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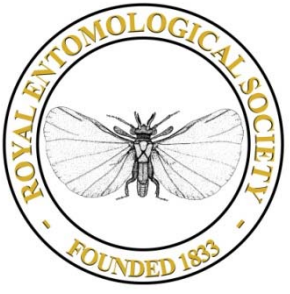

HANDBOOKS FOR

THE IDENTIFICATION

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HANDBOOKS FOR THE IDENTIFICATION OF BRITISH INSECTS

DIPTERA

2. NEMATOCERA : families TIPULIDAE TO CHIRONOMIDAE

By

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Family TRICHOCERIDAE.

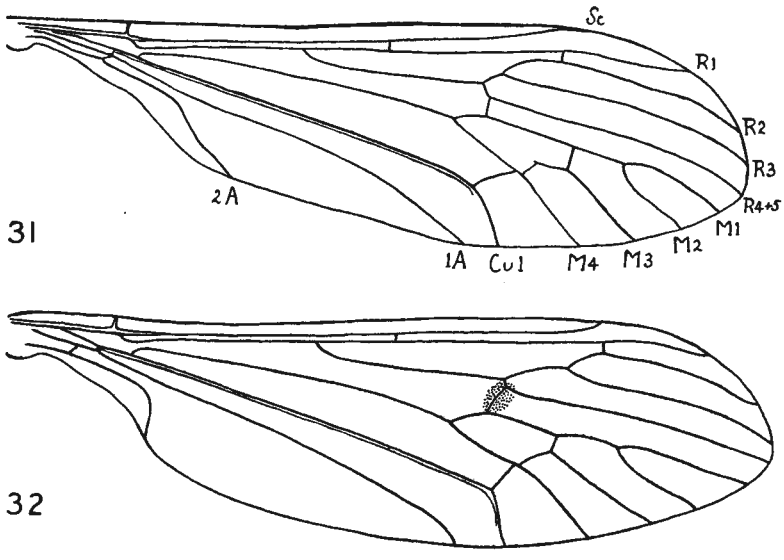
By Paul Freeman.

This is a small family represented in Europe by two genera, *Trichocera* (winter gnats) and *Diazosma*. The wing venation is similar to that of some Tipulidae (Limoniinae), but the larva much more closely resembles that of the Anisopodidae (Rhyphidae) and prevents their inclusion in the Tipulidae. It is now usual to treat them as forming a separate family allied both to the Tipulidae and to the Anisopodidae.

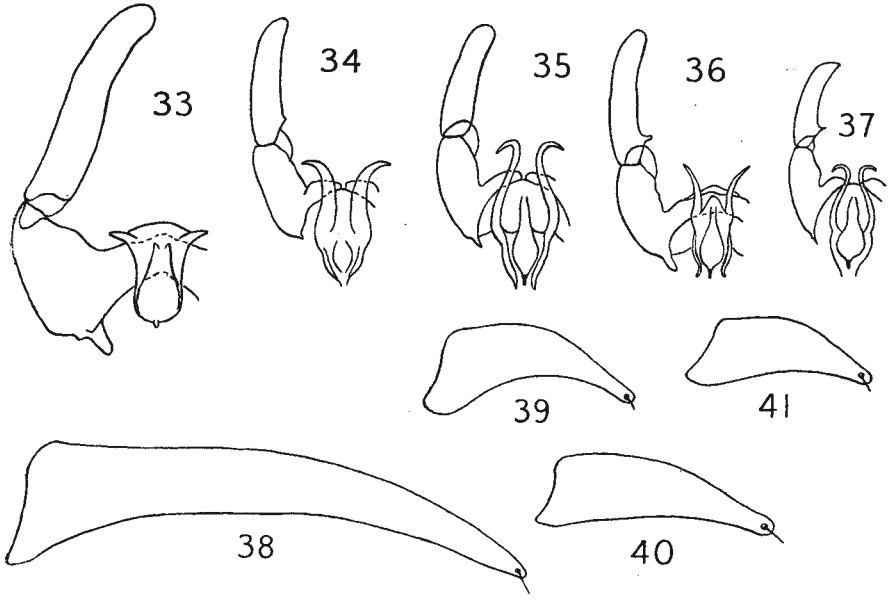
The essential differences between adult Trichoceridae and Tipulidae lie in the head, the most obvious one being the presence of ocelli in the former and their absence in the latter. A second difference lies in the shape of the maxillae, a character in which the Trichoceridae resemble the Anisopodidae rather than the Tipulidae. Other characters separating the Trichoceridae from most if not all of the Tipulidae are: vein 2A extremely short (figs. 31–32), cross vein m-cu at outer end of discal cell; suture between scutum and scutellum ill-defined; cerci of female, when horny, curved downwards; male styles single and usually simple; legs not markedly deciduous; upper surface of posterior pronotum forming a continuous flat shelf on each side of the mesonotum, the sensory pits longitudinally placed in the furrow between this shelf and the mesonotum.

The family includes the well-known "winter gnats," not uncommon during autumn, winter and spring. The males of some species are often to be seen dancing in swarms on warm, calm afternoons during winter, each swarm apparently consisting of one species. When a female enters a swarm, pairing ensues, and the pair drops to the ground. The adults of some species may also be found in cellars, caves, mines and similar darkened retreats.

The larvae live in decaying vegetable matter such as beneath rotted leaves and in places which may show organic decay, such as in stored roots and tubers. The head capsule of the larva is free, and all the appendages closely resemble those of an Anisopodid larva; the segments of the body are divided into secondary annuli, thoracic segments with two annuli, abdominal with three; the larva is amphipneustic, that is, spiracles are borne on the prothorax and at the posterior end of the abdomen; the posterior spiracles are surrounded by four lobes, the ventral ones the longer. It is of interest to note that Anisopodid larvae are also amphipneustic, but that Tipulid larvae are metapneustic, that is, only the posterior pair of spiracles is functional. Pupation takes place in the soil and the pupa wriggles to the surface for emergence.



FIGS. 31–32.—Wings of TRICHOCERIDAE. 31. *Diazosma hirtipenne.* 32. *Trichocera regelationis.*



FIGS. 33–41.—Hypopygia of males and ovipositors of females of *Trichocera.* 33. *T. major.* 34. *T. rufescens.* 35. *T. saltator.* 36. *T. hiemalis.* 37. *T. parva.* 38. *T. major.* 39. *T. fuscata.* 40. *T. saltator.* 41. *T. rufulenta.*

The following key is based on that of Edwards (1938) :

KEY TO GENERA AND SPECIES.

1 Eyes bare ; ovipositor short and fleshy ; tibial spurs minute, pale, only one to each tibia ; wing veins conspicuously hairy ; 2A longer (fig. 31), r-m straight and vertical ; wings without markings..... **Diazosma** Bergroth.
One species, rarely recorded, wing-length 5–8 mm. *Wilts., Hereford, Herts., Leicestershire, Inverness*..... **D. hirtipenne** Siebke.
Eyes hairy ; ovipositor horny, down-curved ; tibial spurs small, distinct, two to each tibia ; wing veins not conspicuously hairy ; 2A very short, strongly curved (fig. 32), r-m usually oblique and curved. **Trichocera** Meigen..... 2
2 Abdomen more or less distinctly banded..... 3
Abdomen unicolorous or at most with tip pale..... 4
3 Wings with spot or cloud over base of Rs, often extending across upper basal cell ; cross veins more or less distinctly clouded ; posterior margins of abdominal segments pale ; male styles with small basal tubercle, parameres long and curved. Wing-length 7–8 mm. *N. Lancs., Midlothian*
T. maculipennis Meigen.
Wings unspotted, though cross veins may be darkened or clouded ; anterior margins of abdominal segments pale ; male genitalia resemble *maculipennis*. Wing length 5–8 mm. *Common. Beds., Herts., Berks., London, Bucks., Sussex, Hants, Devon, Cornwall, Argyllshire*..... **T. annulata** Meigen.
4 A more or less distinct cloud over r-m (fig. 32), other cross veins sometimes faintly darkened ; male styles without basal tubercle, parameres long and recurved. Wing length 5–8 mm. *Abundant everywhere in winter, also found on mountains in summer*..... **T. regelationis** Linnaeus.
No trace of cloud over r-m..... 5
5 $R_2 + _3$ (i.e. stalk of R_2 and R_3) shorter than first section of R_3 (it is advisable to use the genitalia as confirmatory characters)..... 6
$R_2 + _3$ longer than (rarely about equal to) first section of R_3..... 7
6 Largest British species (wing length 7–9·5 mm.) ; female brownish with long slender cerci (fig. 38) ; male styles long without basal tubercle, parameres very short (fig. 33). *Herts., Beds., Oxford, Yorks., Lanarkshire*.... **T. major** Edwards.
Smaller species (wing length 5–7 mm.) ; female blackish with shorter thicker cerci (fig. 39) ; male genitalia unknown. *Hants, Kent*.... **T. fuscata** Meigen.
7 Cell M_1 longer, more than twice as long as broad, nearly parallel-sided ; male styles without basal tubercle..... 8
Cell M_1 shorter, usually not more than twice as long as broad, somewhat widened apically ; male styles with small basal tubercle..... 9
8 Thorax largely reddish, only praescutum dark in the middle ; scape yellowish ; female cerci moderately long, as *fuscata* ; male genitalia (fig. 34) as *saltator*, but parameres shorter. Wing length 5–6 mm. *Cornwall, Notts., Yorks., Lanarkshire, Morayshire*..... **T. rufescens** Edwards.
Thorax blackish ; scape dark ; female cerci moderately long (fig. 40) ; male parameres (fig. 35) long and recurved (var. ? **rufulenta** Edwards has much shorter cerci as in fig. 41 and reddish thorax). Wing length 6–8 mm. *Abundant everywhere in winter*..... **T. saltator** Harris.
9 Smallish species ; wings indistinctly pale basally ; basal projections of male coxites forming a complete bridge (fig. 36), parameres long and recurved but not as long as in *parva*. Wing length 5–6·5 mm. *Abundant everywhere in winter*..... **T. hiemalis** Degeer.
Very small species ; wings whitish at the base ; basal projections of male coxites not meeting in the middle (fig. 37), parameres longer. Wing length 4·5–5·5 mm. *Herts., Beds., Dumbarton*..... **T. parva** Meigen.

REFERENCE.

EDWARDS, F. W., 1938, British Short-Palped Crane-flies. *Trans. Soc. Brit. Ent.* **5** : 1–168.

Family ANISOPODIDAE (RHYPHIDAE).

By PAUL FREEMAN.

This is a small and primitive family represented in Europe by two apparently diverse genera, *Anisopus* Meigen (*Rhyphus* Latreille) and *Mycetobia* Meigen, both of which occur in Britain. *Mycetobia* was once placed in the MYCETOPHILIDAE, but larval structure makes it evident that it is closely allied to *Anisopus* and not to the MYCETOPHILIDAE. Both genera are allied to the TRICHOCERIDAE, a relationship also evident from larval structure.

The following are some of the characters of the ANISOPODIDAE : ocelli present, three in number placed more or less in an equilateral triangle ; maxillary palp with a sensory vesicle in antepenultimate segment opening by a pore at the tip ; mesonotal prescutum not distinctly separated from scutum but scutellum sharply marked off by a deep furrow ; Rs two-branched, discal cell often present ; larva amphipneustic.

The early stages are passed in situations where there is plenty of wet decaying and fermenting organic matter which forms the food of the saprophagous larvae. *Anisopus* larvae feed on dung or the liquid running from manure heaps, fermenting sap, decaying plant roots, etc., *Mycetobia* has been recorded from fermenting sap ; as the larvae can swim actively it is immaterial whether the food be merely damp or actually under water. The larvae bear supplementary rings on the abdominal segments, the last segment bearing fleshy lobes. Pupation takes place in the larval habitat without the formation of a cocoon ; the pupae wriggle actively and make their way to the surface before emergence of the adults.

The adult males of *Anisopus* swarm in large or small groups, mating taking place when females fly from nearby shrubbery into the swarm. Adults are frequently found indoors on windows and out of doors on tree trunks. *Mycetobia* adults are not very common, but can sometimes be found near the sap in which the larvae feed.

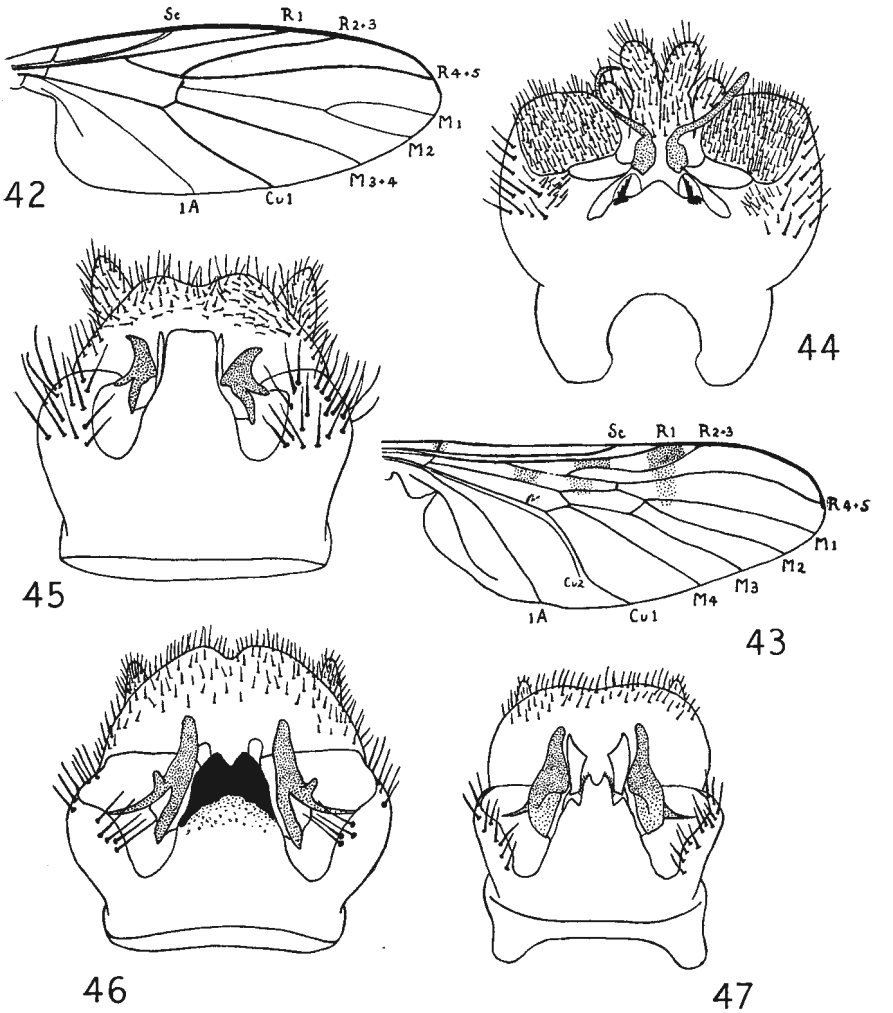
The species of *Anisopus* may be found during most months of the year ; *Mycetobia* seems more restricted to Spring and Summer.

Identification of the species of *Anisopus* is difficult, except for *punctatus*, and it is possible that there has been some confusion of *cinctus* with *fenestralis* : it is best to catch pairs and to identify from the male genitalia. The following key is adapted from Edwards (1928) :

KEY TO GENERA AND SPECIES.

1 M 3-branched, discal cell absent (fig. 42), wings without dark markings, macrotrichia not present on wing membrane ; antennae shorter.... **Mycetobia** Meigen. Only one British species, wing length 2·5–4 mm. *Surrey, London, Herts., Essex, Cambridge, Dorset, Glamorgan, Lancs*.....**M. pallipes** Meigen.

M 4-branched, discal cell present (fig. 43), wings with dark markings, macrotrichia present on wing membrane at least apically ; antennae longer. **Anisopus** Meigen.....2



FIGS. 42–47.—Wings and male hypopygia of ANISOPODIDAE. 42. *Mycetobia pallipes*. 43. *Anisopus punctatus*. 44. *A. punctatus*. 45. *A. zetterstedti*. 46. *A. fenestralis*. 47. *A. cinctus*.

2 Cell M_1 pointed at the base ; wing tip clear (fig. 43) ; male genitalia as fig. 44. Wing length 4–6·5 mm. *Common, recorded from Morayshire to Devon*
A. punctatus Fabricius.

Cell M_1 clearly broad at the base ; wing tip with distinct markings (faint in some vars. of **cinctus**) 3

3 Hind femora yellow except at the tip ; male eyes almost touching approximately one facet width apart ; male genitalia as fig. 45 ; abdomen extensively reddish, in female entirely red ; dark wing markings small, clearly defined ; yellow stigmatic area longer. Wing length 6–7·5. *Devon, Notts., Westmorland, Banffshire* ..... **A. zetterstedti** Edwards.

Hind femora yellow with traces of a dark median ring, sometimes lacking in *cinctus* ; male eyes well separated 4

4 Marginal cell dark except at the base ..... **A. cinctus** var. **withycombei** Edwards.

Marginal cell with a yellow area beyond the middle 5

5 Thorax always with three blackish stripes ; male genitalia with broad black ninth sternite, clasper with basal tooth (fig. 46). Wing length 5–7·5 mm. *Common, recorded from Ross and Cromarty to Cornwall* ..... **A. fenestralis** Scopoli.

Thorax variable, in male often all yellow ; male genitalia with ninth sternite narrower and less black, clasper without basal tooth (fig. 47) ; size averaging smaller and wing markings less dark. Wing length 4·5–6 mm. *Recorded from Inverness to Cornwall, probably often confused with* fenestralis
A. cinctus Fabricius.

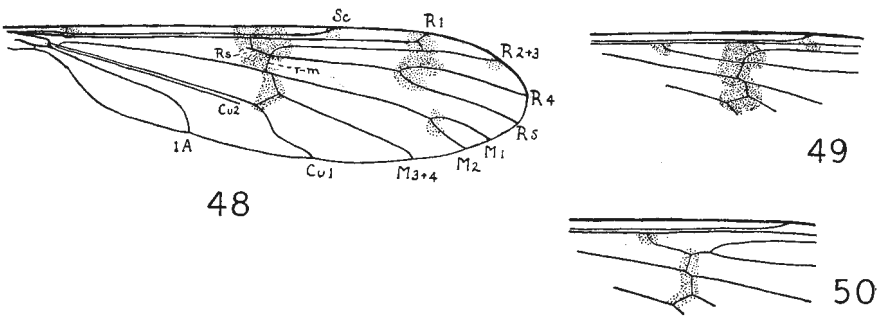
Reference.

Edwards, F. W., and Keilin, D., 1928, Anisopodidae. *Genera Insectorum*, **190** : 7–26.

Family PTYCHOPTERIDAE.

By Paul Freeman.

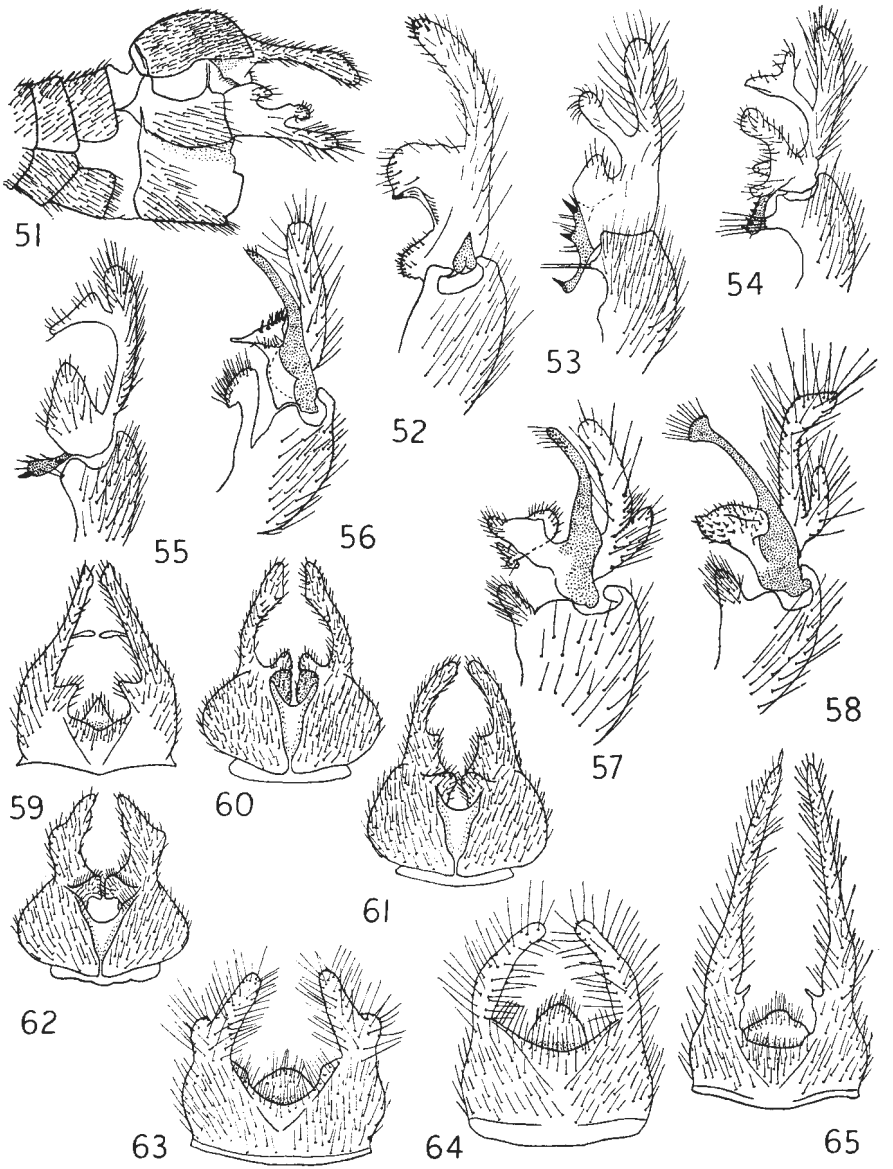
The Ptychopteridae are a primitive family belonging to the same stock as the (non-British) Tanyderidae and the Psychodidae, but showing points of similarity with the Tipulidae. The family is divisible into two subfamilies, the Ptychopterinae and the Bittacomorphinae, only the former occurring in Britain.



Figs. 48–50.—Wings of *Ptychoptera*. 48. *Pt. lacustris*. 49. Portion of wing of *Pt. contaminata* showing Rs. 50. The same of *Pt. albimana*.

