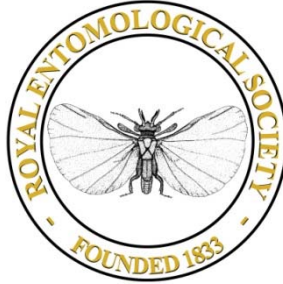


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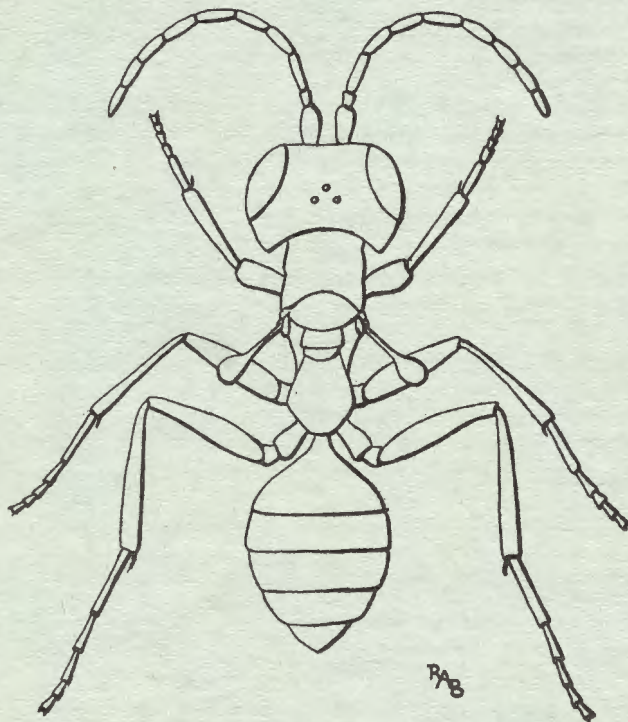
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HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS



HYMENOPTERA BETHYLOIDEA (excluding CHRYSIDIDAE)

By
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HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS

The aim of this series of publications is to provide illustrated keys to the whole of the British Insects (in so far as this is possible), in ten volumes, as follows :

- | | |
|------------------------------------|------------------------|
| I. Part 1. General Introduction. | Part 9. Ephemeroptera. |
| " 2. Thysanura. | " 10. Odonata. |
| " 3. Protura. | " 11. Thysanoptera. |
| " 4. Collembola. | " 12. Neuroptera. |
| " 5. Dermaptera and
Orthoptera. | " 13. Mecoptera. |
| " 6. Plecoptera. | " 14. Trichoptera. |
| " 7. Psocoptera. | " 15. Strepsiptera. |
| " 8. Anoplura. | " 16. Siphonaptera. |
- II. Hemiptera.
III. Lepidoptera.
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VI. Hymenoptera : Symphyta and Aculeata.
VII. Hymenoptera : Ichneumonidea.
VIII. Hymenoptera : Cynipoidea, Chalcidoidea, and Serphoidea.
IX. Diptera : Nematocera and Brachycera.
X. Diptera : Cyclorrhapha.

Volumes II to X will be divided into parts of convenient size, but it is not possible to specify in advance the taxonomic content of each part.

Conciseness and cheapness are main objectives in this series, and each part is the work of a specialist, or of a group of specialists. Although much of the work is based on existing published keys, suitably adapted, much new and original matter is also included.

Parts are issued, separately paged and priced, as they become available.

A second (revised) edition of *A Check List of British Insects*, by G. S. Kloet and W. D. Hincks, is being issued as an extra, eleventh, volume in this series.

The Society is indebted to the Royal Society for a grant towards the cost of initiating this series of *Handbooks*.

A list of parts so far published appears on the inside and outside back covers.

HYMENOPTERA

Superfamily BETHYLOIDEA (excluding Chrysididae)

By J. F. PERKINS

INTRODUCTION

The Chrysididae, which are familiar insects, seem at first sight very different from the other much rarer Bethyloidea but intermediate genera occur in the American and Indo-Australian faunas. The Bethylidae are small or moderate-sized insects, usually black and with the same number of antennal segments (12 or 13) in both sexes, whereas in typical aculeates the male usually has 13 and the female 12. The larvae mostly live as external parasites of coleopterous or less often lepidopterous larvae. No real nest is made but in *Bethylus* the female takes her stung and paralysed prey into a sheltered place or hollow stem, lays several eggs on the prey and stands watch over them until after they have hatched. Some other Bethylidae show a limited amount of maternal care. Only three British species are at all common and three or four others are introduced species, found in warehouses.

The position of the Dryinidae and Embolemidae is much more dubious. They have been placed traditionally near the Bethylidae though they have 10 antennal segments. The North American catalogue (1st ed. 1951) placed them in the Sphecoidea. Since *Harpagocryptus* Perkins has now been synonymized with *Olixon* Cameron (cf. Richards, 1939: 293) there is a possibility that they should be placed in the Pompiloidea.

As far as is known, all Dryinidae and Embolemidae (one American *Ampulicomorpha* bred) are parasites of Homoptera, mainly cicadellids and delphacids. The female lays an egg between two overlapping sclerites of the host (usually nymph) and after the first instar the larva begins to project externally in a sac formed of successive moult-skins. In the Aphelopinae the sac includes much more host-tissue. In the Dryinidae, the female (except Aphelopinae) has evolved an extraordinary chela on the fore tarsus, the fifth segment and one claw being enlarged and opposable. Nearly always the parasites of delphacids have peg-like lamellae on the enlarged claw, whereas parasites of cicadellids do not. Parasitized homopterous nymphs are sometimes quite common in the field but adult Dryinidae are relatively rare, though sometimes found in some numbers in very restricted localities.

KEY TO FAMILIES

- 1 Colours metallic. Antennae with 12-13 segments. Species fully winged, sexual dimorphism slight **Chrysididae** (not dealt with in this part)
- Colours not metallic. Species sometimes apterous (usually in ♀ only), sexual dimorphism often marked. 2
- 2 Antennae with 12-13 segments, inserted low down on face. Usually black, rather long and narrow species. A few are apterous or brachypterous. **Bethylidae** (p. 3)

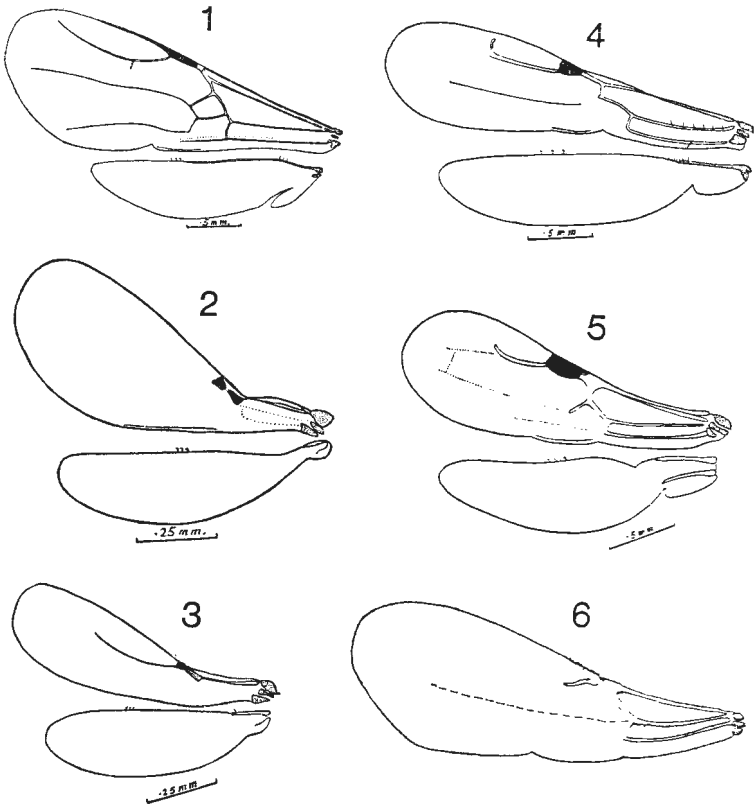
- Antennae with 10 segments, inserted on a prominence near dorsal margin of clypeus.....3
- 3 ♀ brown, apterous with pyriform head, narrowed below; fore tarsus not chelate. ♂ fully winged, fore wing with an enclosed cell in centre of fore wing (fig. 1). Embolemidæ (p. 2)
- ♀ head not pyriform; fore tarsus chelate except in the winged Aphelopinae. ♂ and many ♀ fully winged, no enclosed cell in centre of fore wing. Dryinidæ (p. 9)

Family EMBOLEMIDÆ

Only one genus, containing two species, is present in the British Isles. No information is known concerning the biology of *Embolemus*, but the related *Ampulicomorpha confusa* Ashmead of N. America has been bred from nymphs of the Homopteran, *Epiptera floridæ* (Walker) (Achilidae).

Genus *Embolemus* Westwood

The males of the two recorded British species have not so far been distinguished. Males (wings fig. 1) have been taken in widespread localities



FIGS. 1-6.—Wings: 1, *Embolemus ruddii* ♂; 2, *Cephalonomia formiciformis*; 3, *Platanoxus westwoodi*; 4, *Bethylus cephalotes*; 5, *Goniozus claripennis*; 6, *Laelius microneurus*; fore wing.

from Argyll in Scotland to the South coast of England. Both sexes are found in August, September and October; the females hibernate and are active again in late April and May.

KEY TO FEMALES

- 1 Antenna somewhat longer than body, with distal segments three to four times as long as broad, pedicel more than twice as long as broad; colour uniformly reddish-brown; head laterally, centrally with close, small punctures and with scattered larger punctures; contrasting conspicuously with the finely punctate top of the head. 4-5 mm. ruidii Westwood
Norfolk; Surrey; Berks.; Hants.
- Antenna not longer than body, with distal segments at most 3 times as long as broad, pedicel little longer than broad; colour uniformly yellowish brown; head laterally very finely punctate and similar in sculpture to the top of the head. 3-5 mm. antennalis Kieffer
Only one British specimen known: Somerset, Long Ashton, 18.x.1927 (C. L. Walton).

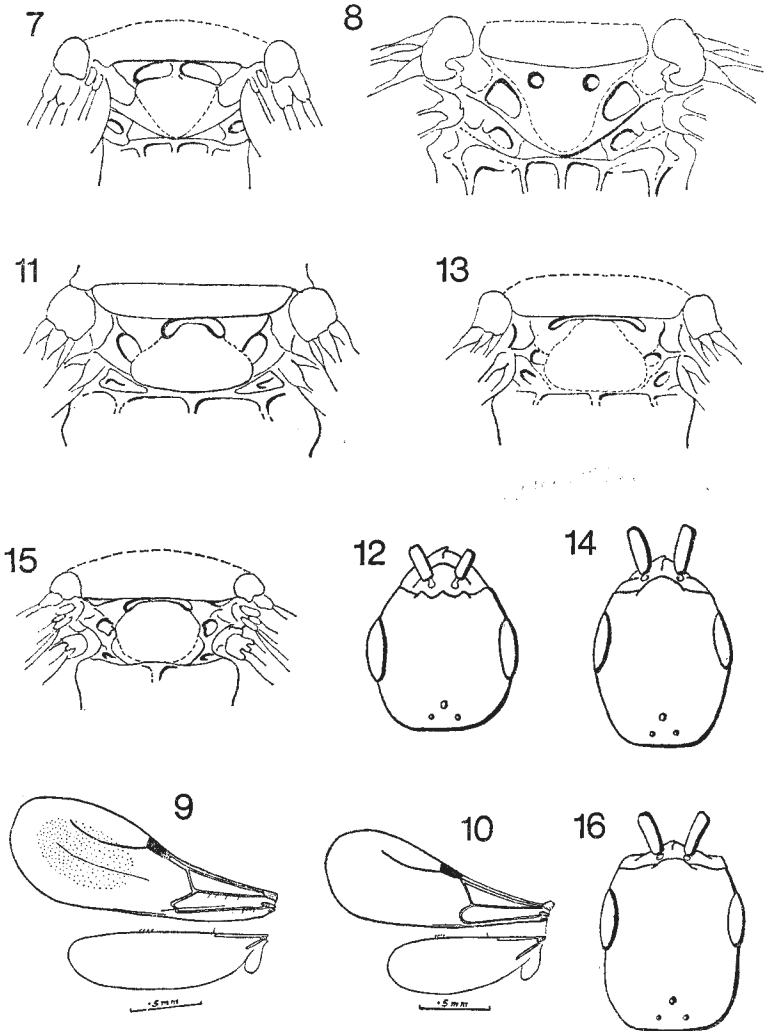
Family BETHYLIDAE

Although Evans (1964) divided the Bethylidae into three subfamilies, these are not indicated here as with the very limited fauna occurring in the British Isles this adds unnecessary complications to the identification of the species. With few exceptions the species are almost entirely black or piceous and thus colour plays little part in their separation.

