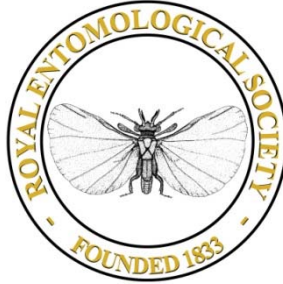


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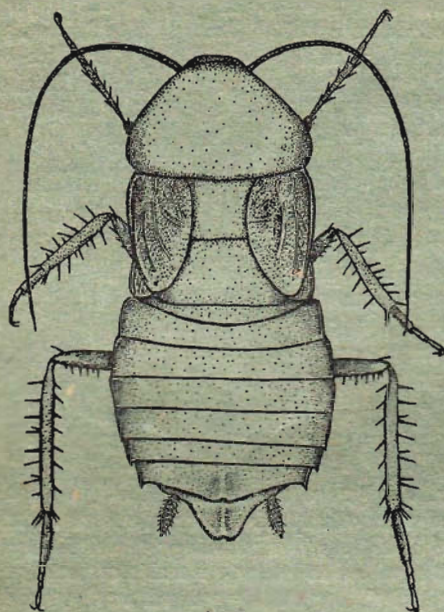
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# HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS



DERMAPTERA AND ORTHOPTERA

By

W. D. HINCKS

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# DERMAPTERA AND ORTHOPTERA.

BY W. D. HINCKS.

THE Orders **Dermaptera** and **Orthoptera** are usually treated together, as a matter of convenience, in dealing with limited faunas such as our own. They may be separated as follows :

- 1 (2) Abdomen terminating in a pair of strongly chitinized forceps. Tegmina, when present, small, of uniform, horny consistency. Wings, when present, folded transversely as well as longitudinally when at rest beneath tegmina. Legs without spines or spurs (figs. 1, 1a). Earwigs.

**DERMAPTERA** (p. 5).

- 2 (1) Abdomen not terminating in a pair of forceps. Tegmina, when present, with distinct veins. Wings not folded transversely when hidden beneath tegmina. Legs, at least in part, with distinct spines and/or spurs (figs. 2-7).

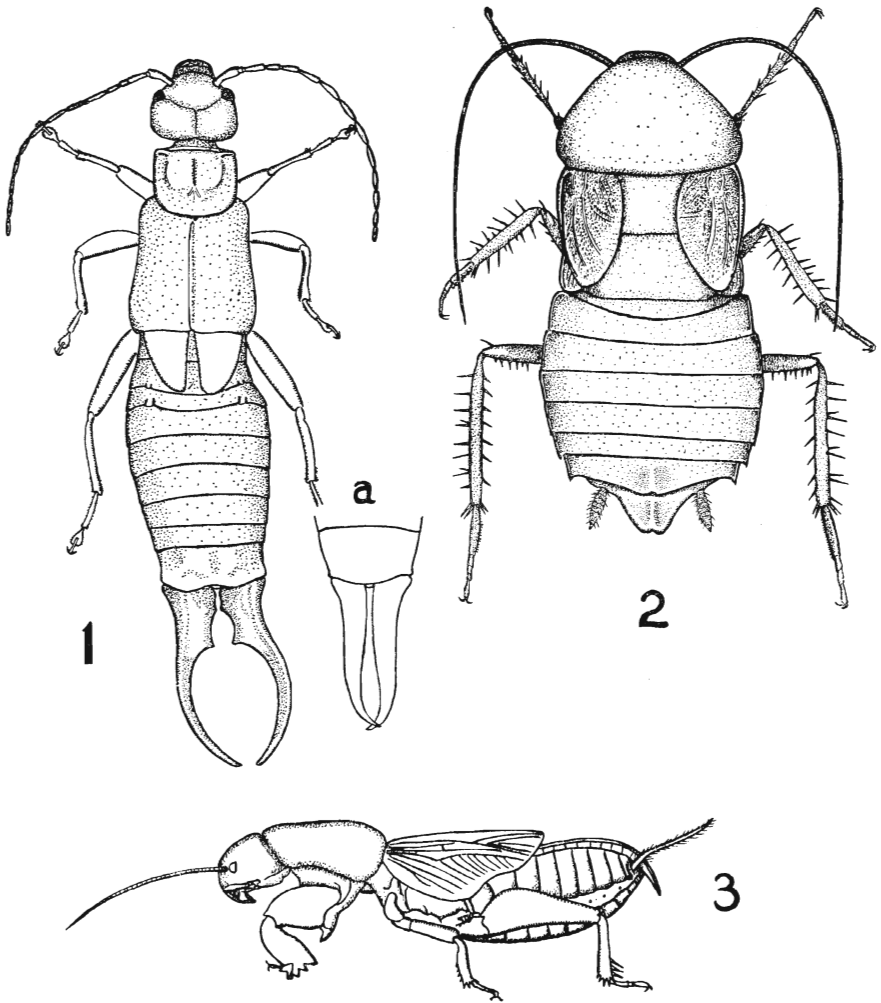
**ORTHOPTERA** (p. 7).

The Order **Dermaptera**, regarded formerly as the Family **FORFICULIDÆ** of the **Orthoptera**, consists of approximately 1000 species of small to medium-sized insects. It is very poorly represented in Britain by five native and four to five introduced and casual species. With the exception of the Common or European Earwig little is known of their life history. Most species are omnivorous in food habits as far as is known, thriving alike on vegetable and animal diets. In the Common Earwig the sexes mate in the autumn and hibernate together in pairs in cells in the soil. The eggs are laid in winter or very early spring in the cell. The males leave the nest early in the year, perhaps under compulsion from the females, which remain with the eggs and later with the nymphs until a late stage in their development, evincing a strong maternal solicitude. The eggs take many weeks to hatch, and are kept in good condition by the constant attention of the female. Young nymphs appear in April and the first adults towards the end of June. Some females are able to rear a partial second brood.

There are four nymphal instars which are distinguished by differences in the numbers of antennal segments. These increase from stage to stage by the division of the third segment. The following table gives the number of antennal segments in each of the stages of five species :

	I.	II.	III.	IV.	V. (adult).
<i>Anisolabis (E.) annulipes</i> (Lucas, H.) .	8 or 9.	11.	13.	14.	16.
<i>Labia curvicauda</i> (Motschulsky) .	8.	9.	10.	11.	12.
<i>Prolabia arachidis</i> (Yersin) .	8.	10.	11.	12.	13.
<i>Chelisoche morio</i> (Fabricius) .	8.	12.	16.	19.	20.
<i>Forficula auricularia</i> (Linnaeus) .	8.	10.	11.	12.	14.

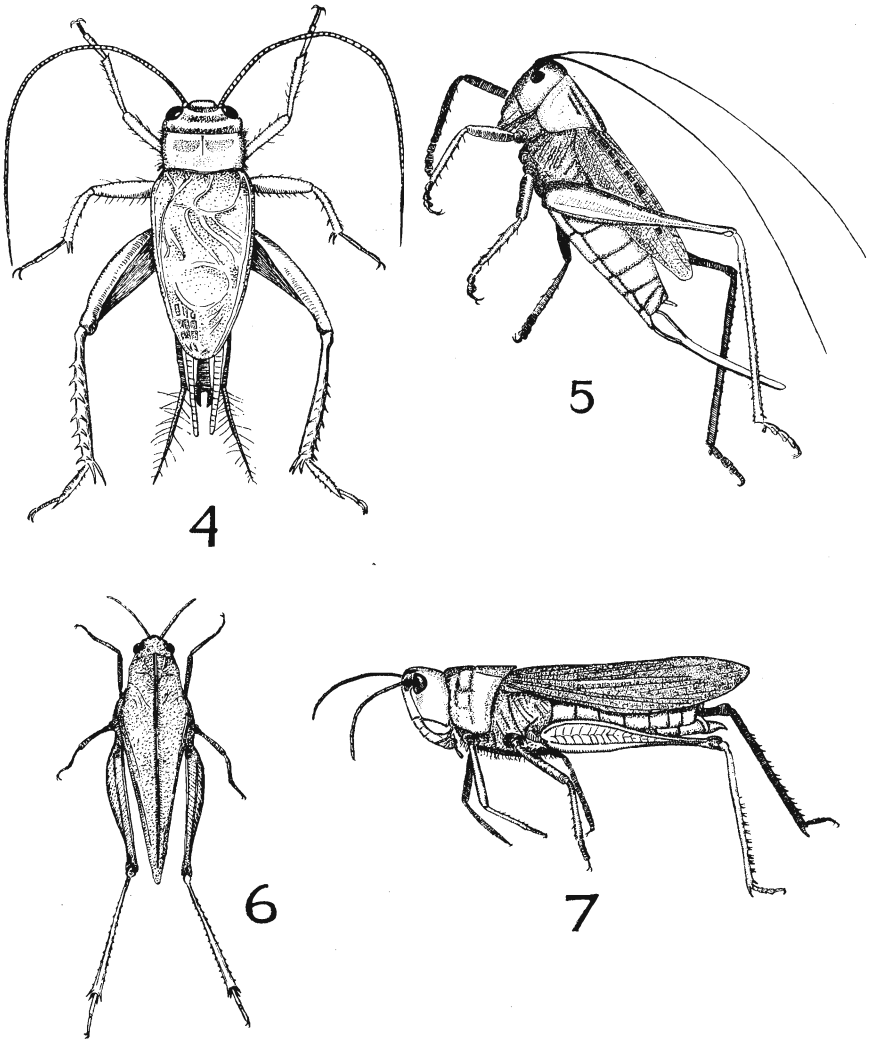
The Order **Orthoptera** are medium to large, often handsome insects. More than 20,000 species are known. Although associated in our minds,



FIGS. 1-3.—1. The Common Earwig, *Forficula auricularia* Linn., male. 1a. Ditto, female forceps. 2. The Common Cockroach, *Blatta orientalis* Linn., female. 3. The Mole Cricket, *Gryllotalpa gryllotalpa* (Linn.).

through their song, with one of the pleasantest periods of the year, the golden days of late summer and early autumn, they are surprisingly little seen and consequently but little studied in this country. Several species are very local, and even the common species are somewhat difficult to find except by careful collecting—a fact which adds to the charm and interest of the group, but which accounts for some of the neglect of the order. Our fauna, however, is but a poor one compared with that of the warmer parts of the Continent.