The following characters will serve to define the Ptychopteridae as represented in Britain by the genus *Ptychoptera*: head transverse, closely applied to the thorax; maxillary palpi elongate 4-segmented, terminal segment approximately equal to the other three together; antennae 16-segmented; ocelli absent; pronotum very reduced; mesonotum gibbous, transverse suture bent strongly to form a deep loop; legs moderately elongate, tibial spurs present; wing membrane with macrotrichia apically; radius 4-branched, media 3-branched, only one anal vein present; small basal lobe to haltere (prehaltere) present; male hypopygium with lateral lobes of ninth tergite produced into more or less elongate digitiform processes, styles branched or split into separate units; ovipositor with cerci strongly compressed, bent slightly so that ventral margin is straight or feebly concave.

The larva is long and slender with the caudal extremity (segments 7–9) prolonged into a more or less completely retractile respiratory tube, bearing the two spiracles at the tip (the larva is metapneustic). There are two so-called anal gills, elongate cylindrical organs, arising near the base of



FIGS. 51–65.—Hypopygia of *Ptychoptera*. 51. Lateral view of end of abdomen of *Pt. contaminata*. 52–58. Right coxite and style seen in dorso-lateral aspect. 52. *Pt. albimana*. 53. *Pt. contaminata*. 54. *Pt. scutellaris*. 55. *Pt. minuta*. 56. *Pt. paludosa*. 57. *Pt. lacustris*. 58. *Pt. longicauda*. 59–65. Dorsal view of ninth tergite. 59. *Pt. albimana*. 60. *Pt. contaminata*. 61. *Pt. scutellaris*. 62. *Pt. minuta*. 63. *Pt. paludosa*. 64. *Pt. lacustris*. 65. *Pt. longicauda*.

the ninth segment. The integument bears tiny hairs, and there are pseudopods on abdominal segments 1–3 each with a curved claw. The head is complete with distinct eye-spots, opposed mandibles and a many-toothed mentum.

The pupa is propneustic (i.e. only prothoracic spiracles functional) with two respiratory horns, the left one being degenerate whilst the right one is greatly elongate. There is a powerful dorsal median lobe near the base of the eighth abdominal segment.

The adults are especially characteristic of damp meadows and marshes, the larvae and pupae being found in the water and saturated earth in the same habitat, the larvae feeding upon decaying vegetable matter. There are two broods a year and adults may be found in Spring and Summer.

The males of the *Pt. paludosa* group possess a curious secondary sexual character in the form of an invagination with brushes of hairs on the fourth abdominal sternite ; the species related to *Pt. contaminata* show this to a much lesser extent, whilst it is completely absent in *Pt. albimana*. The structure of the male hypopygium also shows this grouping of species, as can readily be seen from the figures. A similar organ is to be found in some species of the Tipulid genus *Teucholabis* (non-British). Tonnoir in 1919 proposed a sub-genus *Paraptychoptera* for the species showing this character, leaving the other species in *Ptychoptera*. *Pt. albimana* is obviously distinct from this latter group and would have to be placed in a further sub-genus, again based on male characters alone. On the whole I have thought it wiser to leave the sub-genera out.

Unfortunately the best and in some cases the only characters lie in the structure of the male genitalia, particularly in the shape of the styles. It is therefore essential to catch as many specimens as possible *in coitu*.

Genus **Ptychoptera** Meigen.

Key to Species.

1 Rs longer than r-m, seldom produced backwards at the angle (figs. 49–50) ; scutellum usually at least partially yellow ; pleura silvery ; sternite 4 of male not or only slightly modified.....2

Rs not much longer than or equal to r-m, often produced backwards at the angle (fig. 48) ; scutellum unicolorous black or brown ; pleura not silvery, sternite 4 of male greatly modified.....5

2 Rs about four times as long as r-m (fig. 49) ; small brown spot present at base of wing ; other spots more variable but usually one at base of Rs, another across middle of wing, one apically at level of extremity of R_1, and one at fork of M_1 and M_2 ; male abdomen with yellow stripes on segments 3, 4 and 5, female abdomen with stripes reduced to lateral spots ; male genitalia figs. 51, 53 and 60. Wing length 7–10 mm. *Common and widely distributed*
Pt. contaminata Linnaeus.

Rs shorter (fig. 50), sometimes less than twice as long as r-m ; usually no brown spot at wing base.....3

3 Wings spotted but much less strongly than in *contaminata*, spots sometimes practically absent ; hind metatarsus whitish yellow ; thorax rather dull ; male abdomen with yellow bands on segments 4 and 5, often reduced in female ; male hypopygium figs. 52, 59. Wing length 9–12 mm. *Common and widely distributed*.....**Pt. albimana** Fabricius.

Wings clear ; hind metatarsus always dark ; thorax shining, often metallic....4

4 Male hypopygium as figs. 54 and 61 ; note particularly shape of processes of ninth tergite and position and shapes of lobes of style ; male abdomen with faint transverse grey stripes, female unicolorous black. Wing length 7–8 mm. *Widely distributed in England and Scotland, but not as common as preceding species* ..... **Pt. scutellaris** Meigen.

Male hypopygium as figs. 55 and 62 ; other characters as *scutellaris*. Wing length 6–8 mm. *Hants, Herts., Yorks., Inverness* ..... **Pt. minuta** Tonnoir.

5 Abdomen unicolorous black ; style of male hypopygium (fig. 56) with small lobe with strong black spines and with long inwardly projecting finger, inner lobe simple ; ninth tergite as fig. 63, processes soft and shrivelled in dried specimens ; wing markings as in *lacustris* (fig. 48). Wing length 8–10 mm. *Devon, Dorset, Hants, Kent, Herts., Hereford, Flint., Derby* ..... **Pt. paludosa** Meigen.

Abdomen with yellow markings, except in melanic forms ; male hypopygium as figs. 57, 58, 64, 65 ; note inner lobe of style is branched 6

6 Male coxite and style as fig. 57 ; middle lobe of style blunt ; lobes of ninth tergite short though shrivelled in dried specimen (fig. 64) ; wings as fig. 48. Wing length 8–10 mm. *Devon, Hants, Essex, Herts., Notts., Arran* **Pt. lacustris** Meigen.

Male coxites and styles as fig. 58 ; middle lobe of style spatulate ; lobes of ninth tergite very long (fig. 65), though shrivelled in dried specimen ; wings as *lacustris*. Wing length 8 mm. (one male). *Only two British records, Hereford and Yorks* **Pt. longicauda** Tonnoir.

Reference.

Audcent, H. L. F., 1934, British Liriopeidae (= Ptychopteridae). *Trans. Soc. Brit. Ent.* 1 : 103–116.

Family PSYCHODIDAE.

By Paul Freeman.

The family Psychodidae contains four subfamilies, the Bruchomyiinae, Phlebotominae, Trichomyiinae and Psychodinae. The Phlebotominae are the " sand flies " of the warmer parts of the World and are the only subfamily of much economic importance. Only the Trichomyiinae and Psychodinae are found in Britain, where they are represented by 73 species commonly known as " moth flies."

Apart from the Phlebotominae, important as man-biters and disease carriers, the family has been much neglected systematically and the work of Eaton (1893–1904) still forms much of the basis of the modern classification. Tonnoir is the recent authority, and the keys given below are based on his 1940 paper.

Psychodidae are all small flies, many of a drab greyish-brown colour, thickly clothed with hairs and scales. They are readily distinguished from other families by the broad wings with ten or eleven veins reaching the margin and with the main cross-veins near the base, by the absence of ocelli and by the thick clothing of hairs and scales. The adults are to be found in large numbers near their breeding places, and are common on windows, in outhouses, on trees overhanging marshy streams or ponds, etc. ; many species can be found in daytime on tree trunks.

Adult Psychodidae are to be found all through spring and summer ; household species have been found in practically all months of the year.

The larvae of *Psychoda* feed in cow dung, decaying vegetable matter, exuding sap, fungi, putrid water, around drains, etc. ; some species are abundant in sewage works. The larvae of *Pericoma* and *Telmatoscopus* have been recorded from shallow slow-flowing water and tree-holes. The larva has a complete head, abdominal segments bi- or tri-annulate, and posteriorly either a short respiratory siphon (*Psychoda*), or four small protuberances fringed with soft hair. Satchell has described the larvae of most of the British species of *Psychoda* and *Pericoma*.

The important characters for classifying the adults lie in the structure of the antennae, wings and genitalia. It is often, unfortunately, necessary to mount the specimen in Canada balsam or other medium for examination with a high power, and nearly always necessary to denude part of the specimen of hairs and scales. Each of the main characters is discussed in the following paragraphs.

Antennae.—The shape of the segments, whether they are spindle-shaped (figs. 79–80) or have a narrow apical neck (figs. 110–134), can usually be seen without denuding the specimen, but in order to see the basal segments

it is necessary to denude the antenna. The hair and scales may be removed with a brush, but it is probably more satisfactory to warm in caustic potash (alcoholic) and mount in some medium on a celluloid or glass slip carried on the same pin as the specimen ; the warming in potash and subsequent operations usually cause the hairs and scales to fall away. To see the small apical segments of *Psychoda* clearly, the antenna must be mounted and examined with at least a $\frac{2}{3}$ in., and preferably a $\frac{1}{6}$ in. objective. The flagellar segments in most genera carry peculiar, transparent sensory organs called " ascoids," important in the genus *Telmatoscopus* but not differing much within the other genera. To see the ascoids clearly they must be stained in, say, Ziehl's carbol fuchsin, or else mounted in a medium such as de Faure's or euparol which have a somewhat better refractive index than balsam. The ascoids are better developed in the male, and may be greatly

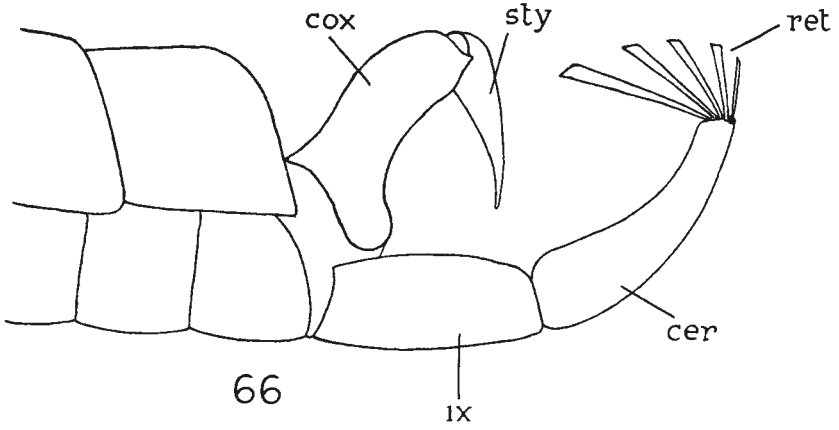


FIG. 66.—Lateral view of end of abdomen of *Pericoma nubila* male. *cer*, cercus ; *cox*, coxite ; *sty*, style ; *ret*, retinacula ; *IX*, ninth tergite.

reduced in the female. In *Pericoma* they consist of a pair of more or less straight, thick, transparent spines ; in *Telmatoscopus* (figs. 115–121) they are paired and simple, or numerous, branched, or leaf-like, etc. ; in *Psychoda* (figs. 122–134) they have normally three branches, two forwardly and one backwardly directed and are usually similar in both sexes.

Wings.—The venation can usually be seen on the dried specimen, especially if some hairs are removed from the critical points, but sometimes it is necessary to mount in balsam to be certain of the configuration around the basal cell. The venation (figs. 67, 69, 73) is used largely in *Pericoma* and *Telmatoscopus*, but there is often a certain amount of variation which makes these genera difficult ones. The important points are the positions of the fork of R_2 and R_3 (anterior fork) and the fork of M_1 and M_2 (posterior fork) and the relationship of the stem R_{2+3} to the apex of the basal cell. Little use has been made of venation in these keys in *Psychoda*. The vestiture of the wings consists of (1) decumbent hairs and scales arising in two series along the veins, (2) " bristling " or erect hairs on some or all of the veins, and (3) a wide fringe of long hairs around the margin ; in the

genus *Trichopsychoda* the wing membrane bears hairs. The coloration of both decumbent and erect hairs, the arrangement of the erect hairs in rows or tufts and the presence or absence of scales are important in both *Pericoma* and *Telmatoscopus* but less important in *Psychoda*, the species of which are usually unicolorous.

Male genitalia.—The male hypopygium is of the inverse type, that is, it has, during the course of development, been twisted through 180° so that the cerci and tergites are ventral and the coxites, styles, aedeagus and sternites dorsal; this is shown in fig. 66. The coxites and styles are simple in structure in most species, but in some species of *Pericoma* the styles are a little more complex: their structure, together with that of the aedeagus lying between, is often useful to separate closely allied species. The cerci (cercopods of Tonnoir) arising from the fused ninth, tenth and eleventh tergites (proctiger) bear at their apices a number of thick blunt spines or retinacula constant in number within a species. The number of retinacula together with the shape of the cerci is important in both *Pericoma* and *Psychoda*.

Female genitalia.—The shape of the ovipositor is occasionally useful, but more useful, especially in the genus *Psychoda*, is the shape of the apex of the sub-genital plate (ninth sternite) which lies immediately beneath.

Pericoma contains a number of supposed pairs of species (e.g. *nubila-trivialis, fusca-auriculata*), which are, perhaps, only single species with dimorphic males: the females are identical.

The geographical distribution given for each species is simply the distribution of specimens that I have seen. More collecting will, undoubtedly, lengthen the lists of counties.

I would like to take this opportunity of thanking Dr. Llewellyn Lloyd and Dr. G. H. Satchell for their assistance in drawing my attention to new characters in some of the species of *Psychoda*.

KEY TO SUBFAMILIES.

Rs with three branches, i.e. one simple vein between the two main forks (figs. 67–68) ..... TRICHOMYIINAE.

Rs with four branches, i.e. two simple veins between the two main forks (e.g. figs. 69–78) ..... PSYCHODINAE.

Subfamily TRICHOMYIINAE.

KEY TO GENERA AND SPECIES.

Cu long (fig. 67); wing covering dense, brown with two vague darker cross bands; antennal segments elongate, spindle-shaped, clothed with long hairs on the basal 2/3rds ..... **Trichomyia** Haliday.

Only one British species: wing length 2·5–3 mm. *Cambs., Herts., Surrey, Hants, Somerset, Dorset, Devon* ..... **T. urbica** Haliday.

Cu short (fig. 68); wing covering sparse; general coloration pale brown; antennae much as in **Trichomyia**, but whole insect much less hairy and smaller ..... **Sycorax** Haliday.

Only one British species: wing length 1·6–2 mm. *Yorks., Berks., Glouc.s., Somerset, Hants, Devon, Kerry* ..... **S. silacea** Curtis.

Subfamily PSYCHODINAE.

KEY TO GENERA.

1 Flagellar segments either cask- or spindle-shaped (figs. 79–80), with distal end sometimes thinner than basal end but never with distinct distal neck; antennae usually much shorter than width of wing 2

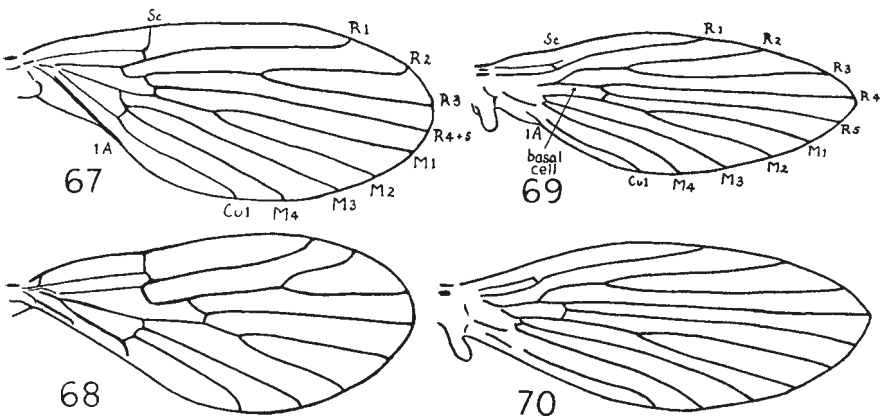
Flagellar segments provided with a more or less elongated distal neck (figs. 110–134); antennae usually longer than width of wing 3

2 First basal cell elongate (figs. 69–70), distance between its apex and origin of stem of anterior fork longer than width of cell ; R_4 ending at wing-tip, which is somewhat pointed ; male antenna 15-segmented, female 16-segmented ; scape in male at least 6 times as long as wide, in female 3 times ; third segment of male antenna with an undulate pencil of slightly clavate hairs (fig. 80)
Clytocerus Eaton.

Basal cell not elongate. Distance between its apex and the origin of stem of anterior fork not usually longer than width of cell (except *Pericoma pilularia*) ; when R_4 ends at wing tip then tip rounded (figs. 71–78) ; antennae 16-segmented in both sexes, scape usually less than three times as long as wide
Pericoma Walker.

3 Antennae 14–16-segmented ; last few segments distinctly smaller than the others and without verticils, thirteenth and following without necks (figs. 122–134), sometimes no sutures between some or all of the diminutive terminal segments ; wings always pointed at the tip where R_5 ends ; anterior fork always distal to posterior fork ; usually small unicolorous flies 4

Antennae 16-segmented, quite exceptionally 15-segmented ; last few segments not diminutive and not devoid of verticils ; if so, then ascoids not Y-shaped ; R_5 usually not ending at wing tip ; anterior fork before or after posterior
Telmatoscopus Eaton.



FIGS. 67–70.—Wings.—67. *Trichomyia urbica*. 68. *Sycorax silacea*. 69. *Clytocerus ocellaris*. 70. *C. dalii*.

4 Wing membrane as well as veins hairy ; wings held flat in life
Trichopsychoda Tonnoir.

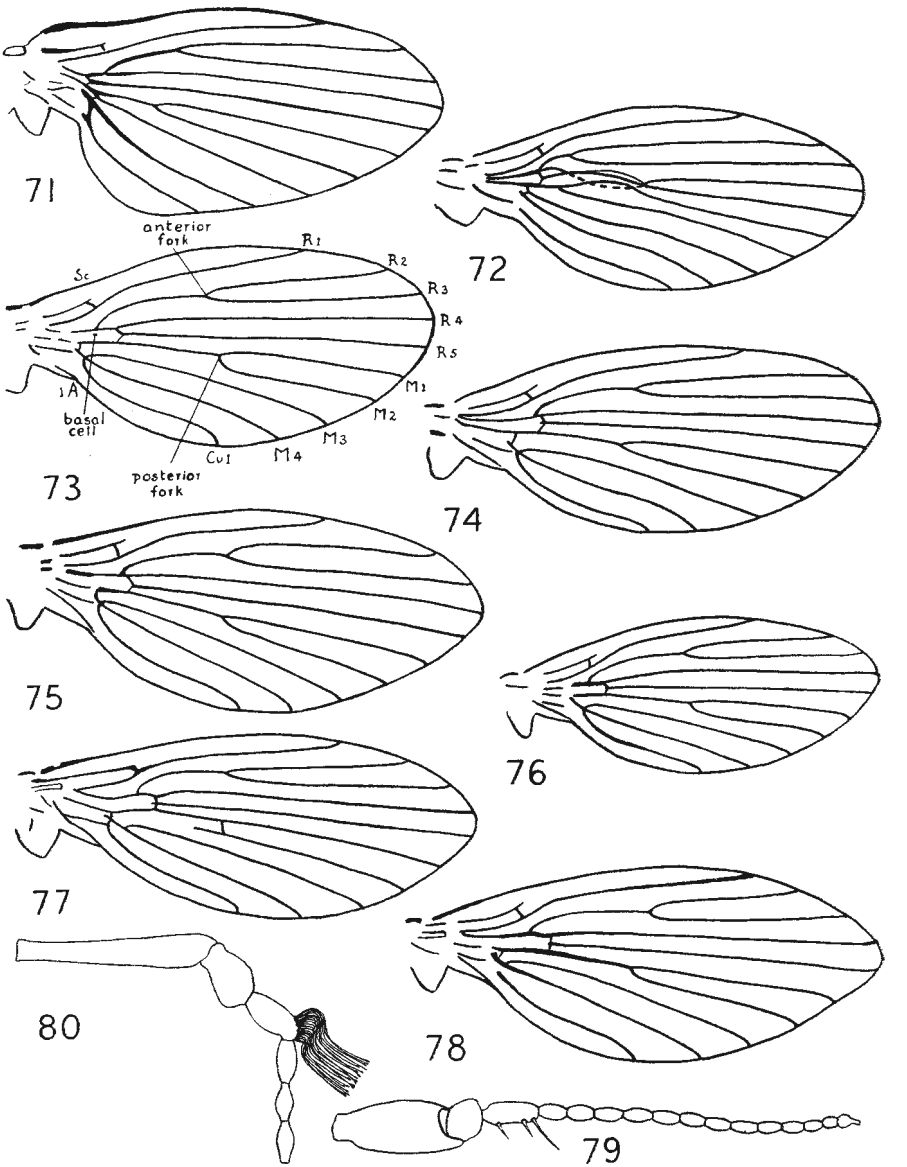
Wing membrane devoid of hairs which are confined to veins ; wings almost always held in a roof-like manner ..... **Psychoda** Latreille.

Genus **CLYTOCERUS** Eaton.

KEY TO SPECIES.

Basal cell elongate, distance between origin of stem of anterior fork and apex of cell about three times width of cell ; stem of fork more than half length of R_2 (fig. 69) ; brown species with three distinct ocellated white spots on wings, a large one basally and two apically, one on anterior margin and one on posterior ; fringe of apex of wing mainly white, small white tufts at apices of R_1, R_2, R_3, M_1, M_2, M_3 ; abdomen with white hairs. Wing length 2–3 mm. *Norfolk, Hunts., Herts., Surrey, Hants, Somerset, Devon* ..... **C. ocellaris** Meigen.

Basal cell shorter, distance from origin of stem of fork to apex of cell only about twice cell width, stem of fork less than half length of R_2 (fig. 70) ; paler species, basal white wing marking more or less ocellated, others not ocellated ; small white tufts present at apices of most veins but absent from M_1 and M_2 ; abdomen with dirty white hairs. Wing length 3–3·5 mm. *Surrey, Hants, Somerset, Dorset, Devon* ..... **C. dalii** Eaton.



FIGS. 71–80.—Wings of *Pericoma* and antennae of males of *Clytocerus* and *Pericoma*. 71. *Pericoma fusca*. 72. *P. fuliginosa*. 73. *P. palustris*. 74. *P. compta*. 75. *P. mutua*. 76. *P. gracilis*. 77. *P. neglecta*. 78. *P. trifasciata*. 79. *P. neglecta*. 80. *C. dalii*.