KEY TO GENERA

- 1 Antenna with 12 segments 2
- Antenna with 13 segments 4
- 2 Fore wing with *Rs* absent (fig. 2); if brachypterous then wings very small and scale-like or apterous, and with basal flagellar segments transverse and malar space longer than breadth of pedicel. Claws simple Cephalonomia (p. 7)
- Fore wing with *Rs* present (fig. 3); if brachypterous then wings rarely very short with basal flagellar segments at least a little longer than broad and malar space conspicuously shorter than breadth of pedicel. 3
- 3 Length less than 1.8 mm; venation indistinct but fore wing with *R*₁ strongly thickened before pterostigma (fig. 3); *Rs+M* absent and sometimes cells *R* and *M+Cu*₁ not enclosed: never brachypterous; claws simple. Warehouse or outdoor species. Plastanoxus (p. 6)
- Length 2.2-5 mm; fore wing (fig. 4) with *R*₁ not thickened distally; *Rs+M* present as a short stump; sometimes brachypterous; claws with a strong basal lobe and strongly curved apically. Outdoor species. Bethylus (p. 8)
- 4 Fore wing (fig. 5) with proximal abscissa of *Rs+M* present; first abscissa of *Rs* strongly thickened where it joins *R*; face with the central carina of the clypeus strongly produced upwards between the antennal sockets; ♀ fully winged; claws with a strong basal lobe, strongly curved apically. Goniozus (p. 8)
- Fore wing (figs. 6, 9, 10, 23) with proximal abscissa of *Rs+M* absent; first abscissa of *Rs* not thickened where it joins *R*; face with the central carina of clypeus not produced upwards or (*Holepyris*) with the carina very weak; ♀ wingless in some genera; claws with a weak basal lobe, only moderately curved apically, sometimes with a pre-apical tooth. 5
- 5 Metanotum occluded centrally (figs. 7, 8) so that apex of scutellum and base of propodeum are contiguous; costal cell occluded (figs. 6, 9, 10); ♀ fully winged or brachypterous; ocelli present; eyes moderately large; black. 6
- Metanotum well developed centrally with an emargination or fovea opposite apex of scutellum (fig. 22); ♂ costal cell well developed (fig. 23); ♀ wingless, ocelli absent, eyes absent or very small; entirely testaceous. 8
- 6 *Rs* conspicuously shorter than *M* (basal vein) (fig. 6); upper basal cell glabrous, lower basal cell with a few microtrichiae in the lower apical corner; head, thorax,

- femora and tibia and veins surrounding basal cell with sub-erect black bristles; malar space distinct; gaster with black bristles particularly laterally and apically; ♀ winged. Eyes glabrous; scutellar fovea entire **Laelius** (p. 5)
- *Rs* conspicuously longer than *M*; upper and lower basal cells with abundant microtrichiae; head, thorax, femora, tibia and veins surrounding basal cell at most with sordid hairs; malar space extremely short, ♀ sometimes wingless and sometimes eyes absent.....7



FIGS. 7-16.—7, *Epyris niger*, scutellum; 8, *Epyris bilineatus*, scutellum; 9, *Holepyris hawaiiensis*, wings; 10, *Holepyris sylvanidis*, wings; 11, *Cephalonomia tarsalis*, scutellum; 12, The same, head of ♀; 13, *Cephalonomia waterstoni*, scutellum; 14, the same, head of ♀; 15, *Cephalonomia formiciformis*, scutellum; 16, The same, head of ♀.

- 7 Scutellar fovea of ♀ represented by a pair of lateral pits (fig. 7, 8) or by a groove which is interrupted centrally; clypeus with no notch on each side of central lobe. Outdoor species **Epyris** (p. 5)
- Scutellar fovea entire; clypeus with a distinct notch at the base of each side of the central lobe. Warehouse species. **Holepyris** (p. 5)
- 8 ♂, eyes hairy; gaster piceous, with apices of segments paler; clypeus with a projecting sub-trapezoidal central lobe which is truncate anteriorly; scutellum projecting into the anterior incision of metanotum; claws simple; ♀ (fig. 22), propodeum viewed dorsally strongly narrowed from about middle to base where there are a pair of anteriorly projecting processes separated by a semicircular incision; eyes absent; mesonotum elongate; head, thorax and gaster infuscate. **Pseudisobrachium** (p. 9)
- ♂, eyes glabrous; gaster red; clypeus with a broadly rounded central lobe; metanotum not excised anteriorly; claws with a preapical tooth; ♀, propodeum with the maximum constriction behind spiracles, broadly in contact with mesoscutum; eyes small but present; mesoscutum transverse; an entirely pale testaceous species. **Pristocera** (p. 9)

Genus **Epyris** Westwood

Three species of this genus were recorded by Richards (1939). However, Móczár (1966) found the Marshall specimen of *Epyris brevipennis* Kieffer in the Hungarian Museum of Natural History and it proves to have been captured in Brittany, not in England. It is therefore excluded from the British list. The known hosts of the genus are larvae of Tenebrionidae.

KEY TO SPECIES

- 1 Head and pronotum dorsally dull and densely coriaceous, with distinct punctures; lateral ocelli separated from occiput by a distance approximately equal to POL; ♀ eyes hairy; front tarsus with segments 2–3 subcylindrical, 4 cordiform; scutellar fovea (fig. 7) represented by an interrupted groove. **niger** Westwood
Surrey, Kent, Hants., I. of Wight, Devon. ♂ viii; ♀ vii-vi (hibernates).
- Head and pronotum dorsally weakly coriaceous, with distinct punctures and shining in ♀, with fine punctures and rather shining in ♂; lateral ocelli separated from occiput by distance equal to 0.75 POL in ♂, 0.5 POL in ♀; ♀ eyes almost bare; front tarsus with segments 2–4 cordiform; scutellar fovea (fig. 8) represented by lateral pits only; mid-tibia outwardly and posteriorly spinose. **bilineatus** Thomson
(= *fraternus* Westwood)
Suffolk, Surrey, Hants., I. of Wight, Devon. ♂ and ♀ vii.

Genus **Laelius** Ashmead (= *Allepyris* Kieffer)

Only a single species of this genus is known from the British Isles. Known hosts of the genus are species of dermestid beetles. **microneurus** (Kieffer)
Kent: Beckenham, 1♀, 9.vii.1972 (D. E. Kimmins); Berks: Ascot, Selwood Park, 1♀ 18.viii.1975 (O. W. Richards).

Genus **Holepyris** Kieffer

Both British species of this genus are cosmopolitan, and are found in warehouses in this country. Evans (1966) has been followed in placing *Rhabdepyris zeae* Turner and Waterston in this genus as a synonym of *Holepyris sylvanidis* Brèthes. The two British species are very distinct, the only character placing them together being the form of the clypeus and the basal sulcus of the scutellum.

KEY TO SPECIES

- 1 Notauli absent; ♀ propodeum, anteriorly with 5 longitudinal discal keels and the sculpture mainly transtriate; fore wing (fig. 9) with *M* meeting *Sc*+*R* well before stigma, ♀ fore wing with a dark discal spot; eyes strongly pubescent.

hawaiiensis (Ashmead)

Warehouses; a parasite of *Phycitidae*.

- Notauli deep posteriorly, becoming very faint or absent anteriorly; ♀ propodeum anteriorly with 3 longitudinal discal keels and the sculpture mainly finely rugose; wings (fig. 10) hyaline, *M* meeting *Sc*+*R* close to base of stigma; eyes with extremely short scattered hairs, only visible at high powers.

sylvanidis (Brèthes)

(= *Rhabdopyris zeae* Turner & Waterston)

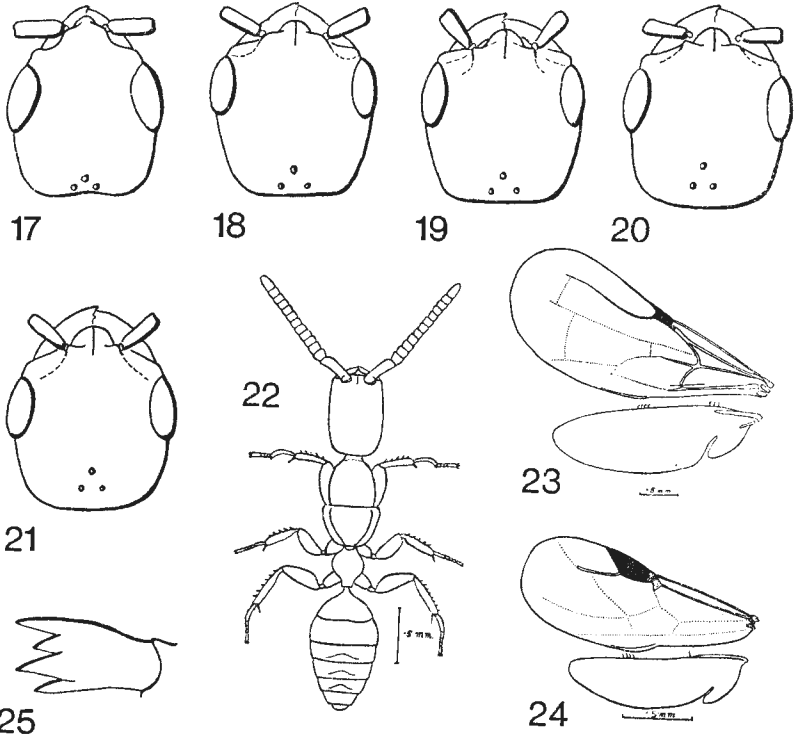
Warehouses; probably a parasite of *Tribolium*.

Genus *Plastanoxus* Kieffer

It is probable that in Britain the hosts of both the warehouse species are species of *Laemophloeus*. The outdoor one probably attacks species of *Cis*.

KEY TO SPECIES

- 1 Length at most 1.5 mm; cell *R* not enclosed; head and dorsum of thorax shining; propodeum coriaceous, with a pair of smooth areas posteriorly, sometimes joined,



FIGS. 17-25.—(17-21) Head of: 17, *Bethylus dendrophilus* ♀; 18, *Bethylus fuscicornis* ♀; 19, the same, ♂; 20, *Bethylus cephalotes* ♀; 21, the same, ♂; 22, *Pseudisobrachium subcyaneum* ♀; 23, the same ♂ wings; 24, *Aphelopus melaleucus*, wings; 25, *Mystrophorus formicaeformis*, mandible.

before the transverse carina; ♂ with anterior ocellus far behind line of hind margin of eyes. **westwoodi** (Kieffer)

Granaries.

- Length about 2.0 mm; cell *R* not enclosed by pigmented veins; head and dorsum of thorax shining; reticulation of propodeum extending further back than in *P. westwoodi* and head wider compared to its length. **chittendenii** (Ashmead)

Outdoor species; S. Devon, Erme Mouth, on Stereum on rotten oak with Cis festivus (Panz.), 11.viii.70 (W. D. Hamilton); also with Cis in U.S.A.

- Length about 1.75 mm; cell *R* enclosed by pigmented veins; head and dorsum of thorax and propodeum conspicuously coriaceous throughout: ♂ with anterior ocellus level with line of hind margin of eyes. **munroi** Richards
- Warehouses.*

Genus *Cephalonomia* Westwood

Two of the British species are found outdoors and are parasites of Ciidae. Three warehouse species are keyed, one of which, *C. gallicola* (Ashmead) has not previously been included in the list of British insects; as a parasite of *Stegobium paniceum* (L.), *Lasioderma serricornne* (F.) and *Ptinus*, its occurrence in this country may really be quite frequent, though the only material seen was sent by the Walton and Weybridge U.D.C. to the British Museum (Natural History). It was found in large numbers in popodom, probably from India, in association with *Lasioderma serricornne*.

KEY TO SPECIES

- 1 ♀ mainly pale testaceous; apterous; propodeum widening from base to the posterior lateral angles; ♂ fuscous with more or less pale testaceous markings; fully winged with the wings in part infusate or apterous. Apterous specimens have scutellum undifferentiated from mesoscutum. **gallicola** (Ashmead)
Warehouse species, associated with anobiids and ptinids.
- ♀ and ♂ fuscous except sometimes for markings on legs and antennae; fully winged or with scale-like wings; wings hyaline; scutellum always differentiated from mesoscutum; ♀ with dorsal surface of propodeum with parallel sides or narrowing posteriorly. 2
- 2 Propodeum with a distinct, central, longitudinal keel and scutellar fovea (fig. 11) conspicuous, deepened laterally into a pit. Sides of head, behind eyes, considerably converging and only a little longer than eyes (fig. 12). **tarsalis** (Ashmead)
Warehouse species; a parasite of beetles in stored grain and dried fruit, especially Oryzaephilus.
- If the propodeum has an indication of a central, longitudinal keel, then the scutellar fovea is represented only by lateral pits. 3
- 3 Larger species, length 1.8 mm; antennae yellow with segment 1 brown. Head distinctly rounded posteriorly; scutellar fovea represented by a pair of lateral pits separated by 5 to 6 times the diameter of one of them; propodeum coriaceous throughout. **hammi** Richards
Outdoor species; Oxford (A. H. Hamm), ♀ found 4.viii.1918 carrying a larva (probably of Cis) on which were 4 eggs. These produced adults on 4.x.1918. No further specimens have been examined.
- Smaller species, length at most 1.6 mm; antenna brown to black, entirely so in ♂, at most segments 2 to 4 yellow in ♀. 4
- 4 Propodeum evenly and rather coarsely coriaceous. Fully winged. ♂ scape shorter, as long as antennal segments 2+3; sides of head more converging behind; ♀ scutellar fovea (fig. 13) represented by lateral pits separated by twice the diameter of one of them; sides of head (fig. 14) in front of eye about 0.5 length of eye. **waterstoni** Gahan
Warehouse species. A parasite of Laemophloeus larvae occurring in stored grain (see Finlayson, 1950).
- Propodeum with a pair of shining areas in ♀, the whole area shining in ♂ before the declivous slope. Both sexes sometimes brachypterous, with wings represented by

small scales. ♂ scape longer, nearly as long as antennal segments 2+3+4; sides of head less convergent behind; ♀ scutellar fovea (fig. 15) conspicuous and little deepened laterally into inconspicuous pits; sides of head (fig. 16) in front of eyes about 0.3 length of eye.

formiciformis Westwood

Outdoor species. A parasite of Cuidae. Widely distributed in S. England. vi-ix.

Genus *Goniozus* Foerster

Only one species known from Britain.

claripennis Foerster

Kent, Dorset, v, vii, viii. On the Continent known as a parasite of Sparganothis pilleriana (Schifferrmueller) and Eupocilia (=Clysia) ambiguella (Hübner).

Genus *Bethylus* Latreille

The Marshall collection of Bethylinidae and Dryinidae, allegedly lost, has been found by Móczár (1965, 1966) to be present in the Hungarian Natural History Museum. Amongst this material is the type of *Bethylus hyalinus* (Marshall) which Richards (1939: 317) decided to omit from the British List on the taxonomic information then available. However, this specimen does not appear to be a freak and is now included in the following key. The species are parasites of lepidopterous larvae.

