** Usually brown: female may be green above. Palps very white at tip. Abdomen red at hind end. Song like *viridulus* but only 5-10 secs and stops as soon as full volume is reached. Heaths and woodland clearings and margins. 6-10.



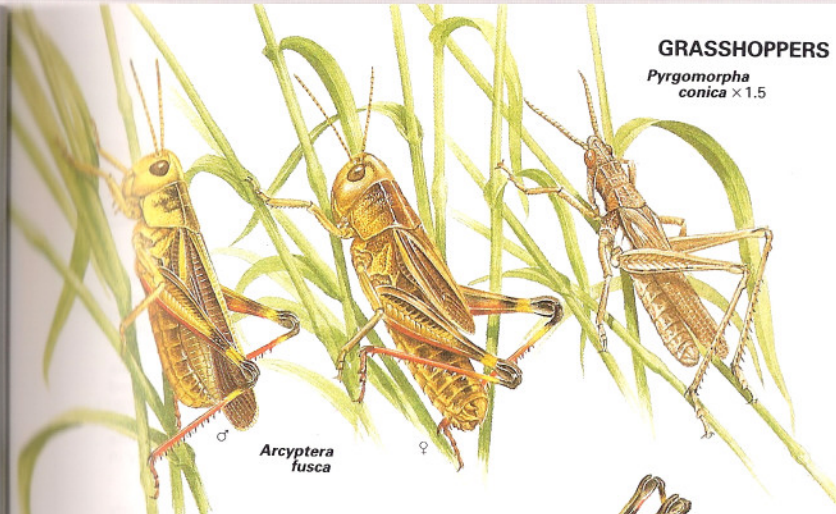
brunneus forewing



biguttulus forewing

GRASSHOPPERS

Pyrgomorpha conica × 1.5



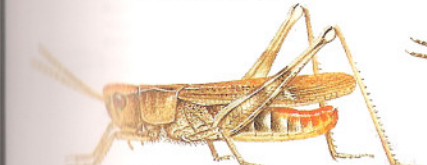
Arcyptera fusca



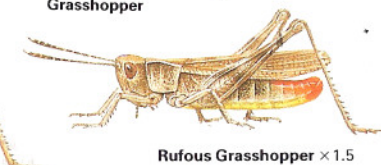
Mottled Grasshopper × 1.5



Large Marsh Grasshopper



Field Grasshopper × 1.5



Rufous Grasshopper × 1.5



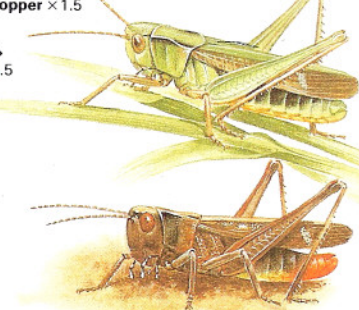
Meadow Grasshopper × 1.5



Common Green Grasshopper × 1.5



Lesser Marsh Grasshopper × 1.5



Woodland Grasshopper × 1.5



Euchorthippus declivus × 1.5

***Euchorthippus declivus*.** Forewings short in both sexes, usually with a clear white stripe. Flightless. Side keels of pronotum almost straight. Song a prolonged succession of short croaks, each consisting of a few distinct pulses. Abundant in both dry and damp grassland, including woodland clearings and montane pastures. 6-10. S & C.

***Gomphocerus sibiricus*.** Male immediately identified by swollen front tibia. Female has no swelling and less strongly clubbed antennae. Pronotum usually clearly humped in front half and often with a clear X-shaped mark on top. Song begins with well-separated chirps, getting quicker, rather like the rapid winding of a watch, and then becomes a constant loud call reminiscent of a small cicada: this lasts for up to a minute and then dies away with a few more short chirps. 7-9. Montane pastures, mainly in Alps and Pyrenees.

***Chorthippus scalaris*.** Usually dark brown: sometimes green. Male has greatly enlarged front region of forewing. Median area of forewing enlarged in both sexes, with prominent parallel cross-veins in male and irregular cross-veins in female. Hindwings dark. Song starts with slow build-up of short croaks, getting quicker and louder until it becomes a constant rattle like a free-wheeling bicycle. This lasts about 10 secs and is punctuated by short, higher-pitched notes. Both sexes rustle loudly in flight. 7-9. Montane pastures from southern Sweden southwards.