Genus **PERICOMA** Walker.

Key to Species.

1 Stem of anterior fork arising beyond apex of basal cell (fig. 71); large very dark species, females with white tarsi, males with enlarged anal area to wing (fig. 71) 2

Stem of anterior fork arising from basal cell either at apex (fig. 72) or more usually before apex (figs. 76–78) 3

2 Male with last two veins covered with scales on under-side of wing, no scales on other veins; coxites and styles as fig. 81, cerci rather bent with numerous long retinacula. Wing length 3–3·5 mm. *Yorks., Suffolk, Herts., Berks., Sussex, Somerset, Dorset, Devon* ..... **P. fusca** Macquart.

Male with last two veins covered with long erect hair below, but with no scales, other veins bear scales reaching nearly to middle of wing; female indistinguishable from *P. fusca*, possibly single species with dimorphic males. *Cheshire, Somerset, Devon* ..... **P. auriculata** Haliday.

3 Male with a pouch in wing (fig. 72) and with veins around covered with scales; female with forks sub-opposite and about one-third distance along wing, stem of anterior fork usually arising further back than in male; dark species, wings with broad whitish transverse band or two spots, basally whitish and with apical fringe white; abdominal hairs whitish; coxites and styles as fig. 82, cerci normal with 6 retinacula. Wing length 3–3·5 mm. *Generally distributed* **P. fuliginosa** Meigen.

Wings simple in both sexes, forks at more than one-third of wing length, not always subopposite 4

4 Cu distinctly connected to M just at the forking of M_3 and M_4 at the base of the wing, so that three veins appear to issue from the same point (figs. 73–76) 5

Cu either not distinctly connected to M (fig. 78), or else connected before the forking of M (fig. 77) 14

5 R_4 ending at tip of wing (figs. 73–75) 6

R_4 ending before wing tip (figs. 76–78) 10

(A difficult character not always easy to use.)

6 Anterior fork definitely basal to posterior (fig. 73); body covered with snow-white hair, legs whitish, tips of tibiae dark, last two (male) or last three (female) tarsal segments dark; wings pale with dark border all round and dark transverse stripe, fringe white apically; sometimes wings rather darker, giving appearance of having two white transverse bands; coxites and styles as fig. 83, cerci normal with eight retinacula. (Compare with *mutua* and *gracilis*.) Wing length 3–4 mm. *Perth, Flint, Herts., Hants., Somerset, Devon* **P. palustris** Meigen.

Anterior fork usually above or distal to posterior (figs. 74–75); if basal to it then tips of tibiae white 7

7 Anterior fork distal to posterior and above tip of Cu (fig. 74); origin of stem of anterior fork close to apex of basal cell; coloration as for *palustris* except that tibiae completely pale, tarsi much darker, metatarsus always dark basally; coxites and styles as fig. 84, cerci with 15 rather long retinacula. Wing length 3–3·5 mm. *Cambs., Middlesex, Bucks., Sussex, Hants, Somerset, Dorset, Devon* **P. compta** Eaton.

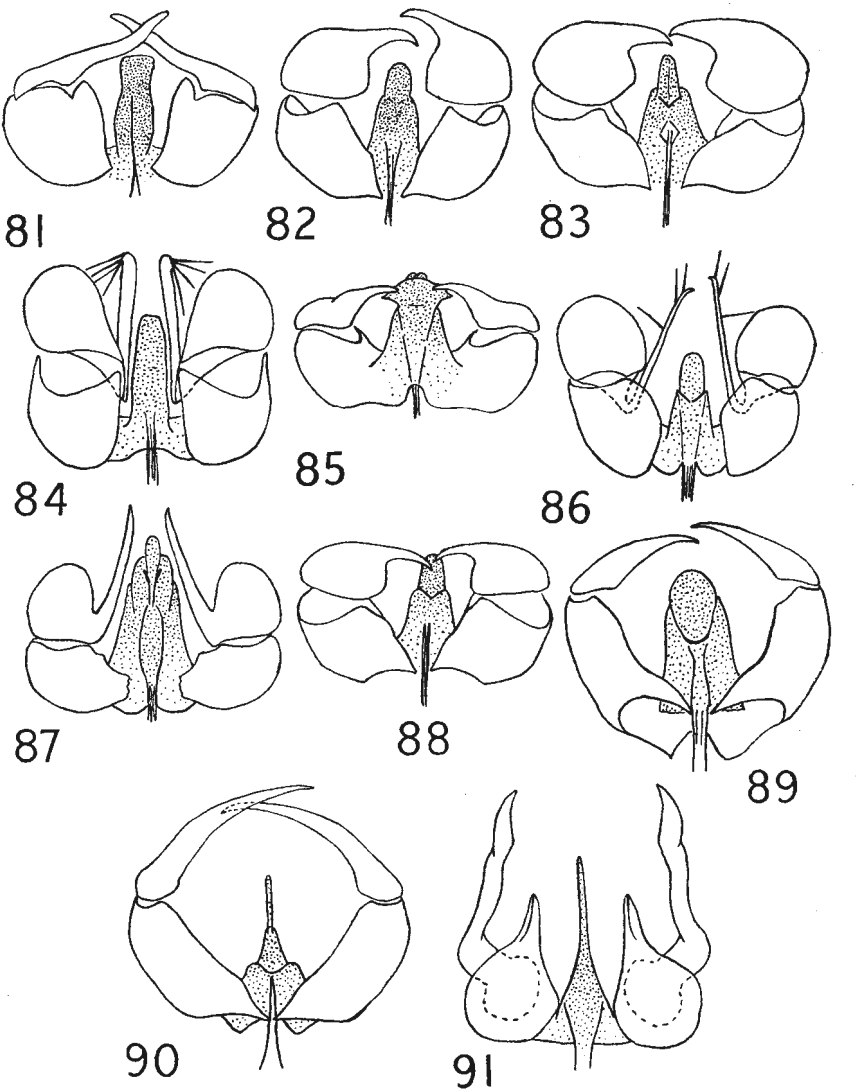
Anterior fork above or slightly basal to posterior fork (fig. 75) 8

8 Origin of stem of anterior fork placed exactly at apex of basal cell in male, a little before it in the female; coloration as in *palustris* but tips of tibiae not darkened, metatarsus entirely white; specimens with anterior fork slightly basal to posterior can be separated from *palustris* by leg colour and position of stem of anterior fork; coxites and styles as fig. 85; 9 retinacula, striated with pectinate tips. Wing length 3–3·5 mm. *Sutherland, Moray, Surrey, Somerset, Devon* **P. mutua** Eaton.

Origin of stem well before apex of basal cell 9

9 Origin of stem placed at a distance from apex of anterior basal cell equal to twice width of that cell; dark species, male hypopygium (fig. 86) resembling that of *compta*, cerci with 7 retinacula. Wing length 3–3·5 mm. *Berks., Dorset, Devon* ..... **P. pilularia** Tonnoir.

Origin of stem placed at a distance equal to width of cell ; paler species ; style of hypopygium (fig. 87) with long simple process arising at base, cerci with 10 retinacula. Wing length 3–3·5 mm. *Moray, Northants, Cambs, Middlesex, Somerset, Devon*.....**P. extricata** Eaton.



FIGS. 81–91.—Coxites and styles of *Pericoma* from above. 81. *P. fusca*. 82. *P. fuliginosa*. 83. *P. palustris*. 84. *P. compta*. 85. *P. mutua*. 86. *P. pilularia*. 87. *P. extricata*. 88. *P. gracilis*. 89. *P. nubila*. 90. *P. canescens*. 91. *P. neglecta*.

10 Hair of body and legs mainly white especially in male, wing coloration as in *palustris*.....11
Hair of body and legs with numerous dark hairs amongst the white ones, wings rather darker than in *palustris*.....12

11 Patagia (lateral prothoracic lobes) present on pronotum of male, each bearing a long white pencil of hair directed downwards each side alongside head ; posterior tibiae without black marks at tip ; male genitalia and wing venation as *gracilis* but smaller species. Wing length 2·25–2·5 mm. *Surrey, Somerset. Devon, Cornwall*.....**P. cognata** Eaton.
Patagia and their long white hair pencils absent in male ; posterior tibiae darkened at apices ; venation as fig. 76 ; coxites and styles fig. 88, cerci with 10 retinacula ; larger species. Wing length 2·75–3 mm. *Somerset*.....**P. gracilis** Eaton.

12 Wing fringe widely white at apex down to M_1 or M_2 ; legs with narrow white rings at apex of tibiae and metatarsi ; wing coloration much as in *palustris* ; coxites and styles similar to *nubila* (fig. 89), cerci with only three retinacula, two long coequal, one less than half length of others ; small species. Wing length 2·5–2·7 mm. *Yorks., Caernarvon, Kerry*.....**P. hibernica** Tonnoir.
Wing fringe hardly white at apex, darker species, wings dark with white spots 13

13 A large tuft of hairs curved backwards on frons of male, white above and black below ; whitish scales on base of male antenna ; coxites and styles as fig. 89, cerci with five rather thick retinacula. Wing length 2·5–3·5 mm. *Cambs., Herts., Surrey, Sussex, Gloucs., Hants, Somerset, Devon*.....**P. nubila** Meigen.
A greyish species lacking this tuft ; genitalia as *nubila* ; females of the two species cannot be separated. *Cromarty, Stirling, London, Middlesex, Surrey, Hants, Somerset, Devon*.....**P. trivialis** Eaton.

14 Vein M_2 prolonged backwards, forming a conspicuous spur at base of posterior fork (fig. 77).....15
No such prolongation.....16

15 Style of hypopygium claw-like (fig. 90), cerci normal, straight, with nine retinacula of normal length ; third male antennal segment simple ; a large brownish species with mottled wings and dark tufts at the tips of most veins, forming a characteristic dotted border. Wing length 2·5–3 mm. *Somerset, Dorset, Devon* **P. canescens** Meigen.
Style elongate, thin and undulate (fig. 91); coxites subspherical and with a flat process directed backwards ; cerci bent upwards nearly at right-angles with numerous long retinacula ; third segment of male antennae with three spines (fig. 79) ; coloration as *canescens*, from which the females cannot be differentiated. *Kincardine, Herts, Somerset, Devon*.....**P. neglecta** Eaton.

16 Fringe of posterior margin of wing with at least one white patch in addition to apical patch.....17
Fringe of posterior margin uninterruptedly dark except for apical pale patch...20

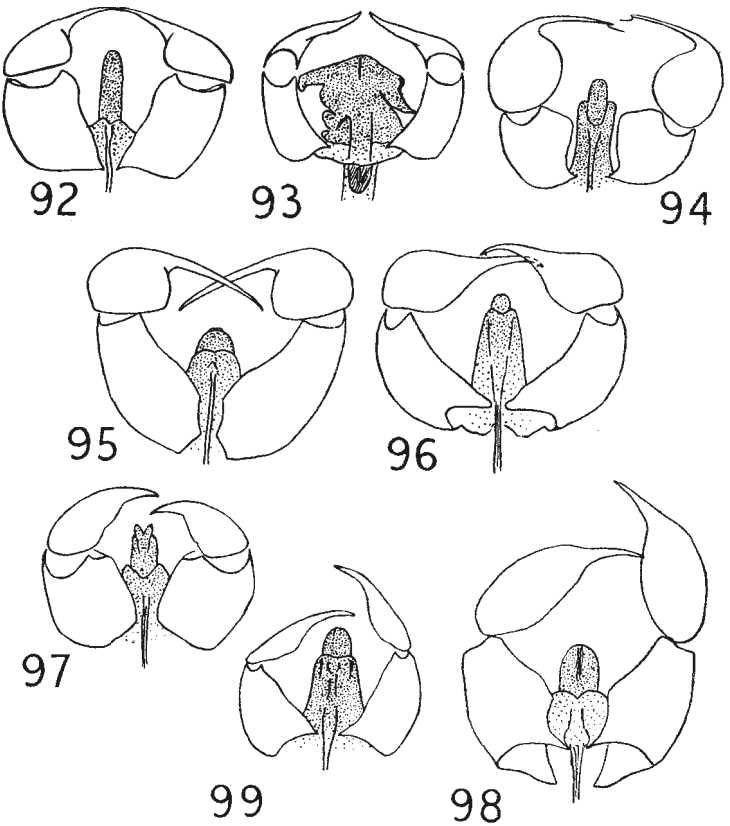
17 Wing fringe with only one white patch on posterior border placed between tips of M_3 and M_4, white at apex from R_3 to just past M_1 ; anterior fringe more or less extensively whitish ; usually anterior tibiae wholly whitish, posterior tibiae with dark hair at their tips, at least last three tarsal segments dark ; leg markings rather variable and not very pronounced ; coxites and styles as fig. 92, cerci with only four retinacula. Wing length 2·75–3 mm. *Somerset, Devon, Kerry*.....**P. blandula** Eaton.
Wing fringe either more extensively white posteriorly, or if with only a single patch then differently placed.....18

18 White patch placed between M_4 and Cu with usually a further white patch near the base of the wing, not always distinct ; apical white patch narrowly interrupted by a very small black space between the tips of R_5 and M_1 so that posterior border may present three white spaces, the basal one not very distinct ; tips of tibiae black, last three tarsal segments black ; aedeagus asymmetrical (fig. 93) ; wing venation similar to *trifasciatus* (fig. 78). Wing length 2–2·5 mm. *Herts., Devon, Somerset*.....**P. pulchra** Eaton.
Wing fringe otherwise marked ; aedeagus symmetrical.....19

19 Style of hypopygium with a long curved seta just below its very fine tip (fig. 94) ; cerci with five retinacula ; white tufts present at tips of most long veins but not at all conspicuous ; posterior margin with three white patches, one between

M_3 and M_4, another posterior to the tip of Cu and the third right at base of wing; tips of tibiae dark haired. Wing length 2 mm. *Somerset* (1 male) **P. calcilega** Tonnoir.

Style of hypopygium without such a seta (fig. 95), cerci with five fairly thick retinacula; white tufts at tips of most longitudinal veins conspicuous; venation fig. 78. Wing length 2·25–2·75 mm. *Yorks., Somerset, Devon* **P. trifasciata** Meigen.



FIGS. 92–99.—Coxites and styles of *Pericoma* from above.—92. *P. blandula.* 93. *P. pulchra.* 94. *P. calcilega.* 95. *P. trifasciata.* 96. *P. avicularia.* 97. *P. fallax.* 98. *P. diversa.* 99. *P. exquisita.*

20 Metatarsus of hind leg whitish at base only, other metatarsi usually the same but more variable; dark species with pale spots at apices of most long veins and dark erect hair near the forks giving appearance of two black spots; coxites and styles as fig. 96, five retinacula. Resembles *P. exquisita.* Wing length 2–2·5 mm. *Cheshire, Lancs., Somerset, Kerry* ..... **P. avicularia** Tonnoir.

Metatarsi completely white or whitish 21

21 Colouring of legs not boldly marked; tibiae darkish, first two tarsal segments whitish; whitish tufts at tips of veins not distinct; black wing spots as in *avicularia*; coxites and styles as fig. 97, cerci with four retinacula. Wing length 2·25–2·75 mm. *Cromarty, Somerset, Dorset, Devon* .... **P. fallax** Eaton.

Colouring of the legs contrasted; whitish tufts at vein tips very conspicuous; black wing spots present 22

22 Vestiture of body and thorax rufous ; anterior tibiae without apical black mark ; tip of style fine and straight (fig. 98), cerci with five retinacula. Wing length 2–2·75 mm. *Westmorland, Yorks., Devon*.....**P. diversa** Tonnoir.
Vestiture of body greyish ; all tibiae with apical black mark ; tip of style curved 23

23 Style of male hypopygium almost spherical at base and with curved thin and sharp beak, more bulbous than *avicularia*, cerci with seven retinacula. Similar to *exquisita*. *Pembroke, Kerry*.....**P. pseudoexquisita** Tonnoir.
Style with basal part not spherical or even bulbous (fig. 99), cerci with four retinacula. Wing length 2–2·5 mm. *Cromarty, Arran, Somerset, Dorset, Devon, Kerry*.....**P. exquisita** Tonnoir.

Genus **TELMATOSCOPUS** Eaton.

KEY TO SPECIES.

1 R_5 always ending at tip of wing, which is somewhat pointed, and anterior fork always basal to posterior fork (fig. 100), both forks before tip of Cu ; antenna of male with long scape and pyriform pedicel (fig. 110) ; last flagellar segments in both sexes almost without neck but not conspicuously smaller than preceding ones (fig. 110*a*).....2
R_5 usually not ending at wing tip ; if it does then either anterior fork distal to posterior fork (figs. 101–109) or else apical antennal segments with well developed neck (fig. 111*a*) ; antennae of male with scape usually less than three times as long as wide (not *consors*) ; pedicel subspherical or with a process (figs. 111–115) 4

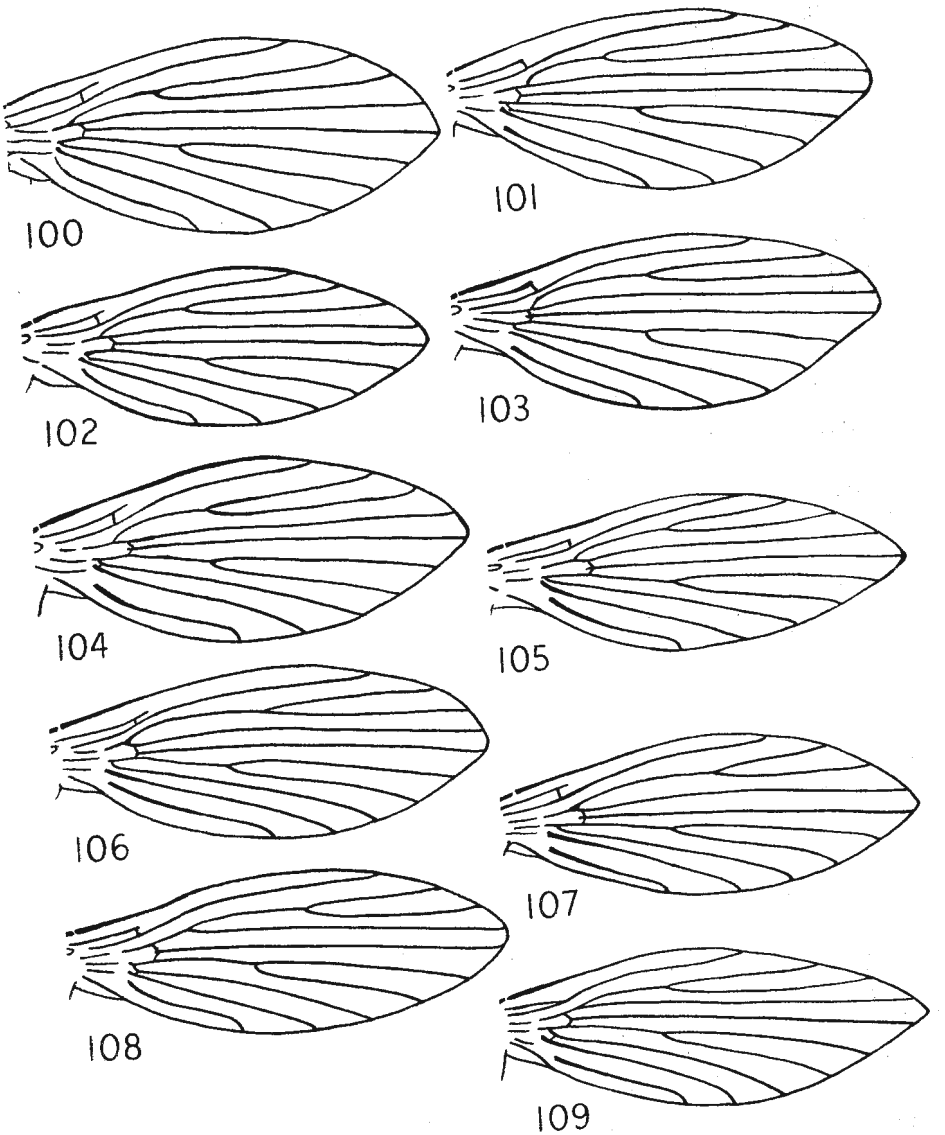
2 Face and base of antennae of male with completely black vestiture ; thorax of male snow-white anteriorly ; scales on wing veins not extending beyond middle of wing on underside, dark tufts present at apices of most long veins ; style eagle-beak shaped ; female indistinguishable from next two species. Wing length 2–3 mm. *Somerset, Devon. Females* (*sp.* ?) *from Yorks., Kerry*
T. notabilis Eaton.
Some white hairs or scales on face and on base of antenna of male ; scales on veins extending well beyond middle of underside of wing.....3

3 Conspicuous white scales on frons, face and base of antenna of male ; thorax much more profusely covered with white hair than *notabilis* ; wing scales extending 2/3rds of wing on underside ; style eagle-beak shaped. *Herts., Sussex, Dorset, Somerset, Devon, Kerry*.....**T. albifacies** Tonnoir.
Much less conspicuous white hairs on face, frons, base of antennae and thorax of male ; wing scales extending almost to tip of wing on underside ; style falcate, regularly curved and with a very fine point. *Devon*
T. goetghebueri Tonnoir.

4 Origin of stem of anterior fork beyond apex of basal cell ; second antennal segment of male with a process covered with scales (fig. 114), or with some of the flagellar segments with port-hole-like sensory organs (fig. 121) or with third antennal segment shorter than fourth ; neck of flagellar segments usually shorter than the basal bulb (fig. 114) ; smallish black species with vestiture of some of the appendages much developed in the male.....18
Origin of stem of anterior fork before or at apex of basal cell except in three species (*fraterculus, ustulatus* and *incertus*), in which it is beyond ; all segments of male antennae normal, neck of flagellar segments usually longer than basal bulb, which is often excentric (fig. 111).....5

5 Base of anterior fork distinctly proximal to that of posterior fork (figs. 101–102).6
Base of anterior fork nearly above or distal to that of posterior fork (figs. 103–107).....9

6 Origin of stem of anterior fork beyond apex of basal cell (fig. 101) ; antennae of both sexes 16-segmented (not 15 as stated by Tonnoir), segments rather shorter than in *labeculosus*, each bearing a large cupuliform whorl of long hairs ; ascoids (fig. 115) numerous in a double row ; uniformly brownish species with three tufts of blackish erect hair on wing, one on middle of Cu, one below posterior fork and third across middle of branches of anterior fork ; indications of tufts of dark hair at apices of most long veins along posterior margin. Wing length 2·25–3 mm. *Somerset, Devon*.....**T. fraterculus** Eaton.
Origin of stem before or at apex of cell, antennal segments without such a broad and perfect whorl of hair.....7



FIGS. 100–109.—Wings of *Telmatoscopus*. 100. *T. notabilis*. 101. *T. fraterculus*. 102. *T. labeculosus*. 103. *T. ustulatus*. 104. *T. ambiguus*. 105. *T. advenus*. 106. *T. decipiens*. 107. *T. soleatus*. 108. *T. revisendus*. 109. *T. caliginosus*.