KEY TO SPECIES

- 1 Ocelli (fig. 17) forming a low isosceles triangle, with the distance between front ocellus and a lateral ocellus about 0.75 POL; posterior ocellus separated from hind margin of head by at most its diameter; antennal segments 3-5 not more than 1.5 times as long as broad; clypeus more angled with the dorsum of the head and with the central keel more prominent; hair on head and thorax longer, of pronotum longer than antennal segments 2+3; head somewhat shining, with weaker coriaceous sculpture. **dendrophilus** Richards
Berks, Surrey, Suffolk, Kent, Beds. iv-vi.
- Ocelli forming approximately an equilateral triangle in ♀, the base slightly wider in ♂; posterior ocellus separated from hind margin of head by a distance greater than its diameter; antennal segments 3-5 at least twice as long as broad; clypeus less angled with dorsum of head and the central keel less projecting; hair of head and thorax shorter, of pronotum shorter than antennal segments 2+3; head dull, with strong coriaceous sculpture. 2
- 2 Propodeum with a well defined narrow furrow arising at the orifice, passing forwards and upwards and forking where it reaches the dorsal surface; each arm then passing outwards, still well defined and ending in a circular pit at the antero-lateral margin; the triangular dorsal area defined by keels is smooth, shining and half as long as scutellum. Otherwise similar to *B. fuscicornis* (Jurine). **hyalinus** (Marshall)
Herts: near St. Albans, vi. 1873 (T. A. Marshall). Only the holotype known.
- Propodeum with dorsal surface finely rugose with a rather narrow central longitudinal smooth streak which may widen posteriorly. 3
- 3 Posterior ocellus separated from hind margin of head by a distance 0.4 to 0.6 (usually 0.5) in ♀ (fig. 18), 0.4 to 0.5 in ♂ (fig. 19) of POL; ♀ sometimes, ♂ rarely with wings shortened; mesopleuron, viewed dorsally, little convex centrally. **fuscicornis** (Jurine)
Widespread and not uncommon. ♂ v-x; ♀ found throughout the year; hibernating as an adult.
- Posterior ocellus separated from hind margin of head by a distance 1.25 to 2.5 in ♀ (fig. 20), 1.0 to 1.5 in ♂ (fig. 21) of POL; ♀ rarely short-winged and these have the hind ocellus closest to hind margin of head; mesopleuron, viewed dorsally, conspicuously swollen centrally. **cephalotes** (Foerster)
Widespread and not uncommon. ♂ v-x; ♀ found throughout the year; hibernating as an adult.

Genus **Pseudisobrachium** Kieffer

Only a single species known from the British Isles. The female is very rare. (figs. 22, 23). **subcyaneum** (Haliday)

Kent, Surrey, I. of Wight, Dorset. viii-ix. ♀ found associated with Tetramorium caespitum (L.) and Myrmecina graminicola (Latreille).

Genus **Pristocera**

This genus is still included only on the evidence of the single male listed below. No further specimens have been seen. The female characters given in the generic key are based on a continental specimen. **depressa** (F.)

Salop: Netley, in the Archdeacon's close, ♂ (F. W. Hope). Parasites of Elateridae.

Family DRYINIDAE

This is a small and aberrant family of which the true affinities are not at present known. All are parasites of Homoptera Auchenorrhyncha of the superfamilies Cicadelloidea and Fulgoroidea. In the subfamilies other than Aphelopinae (p. 11) the female catches with her modified fore leg an adult or nymph of the host, stings it to insensibility and lays an egg on it between two overlapping sclerites. The hopper soon recovers and runs about normally again. The larva is at first invisible but begins to show as a black or dark brown sac in a few days. This sac is composed of cast larval skins so that with each moult an extra piece is added to the sac; there are normally five moults. Just before the larva is full grown it eats out all the contents of the host which usually dies firmly fixed to the food-plant. On completion of feeding, the larva splits open the sac and crawls out. Although legless, it moves quite actively; most British species pupate on the food-plant, but some pupate in the soil. The cocoon is of dense silk, often with an inner closely-fitting lining.

Males of some species are very rare, of others probably absent, particularly in the Gonotopodinae. The association of the sexes is difficult and much further work is needed on this problem.

British species seem to have either one (e.g. *Anteon brachycerum*) or two (e.g. *Gonotopus sepsoides*) generations a year, the winter nearly always being passed in the cocoon. It requires considerable care and skill to successfully bring hibernating cocoons through the winter and rear the adults in the following late spring or summer.

KEY TO SUBFAMILIES

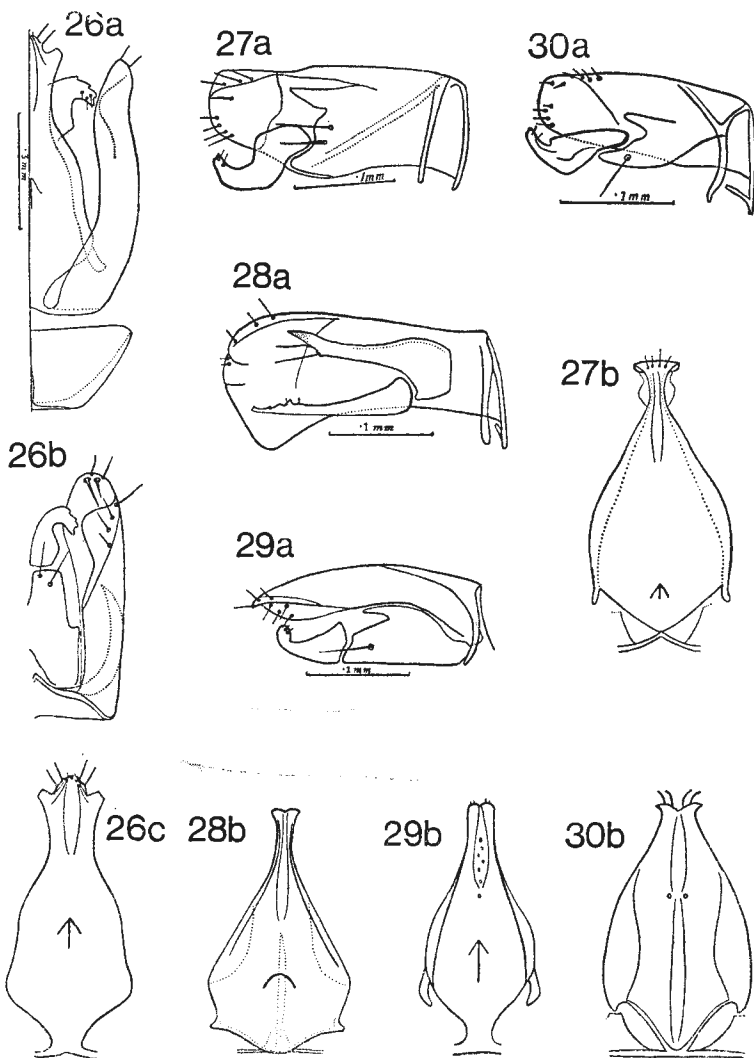
- 1 Fore wing (fig. 24) with only costal cell closed by pigmented veins; never brachypterous or wingless; ♀ with front tarsus not chelate APHELOPINAE (p. 11)
- Fore wing (fig. 33) with costal and two basal cells clearly closed; brachypterous and wingless forms occurring; ♀ with front tarsus chelate 2
- 2 Fore trochanter not or hardly longer than broad; occipital carina complete; ♂ mandible quadridentate, sometimes (*Mystrophorus*) with the posterior penultimate tooth very small (fig. 25).
 ♀ posterior angles of pronotum produced into distinct lobes; one spur on mid tibia; usually fully winged, rarely brachypterous ANTEONINAE (p. 13)
- Fore trochanter at least twice as long as broad; occipital carina at most present dorsally; ♂ mandible tridentate 3
- 3 Occipital carina present dorsally; ♀, posterior angles of pronotum produced into

distinct lobes directed towards the tegulae; mid tibia with a single long spur; British species fully winged, the fore wing with fuscous bands or spots; central area of metanotum normal, differentiated; ♂, ocelli forming a distinct triangle; maxillary palpi with 6 segments.

DRYININÆ (p. 25)

- Occipital carina absent; ♀, posterior angles of pronotum not produced; mid tibia with no spur; British species wingless; central area of metanotum not differentiated; ♂, ocelli arranged in a curved line; maxillary palpi with less than 6 segments.

GONATOPODINÆ (p. 27)



FIGS. 26-30.—*Aphelopus* species: 26, *holomelas*: (a) left half ♂ genitalia, dorsal; (b) right half, ventral; (c) penis-valves, dorsal. (27-30) showing (a) right half ♂ genitalia, ventral and (b) penis-valves dorsal: 27, *nigriceps*; 28, *serratus*; 29, *melaleucus*; 30, *camus*.

Subfamily APHELOPINAE

This subfamily contains only the genus *Aphelopus*. The British species, so far as is known, attack Cicadellidae of the subfamily Typhlocybinae. The egg and at least the first-stage larva are internal and the latter is surrounded by a peculiar hypertrophied mass of host tissue. The second instar breaks out of this mass and projects in a sac composed of larval skins and of very different appearance from those of other Dryinidae. It projects from the anterior part of the abdominal pleura and lies along the side of the abdomen. The sacs vary in colour from yellow to black.

Genus *Aphelopus* Dalman

In determining species, it is essential to examine the genitalia of the males; the females are much more difficult to place.

KEY TO SPECIES

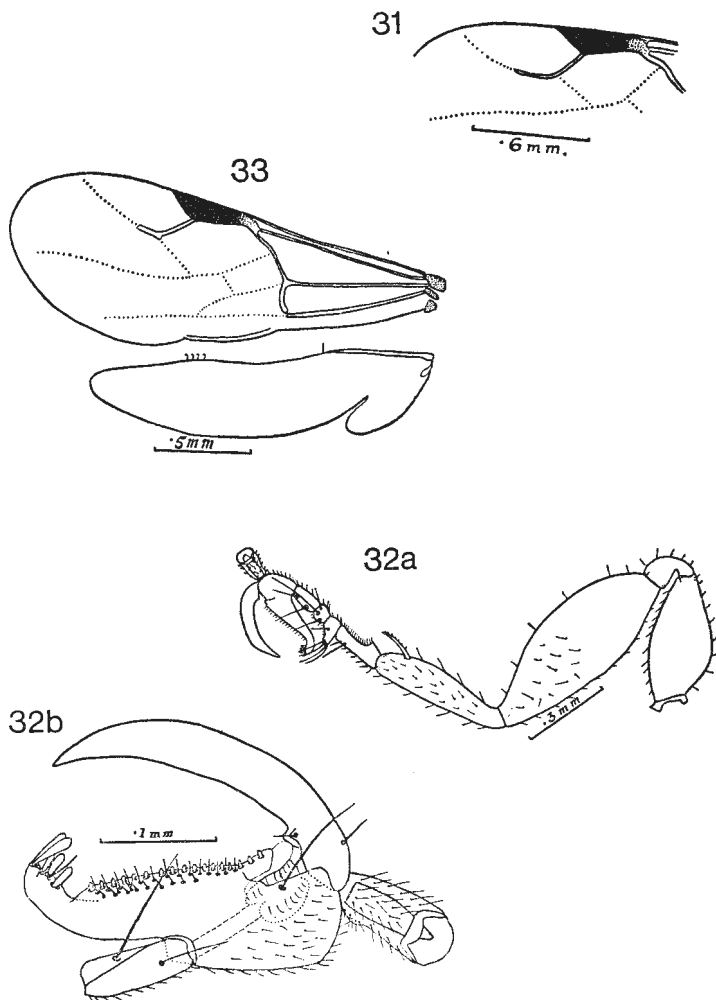
(Males)

- 1 Head with at most the mandibles pale; lamina volsellaris with two spines near base of digitus (figs. 26, 27).....2
- Head with at least the mandibles, and clypeus laterally and apically pale; lamina volsellaris with one or no spine near base of digitus (figs. 28-30).....3
- 2 Penis valves, distally, tridentate; volsella with the cuspis small and far removed from apex of lamina volsellaris; digitus with 3-4 distal teeth (fig. 26); antenna with segment 3 sub-equal to 2. **holomelas** Richards
Widely distributed and not uncommon. Host record from Typhlocyba opaca Edwards on apple. v-viii, ♂ most usually vi, ♀ vii-viii.
- Penis valves, distally, trumpet shaped; volsella with the cuspis large and extending to about level of apex of lamina volsellaris; digitus without distal teeth (fig. 27); antenna with segment 3 a little longer than 2. **nigriceps** Kieffer
Widely distributed but uncommon. vi-ix, both sexes most usually vi.
- 3 Notauli reaching beyond 0.75 length of mesoscutum; antennal segment 3-sub-equal to 6; volsella with cuspis very strongly projecting; digitus straight and with sub-apical serrations on outer side; penis valves, at apex, with weak but distinct lateral projections and without hairs (fig. 28). Clypeus usually entirely ivory, sometimes infuscate basally and centrally; scutellum with conspicuous coriaceous sculpture, dull. **serratus** Richards
Widely distributed but uncommon. Late v to early vii.
- Notauli reaching at most to 0.6 length of mesoscutum; antennal segment 3 distinctly shorter than 6; volsella with cuspis at most reaching apical line of lamella volsellaris; penis valves at apex either with no lateral projections or with four conspicuous hairs.....4
- 4 Head most usually pale marked above clypeus and around antennal sockets; antenna with segment 3 about 0.5 as long as 9; penis valves with apical, lateral projections (fig. 29); notauli weaker and reaching at most 0.5 length of mesoscutum. **melaleucus** (Dalman)
Widely distributed. The commonest species of the genus and sometimes taken in large numbers. Has been bred from Typhlocyba crataegi Edwards. v-ix but most usually taken in v.
- Head neither pale marked above clypeus, nor around antennal insertions; antenna with segment 3 about 0.75 as long as 9; penis valves with apical, lateral projections (fig. 30); notauli deep and reaching about 0.6 length of mesoscutum. **camus** Richards
(=*heidelbergensis* Richards syn. n.)
No further specimens seen since the original description from Cambridge vii-viii.

(Females)

- 1 Frons with a conspicuous white mark above the antennal sockets; antenna often considerably or entirely white. **melaleucus** (Dalman)

- Frons entirely black; antenna with at most the scape and pedicel pale.....2
- 2 Clypeus white, sometimes in part infuscate.....3
- Clypeus entirely black.....4
- 3 Notauli extending to beyond 0.75 length of mesoscutum; scutellum with conspicuous coriaceous sculpture and rather dull. **serratus** Richards
- Notauli extending at most to 0.66 length of mesoscutum; scutellum with weak coriaceous sculpture and rather shining. **camus** Richards
- 4 Clypeus sub-truncate apically; notauli extending to about 0.66 length of mesoscutum. **nigriceps** Kieffer
- Clypeus rounded apically; notauli shallower and extending to about 0.5 length of mesoscutum. **holomelas** Richards



FIGS. 31-33.—31, *Prenanteon*, distal abscissa of *Rs*, fore wing. 32, *Prenanteon* ♀: (a) fore leg; (b) chela enlarged; 33, *Chelogyne lucidus*, wings.