The eggs of the Cockroaches are deposited in horny purse-like cases or oothecae. In the Grasshoppers they are laid in the ground in masses



FIGS. 4-7.—4. The House Cricket, *Gryllulus domesticus* (Linn.). 5. A Long-horned Grasshopper, *Decticus verrucivorus* (Linn.), female. 6. A Grouse Locust, *Tetrix* sp. 7. A Common Short-horned Grasshopper, *Chorthippus bicolor* (Charp.), female.

united by a secretion of the colleterial glands. The eggs of the Bush Crickets are usually laid in the tissues of plants, and those of the true Crickets are deposited singly in the ground. The number of ecdyses appears to vary considerably. In *Blatta* six are recorded; in the ACRIDIDAE there are said to be five to eight and five or six in the TETTIGONIIDAE. Many of our native species are markedly gregarious, and are to be found in colonies of nymphs with increasing numbers of adults as the season advances.

There is still much work to be done on Orthoptera in this country. The general distribution of even common species is inadequately mapped,

and the ecological factors associated with their more detailed distribution offer a field for many workers. The life-history of most species requires study, and the immature stages await systematic treatment. The interesting relationship of coloration to environment and the extensive range of colour variation in certain species is worthy of closer study. The genetics are but little known, and many other aspects, such as food-habits, parasites, fungoid diseases, stridulation, courting and mating habits, etc., offer scope for observation.

An interesting feature of both the Dermaptera and the Orthoptera is the relatively large number of species which are cosmopolitan or which are liable to be introduced into this country in nursery stock, feeding stuffs, stored products and imported goods of all kinds. Such introductions sometimes become established, either temporarily or permanently, in houses, warehouses, stores or greenhouses, etc. Others are casual visitors from time to time, found at large at our ports or larger cities, and never or rarely succeed in breeding here. Many of these introductions are brought in to our museums on account of their striking or unfamiliar appearance, and it is reasonable to expect a synopsis such as the present to provide a means of identifying at least the more usual vagrants. It is not possible, or desirable, to include all the casuals which have been recorded, but those which have been reported several times, or have been established for a period, or have been recorded recently and thus may yet prove to be established, find a place in the present keys. The domiciliary species, such as the Common Cockroach, now fully established in our cities, and species established, or at one time established, under artificial conditions such as heated greenhouses, etc., are marked \*; alien species established or at one time established under natural conditions are indicated by §; casual species which appear sporadically and have only an ephemeral existence here are indicated by †. All these introductions have no status as British insects, but their presence here is nevertheless of considerable interest and may be of minor economic importance.

Orthoptera should be pinned for the collection through the right tegmen. It is desirable to set the expanded tegmina and wings of a male and female in each series, at least on the left side. Small earwigs may be carded, and all immature stages should be preserved in 70% alcohol. Notes should be kept of the coloration in life, especially of specimens preserved in alcohol.

#### REFERENCES

The following brief list of references may be of service in providing further information. These works, and others, have been freely drawn on in the preparations of the keys and illustrations:

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 CHOPARD, L., 1922, *Faune de France*, 3, Orthoptères et Dermaptères. Paris. 212 pp. 466 figs.  
 —, 1938, *La Biologie des Orthoptères*. Paris. 541 pp. 4 pls.  
 —, 1943, *Faune de l'Empire Français*, 1, Orthoptéroïdes de l'Afrique du Nord. Paris. 450 pp. 658 figs.  
 LUCAS, W. J., 1920, *A Monograph of the British Orthoptera*. Ray Society. 264 pp. 25 pls.  
 RAMME, W., 1927, *Die Tierwelt Mitteleuropas*, 4 (2), Orthoptera. 22 pp. 43 figs.

## Order DERMAPTERA.

## Earwigs.

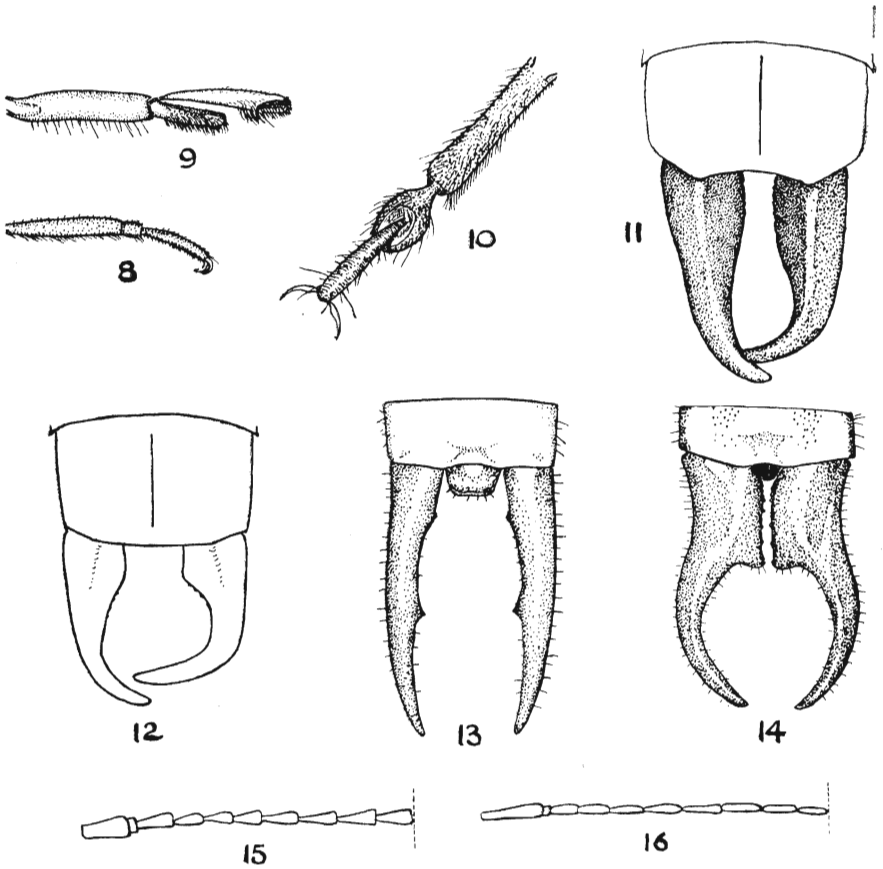
♂—Forceps more specialized (fig. 1), often di- or polymorphic. Nine visible abdominal tergites.

♀—Forceps simple, more or less straight (fig. 1a). Seven visible abdominal tergites.