7 Base of posterior fork beyond level of tip of Cu, R_5 below wing tip (fig. 102); antennae as fig. 111, each segment with a much narrower, but still perfect, whorl of hairs than in *fraterculus*, ascoids simple, straight, a pair on each segment; brownish species with seven small black tufts of erect hairs on disc of wing and blackish hairs at ends of veins. Wing length 2 mm. *Devon*
T. labeculosus Eaton.

Both forks before level of tip of Cu; R_5 terminating at wing tip as in *notabilis* (fig. 100).....8

8 Completely blackish brown; tuft on alula with whitish reflections; scales present on wing on basal half of veins on underside in male; ascoids similar to *rothschildi*. Wing length 2·5 mm. *New Forest*.....**T. tristis** Meigen.

Slightly larger, bronze brown species; vestiture on body, wings and legs partly whitish, two white spaces on costal fringe, black tufts at tips of veins; antennae and ascoids of male as fig. 116. Wing length 2·5–2·75 mm. *Herts., London, Devon*.....**T. rothschildi** Eaton.

9 Anterior and posterior forks almost or quite at same level (figs. 103–105)....10

Anterior fork the more distal (figs. 106–107).....14

10 Origin of stem of anterior fork before apex of basal cell (figs. 104–105).....11

Origin of stem at or beyond apex of basal cell (fig. 103); ascoids as in *fraterculus*; small brownish species with numerous very small erect black tufts on disc of wing and a number of whitish spaces in fringe both on anterior and posterior borders; black tufts on wings show as dark marks on veins on denuded wings. Wing length 2–3 mm *Norfolk, Herts., Dorset, Somerset, Devon*
T. ustulatus Walker.

11 Both forks distinctly before level of tip of Cu (fig. 104); uniformly brown species without markings on legs and without darker tufts on wings; scales present on bases of all veins on underside of wing.....12

Both forks almost immediately above tip of Cu (fig. 105).....13

12 Style of male hypopygium longer, thinner and slightly undulate, cerci shorter than styles and each with eight short retinacula; male with dark dense scales anteriorly on thorax, antennae as *labeculosus* but necks slightly shorter and ascoids in a ring, one pair larger than the rest; subgenital plate of female with posterior margin with triangular and somewhat pointed processes. Wing length 2·7 mm. *Staffs*.....**T. britteni** Tonnoir.

Style of male shorter, thicker and regularly curved, cerci equal in length to the styles, each with ten retinacula of normal length; antennae and ascoids of male as *labeculosus*; no dark dense scales anteriorly on male thorax; female subgenital plate with processes rounded. Wing length 2·5–3 mm. *Somerset, Devon*.....**T. ambiguus** Eaton.

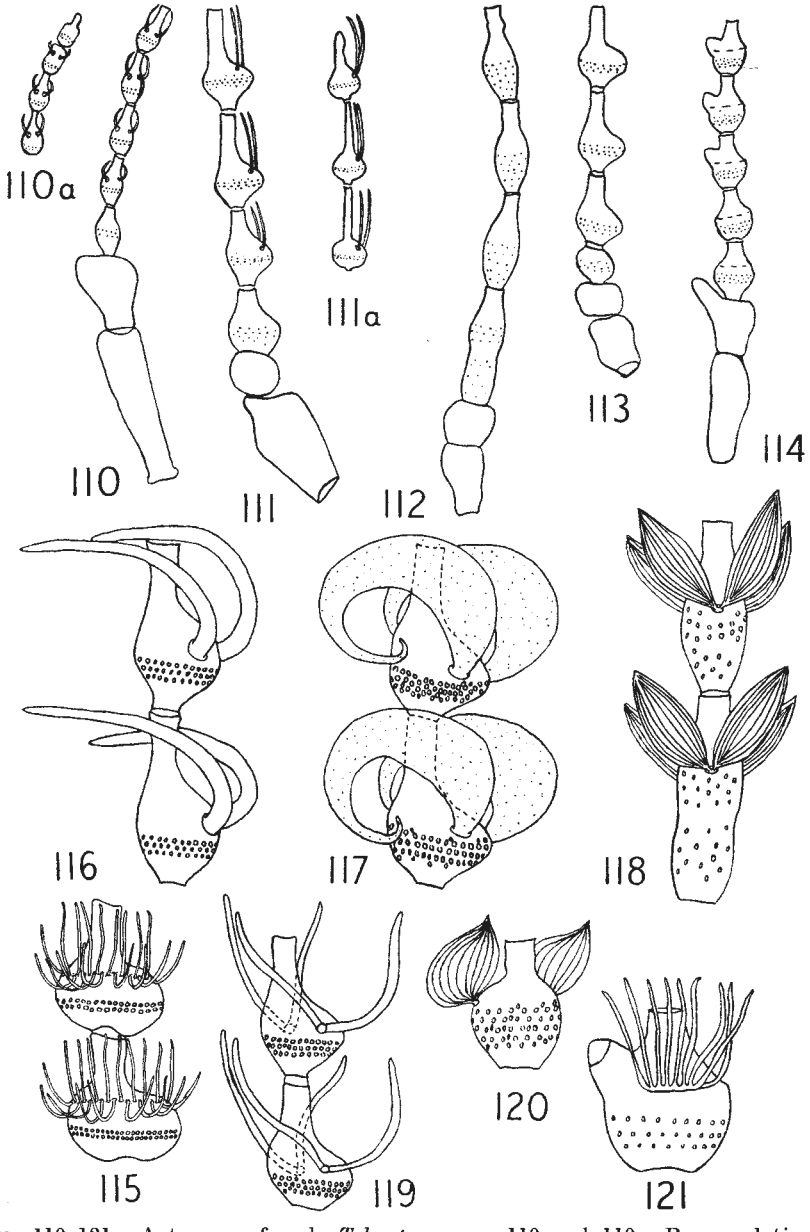
13 Wing apex rather pointed and tip of R_5 ending in it, in the type anterior fork very little beyond posterior one but in most specimens exactly above it (fig. 105); brownish species with anterior part of thorax and base of abdomen whitish; rows of erect bristly hairs on veins greyish with exception of black tufts in region of forks; ascoids of male in form of a pair of large broad leaf-like structures curling around each segment (fig. 117), reduced in female. Wing length 2·5–3 mm. *Herts., Bucks., Devon*.....**T. advenus** Eaton.

Wing apex rounded, tip of R_5 placed a little below it, two forks exactly at same level; brownish-grey species; three black tufts in middle of wing—at end of Cu and at forks, remainder of the rows of bristle hairs beyond these tufts also black; antennae and ascoids as *labeculosus*. Wing length 2–2·75 mm. *Herts., Sussex, Dorset, Somerset, Devon*.....**T. morulus** Eaton.

14 Wings very narrow and pointed, fringe extremely long, in widest part (anal region) as wide as wing itself; four white spaces in costal fringe and four in posterior; legs with white markings; antennae 15-segmented, ascoids of male in form of a pair of long curved filaments (presumably similar to *rothschildi*). Wing length 2 mm. *Herts. (one female)*.....**T. angustipennis** Tonnoir.

Wings less narrow and fringe shorter; dark species without white spaces in costal or posterior fringes, legs entirely dark.....15

15 Origin of stem of anterior fork well beyond apex of basal cell; brown species with white fringe at wing tip; rows of bristly hairs on basal half of wing, whitish at their ends in the region of the forks; scales present on bases of veins on



FIGS. 110–121.—Antennae of male *Telmatoscopus*. 110 and 110*a*. Base and tip of *T. goetghebueri*. 111 and 111*a*. Base and tip of *T. labeculosus*. 112. Base of *T. incertus*. 113. Base of *T. revisendus*. 114. Base of *T. caliginosus*. 115. Segments 4 and 5 of *T. fraterculus*. 116. Segments 8 and 9 of *T. rothschildi*. 117. Segments 4 and 5 of *T. advenus*. 118. Segments 3 and 4 of *T. incertus*. 119. Segments 4 and 5 of *T. revisendus*. 120. Segment 4 of *T. eatoni*. 121. Segment 7 of *T. caliginosus*.

underside of wing ; antennae 15-segmented, third segment elongate compound (fig. 112), fourteenth without neck, ascoids each paired, leaf-like, striated (fig. 118). Wing length 2–2·5 mm. *Dorset, Somerset, Devon*....**T. incertus** Eaton.

Origin of stem of anterior fork at or before apex of basal cell.....16

16 Origin of this stem at apex of basal cell ; uniformly brown species with small dark tufts of erect hairs on middle of wing at forks, another at tip of Cu and a very small one at tip of Sc ; scape of antennae three or four times as long as broad, ascoids similar in shape to *rothschildi*, only about half their length. Wing length 2–3 mm. *Somerset, Kerry*.....**T. consors** Eaton.

Origin of this stem before apex of basal cell.....17

17 Tip of R_1 at about level of M_3 (fig. 106) ; no dark tufts on wing ; uniformly brown species without distinct scales at base of wing on underside ; short black scales on anterior part of thorax of male ; male antennae similar to *fraterculus*. Wing length 2–2·5 mm. *Devon, Dorset*.....**T. decipiens** Eaton.

Tip of R_1 well before level of tip of M_3 (fig. 107) ; small brownish species with two relatively large blackish tufts in middle of wings in region of forks ; wings rather pointed ; male antennae resemble *fraterculus* in form except that scape is longer and ascoids resemble *rothschildi* only three-quarters of their length. Wing length 2–2·5 mm. *Cheshire, Dorset, Somerset, Devon*
T. soleatus Walker.

18 Anterior fork well beyond posterior one and both forks clearly beyond tip of Cu (fig. 108) ; wings light brownish grey with two black rounded spots in the region of the forks ; male antennae with first segment as long as broad, second spheroidal, stouter contiguous with the smaller third segment (fig. 113), segments 4–14 normal, segments 15 and 16 contiguous, 15 lacking a neck, ascoids in pairs, double, finger-shaped (fig. 119). Wing length 2–2·25 mm. *Somerset, Devon*.....**T. revisendus** Eaton.

Anterior fork a very little beyond (fig. 109) or before posterior one ; both forks at or before level of Cu.....19

19 Male with mesopleuron with a bare patch bearing a large vesicular scent organ which is directed upwards, curving backwards in the middle of its length ; wings narrow and pointed, venation similar to *caliginosus* (fig. 109) ; vestiture black, fringe whitish at apex , rows of erect bristles extend to middle of wing, no tufts on disc or at tips of veins ; legs black except for front tibiae, which are swollen and carry a dense dorsal covering of flat, broad scales, the apical 2/3rds of which are whitish ; antennae rather similar to *revisendus*, appearing 15-segmented, because segments 15 and 16 are more or less fused ; ascoids each divided, leaf-like, striated, one branch longer than the other, otherwise very similar to *incertus* (fig. 118). Wing length 2–4 mm. Female unknown. *Cheshire*.....**T. andrenipes** Strobl.

Male without scent organ on thorax or swollen front tibiae.....20

20 Male antennae without port-hole organs or pedicellar process ; ascoids forming a pair of peculiar, transparent, broad, striated lamellae pointed apically (fig. 120), in female much reduced ; antennae 16-segmented, 15th segment without a neck ; wing venation similar to *caliginosus* (fig. 109) ; vestiture of wings uniformly brown, rows of bristly hairs extending a little past the forks, no tufts. Wing length 2–2·25 mm. *Dorset*.....**T. eatoni** Tonnoir.

Male antennae with port-hole organs on at least two segments, ascoids branched (figs. 114, 121).....21

21 Second antennal segment in male with a process (fig. 114) carrying a very dense tuft of black scales ; port-hole organs on segments 5–7 ; wings (venation fig. 109) blackish with two obliquely transverse darker fasciae or series of hair spots, one across the forks, the other at the end of the region of bristling hair. Wing length 2–2·5 mm. *Dorset, Somerset, Devon*.....**T. caliginosus** Eaton.

Male antennae without a process on pedicel or else with a process and port-hole organs on segments 5–6 only, forks rather more basal.....22

22 Male antenna without process on second segment, port-hole organs on segments 5–8 ; small brown species, wing markings as in *caliginosus*. Wing length 1·75–2 mm. *Westmorland*.....**T. palposus** Tonnoir.

Male antenna with process on second segment, port-hole organs on segments 5 and 6 only ; vestiture completely blackish brown. Wing length 2·5 mm. *Herts*.....**T. furvus** Tonnoir.

Genus **TRICHOPSYCHODA** Tonnoir.

Only one species in this genus. Easily separable from all other British Psychodids by the presence of hairs on the wing membrane. Antennae 16-segmented, the last three reduced, without ascoids or verticils, but all distinct, not fused, rather similar to *Psychoda cinerea* (fig. 122), ascoids 3-branched as usual for *Psychoda*. Wing forks incomplete basally (as in *Ps. brevicornis*, fig. 145), only R_3 shorter and M_2 longer. Cerci much shorter than ninth tergite, with a well-developed tooth at the apex below and about a dozen long hairs each terminating in a peculiar nodule reminiscent of the capsule of a poppy; vestiture uniformly dark. Wings held flat in life and has the curious habit of running rapidly in circles. *Recorded only from Hunts.* Wing length 2–2·25 mm.

T. hirtella Tonnoir.

Genus **PSYCHODA** Latreille.

KEY TO SPECIES.

1 Males 2
Females 19

2 Cerci almost equal in length to ninth tergite, never very much longer, sometimes evenly swollen along their length but never bulbous at the base or forficulate when seen from behind (figs. 146, 148); one, two or three retinacula 3
Cerci noticeably longer than the ninth tergite, often twice as long, often bulbous at the base, held vertically and forficulate, i.e. long and curved like the forceps of an earwig (figs. 147, 149), never more than one retinaculum 8

3 Two or three retinacula on each cercus 4
Only one retinaculum on each cercus 5

4 Three retinacula; pubescence of thorax light brown, of abdomen dense and brownish, wings unspotted; ascoids with only one anterior and one posterior branch; antennae 16-segmented, the last three small, equal, distinct, the thirteenth with a very short neck. Wing length 2–2·5 mm. *Somerset, Devon*
Ps. lucifuga Walker.
Two retinacula; pubescence of thorax whitish, brown on the disc, pubescence of rest of insect fairly pale, wings unspotted; antennae 16-segmented, thirteenth segment no neck, last three distinct, subequal; ascoids small three-branched, the anterior branches swollen. Wing length 2–2·75 mm. *Cambs., Sussex, Gloucs., Somerset, Dorset, Devon* ..... **Ps. humeralis** Meigen.

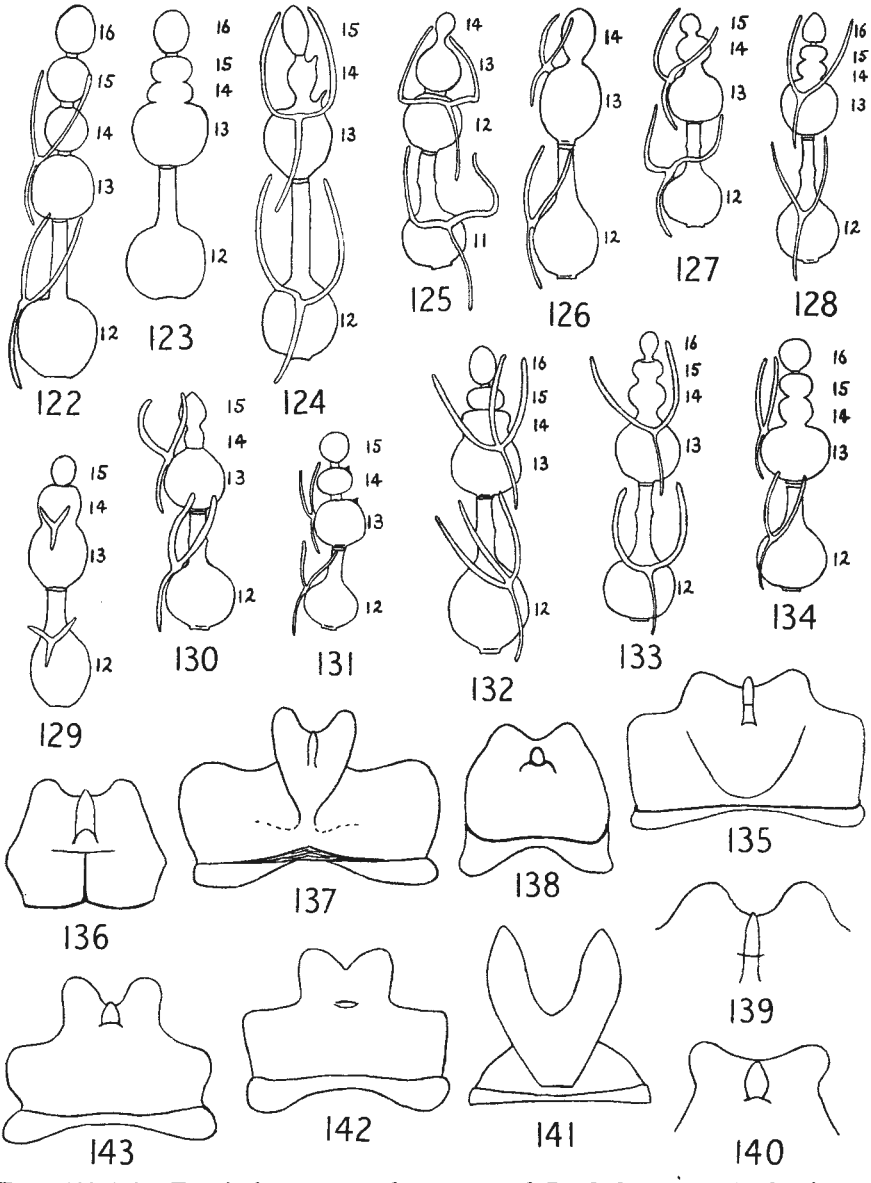
5 Antennae 16-segmented, last three segments diminutive and without verticils or ascoids, subspherical, subequal and separated from each other by a suture (fig. 122) 6
Antennae 15- or 16-segmented; in latter case last segments not subequal and not distinctly separated by a suture though a constriction is present between them (figs. 123–124) 7

6 Style of hypopygium not bulbous basally, suddenly narrowing towards its middle in a long, thin, curved beak (fig. 150), internal lobes under aedeagus fused into one median, flat, bare, squarish plate; pubescence in general rather pale. Wing length 2–2·5 mm. *Northumberland, Cambs., Middlesex, London, Devon, Kerry* ..... **Ps. cinerea** Banks (*compar* Eaton).
Style of hypopygium distinctly bulbous at the base (fig. 151), its beak curved and sharp; internal lobes of aedeagus fleshy. Very similar to *cinerea*. *Herts., Dorset, Devon* ..... **Ps. gemina** Eaton.

7 Antennae 16-segmented (apex, ascoids omitted, fig. 123). *Devon* (1 *male*)
Ps. obscura Tonnoir.
Antennae 15-segmented (apex, fig. 124), segments 13 and 14 with a lateral sensorial cone; pale grey species, wings with ten black spots in three irregular transverse series, wing tip also sometimes dark. Wing length 1·75–2·25 mm. *Westmorland, Somerset, Devon* ..... **Ps. erminea** Eaton.

8 Wings with the two main forks incomplete basally (fig. 145) 9
The two main forks complete (fig. 144) 11

9 Antennae 14-segmented, segments 12 and 13 without necks, ascoids rather contorted, on segments 3–12 (fig. 125); wings rather broad (fig. 145); vestiture greyish brown; coxite elongate, style as long as coxite, very thin and little incrassate basally. Wing length 1·2 mm. *Herts., Surrey, Sussex, Devon*
Ps. brevicornis Tonnoir.
Antennae 15- or 16-segmented 10



FIGS. 122–143.—Terminal segments of antennae of *Psychoda* (122–134), showing a single ascoid of each pair only, and female subgenital plates (135–143) of *Psychoda*. 122. *Ps. cinerea*. 123. *Ps. obscura*. 124. *Ps. erminea*. 125. *Ps. brevicornis*. 126. *Ps. severini* subsp. *parthenogenetica*. 127. *Ps. setigera*. 128. *Ps. trinodulosa*. 129. *Ps. alternata*. 130. *Ps. albipennis*. 131. *Ps. crassipenis*. 132. *Ps. pusilla*. 133. *Ps. spreta*. 134. *Ps. lobata*. 135. *Ps. cinerea*. 136. *Ps. gemina*. 137. *Ps. lobata*. 138. *Ps. grisescens*. 139. *Ps. phalaenoides* subsp. *elongata*. 140. *Ps. crassipenis*. 141. *Ps. alternata*. 142. *Ps. erminea*. 143. *Ps. severini* subsp. *parthenogenetica*.

10 Antennae 15-segmented (fig. 127), last three segments often appear to have a suture between them ; vestiture greyish ; cerci nearly twice as long as ninth tergite, forficulate and basally bulbous, retinaculum long, nearly ¼ length of cercus ; style cylindrical for basal 2/3rds, then suddenly contracted to a fine slightly curved point. Wing length 1·5 mm. *Herts., Surrey*
Ps. setigera Tonnoir.

Antennae 16-segmented (fig. 128) ; cerci as *setigera* ; style bulbous basally, narrowing gradually to the apex ; aedeagus in two parts. Wing length 1·75 mm. *Westmorland, Herts., Devon*.....**Ps. trinodulosa** Tonnoir.

11 Antennae 15-segmented.....12

Antennae 16-segmented.....16

12 Dark dots present at ends of most veins visible on denuded wing as dark spots ; ascoids reduced (fig. 129), especially on apical segments ; retinaculum about ⅛ length of cercus ; style not swollen basally, evenly narrowing to a point, slightly curved, tusk-like ; wings light brownish grey with transverse series of whitish spots forming a broken zig-zag fascia ; venation fig. 144. Wing length 2–3 mm. *Cosmopolitan*.....**Ps. alternata** Say.