Subfamily ANTEONINAE

One genus, *Mystrophorus*, previously unrecorded from Britain, is included in the present treatment. *Chelogygnus*, formerly placed as a subgenus of *Anteon*, is separated as a distinct genus but probably these two segregates will in the future be divided into a series of genera. The application of the name *Anteon*, type-species *A. jurineanum* Latreille, 1809 requires some further elucidation. The species was described from a female, now lost. Walker redescribed the species on both sexes but only males are present in both his and Haliday's collections. We have therefore taken Richards' (1939) interpretation of the female, which agrees with Walker's description, as the first valid revision of *jurineanum* and thus retain the current usage of the name *Anteon*. However, the males present in the Haliday, Walker and Stephens collections represent *Chelogygnus fulviventris* Haliday.

Little is known of the hosts of our British species, but the subfamily as a whole seem to be parasites of Cicadellids.

KEY TO GENERA

- 1 Mandible (fig. 25) with three large teeth and a rudimentary tooth between the two posterior teeth; strongly brachypterous; wings of ♀ not reaching line of apex of scutellum, wings of ♂ (fig. 34) spoon-shaped with "bowl" darkened, and reaching to about half length of propodeum; head and thorax dull and heavily sculptured; maxillary palpi short. **Mystrophorus** (p. 13)
- Mandible with four teeth, progressing larger from anterior one to posterior; ♀ rarely brachypterous when the wings extend beyond apex of scutellum, ♂ fully winged; maxillary palpi long. 2
- 2 Distal abscissa of *Rs* at least as long as *R*₁ (fig. 31); ♀ middle leg with spur about as long as apical breadth of tibia; epinemia complete, at most narrowly erased centrally; ♀ fore tarsus similar to *Chelogygnus* (fig. 32). **Prenanteon** (p. 23)
- Distal abscissa of *Rs* (fig. 33) much shorter than *R*₁; middle leg with spur conspicuously longer than apical breadth of tibia; epinemia absent or at most present as a pair of very short anterior carinae. 3
- 3 Head viewed dorsally with temples shorter than breadth of scape; ♀ with segment 4 of front tarsus at most 0.5 as long as basitarsus, segment 3 expanded; pronotum always transverse. **Anteon** (p. 13)
- Head viewed dorsally with temples at least as long as breadth of scape; ♀ with segment 4 of front tarsus at least 0.66 as long as basitarsus, segment 2 expanded; pronotum usually quadrate or elongate. **Chelogygnus** (p. 18)

Genus *Mystrophorus* Foerster

A single species known from Britain, from male only (fig. 34).

formicaeformis Ruthe

Hants: Hayling Island, 2♂, 1.iv.1961, at roots of grass (J. A. J. Clark), 1♂, 24.iv.1962 (D. J. Clark). Bred by Haupt in Germany from Deltocephalus.

Genus *Anteon* Jurine

In the present treatment, two further segregates are recognised as species. *A. subflavicornis* Haupt appears for the first time on the British list, and *A. cursor* (Haliday) is recalled from synonymy. The British species divide into three clear groups, which hold also for the European material that has been examined.

KEY TO SPECIES-GROUPS

- 1 Gena with close, upstanding, silver pubescence; malar space in greater part pubescent; clypeus closely pubescent; ♀ antenna more elongate, segment 5 at least twice as long as broad; ♂ with flagellum rather thinner.
 Frons carinate centrally and in ♀ laterally (♂ sometimes with weak lateral carinae).
 ♀ chela (figs. 43, 44); ♂ genitalia (fig. 35). **flavicorne** group (p. 16)
- Gena with sparse, semidecumbent pubescence, with upstanding hairs only on the posterior margin; malar space with at most a few hairs near the orbit; clypeus sparsely pubescent, a little closer basally; ♀ antenna shorter, segment 5 at most 1.5 times as long as broad; ♂ with flagellum thicker 2

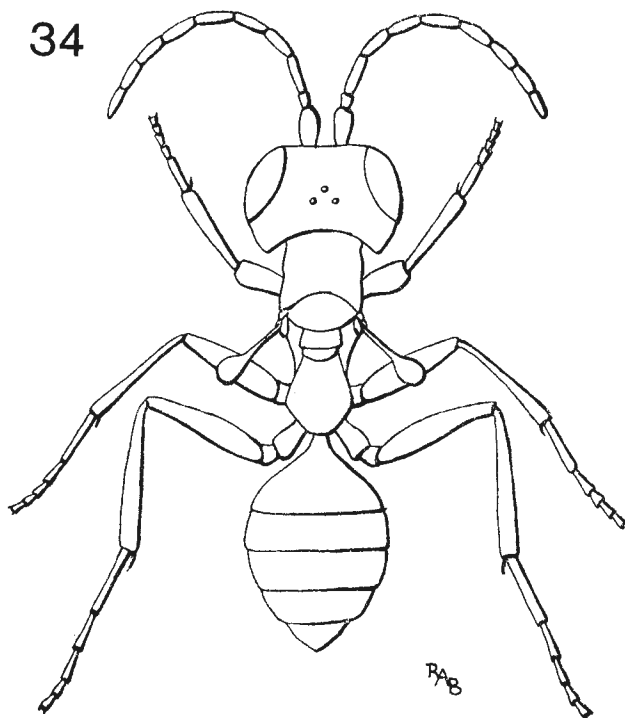


FIG. 34.—*Mystrophorus formicaeformis* ♂.

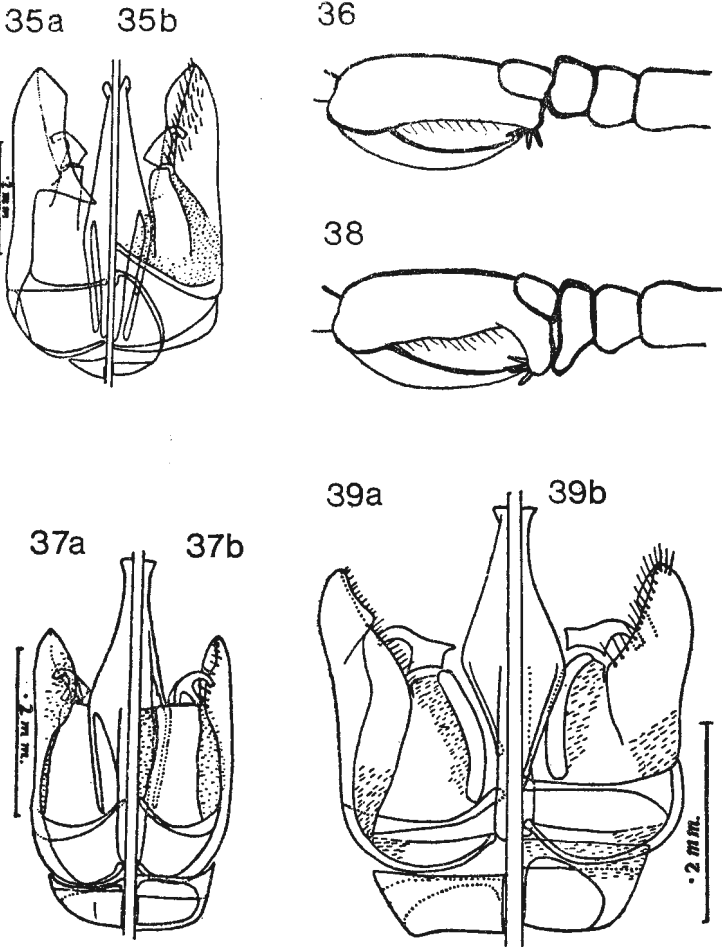
- 2 Frons carinate centrally; propodeum with area petiolaris not delimited, or in ♂ of *brevicorne* sometimes weakly indicated; ♀ with segment 3 of anterior tarsus, viewed dorsally, without an outward lateral process (fig. 36); mesoscutum coriaceous or rugose, less strongly so in ♂ than ♀; genital clasper evenly rounded dorsally (fig. 37). **brevicorne** group (p. 15)
- Frons not carinate centrally; propodeum with area petiolaris clearly delimited; ♀ with segment 3 of anterior tarsus viewed dorsally with an outward lateral process (figs. 38, 40-42); mesoscutum in ♀ with sparse punctures and rarely somewhat coriaceous posteriorly, in ♂ in greater part polished; ♂ genital clasper with a dorsal sub-apical angle (fig. 39). **brachycerum** group (p. 16)

brevicorne group

The type of *brevicorne* has been examined and although the rugose-reticulate sculpture of the frons is more extensive, it agrees otherwise with British examples as defined in the key and is regarded as conspecific with these specimens. The type of *cursor* has also been examined. Synonyms are included under the species in the key.

KEY TO SPECIES

- 1 Mesoscutum in ♀ rugose, in ♂ strongly coriaceous; ocelli smaller, posterior ocellus at least as far from the occipital carina as 1.5 times its diameter; ♀ scape and



FIGS. 35-39.—*Anteon* species: 35, *flavicorne*, ♂ genitalia: (a) dorsal; (b) ventral; 36, *brevicorne* ♀, fore tarsus; 37, *cursor* ♂ genitalia: (a) dorsal; (b) ventral; 38, *brachycerum* ♀, fore tarsus; 39, *brachycerum* ♂ genitalia: (a) dorsal; (b) ventral.

sometimes pedicel yellow, and legs at least in greater part yellow; posterior area of propodeum with closer reticulate sculpture. Frons, dull, weakly rugose laterally and with irregular lateral carinae, centrally with shallow very coarse punctures.

No recent specimens seen. Specimens in Westwood, Dale and Stephens collections and Suffolk, Oulton Broad, 1♀, 16.vi.1922 (C. Morley).

- Mesoscutum coriaceous; ocelli larger, posterior ocellus at most as far from occipital carina as its diameter; scape usually mostly black, rarely in large part red; legs in large part piceous, otherwise red and thus darker; posterior area of propodeum coarsely reticulate. Usually associated with birch, but also taken on other trees2
- 2 ♀ frons with no lateral carinae, reticulate rugose on orbits, strongly coriaceous centrally; central lobe of mesoscutum, anteriorly, weakly coriaceous with fine, scattered punctures. ♂ with sclerotized part of claspers narrow, membranous and white above this. **brevicornis** Dalman
(=*sisythrus* Walker; *scoticus* Kieffer)
Beds., Bucks., Hants., Sutherland, Ross, Nairn, Moray, Forfar, Co. Wicklow. v-vi. Less common than cursor.
- ♀ frons with lateral carinae, reticulate rugose centrally amongst the coriaceous sculpture; central lobe of mesoscutum anteriorly, strongly coriaceous, with scattered coarse shallow punctures. ♂ with claspers broader, sclerotized, with no white membranous dorsal area. **cursor** (Haliday)
(=*otiarthes* Walker; *crenulatus* Kieffer; *rectus* Kieffer; *barbatus* Chitty)
Kent, Surrey, Beds., Bucks., Herts., Hunts., Hants., Somerset, Devon, Sutherland, Ross, Perth, Inverness, Moray, Down, Dublin, Wicklow. v-vi. More common than brevicorne.

brachycerum group

This group contains only the one species.

Frons coriaceous and dull laterally, shining centrally (though often weakly coriaceous) and with fine punctures; antenna black; coxae sometimes pale apically in ♀, trochanters usually in part pale, tibiae and tarsi pale testaceous, those of middle and hind legs usually at least in part piceous; ♀ chela (fig. 38, 42). **brachycerum** (Dalman)

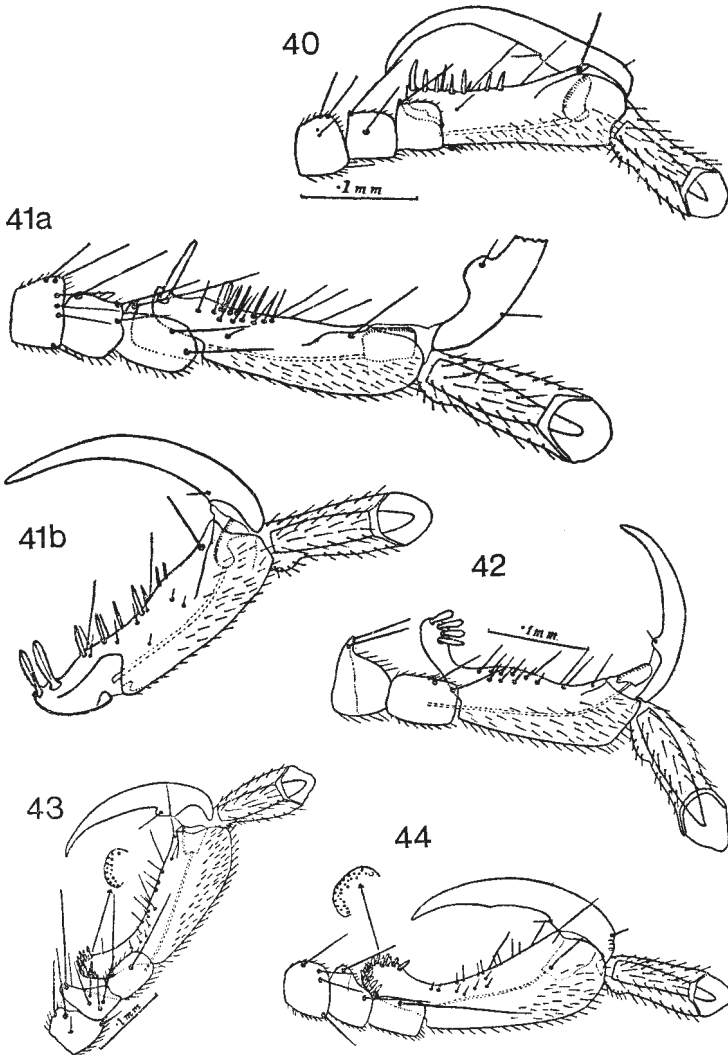
Widespread and rather common, associated particularly with birch. Host Oncopsis spp. (Chambers). iv-vi, most usually in late v and early vi.

flavicorne group

The males of this group may be confused with those of *Chelogyms* (*Chelogyms*) (see p. 18).