## KEY TO FAMILIES, GENERA AND SPECIES.

- 1 (12) Second tarsal segment cylindrical, not dilated or markedly produced beneath third (fig. 8).
- 2 (7) Antennae with many (14–30) segments, the fourth to sixth inclusive not, or little longer than first. . . . . LABIDURIDAE.
- 3 (4) Antennae 25–30 segmented. Tegmina and wings present. **Labidura** Leach.  
Size large, body 13–26, forceps 5–11 mm. General colour pale ochraceous.  
*Very local. Hampshire coast.* . . . . . **L. riparia** (Pallas).
- 4 (3) Antennae less than 25 segmented. Tegmina and wings absent. Colour dark. . . . . **Anisolabis** Fieber.
- 5 (6) Antennae with about 20 segments. Size larger, body 15–23, forceps 3–4.5 mm. Antennae unicolorous. Legs not annulated with blackish. Male forceps markedly asymmetrical (fig. 12). . . . . **A. maritima** (Bonelli).\*  
*Introduced, formerly established at South Shields.*
- 6 (5) Antennae 14–16 segmented, with distal pale annulus. Size smaller; body 9–14, forceps 2–3.5 mm. Legs often annulated with blackish. Male forceps less markedly asymmetrical (fig. 11). (Subgenus *Euborellia* Burr)  
*Introduced, in bakehouses, chemical works, etc.* . . . . . **A. annulipes** (Lucas).\*
- 7 (2) Antennae with fewer (10–16) segments, the fourth to sixth inclusive markedly longer than first. . . . . LABIIDAE.
- 8 (9) Some segments of the antennae conical or pyriform (fig. 15); wings absent **Prolabia** Burr.  
Length of body 7–10, of forceps 2–3 mm. . . . . **P. arachidis** (Yersin).\*  
*Introduced, in bone-works, chemical works, etc.*
- 9 (8) All antennal segments cylindrical (fig. 16); wings present. **Labia** Leach.
- 10 (11) Abdomen reddish brown, anterior parts blackish brown; male forceps usually markedly curved, inner margin without crenulations; ultimate sternite of male not produced. L. 5–5.5, forceps 1 mm.  
*Introduced, greenhouse at York.* . . . . . **L. curvicauda** (Motschulsky).\*
- 11 (10) Colour more or less entirely fuscous; male forceps less curved, inner margin crenulate; ultimate sternite of male produced. L. 5–5.5, forceps 1.5–2.5 mm. The Lesser Earwig. . . . . **L. minor** (Linnaeus).  
*Widely distributed, often taken on wing; comes to light.* 8–9.
- 12 (1) Second tarsal segment dilated and/or conspicuously produced beneath third (figs. 9, 10).
- 13 (16) Second tarsal segment conspicuously produced beneath third but not laterally dilated (fig. 9).
- 14 (15) Colour dull black; forceps stout; tegmina and wings present. **Chelisoches** Scudder.  
L. 12–18.5, forceps 3–8 mm. *Introduced, Kew Gardens.* **C. morio** (Fabricius).\*
- 15 (14) Colour not dull black; forceps slender; tegmina and wings absent or incompletely developed. (Some immature Forficulidae).
- 16 (13) Second tarsal segment dilated laterally as well as produced beneath third (fig. 10). . . . . FORFICULIDAE.
- 17 (22) Males.
- 18 (19) Forceps not dilated at base, widely separated at base by broad pygidium (fig. 13). . . . . **Apterygida** Westwood.  
Wings vestigial; somewhat pubescent species. L. 6–11, forceps 2.5–5 mm.  
*Very local, S.E. England.* . . . . . **A. albipennis** (Charpentier).
- 19 (18) Forceps dilated at base and contiguous, pygidium narrow (figs. 1, 14) **Forficula** Linnaeus.





FIGS. 8-16.—8. *Labia minor* (Linn.), tarsus. 9. *Chelisoches morio* (Fab.), tarsus. 10. *Forficula auricularia* (Linn.), tarsus. 11. *Anisolabis (Euborellia) annulipes* (Lucas, H.), male forceps. 12. *Anisolabis maritima* (Bonelli), male forceps. 13. *Apterygida albipennis* (Charp.), male forceps. 14. *Forficula lesnei* Finot, male forceps. 15. *Prolabia arachidis* (Yers.), basal segments of antennae. 16. *Labia minor* (Linn.), basal segments of antennae.

- 20 (21) Size smaller (6-10, forceps 1.5-3 mm.); wings vestigial, hidden beneath tegmina; forceps of male with inner dilated portion meeting in a straight line and terminating in a more or less right angle (fig. 14) **F. lesnei** Finot. *Local, Southern England.*
- 21 (20) Size larger (10-14, forceps 3.5-9 mm.); wings fully developed and exposed; forceps of male with triangular tooth at apex of inner dilation (fig. 1). The Common or European Earwig..... **F. auricularia** Linnaeus. *Common throughout the British Isles.*
- 22 (17) Females.
- 23 (24) Antennae 14 segmented; wings fully developed and exposed beyond tegmina; size larger, 10-14, forceps 3.5-5 mm..... **F. auricularia** Linnaeus.
- 24 (23) Antennae 12 segmented; wings reduced to small flaps, hidden beneath tegmina; size smaller.

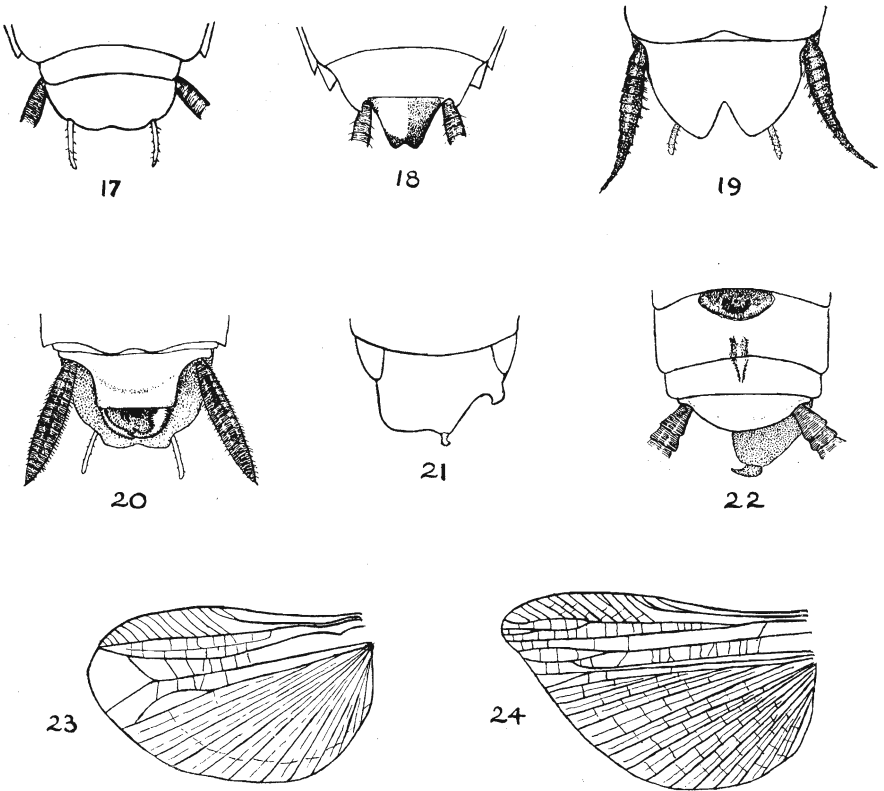
- 25 (26) Distal abdominal tergites distinctly and uniformly punctured; head less tumid. L. 6-8, forceps 1.5-2 mm. . . . . **F. lesnei** Finot.  
 26 (25) Distal abdominal tergites much more diffusely and less distinctly punctured; head more tumid. L. 8-10, forceps 2-2.5 mm.  
**A. albipennis** (Charpentier).

Order **ORTHOPTERA.**

Grasshoppers, Crickets, Cockroaches, etc.

KEY TO FAMILIES.

- 1 (6) Posterior femora not larger than anterior pair (fig. 2); mute species; body more or less flattened with wings superposed when at rest; tergites and sternites subequal.  
 2 (3) Body oval, much flattened; head nearly concealed beneath the pronotum; legs similar and fitted for rapid running, the coxae large. Cockroaches (fig. 2) . . . . . **BLATTIDAE** (p. 8).  
 3 (2) Body elongate; head free, not concealed from above by the prothorax; deliberate movers.  
 4 (5) Prothorax much longer than the mesothorax; anterior legs almost always heavily spined, formed for seizing prey; cerci usually with several joints. Soothsayers, Praying Mantids . . . . . (**MANTEIDAE**).  
 5 (4) Prothorax short; legs all similar, formed for walking; cerci one-jointed. Stick and Leaf Insects . . . . . **PHASMATIDAE**.  
*To this family belongs the Stick Insect, Carausius morosus Brunner von Wattenwyl,\* from the Oriental region, well known and frequently bred in schools, laboratories, etc.*  
*The New Zealand species, Acanthoxyla prasina (Westwood),§ has been recorded as established in several localities on the south coast (Uvarov, 1944, Proc. R. ent. Soc. Lond. (B), 13: 94-96, fig.).*  
 6 (1) Posterior femora almost always much larger than the anterior pair (fig. 4); jumping species; if not (**GRYLLOTALPIDAE**), the anterior legs broadened for burrowing (fig. 3); species usually capable of stridulation; body more or less cylindrical, the wings held sloping against the sides of the body when at rest; tergites usually larger than the sternites.  
 7 (14) Antennae usually long and many jointed, delicately tapering and exceeding the body in length, rarely short; auditory organs, if present, near the base of the anterior tibia; ovipositor of female usually long and well developed; tarsi 3- or 4-jointed.  
 8 (11) Tarsi 4-jointed, at least on the four posterior legs; antennae always very long and tapering; ovipositor usually long and sword-shaped.  
 9 (10) Tarsi more or less depressed. Bush Crickets (fig. 5) **TETTIGONIIDAE** (p. 11).  
 10 (9) Tarsi distinctly compressed; apterous forms, usually dull-coloured. Camel Crickets . . . . . **GRYLLACRIDIDAE** (p. 13).  
 11 (8) Tarsi with three joints or less; ovipositor, when present, needle-shaped.  
 12 (13) Front tibiae strongly dilated, digitate; ovipositor short, not protruding. **GRYLLOTALPIDAE** (p. 15).  
 13 (12) Front tibiae not dilated and digitate; ovipositor projecting, usually long; antennae always with more than thirty joints (fig. 4). Crickets. **GRYLLIDAE** (p. 15).  
 14 (7) Antennae shorter, with less than 30 joints, filiform, rarely clubbed, but not delicately tapering; auditory organ, if present, near the base of the abdomen; ovipositor of female never elongate; tarsi 3-jointed.  
 15 (16) Tarsal claws without a pad (arolium) between them; pronotum greatly lengthened, extending backwards to cover the entire abdomen; tegmina vestigial, consisting of small scales at the base of the usually large wings (fig. 6) . . . . . **TETRIGIDAE** (p. 15).  
 16 (15) Tarsal claws almost always with an arolium between them; pronotum small, not extending backwards over more than a small basal part of the abdomen (fig. 7). Grasshoppers and Locusts . . . . . **ACRIDIDAE** (p. 16).