Dark dots absent at ends of veins.....13

13 Fourteenth segment of antennae much smaller than fifteenth (fig. 130).....14

Fourteenth segment larger than fifteenth (fig. 131).....15

14 Coxite almost four times as long as wide, subcylindrical, style with short sensory setae (fig. 152) ; pale whitish-grey species similar in appearance to *phalaenoides* ; antennae fig. 130. Wing length 1·5–2 mm. *Herts., London, Surrey, Somerset, Dorset, Devon*.....**Ps. albipennis** Zetterstedt.

Coxite hardly as long as wide, very much swollen on the side, style with one long and several shorter sensory setae (fig. 153) ; whitish species with faint darkish fascia across wing ; antennae as *albipennis*, with a very short sensory cone on segments 13 and 14. Wing length 2–2·75 mm. *Lancs.* (1 *male*)
Ps. surcoufi Tonnoir.

15 Aedeagus very much swollen, coxites almost twice as thick at base as at tip (fig. 155) ; antennae as fig. 131, a small sensory cone on segments 13 and 14 ; vestiture greyish brown. Wing length 1·25 mm. *Herts.*
Ps. crassipenis Tonnoir.

Aedeagus long but not swollen, coxites scarcely thicker at base than at apex (fig. 154) ; antennae as *crassipenis* ; vestiture greyish brown. Wing length 1·5–2·25 mm. *Ross, Yorks., Herts., Surrey, London, Somerset, Devon, Cork, Kerry*.....**Ps. phalaenoides** Eaton.

16 Ascoids with three anterior branches (fig. 132) ; style subequal to coxite, conical, pointed ; similar in coloration to *albipennis*. Wing length 1·5 mm. *Herts.*
Ps. pusilla Tonnoir.

Ascoids with two anterior branches.....17

17 Style suddenly tapering away from middle and ending in a sharp beak (fig. 157) ; parameres large and pubescent ; all apical antennal segments united (fig. 133), though 16th sometimes appears separate. Wing length 1·5 mm. *Westmorland, Yorks., Herts., Devon*.....**Ps. spreta** Tonnoir.

Style more or less wedge-shaped, or at any rate tapering to a not very sharp point (fig. 156) ; suture present between at least antennal segments 15 and 16....18

18 Style much as shown in fig. 156, straight, wedge-shaped, or evenly curved, not always as bulbous as shown ; antennal segments 13 and 14 united with no suture, 14 and 15 apparently with a suture [though Tonnoir says that it does not exist], last two segments with distinct suture, very similar to *pusilla* (fig. 132) except for ascoids ; squarish ninth sternite serrated at corners. Wing length 2 mm. *Herts., Surrey, Sussex, Devon*.....**Ps. grisescens** Tonnoir.

Style slightly sinuated, not straight or evenly curved ; antennal segments 13, 14 and 15 united with no sutures ; ninth sternite rounded, not serrated. Wing length 1·8–2 mm. *Yorks., Devon*.....**Ps. lobata** Tonnoir.

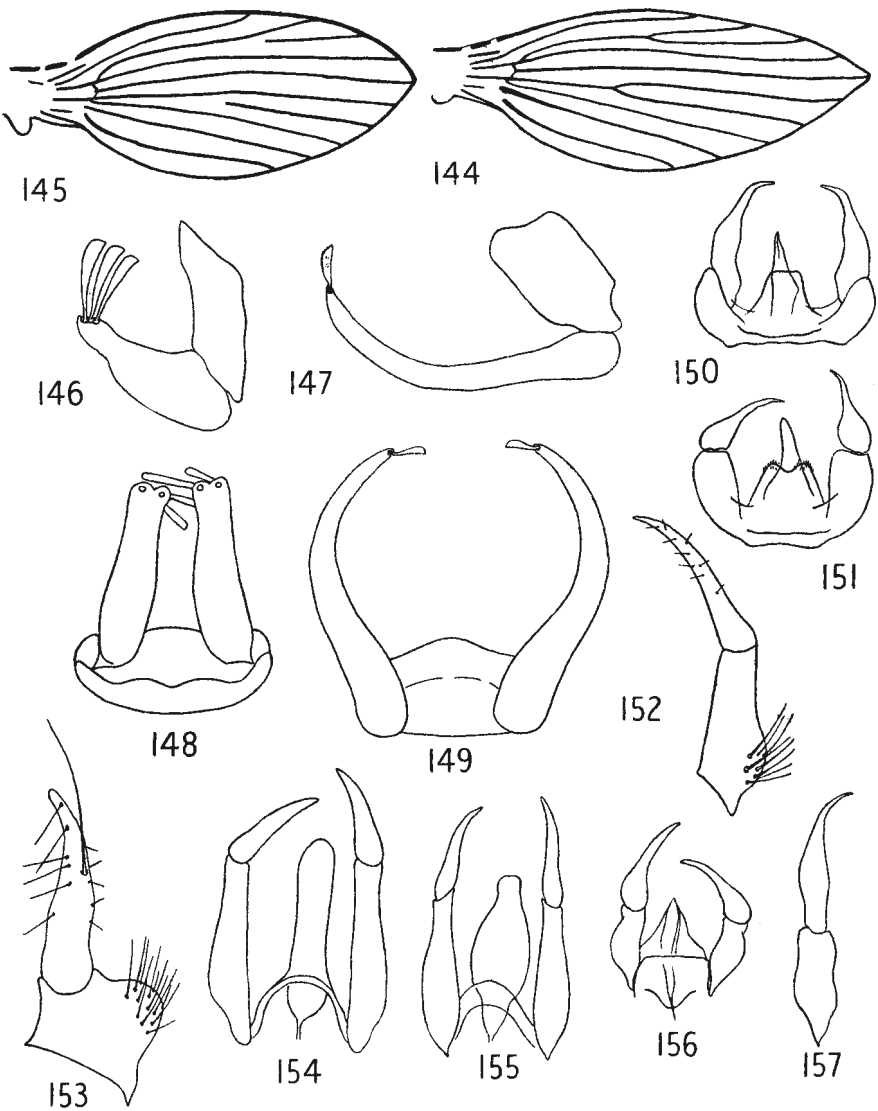
19 Antennae 16-segmented.....20

Antennae 15-segmented.....30

Antennae 14-segmented.....36

20 Distinct sutures between all of the apical four segments, the last three subequal (fig. 122).....21

No sutures between two or more of the last four segments, the last three sometimes of unequal size.....24



FIGS. 144–157.—Wings (144–145) and male genitalia of *Psychoda*. 144. *Ps. alternata*. 145. *Ps. brevicornis*. 146. Lateral view of cercus and ninth tergite of *Ps. lucifuga*. 147. The same of *Ps. albipennis*. 148. Terminal view of cerci of *Ps. humeralis*. 149. Terminal view of forficulate cerci of *Ps. albipennis*. 150. Coxites and styles of *Ps. cinerea* from above. 151. The same of *Ps. gemina*. 152. Right coxite and style of *Ps. albipennis*. 153. The same of *Ps. surcoufi*. 154. Coxites and styles of *Ps. phalaenoides*. 155. The same of *Ps. crassipenis*. 156. The same of *Ps. grisescens*. 157. Left coxite and style of *Ps. spreta*.

21 Ovipositor very much reduced, not longer than wide....**Ps. humeralis** Meigen.
Ovipositor normal, longer than basal width and pointed at apex.....22
22 Ascoids with only one anterior branch ; third antennal segment amphora-shaped
Ps. lucifuga Walker.
Ascoids with at least two anterior branches ; third segment of similar shape to the following ones.....23
23 Subgenital plate wider than long, its internal sensory organ long, narrow and cylindrical (fig. 135) ; spermatheca smooth.....**Ps. cinerea** Banks.
Subgenital plate about as wide as long, with a median sclerotized embedded rod at base ; internal sensory organ bullet-shaped (fig. 136) ; spermatheca with surface strongly reticulated.....**Ps. gemina** Eaton.
24 Ascoids with two anterior branches.....25
Ascoids with three anterior branches (fig. 132).....**Ps. pusilla** Tonnoir.
25 No suture at all between any of the last four antennal segments ; segments 14 and 15 wider than long, 16 smaller than the preceding ones, sometimes with an ill-defined suture between 15 and 16 (fig. 133) ; subgenital plate with markedly divergent lobes forming a crescent with rounded points
Ps. spreta Tonnoir.
At least one well-defined suture between some of the last four segments.....26
26 No suture between segments 13, 14 and 15, a suture between 15 and 16 (*grisescens* often appears to have a suture between 14 and 15).....27
Suture missing between two only of terminal segments, antennae 15-segmented (see couplet 19 again).....30
27 Subgenital plate much wider than long, its two lobes forming a heart-shaped median projection (fig. 137) ; segment 16 spherical, subequal to two preceding ones (fig. 134) ; ascoids normal ; vestiture uniformly greyish
Ps. lobata Tonnoir.
Subgenital plate not much, if at all, wider than long.....28
28 Both main forks of the wing incomplete basally (as in fig. 145) ; antennae fig. 128
Ps. trinodulosa Tonnoir.
Both forks complete.....29
29 Sides of subgenital plate convex in profile, its distal lobes little produced and separated by a shallow indentation (fig. 138).....**Ps. grisescens** Tonnoir.
Sides of subgenital plate concave in profile, its distal lobes large and separated by a deep indentation ; antenna fig. 123. *Only one male so far known from Britain*
Ps. obscura Tonnoir.
30 A suture between all terminal segments of antenna, last two segments subspherical and subequal (fig. 131).....31
Suture absent between at least two of the terminal segments, sometimes no sutures at all.....32
31* Subgenital plate wider than long ; internal sensory organ about four times as long as wide (fig. 139) ; ascoids long and somewhat curved even on basal segments.....**Ps. phalaenoides** Linnaeus.
Subgenital plate rather narrower, internal sensory organ scarcely twice as long as wide (fig. 140) ; ascoids short and blunt, especially on basal segments
Ps. crassipenis Tonnoir.
32 The last three antennal segments without any suture between them (fig. 127) and the 14th never bare.....**Ps. setigera** Tonnoir.
Only two of the terminal segments are without sutures between them ; if suture is absent between other segments as well, then 14th bare and smaller than last one.....33
33 Fourteenth segment distinctly smaller than 15th and never pubescent, at most with only one sensory cone (fig. 130).....34
Fourteenth segment subequal to or larger than 15th.....35

* Tonnoir divided *phalaenoides* into two subspecies on the shape of the sensory organ in the female subgenital plate. Subsp. *phalaenoides* has the sensory organ only twice as long as wide (as in *crassipenis*, fig. 140) ; subsp. *elongata* has the sensory organ four times as long as wide and was thought by Tonnoir to be parthenogenetic. Dr. Satchell informs me that as a result of breeding experiments he finds that subsp. *elongata* is the common form and is not parthenogenetic : subsp. *phalaenoides* is very scarce ; no associated males have been found as yet and it may simply be an aberrant form.

34 Wings with faint, transverse, blackish, median fascia ; subgenital plate with two lobes separated from the base of the plate by a strong constriction, the effect being somewhat as in *lobata* (fig. 137) but shoulders of base of plate fall away as in *alternata* (fig. 141) ; sensory organ hardly visible. *Only one male known from Britain*.....**Ps. surcoufi** Tonnoir.
Wings without fascia ; lobes of subgenital plate small, no constriction between them and base of plate.....**Ps. albipennis** Tonnoir.

35 Fifteenth antennal segment much smaller than 14th, which is broadly united to 13th (fig. 129) ; ascoids small ; subgenital plate (fig. 141) with long and narrow lobes separated from base of plate by a constriction ; some dark tufts at tips of some wing veins.....**Ps. alternata** Say.
Fifteenth segment subequal to 14th (fig. 124) ; lobes of subgenital plate small, no marked constriction between them and the base (fig. 142)
Ps. erminea Eaton.

36 Forks of wing incomplete at base (fig. 145) ; 12th antennal segment without neck (fig. 125).....**Ps. brevicornis** Tonnoir.
Forks complete ; 12th segment with neck, 14th small, ovoid, no suture or rudiment of a segment between it and 13th (this is present in typical subsp., which has not yet been found in Britain) as in fig. 126 ; subgenital plate fig. 143 ; vestiture greyish. Wing length 2–2·75 mm. *Cosmopolitan, common in sewage beds. Parthenogenetic subspecies, males unknown*
Ps. severini subsp. **parthenogenetica** Tonnoir.

ALTERNATIVE PARTIAL KEY TO GENUS PSYCHODA (MALES AND FEMALES).
After Tonnoir, 1940.

1 Wings with small dark spots on the courses of the veins.....**Ps. erminea** Eaton.
Wings with black dots at tips of veins.....**Ps. alternata** Say.
Wings quite unmarked, or at most (*surcoufi*) with a faint dark band across the middle.....2

2 Wings with the two main forks incomplete basally (lower branch disconnected).....3
Wings with the forks complete.....4

3 Twelfth antennal segment without neck.....**Ps. brevicornis** Tonnoir.
Twelfth segment with usual long neck.....**Ps. setigera** Tonnoir.
Ps. trinodulosa Tonnoir.

4 Antennae with three small, subequal and subspherical segments at tip
Ps. cinerea Banks.
Ps. gemina Eaton.
Ps. lobata Tonnoir.
Ps. lucifuga Walker.
Ps. humeralis Meigen.
Antennae with two such segments.....**Ps. phalaenoides** Linnaeus.
Ps. crassipenis Tonnoir.
Small terminal segments unequal, not all subspherical.....5

5 Three small terminal segments.....**Ps. obscura** Tonnoir.
Ps. grisescens Tonnoir.
Ps. spreta Tonnoir.
Ps. pusilla Tonnoir.
One or two small terminal segments.....**Ps. albipennis** Zetterstedt.
Ps. severini Tonnoir.
Ps. surcoufi Tonnoir.

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Family CULICIDAE.

Subfamilies DIXINAE and CHAOBORINAE.

By PAUL FREEMAN.

The family CULICIDAE contains three sub-families, the DIXINAE, CHAOBORINAE (CORETHRINAE), and CULICINAE, the last comprising the mosquitoes. The characters by which the family is separable from other Nematocerous families lie mainly in the wing venation and are as follows : Sc long, reaching the costa ; R 4-branched, R_{2+3} forked and R_{3+4} simple ; M 3-branched, M_{4+5} simple ; cross-veins r-m and m-cu both present ; 1A long, reaching wing margin. Figures 158 and 163 show the venation in the DIXINAE and CHAOBORINAE ; in the CULICINAE the normal Comstock-Needham wing vein letters are not used but the older system of numbers is employed ; a comparison of the two systems will be found in the Introduction (p. 21). The CULICIDAE resemble the CHIRONOMIDAE and CERATOPOGONIDAE in the reduction of the first antennal segment and the enlargement of the second. The larvae are aquatic, and have a complete head capsule and one pair of functional spiracles (absent in the CHAOBORINAE) situated *dorsally* on the ninth segment : larvae of no other families have this combination of characters.

The DIXINAE contains two genera, *Dixa* and *Neodixa*, the latter confined to New Zealand. The adults of *Dixa* are bare flies with short mouthparts not formed for biting and sometimes with clouded wings ; the males do not have plumose antennae : they are to be found near water.

The elongate, almost cylindrical larvae of *Dixa* are aquatic, but are not very active swimmers ; they spend most of their time on vegetation or rocks at the water's edge crawling by means of pseudopods on the first two abdominal segments and pairs of sclerotized plates bearing hooks on segments 5–7. They are frequently found with the body bent in the form of a $\cap$, the greater part being above water level (though immersed in the surface film) and only the tip of the abdomen and the head submerged. The food of the larvae consists of small organisms occurring at or near the surface film, gathered by mouth-brushes ; the antennae and palps are simple. The pupae are rather like those of mosquitoes ; the tergites have angular ridges in the middle ; there are paddles at the end of the abdomen and a pair of respiratory horns on the thorax.

The males of *Dixa* fly in small swarms usually just before sunset ; there are no special observations on record as to the mating or feeding habits. The eggs are laid in a mass of jelly on a solid substratum.

The subfamily CHAOBORINAE is represented in Britain by the genera *Chaoborus* (*Corethra*) and *Mochlonyx*. The adults are hairy and scaly flies with a short rostrum, though the mouthparts are short and not formed for biting. The antennae of the males are plumose.

The larvae of the British genera of CHAOBORINAE are glassy (darker in *Mochlonyx*) and transparent, with raptorial antennae furnished with spines for seizing their prey and two pairs of kidney-shaped air-sacs, one in the thorax and one in the seventh abdominal segment. The thorax is of larger diameter than the abdomen, and the last abdominal segment bears a ventral flat brush of 20–30 hairs arranged almost in one row. There are no functional spiracles, and the larvae swim in a horizontal position in the water, seldom coming to the surface. The larvae are carnivorous, feeding on mosquito larvae, small crustacea, etc. The pupae are normal for the family, with thoracic respiratory horns and paddles at the end of the abdomen.

The eggs of *Chaoborus* are hard-shelled and spindle-shaped, enclosed in a circular mass of jelly, and are deposited on the surface of the water ; in *Mochlonyx* they have no special floating mechanism, and are deposited singly on the surface of the water.

KEY TO SUBFAMILIES.

1 Antennal flagellum 14-segmented ; vein Sc ending above or before Rs (fig. 158) ; mouthparts short ; no scales ..... DIXINAE.
Antennal flagellum 13-segmented ; vein Sc ending much beyond base of Rs (figs. 163, 166) 2
2 Mouthparts short, but short rostrum present, palpi incurved ; scales almost confined to wing fringe ..... CHAOBORINAE.
Mouthparts elongate forming a long proboscis, palpi not incurved ; wing-veins and legs scaly (figs. 158–162) ..... CULICINAE.

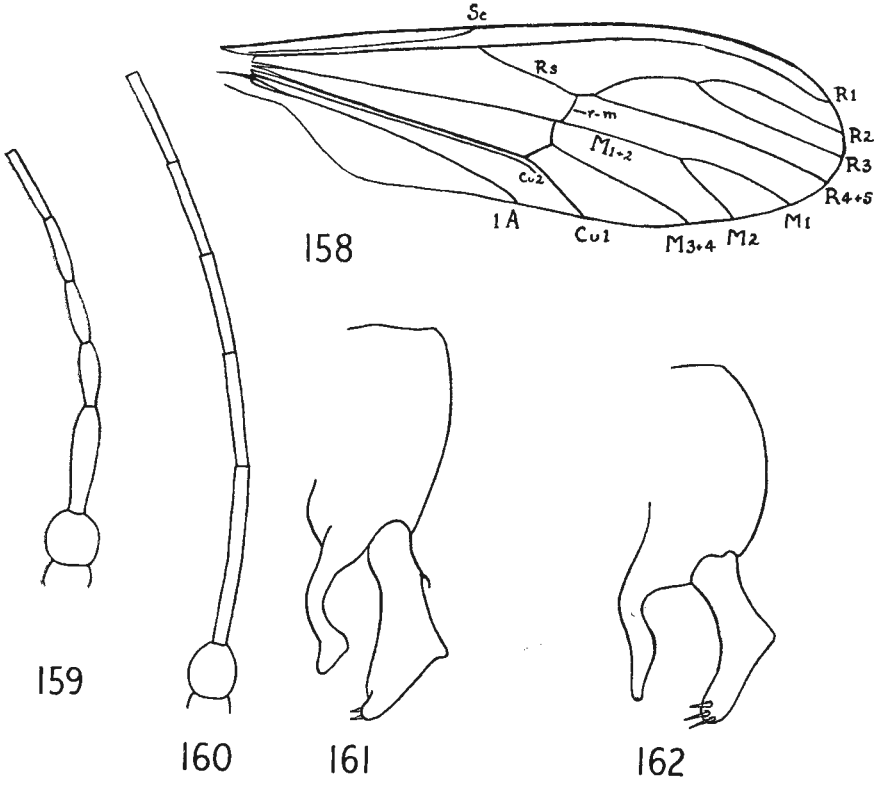
Subfamily **DIXINAE.**

KEY TO SPECIES.

Only one British genus—**Dixa** Meigen.

1 Antennae relatively short, the first flagellar segment thickened, basal segments of flagellum more or less fusiform (fig. 159), all segments distinct ; wings clouded, at least around cross-vein r-m. Subg. **Dixa** Meigen 2
Antennae relatively long, first flagellar segment elongate, cylindrical, no segments of flagellum fusiform (fig. 160), segmentation difficult to see ; wings clear or with only a very faint cloud around r-m, (except in *D. filicornis* which has a well developed cloud but r-m meeting Rs well before the fork as in fig. 158). Subg. **Paradixa** Tonnoir 7
2 Dark spot over cross-veins large and sharply defined, spreading upwards almost or quite to R_1 ; middle thoracic stripe clearly longitudinally divided ; pleurae distinctly striped 3
Dark spot small and ill-defined ; middle thoracic stripe undivided or only very faintly so ; pleurae mottled or unicolorous 4
3 Forks of R_2 and R_3, and M_1 and M_2, distinctly clouded. Wing length 4–5 mm. *Inverness, Notts., Herts., Hereford, Devon* ..... **D. nebulosa** Meigen.
These forks not at all clouded. Wing length 4–5 mm. *Arran, Westmorland, Yorks., Brecon, Herts., Devon, Cornwall, Kerry* ..... **D. nubilipennis** Curtis.
4 Thorax without distinct grey shimmer ; pleurae nearly unicolorous brown ; mesonotum without dark pubescence ; a single dark separate rounded spot is placed on the shoulders in front of the lateral thoracic stripes ; pronotal lobes entirely dark ; wing spot evenly spread around cross-vein. Wing length 4–5 mm. *Inverness, Westmorland, Brecon, Shropshire, Devon, Cornwall* **D. puberula** Loew.
Thorax with distinct grey shimmer on pale areas ; pleurae mottled ; mesonotum with pale pubescence ; no separate rounded spots in front of lateral thoracic stripe ; pronotal lobes laterally pale ; wing spot mainly on inner side of cross-vein 5

5 Middle thoracic stripe with an elongate dark area attached to it on either side connecting it to the lateral stripes; scutellum all yellowish. Wing length 4–4·5 mm. *Sutherland, Cromarty, Inverness, Perth, Argyll, Arran, Yorks., Notts., Bucks., Shropshire, Devon*.....**D. dilatata** Strobl.
Middle thoracic stripe simple, well separated from the lateral ones.....6
6 Scutellum conspicuously darkened on each side. Wing length 4–5 mm. *Suffolk, Hereford, Denbighshire*.....**D. maculata** Meigen.
Scutellum scarcely if at all, darkened laterally. *Westmorland, Yorks., Warwick., Notts., Beds., Herts, Middlesex, Berks., Oxford, Shropshire, Dorset, Cornwall, Kerry* **D. submaculata** Edwards.