KEY TO SPECIES

- 1 Legs in part fuscous or black; antenna with scape at most yellow beneath, flagellum paler beneath (in ♂ paler apically); stigma dark; ♀ frons broader.
♀ frons centrally, dorsally, usually rugose, or anyway without coarse, shallow punctures; flagellum thicker; antenna with segment 3 about 2.5 times as long as broad, segment 6 about 1.5 times as long as broad, ♂ flagellum thicker; antenna with segment 3 about twice as long as broad. Both sexes with petiolar area of propodeum projecting forward beyond anterior margin of lateral areas.
jurineanum Latreille (♀ Richards)
(=*flavicornis* var. *bensoni* Richards; *arcuatus* Kieffer; *imberbis* Kieffer)
Widespread, the commonest species of the group. v-vi.
- Legs red marked with yellow, at most with an intero-dorsal fuscous stripe on hind femur, hind tibia fuscous marked apically and with hind coxae black basally; antennae yellow with only inconspicuous fuscous dorsal markings; stigma pale; ♀ frons narrower.2



Figs. 40-44.—*Anteon* species: 40, *marginatum*, ♀ fore tarsus; 41, *cursor*: (a) fore tarsus ♀; (b) chela ♀; 42-44, Chela ♀: 42, *brachycerum*; 43, *jurineanum*; 44, *flavicorne*.

- 2 Propodeum with the more sculptured petiolar area projecting forward beyond anterior margin of lateral areas; frons less shining centrally and with coarser punctures; segment 3 of antenna about 3 times as long as broad; hind tibia entirely red. ♂ flagellum thinner than in *jurineanum*, antenna with segment 3 about 2.5 times as long as broad. **flavicorne** (Dalman)
- Widespread but rare. v-vii. Has been reared from Idiocerus sp. (Chambers).*
- Propodeum with the centrally shining petiolar area not projecting forward beyond the anterior margin of lateral areas, so that an arcuate central transverse carina is formed; frons more shining centrally and with finer punctures; segment 3 of

antenna about 2.5 times as long as broad; hind tibia marked with fuscous apically. ♂, unknown. **subflavicornis** Haupt
Bucks., Slapton, 1♀, 16. viii. 1942 (R. B. Benson); No locality, 1♀, Desvignes Coll. The type material, 3♀ from Bellinchen (Oder) were reared from nymphs of Idiocerus confusus Flor.

Genus *Chelogynus* Haliday

The genus is here divided into two sub-genera as names are already available for the two groups which are easily distinguished. It should be noted that the type-species of the genus *Chelogynus* is *Dryinus infectus* Walker by designation of Muesebeck & Walkley (1951); the type selected by Kieffer was not an originally included species.

KEY TO SUBGENERA

- 1 Gena with close, upstanding silver pubescence; propodeum with petiolar area shining and with almost no sculpture; ♀ with pronotum much broader than long; frons more evenly punctured **Chelogynus**
- Gena with sparse, semidecumbent pubescence; propodeum with petiolar area rugose; ♀ with pronotum at least 0.75 as long as broad; frons at least in part with sparse punctures **Neochelogynus**

Subgenus *Chelogynus* Haliday

The species which fall into this section are superficially similar to the *flavicornis* group of *Anteon* though structurally very distinct, particularly in the female. In the males, *C.* (*Chelogynus*) as well as having longer temples, has the area petiolaris in large part polished and without sculpture, whereas in the *Anteon flavicornis* group it is at least in greater part coriaceous and rugose punctate.

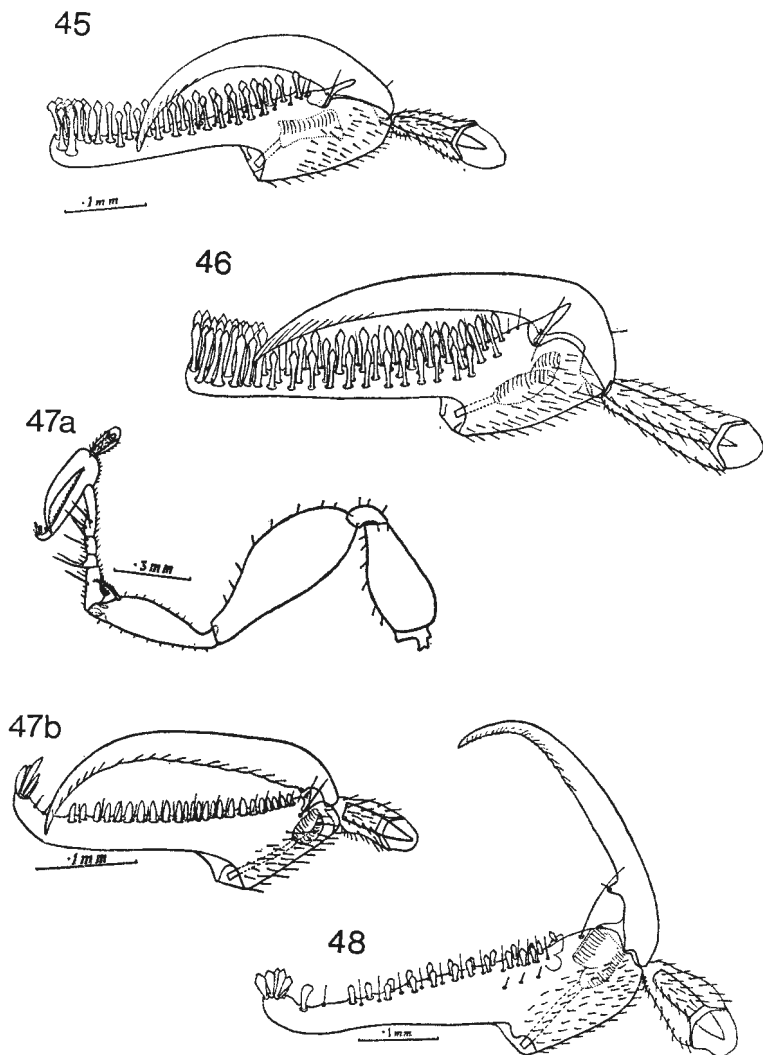
KEY TO SPECIES

(Females)

- 1 Antenna with segments 2 + 3 conspicuously longer than 1; mandibles at least broadly black at base.
 Antennae black, yellow-brown beneath; legs piceous, tibiae and tarsi yellowish; tarsal segment 5 with two irregular rows of 41 and 30 lamellae (c.f. fig. 46).
scapularis (Haliday)
Sussex, Somerset, Bucks., Beds., Herts. v-vii.
- Antenna with segments 2 + 3 sub-equal to 1; mandibles yellow with only the extreme base narrowly black 2
- 2 Frons duller, more punctured; hind femur mainly dark; fore tarsus with two rows of 24 and 12 lamellae (fig. 45).
infectus (Haliday)
Widely distributed. v-vi.
- Head shining, less punctured; hind femur yellow, infuscate proximally; chela with two irregular rows of 41 and 30 lamellae (fig. 46).
luteicornis (Kieffer)
Only the ♀ collected by Dale in Dorset, Glanvilles Wootton, 17. vi. 1878 is as yet known from this country.

(Males)

- The male of *luteicornis* is unknown.
- 1 Mesoscutum distinctly punctate almost to the scutellar fovea; legs darker; the hind femur almost completely black; hind tibia fuscous, whitish basally.
infectus (Haliday)
 - Mesoscutum with the punctures effaced in the posterior half; legs paler, the hind femur in greater part testaceous; hind tibia weakly infuscate and thus with no distinctly paler base.
scapularis (Haliday)



FIGS. 45-48.—*Chelogyne* species, chela ♀: 45, *infectus*; 46, *luteicornis*; 47, *fulviventris* (a) showing fore leg ♀; 48, *kiefferi*.

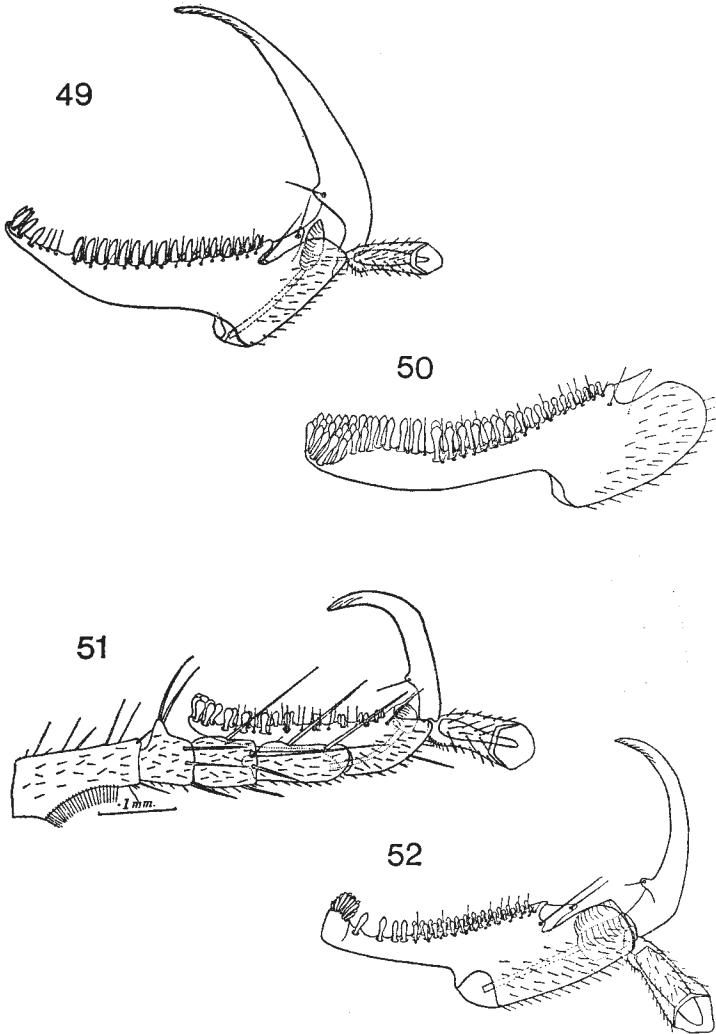
Subgenus *Neochelogyne* Perkins, R. C. L.

KEY TO SPECIES

(Females)

- 1 Frons and vertex entirely coriaceous and rather dull, with at most a few, vague, large, shallow punctures anteriorly and on the vertex near occipital carina; flagellum yellow at least apically.

Variable in colour from pale testaceous with only the propodeum black to the



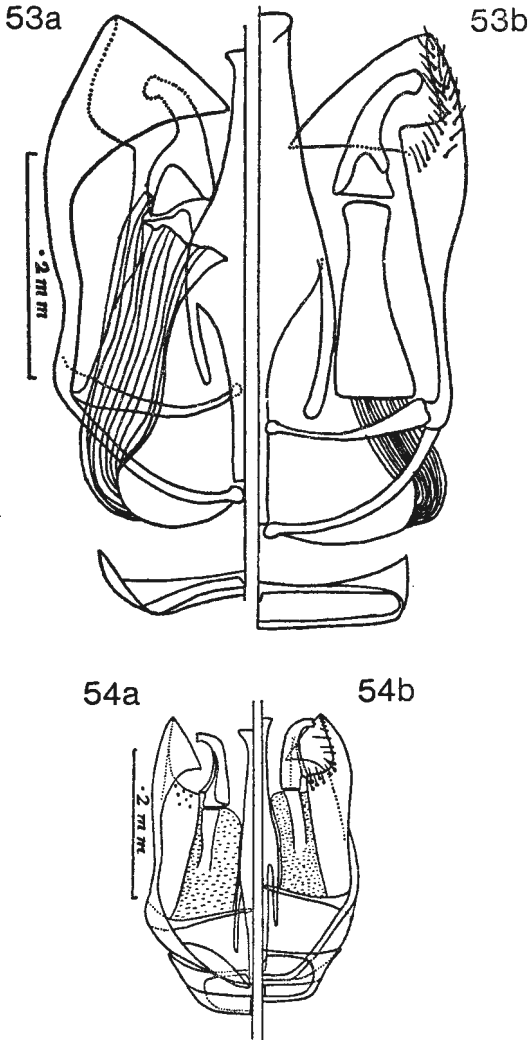
FIGS. 49-52.—*Chelogyne* species, chela ♀: 49, *ephippiger*; 50, *gaullei*; 51, *rufulocollis*; 52, *cameroni*.

whole insect becoming infuscate and black; chela (fig. 41) with one row of about 20 lamellae and a single row of bristles, and an apical group of 5 to 6 lamellae; malar space long; eye with longer hairs.

fulviventris (Haliday)

Generally distributed. v-ix. A series of 6♂, 15♀ from *Mocydia crocea* and 2♂, 2♀ from an unknown host reared v-vii.1965 to 1969 by V. H. Chambers has confirmed the association of the sexes.

- Frons punctate at least anteriorly, often strongly shining, at most weakly coriaceous between punctures; flagellum often black apically..... 2



Figs. 53-54.—*Chelogyne* species, ♂ genitalia (a) dorsal; (b) ventral: 53, *cameroni*; 54, *lucidus*.