FIGS. 17-24.—17. *Periplaneta australasiae* (Fab.), male subgenital plate. 18. *Blatta orientalis* Linn., female subgenital plate. 19. *Periplaneta americana* (Linn.), supra-anal plate of male. 20. *P. australasiae* (Fab.), supra-anal plate of male. 21. *Blattella germanica* (Linn.), subgenital plate of male. 22. *Ectobius* sp., apex of abdomen, dorsal view of male. 23. *Ectobius* sp., wing. 24. *Blattella germanica* (Linn.), wing.

### Family BLATTIDAE.

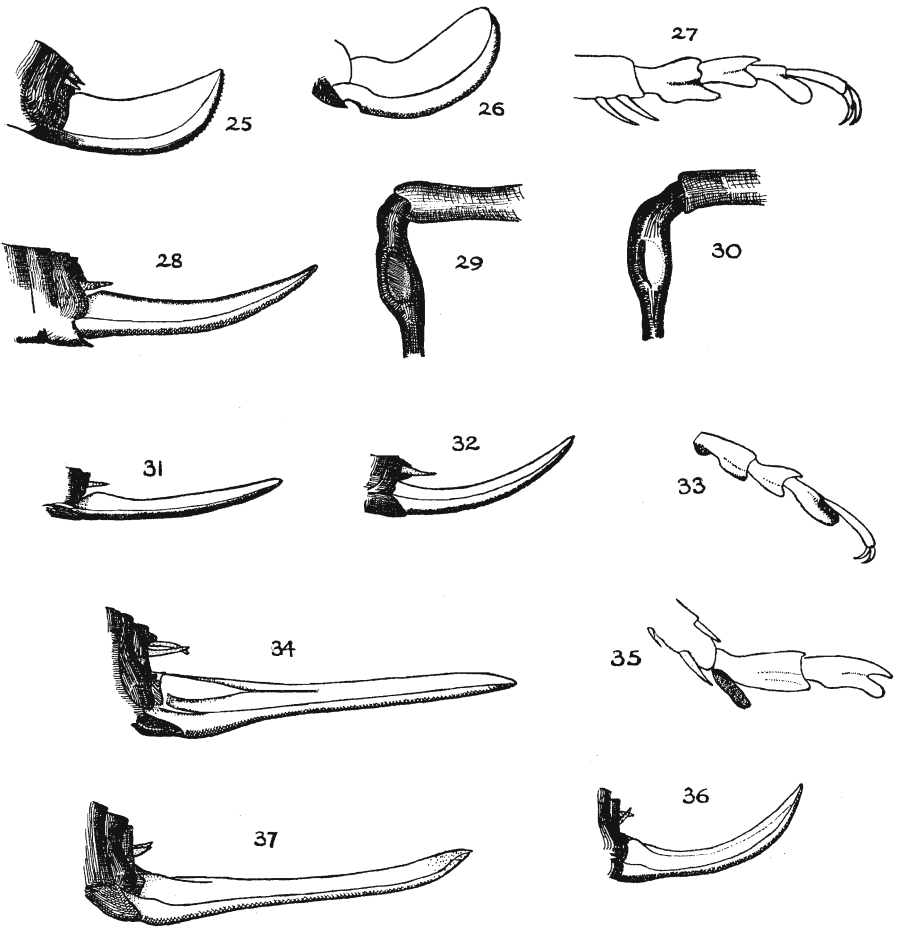
#### Cockroaches.

- ♂—Usually macropterous; abdomen with 9 visible sternites, usually a pair of styles present in addition to cerci, on distal margin of last sternite (sub-genital plate).  
 ♀—Often brachypterous; abdomen with 7 visible sternites, styles absent; ovipositor not developed; last sternite often divided into two valves by median fissure.

#### KEY TO SUBFAMILIES, GENERA AND SPECIES.

- 1 (20) Intermediate and posterior femora, or at least latter, with several evident marginal spines beneath.  
 2 (7) Subgenital plate of male symmetrical, with two similar styles (fig. 17); of female divided distad to form valvular apparatus (fig. 18). Moderate to large, heavily pigmented species. . . . . BLATTINÆ.  
 3 (4) Tegmina of male shorter than abdomen; reduced to small flaps in female (fig. 2). Arolia absent. . . . . *Blatta* Linnaeus.  
 Blackish brown, unicolorous. L. 19-25 mm. . . . . *B. orientalis* Linnaeus.\*  
*Cosmopolitan. The Common Cockroach.*

- 4 (3) Tegmina and wings in both sexes longer than abdomen. Arolia present  
**Periplaneta** Burmeister.
- 5 (6) Supra-anal plate in both sexes much exceeding sub-genital plate, distal margin deeply incised (fig. 19). Colour castaneous, with obscure yellowish markings on pronotum. Tegmina and wings in both sexes surpassing the abdomen. L. 38-42 mm. . . . . **P. americana** (Linnaeus).\*  
*Cosmopolitan. In heated greenhouses, bakehouses, warehouses, etc. The American Cockroach.*
- 6 (5) Supra-anal plate not exceeding sub-genital plate, its distal margin divided in female, truncate in male (fig. 20). Costal margin of tegmina at base and disc of pronotum sharply marked with yellow. Size somewhat smaller. L. 30-36 mm. . . . . **P. australasiae** (Fabricius).\*  
*Cosmopolitan. Found under similar conditions to above. The Australian Cockroach.*
- 7 (2) Sub-genital plate of male asymmetrical, with two unequal styles (fig. 21); of female large, undivided, and rounded.
- 8 (19) Supra-anal plate of both sexes usually transverse and narrow (fig. 22); wings, when present, with an apical field (fig. 23); posterior femora usually sparsely armed with spines beneath. . . . . **ECTOBIINAE.**  
*Our native cockroaches. . . . . Ectobius* Stephens.
- 9 (14) Males: wings fully developed, covering abdomen; sub-genital plate produced distad.
- 10 (13) Size larger, 8-11 mm.
- 11 (12) Disc of pronotum usually dark, the edges clear; antennae and palpi blackish; underside dark; wings extending beyond cerci  
*Southern counties, 7-9. . . . . E. lapponicus* (Linnaeus).
- 12 (11) Entirely fulvous above and beneath; wings not reaching tips of cerci  
*Southern counties, 8-9. . . . . E. lividus* (Fabricius).
- 13 (10) Size smaller, 6-7 mm. Pronotum pale greyish, with a few dark specks on disc; legs largely pale. Sometimes disc of pronotum mainly dark, the dark patch being divided in middle, and legs blackish (var. *nigripes* Stephens). *South and south-east coasts. . . . . E. panzeri* Stephens.
- 14 (9) Females: wings usually reduced; sub-genital plate broad at apex.
- 15 (18) Size larger, 7-8 mm. Tegmina long, nearly or quite covering abdomen, separately rounded at apex.
- 16 (17) Tegmina not quite covering abdomen; wings reduced, dark in colour; underside with broad dark streak on each side; sub-genital plate largely dark. . . . . **E. lapponicus** (Linnaeus).
- 17 (16) Tegmina covering abdomen; wings scarcely reduced, yellow in colour; underside pale. . . . . **E. lividus** (Fabricius).
- 18 (15) Size smaller, about 6 mm. Tegmina scarcely longer than wide, broadly truncate at apex, scarcely covering first segment of abdomen; upper side with dark dots; legs largely pale. Sometimes upper side with more extensive dark markings and blackish legs (v. *nigripes* Stephens)  
**E. panzeri** Stephens.
- 19 (8) Supra-anal plate of both sexes more or less produced, triangular; wings without apical field (fig. 24); posterior femora usually strongly spined beneath. . . . . **PSEUDOMOPINAE. Blattella** Caudell.  
Dirty yellow; pronotum with two fuscous longitudinal marks; both tegmina and wings extending beyond abdomen. L. 11-12 mm.  
**B. germanica** (Linnaeus).\*  
*Cosmopolitan. In restaurants, bakehouses, etc. The German Cockroach.*
- 20 (1) Intermediate and posterior femora unarmed beneath, or furnished only with hairs and bristles.
- 21 (22) Tarsal claws without arolia, or with a minute arolium. Large robust but not very convex species. Anal field of wings large and folded fan-like  
**BLABERINAE. Blaberus** Serville.  
L. 55-65 mm. . . . . **B. giganteus** (Linnaeus).†  
*The Drummer. Occasionally introduced at our docks and elsewhere.*
- 22 (21) Tarsal claws with a distinct arolium between them. Abdominal tergites with produced lateral angles. . . . . **PANCHLORINAE**



Figs. 25-37.—25. *Leptophyes punctatissima* (Bosc.), female ovipositor. 26. *Phaneroptera falcata* (Poda), female ovipositor. 27. *Decticus verrucivorus* (Linn.), anterior tarsus. 28. *Meconema thalassinum* (Deg.), female ovipositor. 29. *M. thalassinum* (Deg.), auditory pit of anterior tibia. 30. *Conocephalus* sp., auditory pit of anterior tibia. 31. *Conocephalus discolor* (Thunb.), female ovipositor. 32. *Conocephalus dorsalis* (Latr.), female ovipositor. 33. *Tettigonia viridissima* Linn., posterior tarsus. 34. *T. viridissima* Linn., female ovipositor. 35. *Decticus verrucivorus* (Linn.), part of posterior tarsus. 36. *Pholidoptera griseoaptera* (Deg.), female ovipositor. 37. *Decticus verrucivorus* (Linn.), female ovipositor.