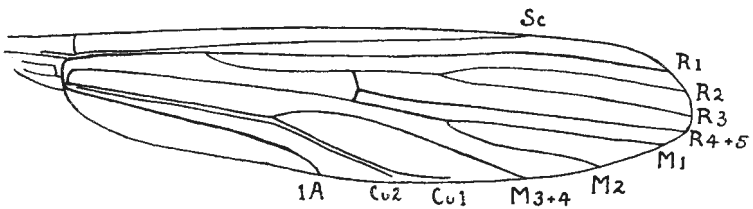
FIGS. 158–162.—Wing, antennae and hypopygia of *Dixa*. 158. *D. obscura*. 159. *D. puberula*. 160. *D. aestivalis*. 161. *D. serotina*. 162. *D. autumnalis*.

7 Cross-vein r-m well basal to fork of Rs (fig. 158).....8
Cross-vein meeting Rs at fork or just beyond.....9
8 Wings with a distinct brown cloud placed symmetrically over cross-vein r-m, cell Cu with brownish tinge; head dark; thoracic stripes very clearly defined, the middle one finely divided longitudinally; scutellum yellow; postnotum dark; halteres yellow; pleurae mainly brown. Wing length 4·5 mm. (1 specimen). *Sussex*.....**D. filicornis** Edwards.
Wings clear; head dark (said to be yellowish in the type); thoracic stripes fused; scutellum, postnotum and halteres dark brown; pleurae mainly brown. Wing length 4·25 mm. (1 specimen). *Dumbartonshire*.....**D. obscura** Loew.

9 Head largely orange-yellow in the middle.....10
Head entirely blackish in the middle.....11

10 Male genitalia as fig. 161 ; inner process of coxite clubbed, styles hardly concave. Wing length 3·5–4·5 mm. (3 specimens). *Herts*.....**D. serotina** Meigen.
Male genitalia as fig. 162 ; inner process of coxite simple, styles strongly concave. Wing length 3·5–5 mm. *Nairn, Hunts*.....**D. autumnalis** Meigen.

11 Mesonotum with three well separated, distinct, clearly defined stripes, the middle one normally divided longitudinally ; pleurae, mesosternum and postnotum usually yellowish. Wing length 4–6 mm. *Generally distributed*
D. aestivalis Meigen.
Mesonotal stripes connected by dark patches, the middle stripe usually entire ; most of pleurae and mesosternum and whole of postnotum dark.....12



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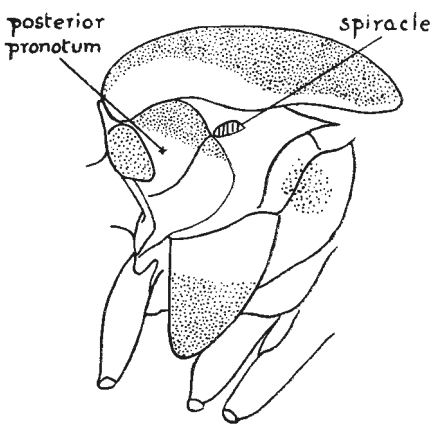

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FIGS. 163–164.—163. Wing of *Chaoborus pallidus*. 164. Lateral view of anterior part of thorax of *Ch. crystallinus*.

12 Mesonotal stripes clearly defined, lateral ones connected to central one by anterior extensions, not fused along whole length of central one, shoulders and sides of mesonotum yellow ; head usually lighter along eye-margins ; M_{1+2} as long as M_2. Wing length 4–4·5 mm. *Carnarvon, Devon, Cornwall*
D. martinii Peus (*laeta* Goet. *nec* Loew).
Mesonotal stripes broad and confluent, occupying all of mesonotum except for an area in the middle posteriorly which is yellow, thus shoulders and sides dark and no yellow area between central and lateral stripes ; head not noticeably lighter along eye-margins ; M_{1+2} much longer than M_2. Wing length 3·5–4·5 mm. *Inverness, Yorks., Hunts., Somerset*.....**D. amphibia** Degeer.

Subfamily **CHAOBORINAE (CORETHRINAE).**

KEY TO SPECIES.

1 Metatarsus short, about a ¼ length of strongly lengthened second tarsal segment; claws with two teeth, a basal short one and a very long one placed centrally. **Mochlonyx** Loew.....2

Metatarsus normal, elongate, nearly or quite twice as long as second tarsal segment; claws small, simple. **Chaoborus** Lichtenstein (*Corethra* Meigen).....3

2 Hairs at *bases* of first two tarsal segments whitish, legs largely pale, femora usually conspicuously dark apically; legs thicker; thorax paler, not appearing striped when viewed from the front; male hypopygium shorter. Larger species, wing length 4·5–5 mm. *Common in woods in spring*.....**M. culiciformis** Degeer.

All tarsal segments with dark hair right to the base; femora unicolorous, not apically darkened; legs thinner; thorax darker, appearing indistinctly striped from the front; male hypopygium longer. Smaller species, wing length 3·5–4 mm. *Yorks., Kerry*.....**M. martinii** Edwards (*velutinus* Martini *nec* Ruthe).

3 Femora and tibiae with many dark rings; pulvilli absent; vein Cu_1 with a hairy spur near the tip parallel to hind margin (fig. 163). Wing length 3·5–4·5 mm. *Yorks., Cambs., Hunts., Herts., Middlesex, Shropshire, Hants*
Ch. pallidus Fabricius.

Legs unbanded; pulvilli present; Cu_1 running straight to hind margin.....4

4 Abdomen uniformly dark, unbanded; posterior pronotum (fig. 164) blackish on upper half, yellowish on lower half; femora always unicolorous, not darkened apically; last segment of male antenna 2/3rds length of penultimate. Wing length 3·5–5 mm. *Common and generally distributed*
Ch. crystallinus Degeer.

Abdomen banded on at least some of the segments; if pronotum dark on upper half then femora dark apically.....5

5 Posterior pronotum as in *crystallinus*; femora blackish apically; male antennae as *crystallinus*. Wing length 4·5–5 mm. *Bucks., Glamorganshire* (2 specimens)
Ch. obscuripes Van der Wulp.

Posterior pronotum either entirely pale or indistinctly brown or darker on *lower* half; femora unicolorous; apical segment of male antenna as long as penultimate. Wing length 3·5–4·5 mm. *Common and generally distributed.* Most of the pale specimens will be found to belong here.....**Ch. flavicans** Meigen.

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Family CULICIDAE.

Subfamily CULICINAE.

By P. F. MATTINGLY.

THE Culicinae or mosquitoes can be distinguished from the great majority of other Nematocera by the possession of an elongate proboscis (fig. 165*a*, *b*). Species of the genus *Geranomyia* (TIPULIDAE), which possess a superficially similar structure, can be recognized by their more complex wing venation, and by the absence of scales from the wing-veins, legs and other parts of the body where they are present in abundance in mosquitoes. Most of the characters used for distinguishing the British species are illustrated in the figures accompanying the present key. In certain cases identification is easier in the larval stage. For this purpose a short key to larvae has been included (Appendix III). For fuller descriptions of both stages the reader is referred to Marshall (1938). In all the British species the males can be distinguished from the females by their plumose antennae.

KEY TO ADULTS.

1 Female palps slender, about the same length as the proboscis. Male palps much the same length as in the female, but with a smooth shaft terminating in a hairy club-shaped head (fig. 165*a*, *d*). Abdomen without scales (fig. 167*a*). (Tribe ANOPHELINI).....2

Female palps from one-eighth to one-half the length of the proboscis (fig. 165*b*). Male palps long and hairy (except in *Aëdes cinereus*, in which they are about one-seventh the length of the proboscis), swollen apically in only a few species (fig. 165*c*, *e*, 178*d*). Abdomen heavily scaled (fig. 167*b*, *c*). (Tribe CULICINI)..5

2 With a conspicuous tuft of white or whitish scales on the crown of the head (fig. 165*a*), and another on the front edge of the scutum. Scutum distinctly darker at the sides. Coxite with 2–3 parabasal spines (fig. 168*a*). *Widely distributed indigenous species*.....3

Without such tufts of pale scales. Scutum not distinctly darker at the sides. Coxite with only one parabasal spine (fig. 169*c*). *Recorded from shallow pools among thick sedge. Bites man voraciously, but unlikely to be found in houses in any numbers. Recorded only once from Britain, from three localities in Norfolk. Doubtfully indigenous*.....**Anopheles (Anopheles) algeriensis** Theobald.

3 Wings with scale clusters forming dark spots at the bases of the two upper forks and the base of vein 2 and in the neighbourhood of the cross-veins. Coxite with two simple parabasal spines which are set on small protuberances (fig. 169*a*). *Breed mainly in ponds and slow-moving streams, showing a preference for open, unshaded situations. Partly domestic. Hibernate in houses or outbuildings from November to March. Frequently bite man*

Anopheles (Anopheles) maculipennis complex. (See Appendix I.)

Wings unspotted. Coxite either with two simple parabasal spines arising direct from its surface or with three, two of which are branched while the other arises from a small protuberance (fig. 169*b*, *d*).....4

4 Larger brownish species. Scales on the front margin of the scutum not pure white. Ratio of the apical to the sub-apical segment of the female palp usually between 0·4 : 1 and 0·5 : 1. Male terminalia with three parabasal spines, two of them branched. Internal spine arising near the tip of the coxite (fig. 169*b*). *Breeds mainly in weedy pools or pond edges in shady situations. Winters as larva from November to March. Bites man out of doors*

Anopheles (Anopheles) claviger Meigen.

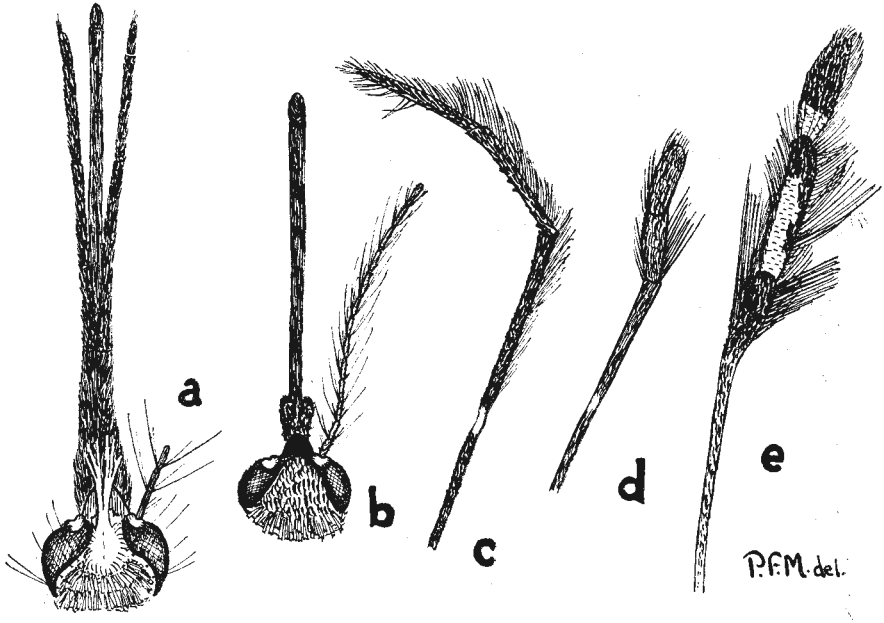

FIG. 165.—Heads and mouthparts of mosquitoes. a. *Anopheles maculipennis* ♀. b. *Culex pipiens* ♀. c. *Culex pipiens*. Male palp. d. *Anopheles maculipennis*. Male palp. e. *Aëdes rusticus*. Male palp.

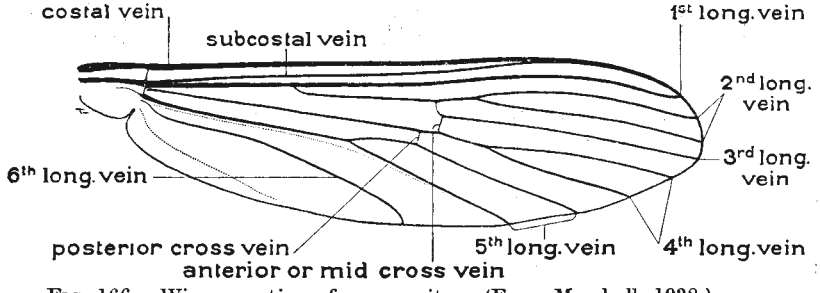

FIG. 166.—Wing venation of a mosquito. (From Marshall, 1938.)

Smaller blackish species with a tuft of pure white scales on the front margin of the scutum. Ratio of the apical to the sub-apical segment of the female palp usually between 0·6 : 1 and 0·75 : 1. Male terminalia with two simple parabasal spines inserted directly on the coxite. Internal spine arising near the centre of the coxite (fig. 169*d*). *Breeds almost exclusively in tree-holes. Winters as larva from November to March. Bites man persistently out of doors*

Anopheles (Anopheles) plumbeus Stephens.

5 Postspiracular bristles present (fig. 170*b*). Front and middle claws of female toothed (fig. 171*b*). Female abdomen tapering to a point (fig. 167*b*). Male terminalia with inner face of coxite divided longitudinally into a dorsal and a ventral flap. Basal lobe, when present, not heavily sclerotized. Claspettes present (fig. 168*b*). (Genus **Aëdes** Meigen).....6

Postspiracular bristles absent. Female with all claws simple (fig. 171*a*, *c*). Abdomen blunt-tipped (fig. 167*c*). Male terminalia without claspettes. Coxite not divided longitudinally (figs. 168*c*, 176*a*, 177*a*, 178*a*, *d*), or, if so divided, then with the basal lobe heavily sclerotized and bearing a long, very thick, blunt rod (fig. 177*b*).....19

6 Tarsi without pale rings.....7

Tarsi with pale rings at the joints.....14

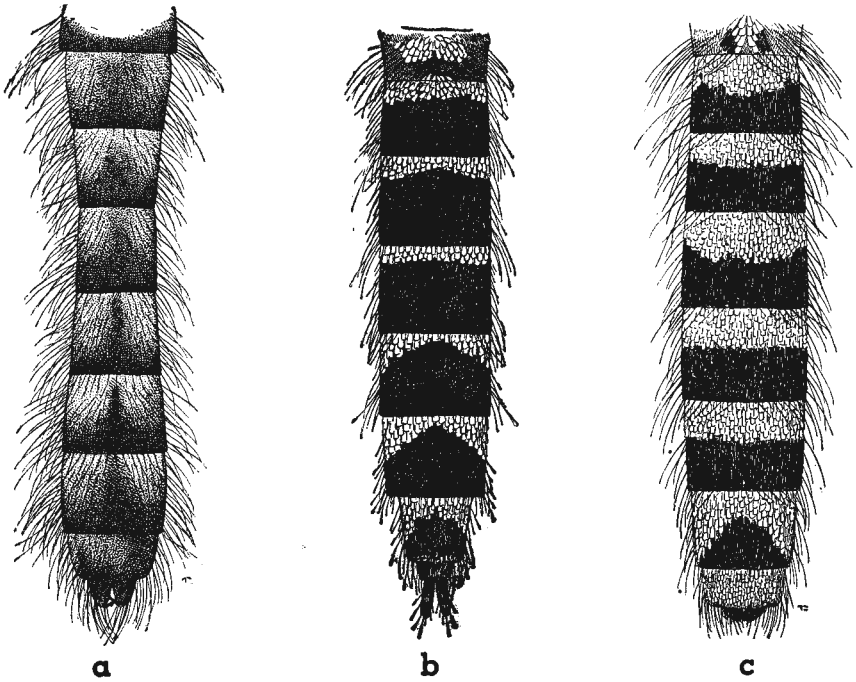

FIG. 167.—Abdomens of: a. Male *Anopheles maculipennis*. b. Female *Aëdes punctor*. c. Female *Culex pipiens*. (From Marshall, 1938.)

7 Abdominal tergites without pale bands (with lateral pale patches which do not meet in the middle).....8

Abdominal tergites normally with complete basal pale bands (fig. 174*a*, *b*).....9

8 Scutum more or less uniformly reddish brown. Tergites with narrow lateral stripes of pale scales not readily seen from above. General coloration brownish. Pale knee-spots relatively inconspicuous. Sternite of 8th abdominal segment exceptionally large. Cerci sharply pointed. Male palpi not more than about one-seventh the length of the proboscis. Male terminalia with the style bifurcate at the tip and arising from well below the apex of the coxite. Basal lobe of coxite conspicuous, hairy (fig. 172*a*). Claspette small, without a terminal appendage but with a conspicuous projection at the base (fig. 175*a*). *Breeds in fresh water marshes and pools. Widely distributed in Britain. A one-generation species wintering from October to March in the egg. Bites man out of doors.* (Subgenus **Aëdes** Meigen) .....**Aëdes (Aëdes) cinereus** Meigen.

General coloration blackish, with conspicuous white markings on the scutum and tergites and at the knee-joints (fig. 173*a*). 8th abdominal segment large but cerci blunt. Male palpi only slightly shorter than the proboscis. Male terminalia with the style pointed at the tip. Apical lobe of coxite absent. Basal lobe inconspicuous. Claspettes with a straight stem and a sickle-shaped terminal appendage. *Breeds in tree-holes. Widely distributed in England south of the Humber. No records from Wales or Ireland. Winters from October to March mainly, if not entirely, in the egg. Bites man viciously out of doors.* (Sub-genus **Finlaya** Theobald)..... **Aëdes (Finlaya) geniculatus** Olivier.

9 Normally a very large species. Wing length up to about 7 mm. Female with the pale transverse bands on the abdomen tending to broaden centrally to form a median longitudinal line, especially on the posterior segments (fig. 174*a*).

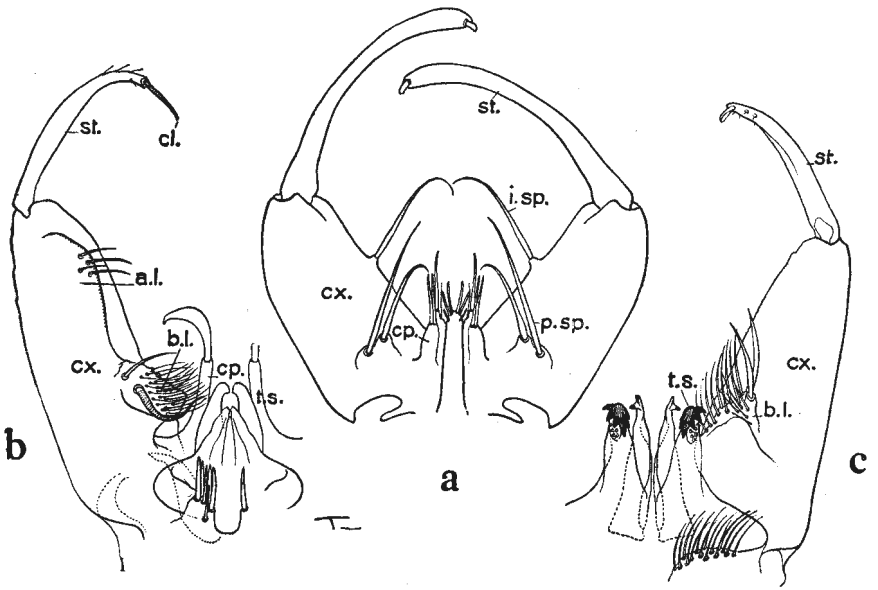

FIG. 168.—Hypopygia of: a. *Anopheles maculipennis*. b. *Aëdes caspius*. c. *Theobaldia annulata*. *a.l.*, apical lobe; *b.l.*, basal lobe; *cl.*, claw; *cp.*, claspette; *cx.*, coxite; *i.sp.*, internal spine; *p.sp.*, parabasal spine; *st.*, style; *t.s.*, tip of tenth sternite. (From Marshall, 1938.)

Female palps exceptionally long, from one-quarter to one-third the length of the proboscis. Cross-veins rarely separated by more than half the length of the posterior one. Posterior pronotal scales broad and flat, the upper ones blackish. Male palps somewhat swollen apically (fig. 165*e*). Male terminalia with the terminal claw of the style wavy. Basal lobe of coxite narrow and elongate, bearing a row of flattened scales or bristles (fig. 172*b*). *Breeds in ditches or woodland pools, usually with dead leaves. Widely distributed in Britain. Winters from October to March as larva. Adults are rarely taken after the middle of July, and larvae have not been recorded in July or August. Bites man in the open.* (Sub-genus **Ochlerotatus** Lynch Arribalzaga in part)

Aëdes (Ochlerotatus) rusticus Rossi.

Smaller species. Pale tergal bands not broadened centrally. Female palps less than one-quarter the length of the proboscis. Posterior cross-vein separated from the mid cross-vein by at least its own length. Upper posterior pronotal scales narrow, curved, paler. Terminal segments of the male palps narrower than the sub-terminal (except in *Aedës punctor*). Male terminalia with the terminal claw of the style straight.....10

10 Lower mesepimeral bristles absent. Scutum dark brown in the middle, white scaled at the sides (fig. 173*b*). Hind tibia with a white stripe on the outer side in the female (not always present in the male). Male terminalia with apical lobe bearing short, curved bristles and reaching back nearly to the middle of the coxite. Basal lobe diverging abruptly from the coxite (fig. 172*d*). Terminal appendage of claspette shorter and broader (fig. 175*d*). *Breeds mainly in water of a temporary character in open or partly shaded situations. Very rare in this country. Probably winters in the egg. Bites man viciously in the open*
Aëdes (Ochlerotatus) sticticus Meigen.