- 2 Pronotum sometimes red, propleurum always black; flagellum little thickened apically, segment 3 at least 2.5 times as long as broad; segment 4 of front tarsus at least as long as 1 and often conspicuously longer.....3
- Pronotum and propleurum red; flagellum conspicuously thickened apically, segment 3 about twice as long as broad; segment 4 of front tarsus a little shorter than 1. Frons closely punctate anteriorly, posteriorly and on vertex shining with sparse punctures; legs red with apex of hind femur infusate; antennal segments 1-2 or 3 yellow.....7

- 3 Mandible conspicuously marked with black in basal quarter; frons weakly coriaceous with coarse shallow punctures anteriorly, more sparsely so posteriorly; antennal segment 5 twice as long as wide; malar space conspicuously longer than breadth of base of mandible: mainly black, front and middle legs marked with yellow; hind legs with trochanter, base of femur and tibia and tarsus in greater part pale. Vertex subrugose behind ocelli and with few, shallow punctures laterally; pronotum coarsely shallowly punctured in apical 0.66; stigma fuscous (fig. 48).
kiefferi (Chitty)
- Suffolk, Oxon, Hants., Berks. Elgin. v-vi.*
- Mandible yellow with base only narrowly black; frons usually with conspicuous deep punctures anteriorly; antennal segment 5 at least 2.5 times as long as its breadth; malar space at most as long as breadth of base of mandible; legs pale, except at most for the black base of hind coxa and apex of hind tibia 4
- 4 Pronotum very pale yellow, dorsally almost white.
Frons less strongly sculptured than in *ephippiger* which it most closely resembles; stigma pale; mesoscutum reddish testaceous, gaster reddish yellow with a small anterior spot on petiole and last three or four segments black.
albidocollis Kieffer
- Dorset. Only the Dale specimens known.*
- Pronotum, if pale marked, testaceous or red 5
- 5 Frons, anteriorly, with fine punctures; stigma pale; pronotum and mesoscutum most usually marked with red, sometimes pronotum entirely red. Chela (fig. 49).
ephippiger (Dalman)
- Widely distributed. vi-viii.*
- Frons, anteriorly with rather close, well developed punctures; stigma with at least the anterior and posterior margin conspicuously infusate; mesoscutum never red, pronotum sometimes red 6
- 6 Pronotum black; wings not infusate; gena with sparse small punctures and with sparse, more appressed hair apically.
lucidus (Haliday)
- Widely distributed and not uncommon. v-viii. Bred from various cicadellids (N. Waloff).*
- Pronotum red; wings infusate below stigma; gena strongly punctate with rather close upstanding hair apically. Chela (fig. 50).
gaullei (Keiffer)
- Norfolk, Herts., Surrey, Berks., Hants., Cty Down. vii-viii.*
- 7 Wings not shortened and not infusate apically; front tarsal segment 5 (fig. 51) with basal process evenly, weakly curved; antennal segment 3 shorter, about three times as long as broad.
rufolocollis (Chitty)
- Berks., Tubney, 1.viii.1906 (A. J. Chitty) Type; Windsor Forest, 1♀, 1.viii.1939 (H. St. J. Donisthorpe).*
- Wings shortened, reaching about to apex of tergite 3 of gaster, infusate towards apex; front tarsal segment 5 with basal process sharply outwardly curved at apex (fig. 52); antennal segment 3 longer, about 4 times as long as broad.
cameroni (Kieffer)
- Widely distributed. vi-vii.*

(Males)

The males of *albidocollis* and *rufolocollis* are unknown. The male associated with *gaullei* is doubtful, and the synonyms of *cameroni* quoted here, the types of which are all males, require further confirmation. At present it is better to use names applied to females.

- 1 Frons coriaceous at most with scattered, shallow, indistinct punctures; legs mainly pale testaceous, scape mostly yellow; hind coxa sometimes black basally, hind femur infusate apically and sometimes dorsally; antennal segment 4 about 3.5 times as long as broad; eye with longer hair.
fulviventris (Haliday)
(=*jurineanum* Latreille; Richards ♂)
- Reared with females by V. H. Chambers.*
- Frons, if distinctly coriaceous, also with distinct deep punctures or with the legs mainly black 2
- 2 Frons, centrally towards ocelli, and vertex except posteriorly at most with scattered, ill defined shallow punctures and at most with ill defined coriaceous sculpture.

- Antenna moderately long, segment 3 little thickened, segment 4 about 3.5 times as broad; mandible yellow, narrowly black on basal margin. **ephippiger** (Dalman)
 (= *fulviventris* Haliday; Richards ♂)
- Frons with conspicuous, clearly defined punctures or with the punctures obscured by deep coriaceous sculpture. 3
 - 3 Antenna with segment 4 at most as long as scape; mandible conspicuously black marked basally; legs almost entirely black or piceous. 4
 - Antenna with segment 4 longer than scape; mandible with basal margin only narrowly black; legs usually in part conspicuously pale. 5
 - 4 Frons and vertex conspicuously coriaceous. **kiefferi** (Chitty)
 - Frons and vertex polished, with at most a faint indication of coriaceous sculpture. Genitalia (fig. 53). **cameroni** (Kieffer)
 (= *lucidus* Haliday; Richards ♂) (= ? *peridas* Walker; ? *vulgaris* Kieffer; ? *breviventralis* Chitty)
- The male most commonly collected.*
- 5 Genitalia with distal inner process of clasper with an acute tip (fig. 54). **lucidus** (Haliday)
 (= *ephippiger* Dalman; Richards ♂)
 - Genitalia with distal inner process of clasper with less acute tip. ? **gaullei** (Kieffer)
 (= *cameroni* Kieffer; Richards ♂)

Genus **Prenanteon** Kieffer

The division of the species adopted here leaves many unresolved problems. It is to be hoped that reared material may be obtained in the future, for a wider range of characters is needed to substantiate the segregates. The use of the notauli as a primary means of distinguishing certain of the species has caused a different grouping of the segregates from that proposed by Richards (1939).

KEY TO SPECIES
 (Females)

- 1 Strongly brachypterous, with wings not reaching mid-length of propodeum. Pronotum coriaceous with rough, irregular punctures; notauli wide reaching about to mid-length of mesoscutum; antenna testaceous. **subapterus** (Kieffer)
Possibly only a variety of basalis. Staffs., Salop, Suffolk, Camba. Inverness, Dumfries. Wicklow. vi-vii.
- Wings always reaching distinctly beyond apex of propodeum. 2
- 2 Notauli shallower, narrow and finely aciculate extending to about mid-line of mesoscutum (fig. 55); hind femur entirely pale testaceous. Pronotum in part coriaceous dorsally, in apical half with irregular punctures; antenna testaceous, sometimes with pedicel and basal flagellar segments infusate; hind coxa, dorsally, infusate to beyond middle; clypeus sometimes marked with red or rarely entirely yellow (fig. 56). **ruficornis** (Dalman)
 (= *pallidineris* Kieffer)
Herts., Surrey, Beds., Sutherland, Ross, Inverness, Sligo, Kildare, Down (♂ only, Somerset, Glos., Salop, Monmouth, Perth, Nairn, Wicklow, Dublin, Queens County). v-vi, tending to appear earlier than other species of the genus. Bred from Psammotetix confinis (Dahlbom).
- Notauli deeper, broader and rather coarsely crenulate, sometimes extending to beyond middle of mesoscutum; hind femur most usually infusate apically. 3
- 3 Head with clypeus, area between clypeus and eye, large rectangular area above antennal sockets extending half-way to anterior ocellus and laterally to outer margin of antennal socket, yellow. Propodeum more sharply declivous apically. **frontalis** (Dalman)
Only the Morley ♀ from Hants., New Forest, Matley Bog, 6.vii.1909. 2♂ doubtfully of this species from Radnor and Dorset. In Germany bred by Haupt from Deltocephalus picturatus Fieber and ocellaris (Fallén).
- Head at most with clypeus and a spot above this yellow. 4

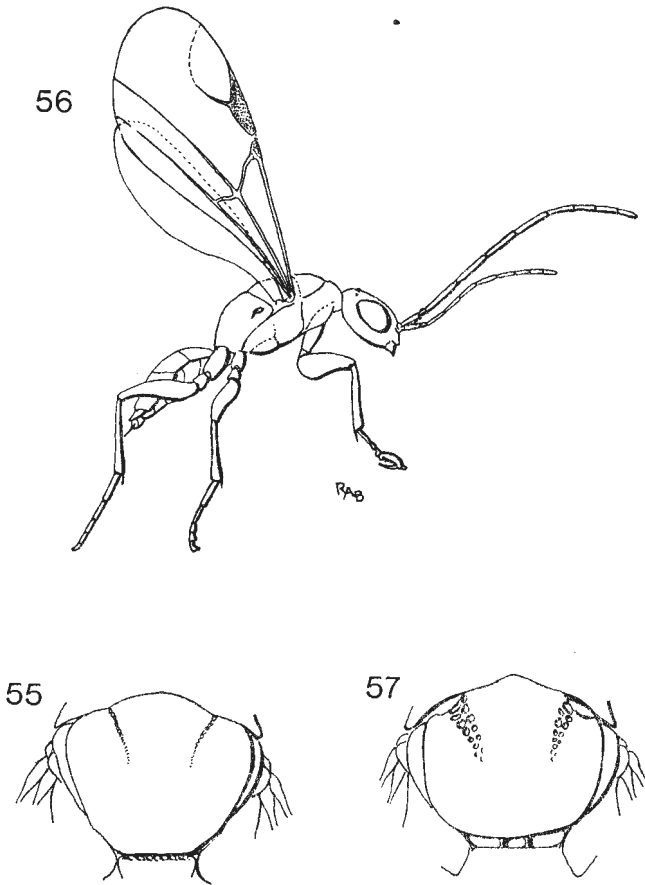
- 4 Notauli extending distinctly beyond mid length of mesoscutum; clypeus and sometimes a spot above this yellow.

Propodeum with area petiolaris, though often only defined apically, broader than in *basalis*, but the declivous part less flattened than in *foveatus*; antenna entirely testaceous or with flagellar segments infuscate. **longicornis** (Dalman) *Yorks., Suffolk, Oxford, Bucks., Dorset, Glos., Beds., Denbigh, Anglesey, Stirling, Dumbarton, Down, Kildare.* A single ♂ probably this species from Surrey. *vi-viii.* Bred from *Euscelis plebeja* (Fallén).

- Notauli at most reaching mid-length of mesoscutum (fig. 57); clypeus at most reddish 5

- 5 Frons with a more or less distinct central groove on the disc; propodeum with a distinct dorsal and flattened sharply declivous apical area; petiolar area rather broad; antennae including scape in large part infuscate. **foveatus** Richards

Bred from *Psammotettix nodosus* (Ribaut) and *confinis* (Dahlbom) and either *Psammotettix cephalotes* (Herrich-Schaeffer) or *Macrosteles laevis* Ribaut also from *Arthaldeus pascuellus* (Fallén).



FIGS. 55-57.—*Prenanteon* species ♀: 55, *ruficornis*, notauli; 56, *ruficornis*; 57, *basalis*, notauli.

- Frons at most with a weak indication of a discal impression; propodeum in lateral view rather evenly rounded from base to apex and petiolar area, narrow though sometimes only distinct apically; antenna testaceous, in small specimens usually entirely so, in larger specimens with basal flagellar segments or entire flagellum infusate.

May well represent a species-group but at present best considered as a single species, larger specimens being more strongly punctate than small; frons varies from having close and strong punctures to rather close but shallow; hypopygium with clear, distinct punctures to almost smooth; pronotum largely smooth between the punctures in larger specimens to distinctly coriaceous in small ones. Wings rarely shortened but always reaching well beyond apex of propodeum. **basalis** (Dalman) (= *daos* Walker; *ruficornis*. var. *melanocera* Kieffer, *procericornis* Kieffer)

Widely distributed. Bred, 1♀ from Elymana sulphurella (Zett.) and 1♂ from Euscelis sp. by O. W. Richards, 3♂ 2♀ from Moevidia crocea (Herrich-Schaeffer) by V. H. Chambers; and from Psammotettix confinis (Dahlbom) by N. Waloff.

(Males)

As with most genera of the family, the association of the sexes presents many problems. In the following key the taxa may represent separate entities, but their true association will probably only be possible using material from numerous breedings. The males associated with *ruficornis*, *foveatus* and *basalis* (which may prove to be a complex of species) will probably prove to be correct, but for the rest, the correlation is very doubtful.

- 1 Notauli narrow and finely crenulate; mesopleuron above transverse furrow with at most a coriaceous or weakly rugose band dividing smooth posterior area from smooth anterior area. Genital claspers narrow. **ruficornis** Dalman
- Notauli broader and more coarsely crenulate; mesopleuron above transverse furrow with the posterior area rugose, or with a broad, strongly rugose band dividing the anterior from the small posterior smooth area. 2
- 2 Notauli extending well behind mid-length of mesoscutum. Genital claspers broad as in *basalis*. **longicornis** Dalman
- Notauli extending to about mid-length of mesoscutum. 3
- 3 Frons with a central longitudinal furrow; propodeum more sharply angled into a dorsal and apical area, the latter without a petiolar area, or if this is present apically then it is relatively broad. **foveatus** Richards
- Frons rarely with a very weak and short indication of a furrow; propodeum, viewed laterally, more evenly rounded, the petiolar area distinct and relatively narrow. Males of this group of species have proved, at present, to be doubtful in association with the females. No correlated specimens are available except for *basalis* 4
- 4 Stigma yellow. **? frontalis** Dalman
- Stigma fuscous. 5
- 5 Genital claspers broad, the dorsal margin conspicuously convex **basalis** Dalman
- Genital claspers narrower, the dorsal margin forming almost a straight line **? subapterus** Kieffer

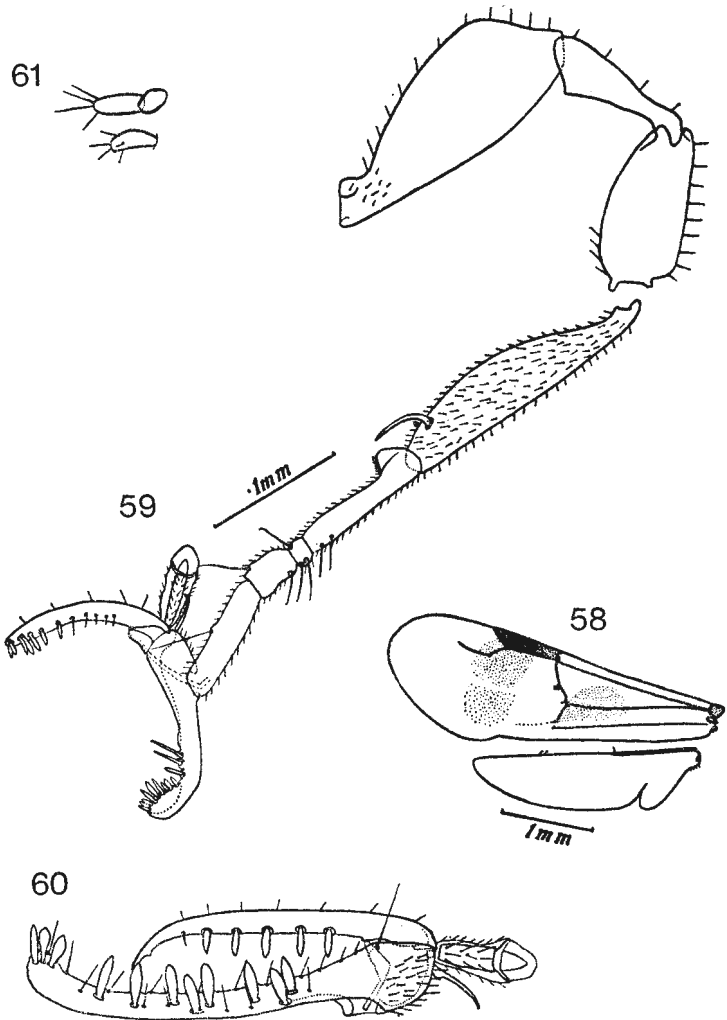
Subfamily DRYININAE

Two species only of this subfamily have been recorded from Britain, and of one of these, *Dryinus formicarius*, no specimens are now known to exist. Both species have the fore wing with two dark bands. No male of either species is known to me.