23 (24) Colour pale green ; delicate, small species, about 20 mm.

**Panchlora** Burmeister.

Frequently reported as imported in fruit, etc.; determinations very doubtful. *P. nivea* (Linnaeus)† (= *virescens* (Thunberg), *exoleta* auctt. Britt.) L. 20-26 mm., and *viridis* (Fabricius)† L. 30-38 mm., have been recorded.

24 (23) Colour not pale green.



- 25 (26) Pronotum dull with a few dark brown marks on disk, caudal margin produced mesad into an obtuse angle. Size larger.  
*(Rhyparobia* Krauss) **Leucophaea** Brunner.  
 L. 31-42 mm. General colour brownish testaceous, body dark brown.  
*Occasionally introduced*..... **L. maderae** (Fabricius).†
- 26 (25) Pronotum shining, solidly dark on disc, evenly rounded caudad. Size smaller.  
**Pycnoscelus** Scudder.  
 L. 14-18 mm. General colour dark brown.... **P. surinamensis** (Linnaeus).†  
*Frequently introduced*.

## Family TETTIGONIIDAE.

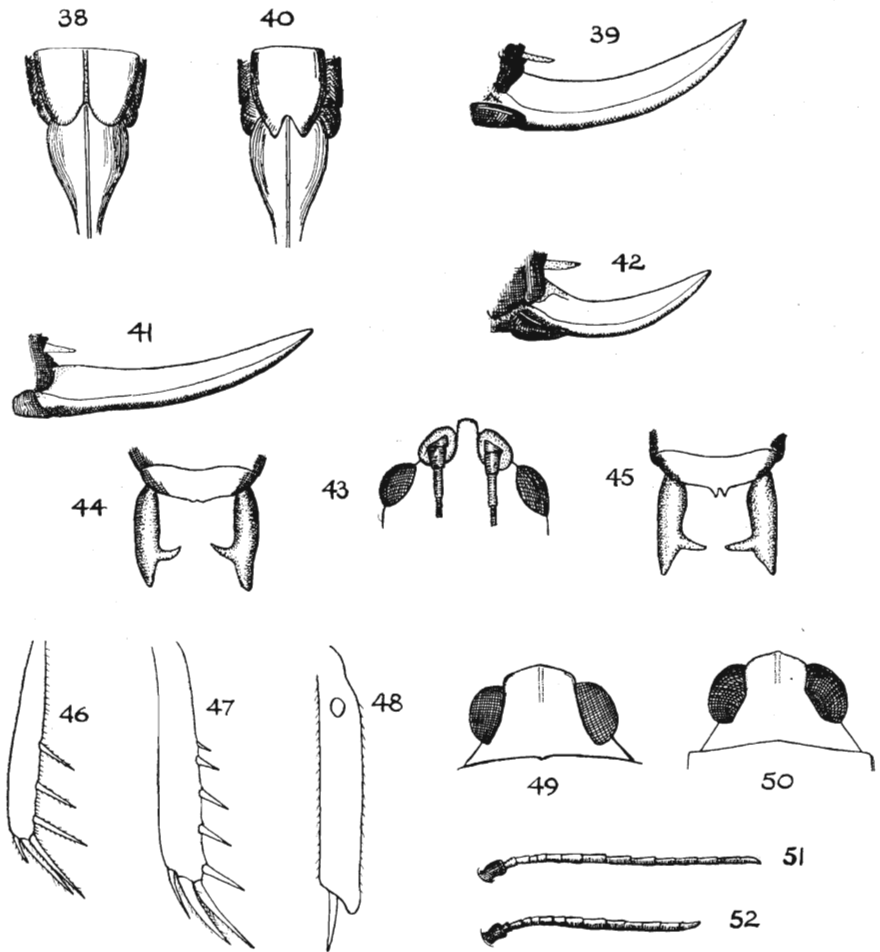
## Bush Crickets, Long-horned Grasshoppers.

Females usually appreciably larger than males with a large sword-like ovipositor. Immature examples distinguished from adult brachypterous forms by having the costa of the tegmina directed dorsad instead of ventrad.

## KEY TO SUBFAMILIES, GENERA AND SPECIES.

- 1 (4) First and second segments of tarsi not longitudinally sulcate laterally; posterior tibiae with an apical spine above on each side  
**PHANEROPTERINAE.**
- 2 (3) Tegmina abbreviated, flap-like in male, or absent in female. Anterior coxae unarmed. Ovipositor short, dilated, broad at base, then strongly compressed, upper margin straight, apex pointed (fig. 25).... **Leptophyes** Fieber.  
 Green, tegmina with faint black line; body with small black and brown marks. L. 12-16 mm., ovipositor 7 mm..... **L. punctatissima** (Bosc).  
*Widely distributed in south to Lincs. 7-9, or later.*
- 3 (2) Tegmina fully developed, longer than abdomen. Anterior coxae armed with a spine. Ovipositor shorter, broader, and less pointed (fig. 26)  
**Phaneroptera** Serville.  
 Dark green; tegmina without spots. L., male 12-15, female 16-18, ovipositor 5.5 mm. *Very rare, Cornwall*..... **P. falcata** (Poda).
- 4 (1) First and second segments of tarsi longitudinally sulcate laterally (fig. 27).
- 5 (8) Auditory pits on anterior tibiae open (fig. 29)..... **MECONEMATINAE.**
- 6 (7) Tegmina and wings fully developed in both sexes; anterior coxae unarmed; cerci of male long and incurved; ovipositor long, sword-like, gently curved upwards (fig. 28); pronotum narrow..... **Meconema** Serville.  
 Small pale green species. L. 12-15, ovipositor 9 mm.  
**M. thalassinum** (Degeer) (*varium* Fabricius).  
*On trees, particularly oaks; comes to light. 8-11. Widespread to S. Yorks.*
- 7 (6) Tegmina much reduced, almost hidden beneath elongate pronotum; anterior coxae armed with short spines..... **Phlugiolopsis** Zeuner.  
 Grey and brown species. L. 11-12, ovipositor 5 mm.... **P. henryi** Zeuner.\*  
*Kew Gardens, in heated greenhouse.*
- 8 (5) Auditory pits on anterior tibiae partly covered by an extension of the chitinous rim which narrows the aperture to a linear slit (fig. 30).
- 9 (12) Anterior tibiae without terminal spine above. Medio-frontal area of head narrow, compressed (fig. 43)..... **CONOCEPHALINAE.**<sup>1</sup>
- 10 (11) Tegmina and wings well developed, extending beyond posterior femora; ovipositor 16 mm. long, straight (fig. 31). Male cerci characteristic (fig. 44). General colour, in life, bright green; tegmina with clearly defined dorsal brown stripe contrasting with pale sides. L., male 15, female 17 mm.  
*Isle of Wight*..... **C. discolor** (Thunberg) (= *fuscus* Fabricius, 1793, *nec* Pallas, 1773).

<sup>1</sup> *Jamaicana subguttata* (Walker)† PSEUDOPHYLLINAE, W. Indies, would run here. Margins of antennal scrobes produced. Olive brown or brown; pronotum usually with longitudinal dorso-lateral fuscous stripes. L. ♂ 35-50, ♀ 48-50, ovipositor ca. 20 mm. *Often imported with bananas.*



FIGS. 38-52.—38. *Platycleis occidentalis* Zeuner, female subgenital plate. 39. *P. occidentalis* Zeuner, female ovipositor. 40. *Metriopectera brachyptera* (Linn.), female subgenital plate. 41. *M. brachyptera* (Linn.), female ovipositor. 42. *Roeseliana roeselii* (Hag.), female ovipositor. 43. *Conocephalus* sp., head from above. 44. *Conocephalus discolor* (Thunb.), male cerci. 45. *C. dorsalis* (Latr.), male cerci. 46. *Nemobius sylvestris* (Fab.), posterior tibia. 47. *Gryllulus domesticus* (Linn.), posterior tibia. 48. *G. domesticus* (Linn.), anterior tibia. 49. *Tetrix subulata* (Linn.), head, dorsal view. 50. *T. ceperoi* Bol., head, dorsal view. 51. *T. vittata* (Zett.), antenna. 52. *T. bipunctata* (Linn.), antenna.

- 11 (10) Tegmina and wings reduced, not extending beyond apex of abdomen, except rarely (v. *burri* Ebner); ovipositor 9 mm. long, curved (fig. 32). Male cerci characteristic (fig. 45). General colour, in life, oily emerald green; dorsum of tegmina uniformly brownish. L., male 12-13, female 12-15 mm. Salt marshes, estuaries. S. and E. England. 8-10. *C. dorsalis* (Latreille).
- 12 (9) Anterior tibiae with a terminal spine above, on outer side.