Lower mesepimeral bristles present. Hind tibia without a distinct continuous stripe on the outer side. Male terminalia with the apical lobe shorter and bearing longer bristles (except in *punctor*). Terminal appendage of claspette relatively long and narrow (fig. 175*c*, *e–g*).....11

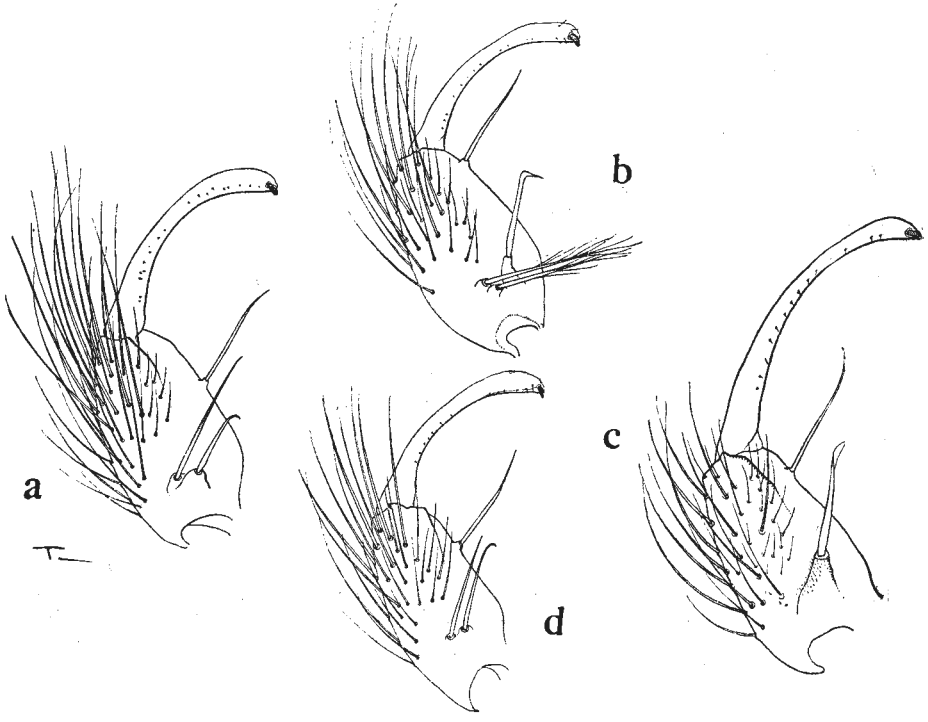

FIG. 169.—Hypopygia of British Anophelini. a. *Anopheles maculipennis*. b. *Anopheles claviger*. c. *Anopheles algeriensis*. d. *Anopheles plumbeus*. (From Marshall, 1938.)

11 Pale abdominal tergal bands normally constricted in the centre, especially on the posterior segments (fig. 167*b*). Pale scales absent from wing veins or restricted to the extreme base of the costa. Male palps with the terminal segment slightly swollen. Male terminalia with the apical lobe bearing short, curved bristles and reaching back nearly to the middle of the coxite. Basal lobe broad at the base and bearing a single prominent spine (fig. 172*c*). Stem of claspette short and straight. Appendage of claspette about three times as long as broad (fig. 175*c*). *Breeds in temporary ground pools, mainly on sandy or gravelly soil. Widely distributed in Britain. Winters as larva from November to March. Bites man viciously in the open. Occasionally enters houses*
Aëdes (Ochlerotatus) punctor Kirby.

Pale tergal bands of more or less uniform width. Pale scales on wing veins more numerous (but in *communis* usually restricted to bases of costa, sub-costa and vein 1). Male palps with the terminal segment narrower than the sub-terminal Male terminalia with the apical lobe shorter and bearing longer bristles....12

12 Anterior surface of fore and mid tibiae usually with only a few pale scales. Male terminalia with stem of claspette long and curved. Appendage of claspette with two slight ridges near the base (fig. 175*e*). *Breeds in temporary woodland pools on sand or gravel. Only once recorded from Britain.* (*Strelley, Notts, ix*, 1922.) *Bites man viciously. Normally encountered only in shade*
Aëdes (Ochlerotatus) communis Degeer.

Anterior surface of fore and mid tibiae generally with a heavy sprinkling of pale scales. Claspettes otherwise (fig. 175*f*, *g*).....13

13 First segment of flagellum devoid of scales. No patch of pale scales immediately below the anterior spiracle. Dark parts of abdominal tergites usually with numerous scattered pale scales (fig. 174*b*). Male palps frequently all dark. Male terminalia with stem of claspette short and nearly straight. Appendage of claspette cylindrical on the basal third (fig. 175*f*). Basal lobe of coxite with

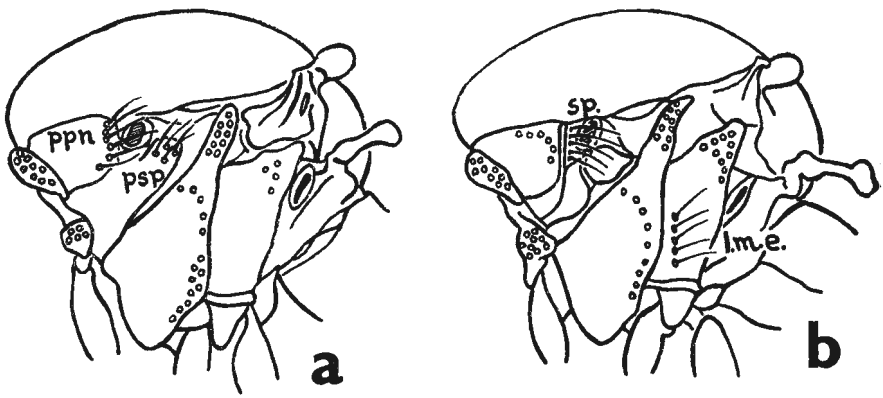

FIG. 170.—Pleural chaetotaxy of Culicini. a. Genus *Aëdes*; b. Genus *Theobaldia*; *l.m.e.* lower mesepimeral; *ppn.* posterior pronotal; *psp.* post-spiracular; sp. spiracular. (After Edwards, 1941.)

one bristle considerably stouter and more conspicuous than the remainder (fig. 172*f*). *Breeds in brackish or saline waters. Widely distributed in coastal regions. Rarely recorded from inland, and then only in the neighbourhood of salt deposits. Winters as larva from December to February. A vicious man-biter with a flight range of from four to five miles*
Aëdes (Ochlerotatus) detritus Haliday.

First segment of flagellum with white scales below. A small patch of pale scales present immediately below the anterior spiracle. Dark parts of abdominal tergites without scattered pale scales. Male palps with numerous pale scales on the sub-apical segment. Male terminalia with the stem of the claspette long and strongly curved. Appendage of claspette otherwise (fig. 175*g*). Basal lobe of coxite with one bristle stouter than the others, but much less conspicuously so than in *detritus* (fig. 172*g*). *Breeds in open or partly shaded situations in coastal or inland districts. Only once recorded from Britain* (*Widmerpools, Notts, v.* 1919).....**Aëdes (Ochlerotatus) leucomelas** Meigen.

14 Tarsi with pale rings embracing the joints. Dorsal surface of abdomen with a more or less continuous pale line (fig. 174*c*). Male terminalia with apical lobe of coxite not very clearly defined (fig. 168*b*).....15

Tarsi with pale rings below the joints only. Tergites with pale basal bands only Male terminalia with apical lobe of coxite clearly defined.....16

15 Scutum with the middle third reddish brown and two narrow white lines posteriorly. The two outer thirds ashy white (fig. 173*d*). Stems of second and fourth wing veins largely pale scaled. Abdomen black, the pale markings white. Male terminalia with the basal lobe of the coxite standing out prominently (fig. 172*h*). Appendage of claspette somewhat broader (fig. 175*h*). *Breeds in brackish water. Recorded from Dorset, Essex, Norfolk and Westmorland, in all cases on or near the coast. Believed to winter in the egg. Bites man fiercely*
Aëdes (Ochlerotatus) dorsalis Meigen.

Scutum reddish fawn with two white stripes running the whole length (Fig. 173*c*). Stems of second and fourth wing veins with dark and light scales more or less evenly mixed. Dark areas on the abdominal tergites brown, pale areas largely yellowish. Male terminalia with basal lobe of coxite rather less prominent,

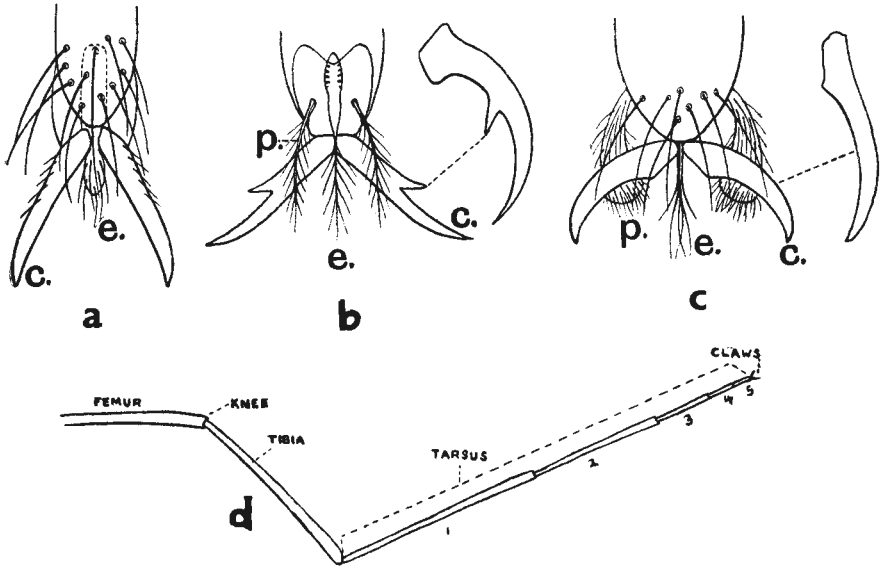

FIG. 171.—Leg and tarsal characters of Culicini. a.–c. Tip of fifth tarsal segment. d. Whole leg. a. Genus *Theobaldia*. b. Genus *Aëdes*. c. Genus *Culex*. *c.*, claw ; *e.*, empodium ; *p.*, pulvillus. (a.–c. from Edwards, 1941.)

broader at the base (fig. 168*b*). Appendage of claspette rather narrower. *Breeds mainly in brackish water, but also in sewage effluents and perhaps occasionally in fresh water. Very widely distributed in coastal districts and not uncommon inland. Winters in the egg. Bites man viciously, sometimes entering houses*
Aëdes (Ochlerotatus) caspius Pallas.

16 Abdominal tergites covered mainly with yellow scales and with a varying proportion of black ones, which may form a median and two lateral dark stripes, but without basal pale bands. First tarsal segments pale scaled except for a narrow apical dark ring. Male terminalia with the basal lobe of the coxite covered with a short pubescence and bearing a single strongly developed spine. Appendage of claspette chopper-shaped (fig. 175*i*). *Breeds in open, marshy situations. Only twice recorded from Britain (Walton-on-the-Naze, Essex, i,* 1928 ; *Isle of Sheppey, Kent, v,* 1922). *Bites man readily but is said to prefer domestic animals*.....**Aëdes (Ochlerotatus) flavescens** Müller.

Abdominal tergites with clearly defined basal pale bands. First tarsal segments generally with narrow pale basal bands and with a variable number of scattered pale scales. Male terminalia otherwise.....17

17 Pale basal bands of tergites distinctly bilobed (fig. 174*d*). Scales of wing veins and proboscis uniformly dark. Pale tarsal rings narrow. Fourth fore-tarsal segment all dark. Male terminalia with the style expanded distally and having a sub-apical claw (fig. 172*j*). Claspette consisting of a stout stem with conspicuous terminal spines (fig. 175*j*). *Breeds in temporary, unshaded collections of water. Recorded sporadically from England and Wales south of the Wash. Doubtfully indigenous. Bites man persistently out of doors.* (Sub-genus **Aëdimorphus**) Theobald).....**Aëdes (Aëdimorphus) vexans** Meigen.

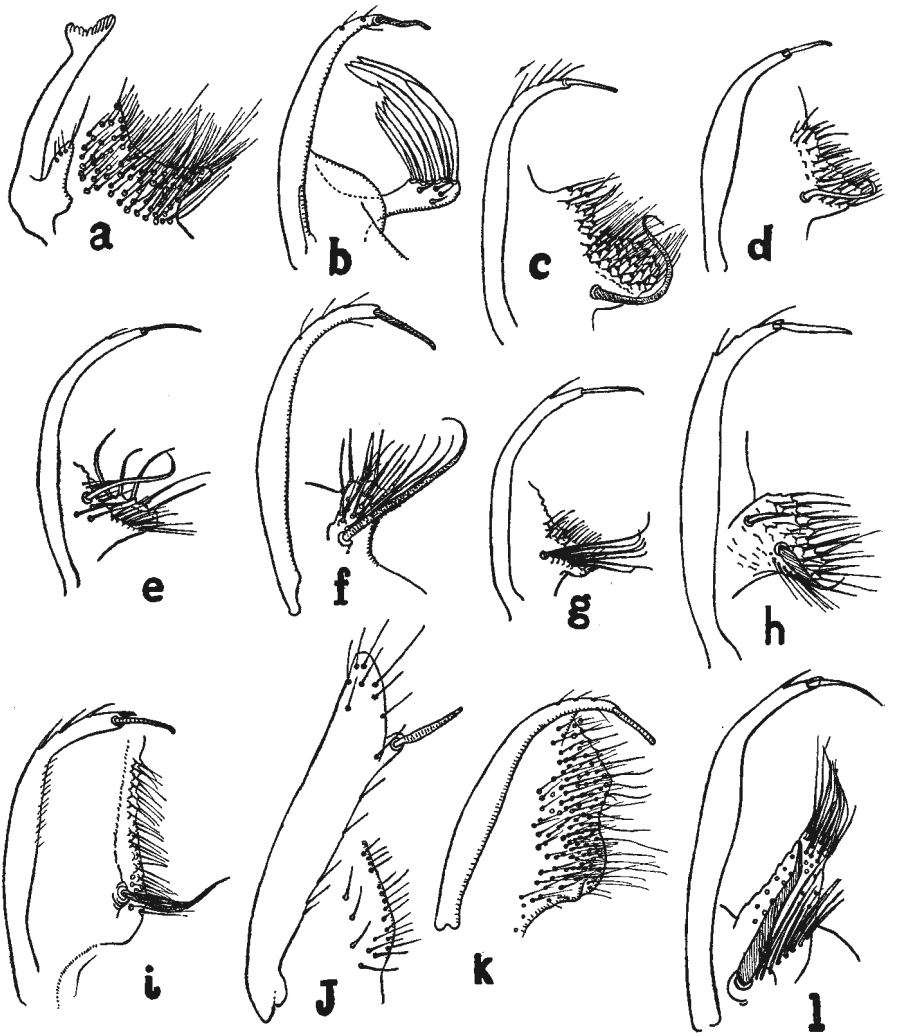

FIG. 172.—Styles and basal lobes of coxites of males of genus *Aëdes*. a. *A. cinereus*. b. *A. rusticus*. c. *A. punctor*. d. *A. sticticus*. e. *A. communis*. f. *A. detritus*. g. *A. leucomelas*. h. *A. dorsalis*. i. *A. flavescens*. j. *A. vexans*. k. *A. annulipes*. l. *A. cantans*. (All except d., e., g., h. and l. after Marshall, 1938.)

Pale basal bands on tergites of more uniform width. Wing veins and proboscis with an admixture of dark and light scales. Male terminalia with the style tapering distally and with apical claw. Claspettes consisting of a narrow stem and terminal leaflet (figs. 172*k*, *l*, and 175*k*, *l*) : 18

18 Pale scales of thorax, abdomen, wings, femora and tibiae yellowish. General coloration brown. Pale rings on hind tarsi each occupying about half the segment. Male terminalia with basal lobe of coxite small and without a thickened bristle (fig. 172*k*). Apical lobe well developed and covered with long, fine hairs. Stem of claspette exceptionally thick, appendage narrower (fig. 175*k*). *Breeds in open swamps or partly shaded fresh-water pools. Widely distributed in England south of Flamborough Head. Not recorded from Scotland, Ireland or Wales. Winters from October to January in the egg and during February and March as larva. Bites man out of doors*

Aëdes (Ochlerotatus) annulipes Meigen.

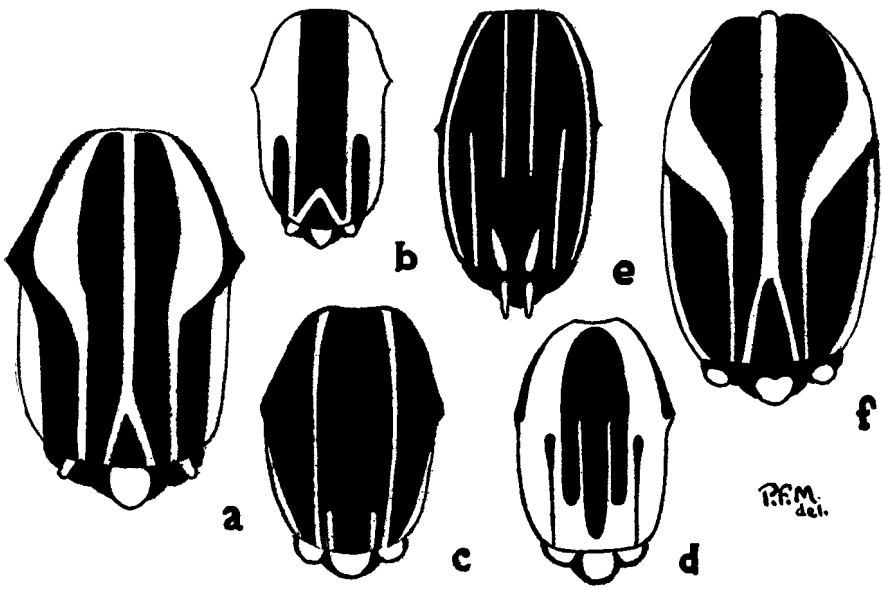

FIG. 173.—Scutal markings of Culicini. a. *Aëdes geniculatus*. b. *Aëdes sticticus*. c. *Aëdes caspius*. d. *Aëdes dorsalis*. e. *Orthopodomyia pulchripalpis*. f. *Theobaldia longiareolata*.

Pale scales white. General coloration blackish brown. Pale hind-tarsal rings occupying about one-third of each segment. Male terminalia with the basal lobe bearing a conspicuous spine and having a large, ventrally directed extension (fig. 172*l*). Stem of claspette narrower, its appendage broad and flag-shaped (fig. 175*l*). *Breeds in densely shaded temporary pools. Widely distributed in England south of the Humber. Not recorded from Scotland, Ireland or Wales. Winters in the egg during October and November and as larva from December to March. Bites man in the open*.....**Aëdes (Ochlerotatus) cantans** Meigen.

19 Tarsi without pale rings. Fifth tarsal segments with pulvilli (fig. 171*c*). Tips of male palpi upturned (fig. 165*c*). Male terminalia with the sub-apical lobe of the coxite well developed and bearing a number of modified bristles. No basal lobe (fig. 176). (Genus **Culex** Linnaeus).....20

Tarsi, at least of the hind legs, with pale rings. No pulvilli. Male palpi otherwise. Male terminalia with the basal lobe of the coxite well developed and generally bearing one or more conspicuous spines (figs. 168*c*, 177, 178). Apical lobe undeveloped or inconspicuous.....23

20 Abdominal tergites with pale transverse bands which are basal in position (fig. 167*c*). Male terminalia with the sub-apical lobe of the coxite bearing a flattened leaflet as well as several modified bristles (fig. 176*a*). (Subgenus **Culex** Linnaeus) 21

Abdominal tergites either with lateral pale patches which are not connected to form continuous transverse bands or, if with continuous transverse bands, then these are apical in position. Male terminalia with the sub-apical lobe of the coxite bearing modified bristles but without a flattened leaflet (fig. 176*b*, *c*)...22

21 General coloration of the dorsal surface of the abdomen dark brown, the pale tergal bands whitish. Sternites covered with pale scales, and normally having a conspicuous median patch of dark scales and two similar lateral or apico-lateral patches. Pale band on the fourth tergite and sometimes those on adjoining tergites frequently constricted in the female so that their apical

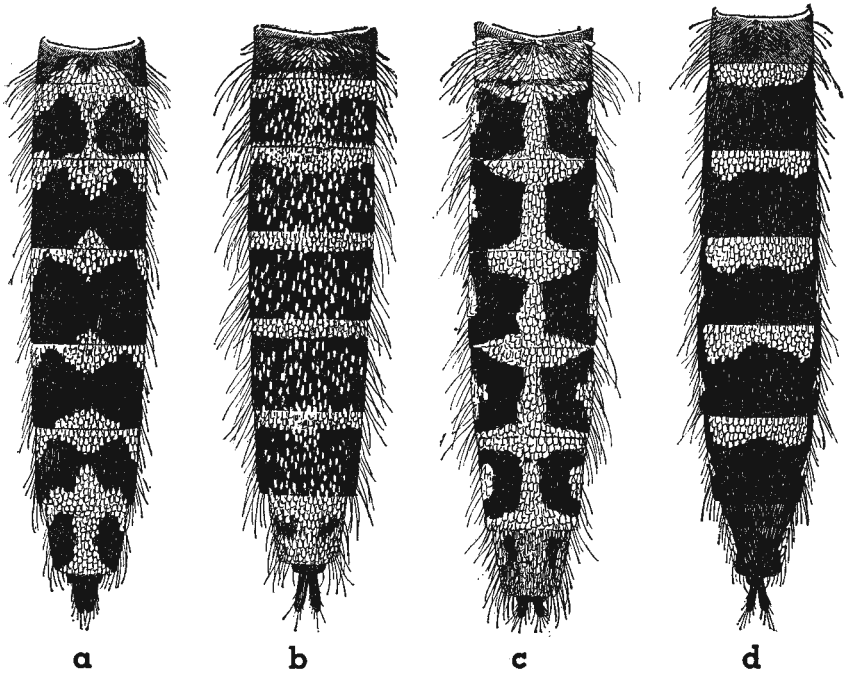

FIG. 174.—Abdomens of females of genus *Aëdes*. a. *A. rusticus*. b. *A. detritus*. c. *A. caspius*. d. *A. vexans*. (From Marshall, 1938.)

margins are convex or bilobed. Pale scales at the tips of the femora and tibiae forming conspicuous spots. Male palps exceeding the proboscis by the whole of the terminal segment. *Breeds in natural or artificial collections of foul, fresh or moderately brackish water. Very widely distributed in Britain. Hibernates as adult in houses and out-buildings from October to April. Larvae not found after November. Common in houses but rarely, if ever, bites man. Cannot produce viable eggs without a blood meal* (anautogenous)

Culex (**Culex**) **pipiens** Linnaeus.

General coloration paler with less contrast between light and dark areas. Dark scales of sternites generally less abundant, often almost entirely absent. Pale basal bands of tergites more uniform. Pale spots at the tips of the femur and tibia less conspicuous. Male palps exceeding the proboscis by less than the

length of the terminal segment. *All breeding places so far recorded in London have been under ground and in darkness or semi-darkness. The Hayling Island strain was obtained from an outdoor tank. Hibernation probably as in* C. pipiens. *Bites man viciously and enters houses freely. Is likely to be most troublesome from late June to early September. Can produce viable eggs without a preliminary blood meal* (autogenous). *Recorded from Hayling Island, Aldershot, London and Hull districts. Distribution otherwise unknown.*

Culex (Culex) molestus Forskål.