KEY TO GENERA

(Females)

- 1 Notauli not developed; a mainly black species (wings, fig. 58); front tarsus with segment 2 broadly expanded at base to receive the chela (fig. 59) **Mesodryinus**



Figs 58-61.—58, 59, *Mesodryinus ater*; 58, wings; 59, ♀ fore leg; 60, 61, *Monogonatopus oratorius* ♀; 60, chela; 61, palpi.

- Notauli complete, extending from anterior margin of mesoscutum to scutellum; a mainly red species; front tarsus with segment 3 broadly expanded at base to receive the chela. **Dryinus**

Genus *Mesodryinus* Kieffer

Only one species known from Britain. **niger** Kieffer
 (= *britannicus* Richards). Dorset, *Glanvilles Wooton*, 23.vii.1900 (Dale);
 Northants, *Ayno*, 21-25.vi.1945 (R. B. Benson). Host unknown.

Genus *Dryinus* Latreille

Only one species known from Britain. **formicarius** Latreille

The only definite records for this species are Surrey, near Cobham (Baly), Shere (Capron) (see Richards, 1939). Recorded on the continent from nymphs of Cixius nervosus (L.) and Fulgora europaea L.

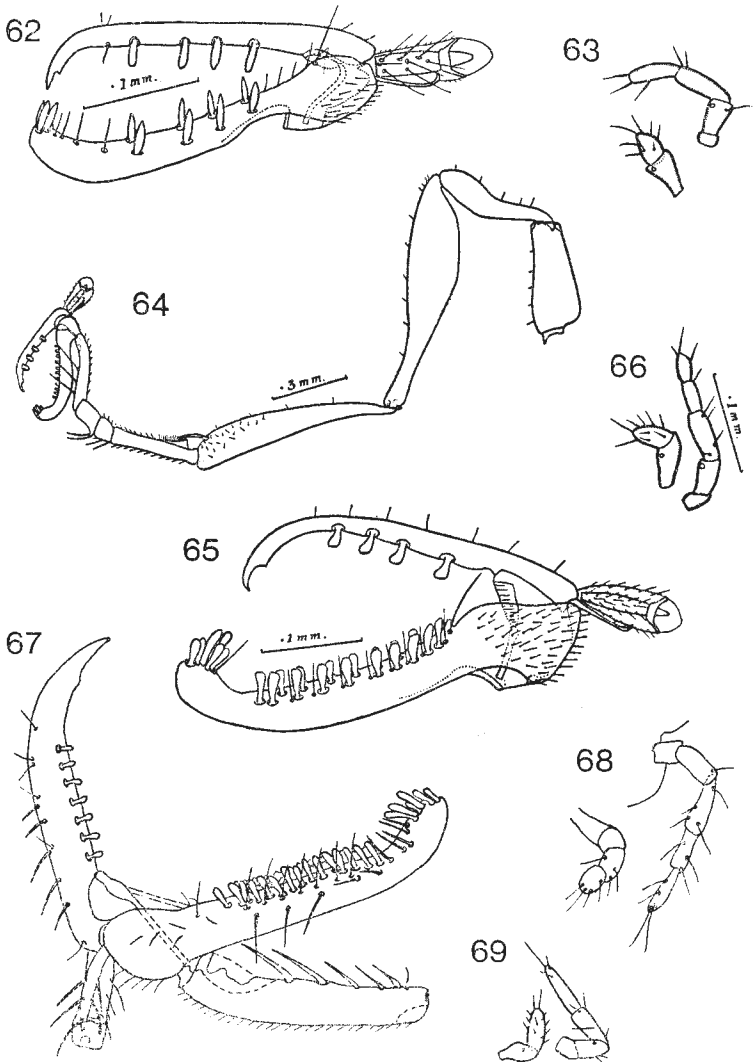
Subfamily GONATOPODINAE

The classification of this subfamily is based entirely on the females. The females of all the known British species are wingless, the males are winged. From world species in general, it is known that the males of many species are extremely rare and of some species none are known. Until rearing is undertaken the males are likely to remain undeterminable. Richards (1939, 1948) described the males known to him under numbers, but suggested that certain of these might be the males of certain genera and species and in the case of *Dicondylus bicolor* he had reared the two sexes. In the main, it now appears that the number of palpal segments agrees between the males and females except that, in the males in particular, the last two segments of the maxillary palpi may be fused. *Gonatopus sepsoides* has been bred on several occasions, but no males have been obtained and it seems that this species probably reproduces parthenogenetically.

In preparing material for study, it is very advantageous to have the mandibles open, for then it is normally possible to count the palpal segments of both the maxillary and labial palpi. As several of our species are known only from a unique specimen, it seems probable that further species and genera may well be found. For these an examination of the palpi is essential, and is in fact advisable for the species already recorded; it is doubtful if *Agonatopoides* and *Plectrogonatopus* would be recognized without an examination of the maxillary palpi. In genera with 4, 5 or 6 segmented maxillary palpi, these are angled at the second segment and thus the number of segments beyond this angle +2 give the total number of segments; in some cases (e.g. *Pseudogonatopus*) the first segment is very small and difficult to differentiate. Where these palps have 3 segments or 2 segments there is only one segment beyond the angle, and the first segment may be completely absent (e.g. *Tetradontochelys*). No known British genus has a 3 segmented maxillary palp.

Those genera of the subfamily with lamellae on the claw of the chela, and a preapical or subapical tooth normally parasitize Delphacidae whereas those with the claw simple or at most with a row of hairs are parasites of Cicadellidae. In addition the cicadellid parasites have a longitudinal keel or pair of keels on the flexor side, whereas in the delphacid parasites these are absent. *Plectrogonatopus* which has short lamellae on the claw and a weak preapical tooth also has the keel well represented; in some genera the keel is difficult to observe and therefore has not been used as a primary character. In the key *Plectrogonatopus* is included with genera with lamellate claws, and not with the cicadellid parasites to which it truly belongs, having been bred from hosts of this family of hoppers.

In the key to genera, superficial characters are used to differentiate our limited number of species, but the presence or absence of a transverse groove



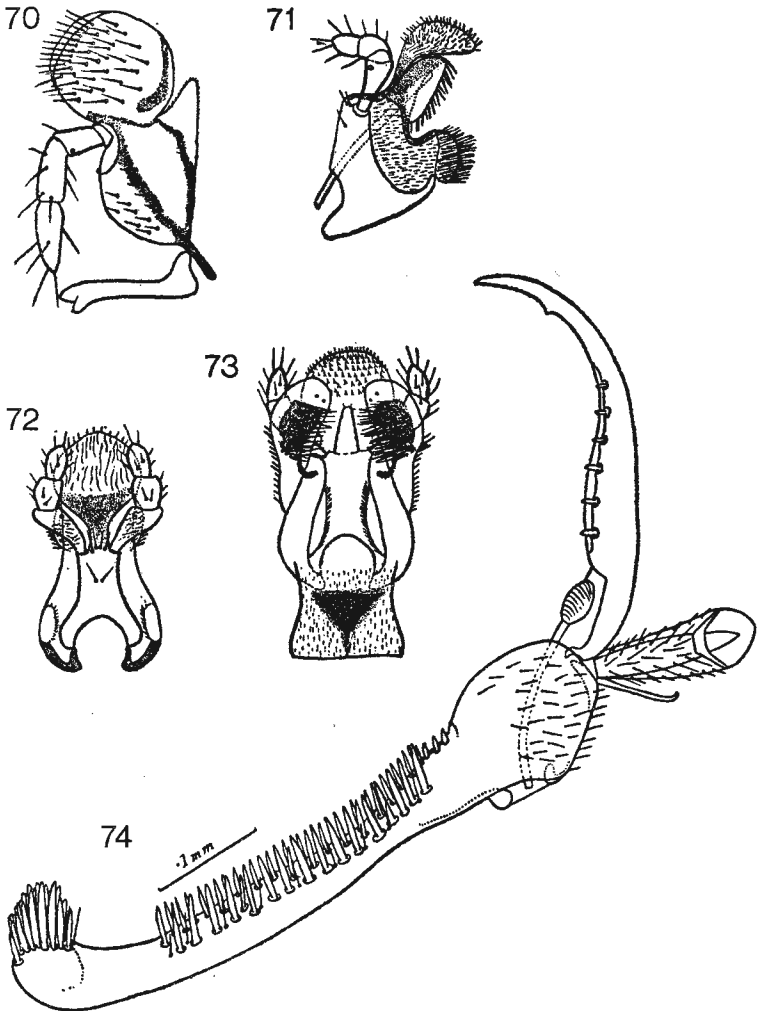
FIGS. 62-69.—62, 63, *Dicondylus bicolor* ♀; 62, chela; 63, palpi; 64, 65, *Donisthorpina formicicola* ♀; 63, fore leg; 65, chela; 66, palpi; 67, 68, *Agonatopoides striatus* ♀; 67, chela; 68, palpi; 69, *Pseudogonatopus distinctus* ♀ palpi.

on the pronotum, the form of the palpi and certain characters of the chela already discussed are of prime importance in distinguishing the genera on a much wider basis; sufficient of such characters can be found in the key to differentiate the genera satisfactorily.

KEY TO GENERA

(Females)

- 1 Enlarged claw of front tarsus with a row of conspicuous lamellae or peg-like structures (*Plectrogonatopus* has the pegs small and best seen when viewed dorso-laterally) and with a distinct, though sometimes small sub-apical or preapical tooth. Enlarged claw with no longitudinal keel except in *Plectrogonatopus* 2
- Enlarged claw of front tarsus with at most a row of microscopic hairs and with at most a weak indication of a preapical tooth. Labial palp with 2 segments; enlarged claw with a longitudinal keel 7
- 2 Pronotum, at most, with a very weak indication of a transverse furrow at about anterior third, and front tarsal segment 5 with 7-8 lamellae set in two rows and a distal group of 3. Enlarged claw with 4-5 lamellae 3
- Pronotum with a conspicuous transverse furrow at about the anterior third, clearly dividing an anterior area from a tumescent posterior area, or front tarsal segment 5 with many lamellae 4
- 3 Thorax and legs testaceous; posterior side of ocellar triangle two-thirds as long as other sides; front tarsal segment 5 with two rows of 6 and 2 lamellae respectively; maxillary palp with 2 segments (1+1); labial palp with 1 segment (figs. 60, 61)
Monogonatopus (p. 31)
- Thorax black with pronotum mainly red; mesonotum varying from almost entirely black to entirely yellow; legs with at least front femur most usually mainly black; posterior side of ocellar triangle half as long as other sides; front tarsal segment 5 with two rows of 4 and 3-4 lamellae respectively (fig. 62); maxillary palp with 4 segments (2+2), the first very small; labial palp with 2 segments (fig. 63).
Dicondylus (p. 31)
- 4 Testaceous except for antennal segments 4-8 and base of abdominal petiole which are piceous or black; propodeum, dorsally longitudinally aciculate with the disc polished, posteriorly with coarse transverse striae; enlarged claw with 4 lamellae and a subapical tooth; front tarsal segment 5 with 2 rows of 8 and 9 lamellae respectively, and a distal group of 6 (figs. 64, 65). Maxillary palp with 5 segments (2+3), the first very small; labial palp with 2 segments (fig. 66).
Donisthorpina (p. 31)
- Mainly black except for the legs; propodeum dorsally not longitudinally striate; enlarged claw with 6 or more lamellae; front tarsal segment 5 either with 2 rows of altogether 21 lamellae or with a very numerous distal group 5
- 5 Pronotum with only a weak transverse furrow; maxillary palp with 5 segments (2+3), labial palp with 3 segments (fig. 68). Enlarged claw with no dorsal carina, the lamellae conspicuous (fig. 67). Very similar to *Plectrogonatopus*.
Agonatopoides (p. 32)
- Pronotum with a conspicuous transverse furrow; maxillary palp with 4 segments (2+2), labial palp with 2 or 3 segments 6
- 6 Penultimate antennal segment more than 1.5 times as long as broad; enlarged claw with 6-12 large lamellae and with no carina and a subapical tooth; front tarsal segment 5 with two rows 8-13 and 8 lamellae respectively, the lamellae expanded at the tip and a distal group of about 6 or about 25 lamellae; labial palp with 2 segments (fig. 69).
Pseudogonatopus (p. 32)
- Penultimate antennal segment subquadrate; enlarged claw with 6 very small peg-like lamellae adjacent to the carina and a small preapical tooth; front tarsal segment 5 with two or three rows of long tapering lamellae (30-40 in all) and a distal group of 20-30; labial palp with 3 segments (figs. 70-74). **Plectrogonatopus** (p. 32)
- 7 Pronotum smooth and shining, transverse impression obsolete; maxillary palp with 2 segments (1+1) (fig. 76).
Posterior side of ocellar triangle a little longer than other sides; penultimate antennal segment not twice as long as broad; front tarsal segment 5 with the small prominence on inner edge bearing 4 small lamellae and with a distal group of 4 (fig. 75).
Tetradontochelys (p. 35)
- Pronotum more or less strongly coriaceous, the transverse impression distinct; maxillary palp with 4 or 5 segments (2+2 or 2+3), the first very small 8
- 8 Propodeum, viewed dorsally, with short, semi-decumbent hairs; flagellum thin with penultimate segment more than twice as long as broad; maxillary palp with 4 segments (2+2) (fig. 77)
Neogonatopus (p. 34)



FIGS. 70-74.—*Plectrogonatopus richardsi* ♀; 74, right maxilla, ventral; 71, labium, left side; 72, labium, ventral; 73, labium, dorsal; 74, chela.