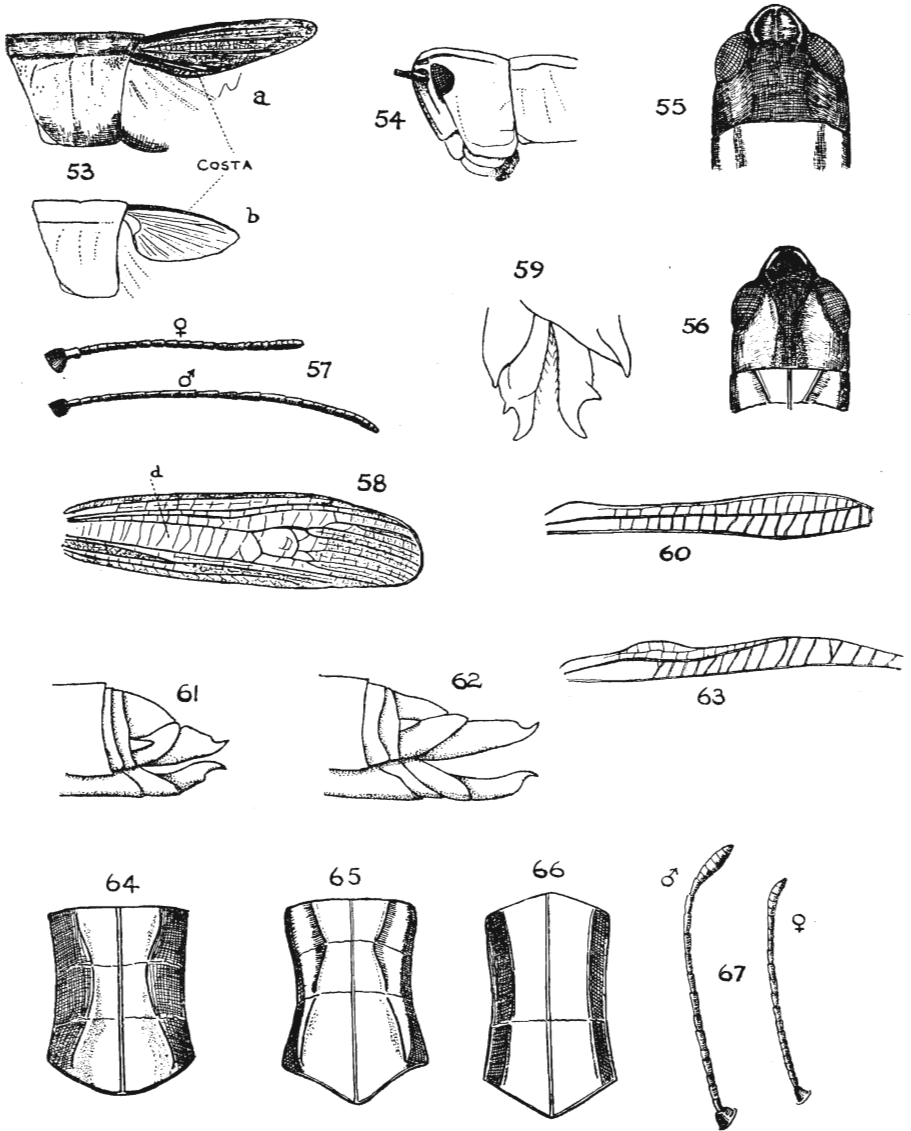
- 13 (14) First segment of posterior tarsi without a free plantula, or with a very short one (fig. 33)..... TETTIGONINAE. **Tettigonia** Linnaeus. L. 30-55, ovipositor 27-30 mm. (fig. 34). Colour uniform green, tinged with pale brown in old specimens..... **T. viridissima** Linnaeus. *The Great Green "Grasshopper."* Widely distributed in the south, more local further north; extending as far as lowlands of Scotland. Thickets. 7-10.
- 14 (13) First segment of posterior tarsi with a free plantula beneath (fig. 35) DECTICINAE.
- 15 (16) Tegmina of male reduced to broadly rounded flaps; rudimentary in female; wings absent..... **Pholidoptera** Wesmael. Male almost black; female brown. L., male 13-15, female 15-18, ovipositor 9-10 mm. (fig. 36)..... **P. griseoptera** (Degeer) (*cinerea* Gmelin). *In thickets, active at night and by day.* 8-10. England, south of Humber.
- 16 (15) Tegmina and wings fully developed, or if abbreviated then narrow and pointed, never broadly rounded.
- 17 (18) Anterior tibiae with 4 spines above; pronotum with entire median longitudinal carina..... **Decticus** Serville. Large species, male 26-38, female 30-44, ovipositor (fig. 37) 17-26 mm. Dark, oily green or brown with row of black spots on tegmina; tegmina and wings fully developed (fig. 5)..... **D. verrucivorus** (Linnaeus). *Very rare; dry fields and hillsides.* Kent, Hants, Dorset.
- 18 (17) Anterior tibiae with 3 spines above; pronotum with indistinct longitudinal keel behind.
- 19 (20) Subgenital plate of female with median furrow and rounded excision and lobes (fig. 38)..... **Platycleis** Fieber. Grey species with spotted tegmina; fully winged. L. 15-22, ovipositor (fig. 39) 8-10 mm. (*grisea* auctt. Brit.)..... **P. occidentalis** Zeuner. *Southern England.* 8-10 (*subspecies jerseyana* Zeuner, Channel Is.).
- 20 (19) Subgenital plate of female smooth or keeled with triangular excision and lobes (fig. 40).
- 21 (22) Ovipositor (fig. 41) regularly curved, twice as long as pronotum. Male cerci toothed in middle..... **Metriopectera** Wesmael. General colour dark brown and green; side flaps of pronotum pale on caudal margin only. L. 12-16, ovipositor 8-10 mm. Occasionally macropterous. **M. brachyptera** (Linnaeus). *Marshy places.* Southern England, Yorks, Cumberland. 8-10.
- 22 (21) Ovipositor (fig. 42) suddenly recurved near base, not more than 1½ times as long as pronotum. Male cerci toothed well beyond middle **Roeseliana** Zeuner. General colour green and brown; side flaps of pronotum with pale border all round. L., male 14-17, female 15-18, ovipositor 8 mm. Occasionally macropterous. *East coast to Yorks. Water meadows.* 8-10. **R. roeselii** (Hagenbach).

Family GRYLLACRIDIDAE.

Camel Crickets.

KEY TO GENERA AND SPECIES.

- 1 (2) Posterior tibiae with 18-20 widely spaced spinules..... **Dolichopoda** Bolivar. Uniform yellowish brown. L. of body 16-17, ovipositor 13 mm. (*Chopardina importata* Uvarov) **D. bormansi** Brunner.\* *Greenhouse, London district.*
- 2 (1) Posterior tibiae with two rows of very numerous (up to 75) closely approximated spinules..... **Tachycines** Adelung. Yellowish brown, variegated with darker markings. L. 14-15, ovipositor 14, cerci 8-9 mm..... **T. asynamorus** Adelung.\* *Widely established and breeding in greenhouses.*



FIGS. 53-67.—53. *Chorthippus parallelus* (Zett.), female (a); nymph (b). 54. *C. bicolor* (Charp.), head in profile. 55. *Mecostethus grossus* (Linn.), head, dorsal view. 56. *Chorthippus bicolor* (Charp.), head, dorsal view. 57. *Stenobothrus* sp., antenna, male and female. 58. *S. lineatus* (Panz.), tegmina, *d* = discoidal area. 59. *S. lineatus* (Panz.), female ovipositor. 60. *S. lineatus* (Panz.), costal portion of tegmina. 61. *Omocestus ventralis* (Zett.), female ovipositor. 62. *O. viridulus* (Linn.), female ovipositor. 63. *Chorthippus bicolor* (Charp.), costal portion of tegmina. 64. *Chorthippus vagans* (Evers.), pronotum. 65. *C. bicolor* (Charp.), pronotum. 66. *C. albomarginatus* (Deg.), pronotum. 67. *Myrmeleotettix maculatus* (Thunb.), antenna, male and female.

## Family GRYLLOTALPIDAE.

## Mole Crickets.

A single British species, of the genus *Gryllotalpa* Latreille. Large, with very elongate prothorax. L. 35–50 mm. (fig. 3). The Mole Cricket

*Gryllotalpa gryllotalpa* Linnaeus.

Local, S. and Midlands, N. Ireland, Scotland. Burrows in wet soil.

## Family GRYLLIDAE.

## Crickets.

Females may be distinguished from males by the long, more or less needle-like ovipositor.