***Dociostaurus maroccanus*.** Pale to dark brown. Side keels of pronotum form a cross with pale outer edges. Central keel clearly cut by transverse sulcus. Female up to 37mm long. Song a soft staccato croak, not unlike a clock ticking. 4-10 in a wide range of habitats. Becomes gregarious and develops into a serious pest in some years, especially in Corsica and Italy and other parts of the far south. The gregarious form has less strongly marked forewings and a less clear white cross on the thorax. S & C.

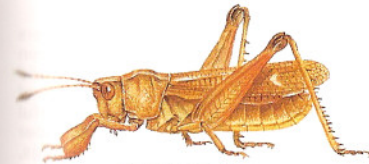
Small Gold Grasshopper *Chrysochraon brachypterus*. Flightless, with short pink or golden green forewings in both sexes – mere lateral flaps in the female. Body with a bright, silky lustre. Song of repeated short buzzing sounds, rather like striking matches. 6-9. Short turf and stony places, wet or dry, in the mountains. S & C.

Large Gold Grasshopper *C. dispar*. Sharply angled forehead. Male forewing distinctly oval. Flightless, with greatly reduced hindwings. Female is often pale brown. Song a very harsh, ratchet-like chirp, lasting about 1 sec and repeated at short intervals. Heathland, woodland clearings, hedgerows, and damp grassland. 6-9.

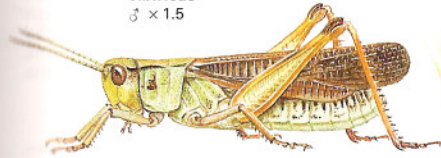
▲ **Stripe-winged Grasshopper *Stenobothrus lineatus*.** Mainly green, sometimes with brown forewings and legs. Median area of forewing enlarged, with prominent parallel cross-veins. Female usually with white stripe near front edge of forewing. End of abdomen orange-red when mature. Song a rather high-pitched whine, lasting 10-20 secs and with a marked rhythmic rise and fall in volume. The male's hind legs move remarkably slowly during stridulation, but he has up to 450 pegs on each femur and the pitch thus remains high. Warm, dry grassland, especially on limestone. 6-10. S & C.

***Paracinema tricolor*.** Stridulatory pegs on forewing. Pronotum with a straight, dark stripe on each 'shoulder'. Forewings become clear towards the tip. Hind tibiae red with black-tipped white spines. Female 30-40mm, male only 25mm. Rustles in flight. Moist grassland. Quite rare in most places, but not uncommon in the rice fields of the Camargue, where it causes some damage. 7-10. S.

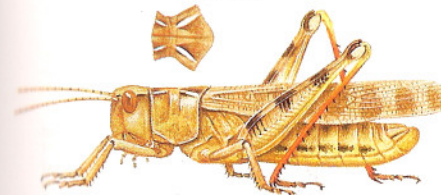
GRASSHOPPERS



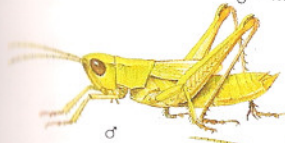
Gomphocerus sibiricus
♂ × 1.5



Chorthippus scalaris
♂ × 1.5



Dociostaurus maroccanus
♂ × 1.5



♂



♀

Small Gold Grasshopper × 1.5

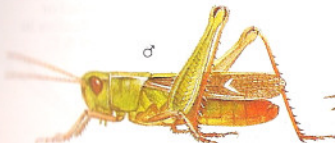


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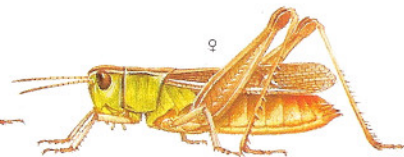


♀

Large Gold Grasshopper × 1.5



♂



♀

Stripe-winged Grasshopper × 1.5



Paracinema tricolor
♀