- Propodeum, viewed dorsally, with long outstanding hairs; flagellum with penultimate segment at most twice as long as broad; maxillary palp with 5 segments (2+3) (fig. 78) Gonatopus (p. 32)

(Males)

Little is known of the males of the British species of this group and the following key is therefore unsatisfactory. It has been thought better at the present time to correlate these males with females on the number of palp segments, than to continue simply using the species numbers employed by

Richards (1939) who in 1948 gave evidence for probable association of some of the species.

- 1 Antennal segment 3 less than 3 times as long as broad 2
- Antennal segment 3 fully 4 times as long as broad 4
- 2 Maxillary palp with 5 segments, labial palp with 3; basal process of gonoforceps long, narrow, sinuate; sternite 9 with sixteen long bristles.
? *Agonatopoides striatus* Kieffer
(=sp. 2 Richards)
- Maxillary palp with 3 or 4 segments, labial palp with 2; basal process of gonoforceps shorter and stouter; sternite 9 with 9 peglike bristles 3
- 3 Maxillary palp with 4 segments, first very short; parameres a little divergent at apex and outwardly hooked; basal process of gonoforceps acuminate at apex; distivolsella with 2 weak teeth near apex which bears one long curved bristle and one minute straight one.
? *Neogonatopus*
(=sp. 1 Richards)
- Maxillary palp with 3 segments, the first apparent segment long; parameres fused at apex and not outwardly hooked; basal process of gonoforceps broadened at apex; distivolsella with one weak tooth at apex and no bristles.
? *Plectrogonatopus richardsi* Móczár
(=sp. 5 Richards)
- 4 Maxillary palp with 4 clear segments, 3 and 4 subequal; basal process of gonoforceps long and broad, distally serrate ? *Pseudogonatopus distinctus* (Kieffer)
(=sp. 3 Richards)
- Maxillary palp with 3 or 4 segments, 4 more or less distinctly shorter than 3 or fused to it; basal process of gonoforceps narrow, without membranous extensions.
Dicondylus bicolor (Haliday)
(=sp. 4 Richards)

Genus *Monogonatopus* Richards

♀. Testaceous; antenna with segments 1-3 yellow, the following segments black (apical segments missing); occiput and posterior half of vertex brown to black. ♂ unknown. *oratorius* (Westwood)

Surrey, Ripley (J. O. Westwood). Only the unique type known.

Genus *Dicondylus* Curtis

♀. Head black, with clypeus, lower orbits and anterior part of malar space, and lower part of face narrowly, yellow; antenna with segments 1 and 2 yellow, the following black or piceous; legs varying from entirely pale with only the front femur marked with black, to forms in which hind coxa basally, front femora mainly, large marks on mid and hind femora and longitudinal stripes on front and mid tibiae are black or piceous. ♂ has been bred with females. *bicolor* (Haliday)

Widespread. Has been bred, in this country from Dieranotropis hamata (Boheman), Criomorpha albomarginatus Curtis, Ditropis pteridis (Boheman), Laodelphax elegantulus (Boheman) and Javesella pellucida (F.); on the Continent has also been obtained from Delphax excisus (Mel.) and collina (Boheman). vi-x. Parasitized delphacid nymphs have been found from iii-viii and adults may be bred from these in the summer. A spring generation of adults can be bred from larvae which have hibernated in Delphacid nymphs.

Genus *Donisthorpina* Richards

Only one species known from Britain.

formicicola Richards

Hants, New Forest, Matley Bog, in nest of Formica transcaucasica Nasanov, 2. viii. 1926 (H. St. J. Donisthorpe). Only the unique type known.

Genus *Pseudogonatopus* Perkins, R. C. L.

KEY TO SPECIES

(Females)

- Apical antennal segment, mesoscutum and apex of propodeum of same colour as rest of black thorax; antenna with segment 5 longer than 2 (about 1.2:1), 4 four times as long as broad; enlarged claw with 6-9 lamellae, front tarsal segment 5 with 2 rows of 13 and 8 lamellae respectively, and a distal group of 5-7 (fig. 80).
For ♂ see key p. 31. **distinctus** (Kieffer)
Surrey, Berks., Hants., I. of Wight, Dorset, vi-vii. Bred from *Ditropis pteridis* (Bohemian) and *Gravesteiniella boldi* (Scott).
- Apical antennal segment, mesoscutum in part and apex of propodeum pale; antenna with segment 5 subequal to 2, 4 hardly more than three times as long as broad; enlarged claw with 10-12 lamellae, front tarsal segment 5 with 2 rows of 8 lamellae each, and a distal group of about 25 (fig. 79). **separatus** Richards
Cornwall, St. Merryn, 3♀, vii. 1925 (K. G. Blair). Glamorgan, Porthcaul, 3. vii. 1927 (H. M. Hallett), type. Appears to be confined to coastal sandhills.

Genus *Agonatopoides* Perkins, R. C. L.

Móczár (1965) found the specimen of *Gonatopus striatus* from the part of the Marshall collection in Budapest which was assigned by Kieffer to his species. Kieffer described this species from Trieste but this type has not yet been located. The Marshall specimen of *G. striatus* differs from the specimens attributed by Richards to *striatus* as shown in the key, and without further evidence it is better at the present time to assume that Kieffer determined the Marshall specimen correctly and utilize the name in the present manner. ♂ possibly the sp. 2 of Richards (1939).

Only one species known from Britain.

striatus (Kieffer)

Devon, Plymouth, in nest of Formica fusca L. The only known specimen from this country.

Genus *Plectrogonatopus* Richards

This generic name is here applied in the sense of Richards (1939), the type species, according to Móczár (1965) having been misidentified; however, some doubt must still remain until the true type of *striatus* is examined, if this is still in existence. ♂ probably the sp. 5 Richards (1948).

Only one species known from Britain.

richardsi Móczár

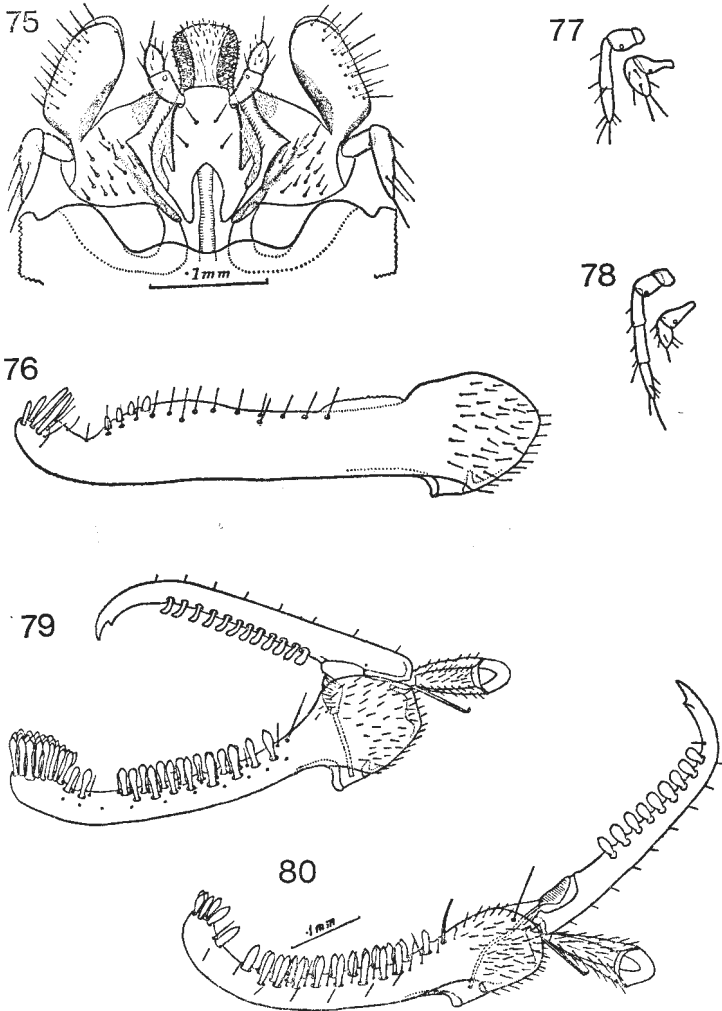
(=*striatus* Kieffer: Richards 1939, nec Kieffer)

Quite widely distributed in England and also taken in Ireland, v-vii. 2 ♀ have been bred from the nymphs of Aphrodes.

Genus *Gonatopus* Ljungh

KEY TO SPECIES

- 1 Mesonotum yellow; vertex with the surface entirely dull and coarsely coriaceous, less excavate; posterior thoracic complex with the striae less distinct; hairs longer and denser on front coxa and propodeum and moderately conspicuous on gaster. (Fore leg and chela, figs. 81-2). ♂ unknown. **barbatellus** Richards



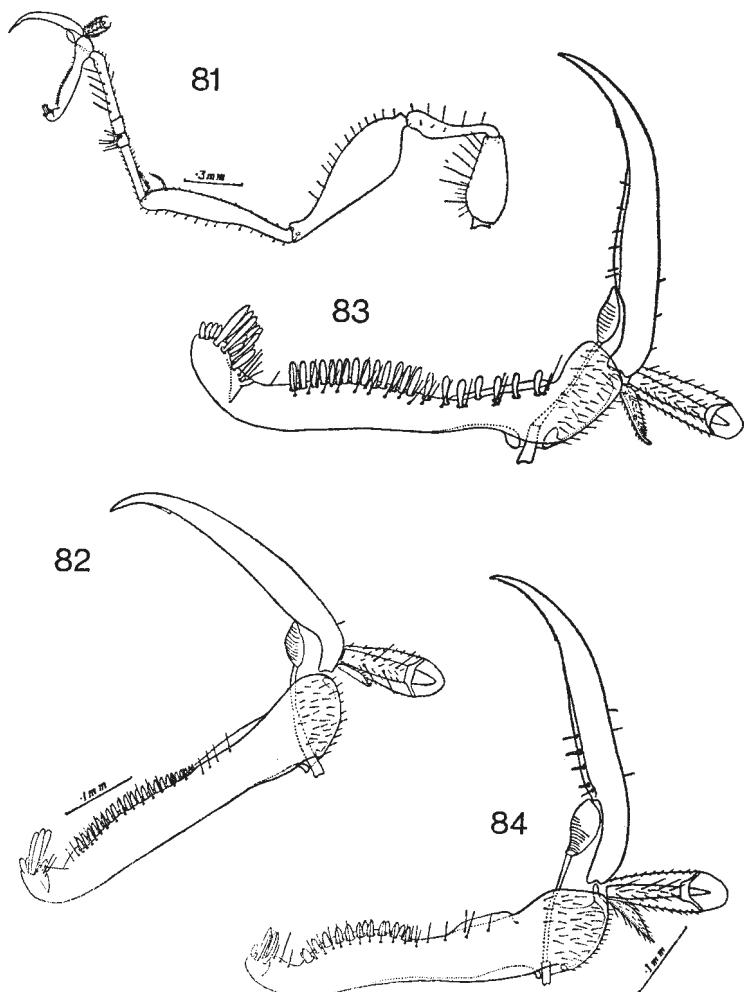
FIGS. 75-80.—75, *Tetradontochelys ljunghii* ♀, labium and maxillae, ventral; 76, the same, ♀ chela (without the claw); 77, *Neogonatopus lunatus* ♀ palpi; 78, *Gonatopus sepsoides* ♀ palpi; 79, *Pseudogonatopus separatus* ♀ chela; 80, *Pseudogonatopus distinctus* ♀ chela.

Suffolk, Icklingham sandhills, 18.vi.1915 (C. Morley). The type, ex Smith coll., and now in the Hope-Westwood collection is almost certainly of British origin. The species is also known from Belgium.

- Mesonotum black; vertex with a shining unsculptured patch on each side of the ocelli, more excavate; posterior thoracic complex in part with conspicuous striae; hairs less dense on front coxa and propodeum and sparser on gaster. ♂ unknown.

sepsoides Westwood

The species of Gonatopodinae most frequently collected. Widespread in England Wales and Ireland but not yet recorded from Scotland. Bred from *Deltocephalus*,



FIGS. 81-84.—81, *Gonatopus barbatellus* ♀ fore leg; 82, the same, ♀ chela; 83, *Neogonatopus lunatus* ♀ chela; 84, *Neogonatopus distinguendus* ♀ chela.

Jassargus pseudocellaris (Flor), *Arthaldeus pascuellus* (Fallén), *Errastunus ocellaris* (Fallén), *Psammotettix confinis* (Dahlbom), and *Jassargus flori* (Fieber). vi-ix. Pupa known to overwinter and a summer generation known to be produced. ♀ parthenogenetic; (cf. Waloff, 1975).

Genus *Neogonatopus* Perkins, R. C. L.

KEY TO SPECIES

- 1 Thorax with rather sparse short hairs on the sternum, before the middle coxæ; mesopleuron with decumbent hairs; front tarsal segment 5 with 10 lamellæ on a

distinct prominence and a distal group of 5-6 (fig. 84); pronotum dorsally and mesoseutum not pale marked. ♂ unknown. **distinguendus** (Kieffer)

Norfolk, Dorset, Glamorgan, Wexford.

- Thorax with a dense patch of longer silver hairs on the sternum, before the middle coxae; mesopleuron with outstanding silver hairs; front tarsal segment 5 with about 20 lamellae extending to base, the last 14 on a very slight prominence, and a distal group of about 15 (fig. 83); pronotum dorsally and more elongate mesoseutum conspicuously pale marked. For ♂ see key p. 31. **lunatus** (Klug)

Norfolk, Kent, Dorset, Yorkshire.

Genus *Tetradontochelys* Richards

Only the type specimen known from Britain. **ljunghii** (Westwood)
Surrey, 12.viii.1833 (J. O. Westwood).

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