## KEY TO GENERA AND SPECIES.

- 1 (2) Posterior tibiae with three movable velutinous spines on upper and three on distal margin (fig. 46)..... *Nemobius* Serville.  
Small dark species; tegmina abbreviated. L. 9–10 mm.  
*N. sylvestris* (Fabricius).  
*Spring and autumn; banks and woodland clearings. Very local; Hants, Isle of Wight and other southern counties. The Wood Cricket.*
- 2 (1) Posterior tibiae with more numerous shorter, fixed, glabrous spines (fig. 47).
- 3 (4) Anterior tibiae without tympanum on inner face; head not depressed  
*Grylloides* Saussure; *G. sigillatus* (Walker).\*  
*Several imported spp. recorded; in greenhouses at Kew, etc.*
- 4 (3) Anterior tibiae with a tympanum on inner face (fig. 48); head more or less depressed.
- 5 (8) Body and legs nearly glabrous..... *Gryllus* Linnaeus.
- 6 (7) Head much broader than pronotum; shining black; tegmina with basal yellow band. L. 20–26 mm..... *G. campestris* Linnaeus.  
*Spring and early summer. Southern counties chiefly; local. The Field Cricket.*
- 7 (6) Head not broader than pronotum; similarly coloured; size larger. L. 20–32 mm. *An occasional introduction*..... *G. bimaculatus* (Degeer).†
- 8 (5) Body and legs pubescent..... *Gryllulus* Uvarov.  
Yellowish buff. L. 16–20 mm. (fig. 4)..... *G. domesticus* (Linnaeus).  
*Common in or near houses; refuse tips. The House Cricket.*

## Family TETRIGIDAE.

## Groundhoppers, Grouse Locusts.

Females generally larger than males, with short ovipositor consisting of four valves which are often strongly toothed.

A single British genus (fig. 6)

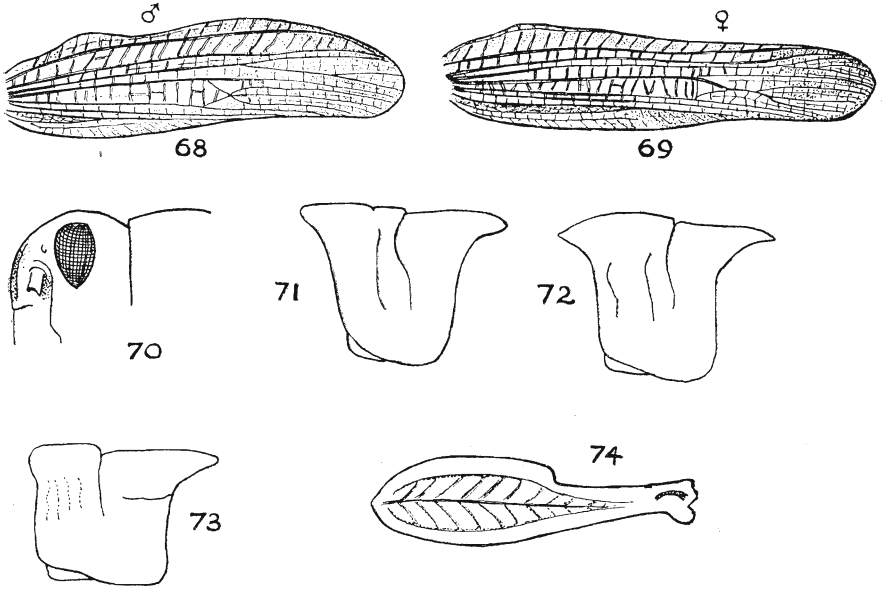
*Tetrix* Latreille (*Acrydium* Geoffroy, *Tettix* auctt.).

*Hibernate as adults; spring and summer.*

KEY TO SPECIES OF *Tetrix*.

- 1 (4) Body slender; pronotum long, clearly extending beyond posterior knees, almost flat or very slightly crested.
- 2 (3) Vertex, seen from above, projecting in front of eyes, obtusely angulate, nearly twice width of eye at base (fig. 49). L. 8–14 mm.  
*Marshy places, S. of England, local*..... *T. subulata* (Linnaeus).
- 3 (2) Vertex, seen from above, scarcely projecting in front of eyes, rounded, width at base little more than that of eye (fig. 50). L. 6–9 mm.  
*S. England*..... *T. ceperoi* Bolivar.





FIGS. 68-74.—68. *Chorthippus bicolor* (Charp.), tegmina of male. 69. *C. bicolor* (Charp.) tegmina of female. 70. Oedipodine head in profile. 71. *Locusta migratoria migratoria* Linn., gregarious phase, pronotum in lateral view. 72. *L. m. migratoria* Linn., solitary phase, pronotum in lateral view. 73. *Oedipoda caerulescens* (Linn.), pronotum in lateral view. 74. *O. caerulescens* (Linn.), posterior femur.

- 4 (1) Body stout; pronotum crested, tectiform, prominently keeled, hardly surpassing posterior knees. L. 8-11.5 mm.
- 5 (6) Segment 6 of antennae and succeeding joints of moderate length, about three times as long as broad (fig. 51).....**T. vittata** (Zetterstedt).  
*Generally common throughout the whole country.*
- 6 (5) Segment 6 of antennae and succeeding joints shorter, hardly twice as long as broad (fig. 52). *Scotland, rare*.....**T. bipunctata** (Linnaeus).

Family ACRIDIDAE.

Short-horned Grasshoppers, Locusts.

The abdomen has 10 visible tergites in both sexes; the visible sternites number 9 in the male and 8 in the female. Females average larger than males, and have an ovipositor consisting of 4 divergent valves. Nymphs have the costa of tegmina directed dorsad instead of ventrad (fig. 53, a = adult; b = nymph).

KEY TO SUBFAMILIES, GENERA AND SPECIES.

- 1 (24) Prosternum simple, without spine or raised tubercle.
- 2 (21) Face retreating ventrad and angulate at junction with vertex when viewed in profile (fig. 54).....ACRIDINAE.
- 3 (4) Foveolae of vertex almost obsolete (fig. 55); average size larger  
**Mecostethus** Fieber.  
Dark olive green; tegmina with bright yellow stripe down mediastinal and scapular areas; posterior femora carmine beneath; posterior tibiae olive, yellow near base, with black spines. L. 12-30 mm. **M. grossus** (Linnaeus).  
*Very local; New Forest and a few other stations in south; Norfolk Fens; ? Galway and Kerry. In bogs. 7-9.*

- 4 (3) Foveolae of vertex well marked (fig. 56) ; generally smaller species.
- 5 (18) Antennae filiform or very slightly depressed towards apex (fig. 57).
- 6 (11) Costal margin of tegmina straight ; mediastinal field not enlarged at base, long, gradually narrowed distad (fig. 60).
- 7 (8) Transverse nervures in discoidal field of tegmina approximately parallel (fig. 58*d*) ; valves of ovipositor in female with a strong lateral tooth (fig. 59).....**Stenobothrus** Fischer.  
Pronotum deep green, lateral margins rosy ; tegmina with white crescent and apical spot ; male abdomen bright red above. L. 18–27 mm.  
*Local, S. England. 7–10.....S. lineatus* (Panzer).
- 8 (7) Transverse nervures in discoidal field of tegmina more irregular (as in fig. 69) ; valves of ovipositor in female without strong lateral tooth (figs. 61, 62)  
**Omocestus** Bolivar.
- 9 (10) Ovipositor of female characteristic (fig. 61). Vertex without distal median carina. Tegmina often spotted with brown and with a whitish lunule in distal third. Male palpi white at apex. L. 13–20 mm.  
*Local but widespread to S. Scotland. 7–9.....O. ventralis* (Zetterstedt).
- 10 (9) Ovipositor of female characteristic (fig. 62). Vertex with a distinct distal median carina. Tegmina with fewer dark spots and usually without whitish lunule. Male palpi not whitish at apex. L. 13–24 mm.  
*Common and widely distributed. 6–9.....O. viridulus* (Linnaeus).
- 11 (6) Costal margin of tegmina convex towards the base ; mediastinal field with a small lobe, short, abruptly narrowed distad (fig. 63)....**Chorthippus** Fieber.
- 12 (15) Lateral carinae of pronotum angled or curved inward in prozona, diverging caudad (figs. 64, 65).
- 13 (14) Typical sulcus of pronotum behind middle (fig. 64). Colour pale ochraceous, generally with greyish spots ; apex of abdomen of general colour or very faintly reddish ; tegmina of female without white band. L. 13–22 mm.  
*Local, heaths, Hants and Dorset.....C. vagans* (Eversmann).
- 14 (13) Typical sulcus of pronotum in or before middle (fig. 65). Colour very variable, green, red, purple, yellow, grey, brown or black. Thoracic sterna more than usually hairy. Tegmina of male (fig. 68), of female (fig. 69). L. 15–24 mm.....**C. bicolor** (Charpentier).  
*Very common and widely distributed. 6–11.*
- 15 (12) Lateral carinae of pronotum straight and parallel or very slightly curved inward cephalad (fig. 66).
- 16 (17) Tegmina and wings well developed in both sexes ; posterior femora uniformly coloured ; lateral carinae of pronotum almost parallel. General colour green or brown. L. 13–18 mm.  
**C. albomarginatus** (Degeer) (*elegans* Charpentier).  
*Rather common in south, especially near coast, to S. Yorks. 6–9.*
- 17 (16) Tegmina abbreviated in female, well developed in male ; wings rudimentary in both sexes. Macropterous forms occur rarely. Knees of posterior legs blackish ; lateral carinae of pronotum less parallel, slightly incurved and a little divergent caudad. Colour green or green and ashy grey or blackish. L. 14–21 mm.  
*Common and generally distributed. 7–10.....C. parallelus* (Zetterstedt).
- 18 (5) Antennae clavate, especially in male (fig. 67).
- 19 (20) Mediastinal area of tegmina dilated at base, with an adventitious vein (as in fig. 63).....**Gomphocerippus** Roberts.  
Size medium, 14–24 mm. long ; colour brown, unspotted ; antennae white-tipped, strongly clubbed. *Local, S. England. 8–10. G. rufus* (Linnaeus).
- 20 (19) Mediastinal area of tegmina not dilated, without adventitious vein (as in fig. 60).....**Myrmeleotettix** Bolivar.  
Size smaller, 12–16 mm. long ; dark spotted and variegated ; antennae unicolorous, moderately clubbed distad.....**M. maculatus** (Thunberg).  
*Common and generally distributed, often on moors and heaths. 6–10.*
- 21 (2) Face nearly vertical and rounding into vertex when viewed in profile (fig. 70)

- 22 (23) Median longitudinal carina of pronotum in lateral view straight, or slightly concave (gregarious phase) (fig. 71); evenly convex, general outline not rendered angulate by typical sulcus (solitary phase) (fig. 72); wings without black band, and not blue in colour..... **Locusta** Linnaeus.  
L., male 29-37, female 35-51 mm..... **L. migratoria** Linnaeus. †  
*Occasional visitor. The Migratory Locust. If seen in Britain specimens and full data relating to their capture should be sent to The Director, Anti-Locust Research Centre, British Museum (Natural History), London, S. W. 7.*
- 23 (22) Median longitudinal carina of pronotum straight in front, angled at typical sulcus, in lateral view (fig. 73). Wings blue with black band. Posterior femora angulate above (fig. 74)..... **Oedipoda** Latreille.  
L., male 16-21, female 22-28 mm..... **O. caeruleus** (Linnaeus).  
*Channel Is., Scilly Is.*
- 24 (1) Prosternum with a spine or sharply raised tubercle..... CATANTOPINAE.
- 25 (26) Pronotum with well marked lateral carinae..... **Calliptamus** Serville.  
L., male 16-20, female 25-30 mm..... **C. italicus** (Linnaeus). †  
*The Italian Locust. Dorset, a casual visitor.*
- 26 (25) Pronotum without lateral carinae.
- 27 (28) Median carina of pronotum much raised, convex in the prozona, well marked in the metazona..... **Anacridium** Uvarov.  
L., male 32-36, female 50-66 mm..... **A. aegyptium** (Linnaeus). †  
*The Egyptian Grasshopper. Occasionally imported.*
- 28 (27) Median carina of pronotum absent in the prozona, feeble in the metazona. **Schistocerca** Stal.  
L., male 46-55, female 53-62 mm..... **S. gregaria** (Forsk.) †  
*The Desert Locust. Occasionally reaches this country.*

INDEX TO FAMILIES, SUBFAMILIES, GENERA AND SPECIES OF  
DERMAPTERA AND ORTHOPTERA.

Numerals in heavy type indicate pages on which illustrations occur.

- Acanthoxyla, 7  
 ACRIDIDAE, 7, 16  
 ACRIDINAE, 16  
 Acrydium, 15  
 aegyptium (Anacridium), 18  
 albipennis (Apterygida), 5, 6, 7  
 albomarginalis (Chorthippus), 14, 17  
 alien species, 4  
 americana (Periplaneta), 8, 9  
 Anacridium, 18  
 Anisolabis, 1, 5  
 annulipes (Anisolabis), 1, 5, 6  
 Apterygida, 5  
 arachidis (Prolabia), 1, 5, 6  
 asynamorus (Tachycines), 13  
 auricularia (Forficula), 1, 2, 5, 6, 6  
 australasiae (Periplaneta), 8, 9  
  
 bicolor (Chorthippus), 3, 14, 16, 17  
 bimaculatus (Gryllus), 15  
 bipunctata (Tetrix), 12, 16  
 BLABERINAE, 9  
 Blaberus, 9  
 Blatella, 9  
 Blatta, 3, 8  
 BLATTIDAE, 7, 8  
 bormansi (Dolichopoda), 13  
 brachyptera (Metrioptera), 12, 13  
 burri (Conocephalus), 12  
 bush crickets, 2, 7, 11  
  
 caerulescens (Oedipoda), 16, 18  
 Calliptamus, 18  
 camel crickets, 13  
 campestris (Gryllus), 15  
 Carausius, 7  
 CATANTOPINAE, 18  
 ceperoi (Tetrix), 12, 15  
 Chelisoches, 1, 5  
 Chopardina, 13  
 Chorthippus, 17  
 cockroach, 2, 4, 7, 8  
 CONOCEPHALINAE, 11  
 Conocephalus, 10, 11, 12  
 cricket, 3, 7, 15  
 curvicauda (Labia), 1, 5  
  
 DECTICINAE, 13  
 Decticus, 13  
  
**Dermaptera**, 1, 5  
 discolor (Conocephalus), 10, 11, 12  
 Dolichopoda, 13  
 domesticus (Gryllulus), 3, 12, 15  
 dorsalis (Conocephalus), 10, 12, 12  
 drummer, 9  
  
 earwig, 1, 2, 5, 6  
 Ectobius, 8, 9  
 ECTOBINAE, 9  
 elegans (Chorthippus), 17  
 Euborellia, 5  
 exoleta (Panchlora), 10  
  
 falcata (Phaneroptera), 10, 11  
 Forficula, 1, 5  
 fuscus (Conocephalus), 11  
 germanica (Blatella), 8, 9  
 giganteus (Blaberus), 9  
 Gomphocerippus, 17  
 grasshopper, great green, 13  
 — long horned, 3, 7, 10, 11, 12, 13  
 — short horned, 3, 7, 14, 16  
 grasshoppers, 2, 3  
 gregaria (Schistocerca), 18  
 grisea (Platyceis), 13  
 griseoptera (Pholidoptera), 10, 13  
 grossus (Mecostethus), 14, 16  
 ground hopper, 15  
 grouse locust, 3, 15  
 GRYLLACRIDIDAE, 7, 13  
 GRYLLIDAE, 7, 15  
 Grylloides, 15  
 Gryllotalpa, 15  
 gryllotalpa (Gryllotalpa), 2, 15  
 GRYLLOTALPIDAE, 7, 15  
 Gryllulus, 15  
 Gryllus, 15  
 henryi (Phlugiolopsis), 11  
  
 importata (Chopardina), 13  
 italicus (Calliptamus), 18  
  
 Jamaicana, 11  
  
 Labia, 1, 5  
 Labidura, 5  
 LABIDURIDAE, 5  
 lapponicus (Ectobius), 9  
 Leptophyes, 11

- lesnei* (Forficula), 6, 6, 7  
*Leucophaea*, 11  
*lineatus* (Stenobothrus), 14, 17  
*lividus* (Ectobius), 9  
*Locusta*, 18  
*locusts*, 7, 16, 18  
  
*maculatus* (Myrmeleotettix), 14, 17  
*maderae* (Leucophaea), 11  
MANTEIDAE, 7  
*maritima* (Anisolabis), 5, 6  
*Meconema*, 11  
MECONEMATINAE, 11  
*Mecostethus*, 16  
*Metrioptera*, 13  
*migratoria* (Locusta), 16, 18  
*minor* (Labis), 5, 6  
*mole cricket*, 2, 15  
*morio* (Chelisoches), 1, 5, 6  
*morosus* (Carausius), 7  
*Myrmeleotettix*, 17  
  
*Nemobius*, 15  
*nigripes* (Ectobius), 9  
*nivea* (Panchlora), 10  
  
*occidentalis* (Platycleis), 12, 13  
*Oedipoda*, 18  
OEDIPODINAE, 17  
*Omocestus*, 17  
*orientalis* (Blatta), 2, 8, 8  
**Orthoptera**, 1, 7  
  
*Panchlora*, 10  
PANCHLORINAE, 9  
*panzeri* (Ectobius), 9  
*parallelus* (Chorthippus), 14, 17  
*Periplaneta*, 9  
*Phaneroptera*, 11  
PHANEROPTERINAE, 11  
  
PHASMATIDAE, 7  
*Phlugiopsis*, 11  
*Pholidoptera*, 13  
*Platycleis*, 13  
*prasina* (Acanthoxyla), 7  
*Prolabia*, 1, 5  
PSEUDOMOPINAE, 9  
PSEUDOPHYLLINAE, 11  
*punctatissima* (Leptophyes), 10, 11  
*Pycnoscelus*, 11  
  
*riparia* (Labis), 5  
*Roeseliana*, 13  
*roeselii* (Roeseliana), 12, 13  
*rufus* (Gomphocerippus), 17  
  
*Schistocerca*, 18  
*sigillatus* (Grylloides), 15  
*Stenobothrus*, 14, 17  
*stick insect*, 7  
*subguttata* (Jamaicana), 11  
*subulata* (Tetrix), 12, 15  
*surinamensis* (Pycnoscelus), 11  
*sylvestris* (Nemobius), 12, 15  
  
Tachycines, 13  
TETRIGIDAE, 7, 15  
*Tetrix*, 3, 15  
*Tettigonia*, 13  
TETTIGONIIDAE, 7, 11  
*Tettix*, 15  
*thalassinum* (Meconema), 10, 11  
  
*vagens* (Chorthippus), 14, 17  
*ventralis* (Omocestus), 14, 17  
*verrucivorus* (Decticus), 3, 10, 13  
*virescens* (Panchlora), 10  
*viridissima* (Tettigonia), 10, 13  
*viridulus* (Omocestus), 14, 17  
*vittata* (Tetrix), 12, 16



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