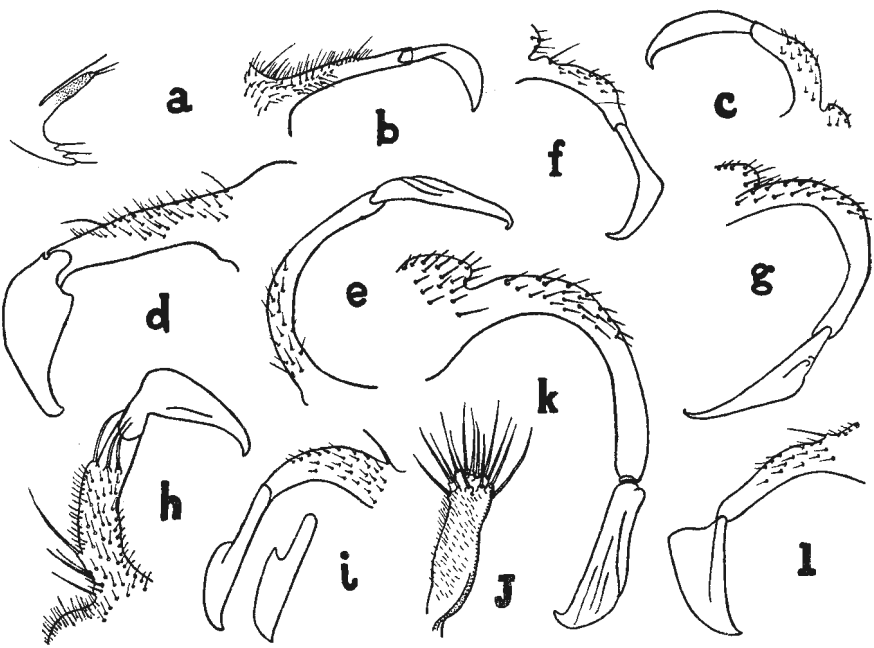

FIG. 175.—Claspettes of males of genus *Aëdes*. a. *A. cinereus*. b. *A. geniculatus*. c. *A. punctor*. d. *A. sticticus*. e. *A. communis*. f. *A. detritus*. g. *A. leucomelas*. h. *A. dorsalis*. i. *A. flavescens*. j. *A. vexans*. k. *A. annulipes*. l. *A. cantans*. (All except b, d and h, after Marshall, 1938.)

22 Abdominal tergites with lateral pale markings tending to form two continuous longitudinal stripes. Male palpi devoid of hair tufts. Male terminalia having the coxite provided with numerous small scales on the outer side. Sub-apical lobe with several stout, straight spines (fig. 176*b*). *Breeds in ground pools in either fresh or brackish water. Recorded from the Portsmouth area in* 1944 and 1945 (*Marshall*, 1945), *but not yet known with certainty to have established itself in Britain. Bites man viciously and is said to enter houses.* (Sub-genus **Barraudius** Edwards)..... **Culex (Barraudius) modestus** Ficalbi.

Abdominal tergites with continuous apical transverse pale bands. Male palpi very hairy. Coxite devoid of scales. Sub-apical lobe with two long, flattened bristles curved at the apex (fig. 176*c*). *Breeds in natural or artificial collections of fresh water of all kinds. Recorded from Southern England and Northern Scotland. Not known to bite man.* (Sub-genus **Neoculex** Dyar)

Culex (Neoculex) apicalis Adams.

23 Female palps nearly half as long as the proboscis. Proboscis black with a conspicuous white ring. Pale tarsal rings confined to the hind legs and the first tarsal segment of the middle legs. Scutum ornamented with narrow longitudinal white lines (fig. 173*e*). Wing with a conspicuous patch of white scales at the base of the first vein. General coloration black and white. Male terminalia with the terminal claw of the style fimbriated. Basal lobe of coxite bearing a number of short, stout, sharply pointed spines (fig. 177*a*). *Breeds in tree-holes. British records confined to Eastern England south of the Wash, where it has so far been taken only in the early stages. Does not bite man.* (Genus **Orthopodomyia** Theobald)..... **Orthopodomyia pulchripalpis** Rondani.

Female palps not more than one-third the length of the proboscis, generally less. Pale tarsal rings present on all the legs. Scutal ornamentation quite otherwise. Terminal claw or claws of style simple. Basal lobe of coxite otherwise..... 24

24 Spiracular bristles present (fig. 170*a*). Posterior cross-vein separated from the mid cross-vein by, at most, its own length. Wing scales narrow. Male terminalia with the inner face of the coxite not divided into a dorsal and a ventral flap. Basal lobe bearing at least two stout, sharp-pointed spines. (Genus **Theobaldia** Neveu-Lemaire)..... 25

Spiracular bristles absent. Posterior cross-vein separated from the mid cross-vein by about three times its own length. Wing scales broad. Male terminalia with the inner face of the coxite divided longitudinally into a dorsal and a ventral flap. Basal lobe bearing a long, very thick, blunt rod. Shape of style highly characteristic (fig. 177*b*). *Breeds in fresh water containing plants of the genera* Ranunculus, Acorus, Glyceria *or* Typha, *to the roots of which the larvae are attached by their specially modified siphons. Widely distributed in England, and has been recorded from both Northern and Southern Ireland. Winters in the egg from October to December and as larva from January to April. Bites man viciously, especially at night, when it may enter houses, leaving again before daybreak.* (Genus **Taeniorhynchus** Lynch Arribalzaga, Sub-genus **Coquillettidia** Dyar)..... **Taeniorhynchus (Coquillettidia) richiardii** Ficalbi.

25 Scutum with conspicuous white markings on a reddish-brown ground (fig. 173*f*). Femora and tibiae with large and conspicuous spots or stripes of whitish scales. Anterior edge of costa almost entirely pale scaled. Male palpi somewhat shorter than the proboscis, strongly swollen apically (fig. 178*d*). Male terminalia having the style swollen at the tip and with two terminal claws. Ninth tergite with two long processes. Phallosome extremely large and heavily sclerotized (fig. 178*e*). *Breeds in natural or artificial collections of water which may be foul or slightly brackish. Recorded from the Portsmouth area in* 1940 (*Staley*, 1940) *and not yet known to have become established. Bites man seldom, if at all.* (Sub-genus **Allotheobaldia** Brolemann)

Theobaldia (Allotheobaldia) longiareolata Macquart.

Scutum not conspicuously ornamented. Femora and tibiae with pale speckling but much less conspicuously marked. Anterior edge of costa largely dark. Male palps longer than the proboscis, less strongly swollen at the apex. Male terminalia with the style tapering at the apex and with a single terminal claw. Phallosome not unusually large. Ninth tergite otherwise..... 26

26 Wings with scale clusters forming dark spots in the neighbourhood of the cross veins, at the bases of the two upper fork cells and at the base of the second vein. Second abdominal tergite with a median longitudinal pale stripe. Pale rings at bases of tarsal segments broad and conspicuous. Male terminalia with the coxite provided with a hairy sub-apical swelling (not always very conspicuous, especially in *annulata*) (fig. 168*c*). (Sub-genus **Theobaldia** Neveu-Lemaire)..... 27

Wings unspotted. Second abdominal segment without a median pale stripe. Pale rings at tarsal joints narrower and less conspicuous. Male terminalia with the coxite devoid of a sub-apical swelling or agglomeration of hairs (fig. 178*a*). (Sub-genus **Culicella** Felt)..... 29

27 Femora each with a pre-apical pale ring. First tarsal segments each with a central pale ring. Lobe of the 8th tergite, in the male, at most with a few scattered bristles..... 28

Femora and first tarsal segments without such markings. Lobe of the 8th tergite, in the male, bearing a row of short, stout spines. *May be expected to breed in open pools. Recorded in this country, as adult only, from Scotland and England north of the Humber. Adults taken from March to October*

Theobaldia (Theobaldia) alaskaensis Ludlow.

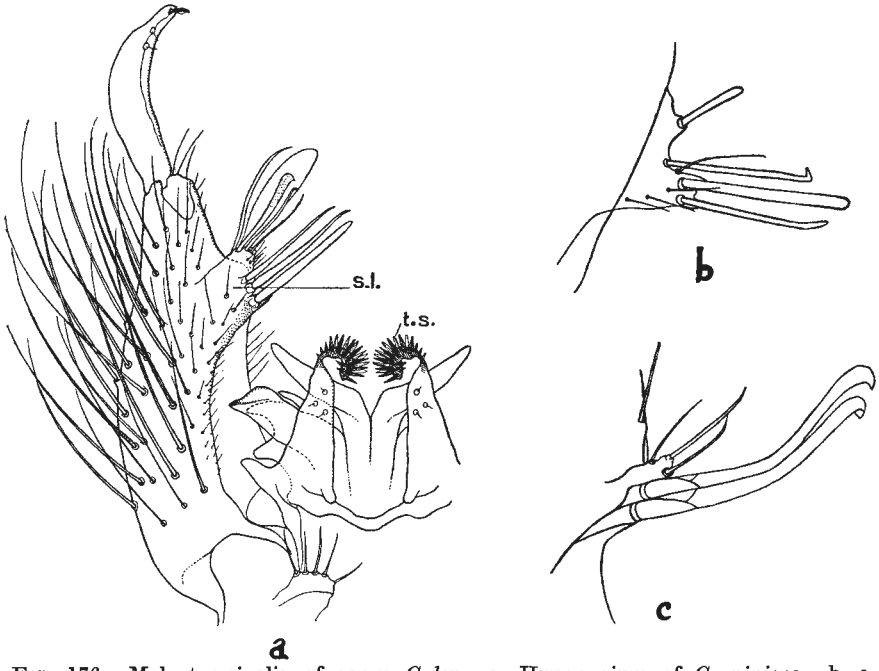

FIG. 176.—Male terminalia of genus *Culex*. a. Hypopygium of *C. pipiens*. b.–c. Apical lobes of coxites. b. *C. modestus*. c. *C. apicalis*. (a. from Marshall, 1938.)

FIG. 177.—Hypopygia of male Culicini. Left: *Orthopodomyia pulchripalpis*. Right: *Taeniorhynchus richiardii*. (From Marshall, 1938.)

28 Pale scales of wing confined to the costa, sub-costa and first vein. Posterior and mid cross-veins in line. Tergites with the pale scales confined largely to the transverse bands and the median stripe on the second segment. Pale tergal bands white, occasionally becoming yellowish towards the centre. Wing spots conspicuous. Male terminalia with the basal lobe of the coxite having two or, occasionally, three spines stouter than the rest. Lobe of the eighth tergite usually devoid of bristles. *Breeds in natural or artificial collections of fresh, foul or brackish water. Very widely distributed in Britain. Bites man viciously. Hibernates in houses from September to April, emerging to lay eggs whenever conditions are favourable*..... **Theobaldia (Theobaldia) annulata** Schrank.

Pale scales present on the fifth wing vein. Posterior cross-vein not infrequently distal to the mid cross-vein. Tergites with numerous scattered pale ochreous scales in addition to the pale basal bands. Pale tergal bands yellowish, becoming lighter towards the sides. Wing spots less conspicuous. Basal lobe of coxite with from three to five bristles conspicuously stouter than the rest. Lobe of eighth tergite frequently with a number of scattered bristles. *Breeding-places as for* T. annulata. *Recorded from a number of scattered localities in England from Dorset to Yorkshire. Prefers to hibernate in out-buildings or cellars. Bites man and domestic animals. Can produce viable eggs without a blood-meal* (autogenous) ..... **Theobaldia (Theobaldia) subochrea** Edwards.

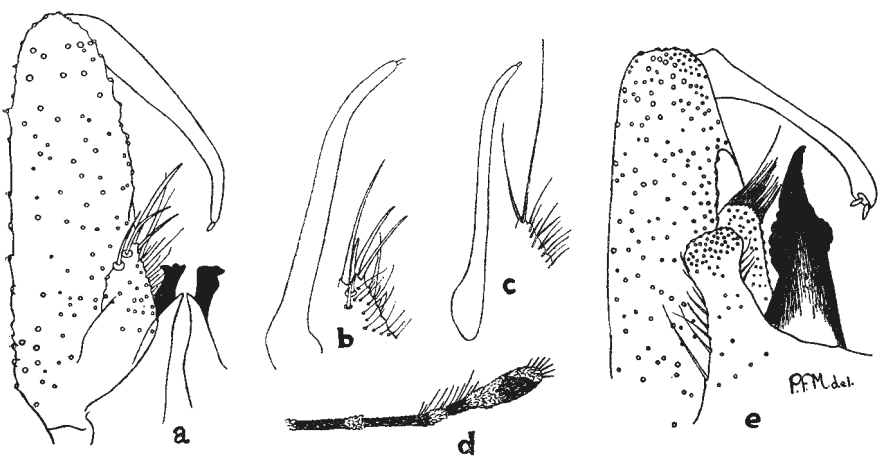

FIG. 178.—Male organs of genus *Theobaldia*. a. Hypopygium of *T. morsitans*. b.–c. Styles and basal lobes of coxites. b. *T. fumipennis*. c. *T. litorea*. d. Palp of *T. longiareolata*. e. Hypopygium of *T. longiareolata*.

29 Last two hind-tarsal joints without pale rings. These joints either unringed or inconspicuously ringed in the fore- and mid-legs. Proboscis of female with at most a few scattered pale scales on the middle third. Abdominal sternites with the dark scales scattered, not forming an obvious pattern. Ratio of the combined lengths of the last four segments of the fore-tarsus to that of the first 0·8 : 1. Male terminalia with the style somewhat thicker (ratio of half-way width to length 0·08–0·09 : 1). Basal lobe with 3–4 stout bristles, none of which reach the tip of the coxite (fig. 178*a*). *Breeds in fresh-water pools or ditches in open or shaded situations. Widely distributed in England and recorded from Wales and Ireland. No records from Scotland. Is thought not to bite man. Winters as larva from September to March*

Theobaldia (Culicella) morsitans Theobald.

Last two tarsal joints with or without conspicuous pale rings. Female proboscis normally with a conspicuous aggregation of pale scales on the middle third. Dark scales on the sternites forming an inverted " V." Style and fore-tarsus otherwise. Basal lobe of coxite either as in *morsitans* or with two stout bristles, one of which reaches beyond the tip of the coxite.....30

30 Pale rings on legs normally present on all tarsal segments. Male palps exceeding the proboscis by almost the whole length of the terminal segment. Last two segments with numerous fine hairs. Male terminalia with the coxite about 2·4 × as long as its basal width, tapering at the tip. Basal lobe with 3–5 bristles stouter than the rest, none of them reaching to the tip of the coxite. Ratio of length of style to length of coxite about 0·68 : 1. Ratio of half-way width of style to length about 0·06 : 1 (fig. 178*b*). Ratio of the combined lengths of the last four segments of the fore-tarsus of the male to that of the first about 1·06 : 1. *Breeds in fresh-water pools mainly in open situations. Widely distributed in Britain. Winters as larva from October to March. Not known to bite man or domestic animals*

Theobaldia (Culicella) fumipennis Stephens.

Last two segments of hind tarsi with pale rings absent or inconspicuous. Male palps exceeding the proboscis by only about half the length of the terminal segment, the last two segments with the hairs stouter and fewer in number. Coxite about twice as long as its basal width, blunt tipped. Basal lobe with two spines stouter than the rest, one of them reaching beyond the tip of the coxite. Ratio of length of style to length of coxite about 0·84 : 1. Ratio of half-way width of style to length 0·04–0·05 : 1 (fig. 178*c*). Ratio of combined lengths of last four segments of the fore-tarsus of the male to that of the first about 0·9 : 1. *Breeds in open situations either in fresh or brackish water. Recorded from Eastern England south of the Wash and from Belfast. Winters as larva from September to March. Does not bite man*

Theobaldia (Culicella) litorea Shute.

Appendix I. The *Anopheles maculipennis* complex.

The *maculipennis* complex was reclassified by Bates (1940). Only two members are known with certainty to occur in Britain. Using Bates' nomenclature, these are *Anopheles* (*Anopheles*) *messeae* Falleroni (= *A. maculipennis var. messeae* of previous authors) and *Anopheles* (*Anopheles*) *labranchiae atroparvus* van Thiel (= *A. maculipennis var. atroparvus* of previous authors). Individual adults of these species cannot be separated with certainty except in the case of gravid females which can be persuaded to lay eggs. In a large proportion of cases the markings of the latter are characteristic. Shute (1935 and 1937) considers that certain minute details of the male terminalia can be used in cases where the egg markings are atypical, but these characters are not suitable for use with individual specimens. The same author with Ungureanu (1947) has drawn attention to a method of identification based on the shape and size of the wing scales. Weyer (1935) used statistical differences in size and in the maxillary index. The occurrence, in Britain, of a third member of the complex has been suggested (Edwards, 1936) but has yet to be proved. This is *Anopheles maculipennis* Meigen of Bates (= *A. maculipennis typicus* of some authors). Of the two species known with certainty to occur *A. labranchiae atroparvus* breeds mainly in brackish water, and is therefore encountered more frequently, though not exclusively, in coastal districts, while *A. messeae* is commoner inland. In general *atroparvus* is more frequently attracted by man and his habitations than is *messeae*, and in consequence is a much more serious vector of malaria. Exceptionally, however, *messeae* also has been incriminated. (Hackett, 1937.)

Appendix II. *Aëdes aegypti*.

Adults of *Aëdes* (*Stegomyia*) *aegypti* Linnaeus, the principal vector of Urban Yellow Fever, were reported by Macgregor (1919) to have been bred out by him from early stages taken from a tree-hole in Epping Forest. The

species is precluded from becoming established in Britain under natural conditions by its temperature requirements (Carter, 1931). It is, however, cultivated for laboratory purposes, often in very large numbers, so that the occurrence of adults and even of early stages in the neighbourhood of laboratories during the summer months would not be surprising. Outbreaks of Yellow Fever in this country, such as that which occurred at Swansea in 1865, appear to have been associated with a single generation of mosquitoes which flew ashore from shipping and which failed to become established. The likelihood of the introduction of this or any other tropical species at the present time is much reduced by measures undertaken on an international scale to prevent the spread of mosquito-borne diseases.

APPENDIX III.

KEY TO FOURTH INSTAR LARVAE.

1 Spiracles of 8th abdominal segment more or less flush with surface, siphon absent (Tribe ANOPHELINI; fig. 179*a*).....2
Spiracles of 8th abdominal segment carried at tip of a conspicuous siphon (Tribe CULICINI; fig. 179*b*).....5

2 Frontal hairs minute, simple.....**Anopheles (Anopheles) plumbeus** Stephens.
Frontal hairs large, plumose.....3

3 Outer clypeal hairs many-branched, bushy; basal hairs with all branches simple **Anopheles (Anopheles) maculipennis** complex. (*See Appendix I.*)
Outer clypeal hairs simple or with a small number of branches; basal hairs with distal branches secondarily divided.....4

4 Integument of head with a continuous dark band just behind bases of frontal hairs; conspicuous spines of more or less equal length all along inner side of antennal shaft; tergal plate of 8th abdominal segment broader than distance between the palmate hairs on 7th segment; root of saddle hair well within margin of saddle; most of long pecten teeth separated by more than one short one.....**Anopheles (Anopheles) algeriensis** Theobald.
Dark band behind frontal hairs broken into discontinuous patches; spines on inner surface of antenna smaller and fewer towards tip (may be absent from distal third); tergal plate of 8th abdominal segment narrower than distance between palmate hairs on 7th segment; root of saddle hair just outside edge of saddle; most of long pecten teeth separated by only one short one **Anopheles (Anopheles) claviger** Meigen.

5 Siphon modified for piercing aquatic plants (fig. 179*c*) **Taeniorhynchus (Coquillettidia) richiardii** Ficalbi.
Siphon not so modified.....6

6 Siphon devoid of pecten; general coloration in life pinkish; 7th and 8th abdominal segments usually with conspicuous dorsal sclerotizations (4th instar only); antenna smooth.....**Orthopodomyia pulchripalpis** Rondani.
Pecten present; general coloration otherwise; 7th and 8th segments without such sclerotizations; antenna spiculate (except in *Aëdes geniculatus* and *Theobaldia longiareolata*).....7

7 Siphon with 3 or more pairs of sub-ventral hair tufts (Genus **Culex**).....8
Siphon with only one pair of sub-ventral hair tufts.....11

8 Siphon expanded distally; siphonal length in uncrushed mounts more than six times its breadth at base.....**Culex (Neoculex) apicalis** Adams.
Siphon not expanded distally; siphonal length less than six times its breadth at base.....9

9 Sub-ventral tufts of siphon set very near mid-line (i.e. almost ventral), most basal with 6–8 branches.....**Culex (Barraudius) modestus** Ficalbi.
Sub-ventral tufts of siphon more widely spaced, most basal with not more than 4 branches.....10

10 Length of siphon in uncrushed mounts on the average about 5 × its breadth at base.....**Culex (Culex) pipiens** Linnaeus.
Length of siphon on the average about 4·3 × its breadth at base or less **Culex (Culex) molestus** Forskål.

11 Sub-ventral tufts of siphon situated near base (Genus **Theobaldia**).....12
Sub-ventral tufts of siphon situated about half way between base and apex (Genus **Aëdes**).....18

12 Pecten with distal teeth modified to form long simple hairs (Sub-genus **Theobaldia**).....13
Distal teeth of pecten short and stout, resembling proximal ones.....15

13 Anal papillae bluntly rounded at tip ; siphonal length in uncrushed mounts about 2·5 × its breadth at base.....**Theobaldia (Theobaldia) alaskaensis** Ludlow.
Anal papillae tapering ; siphonal length about 3·0–3·6 × its breadth at base 14

14 Distance between post-clypeal hairs equal to or greater than that between inner frontal hairs.....**Theobaldia (Theobaldia) annulata** Schrank.
Distance between post-clypeal hairs usually much less than that between inner frontals.....**Theobaldia (Theobaldia) subochrea** Edwards.

15 Siphon in uncrushed mounts less than 3 × as long as its breadth at base ; antennae much shorter than the head, smooth
Theobaldia (Allotheobaldia) longiareolata Macquart.
Siphon more than 4 × as long as its breadth at base ; antennae longer than head, spiculate (Sub-genus **Culicella**).....16

16 Pecten terminating in 2–4 large isolated spines
Theobaldia (Culicella) fumipennis Stephens.
Pecten without large isolated spines.....17

17 Length of siphonal tuft generally less than two-fifths that of the siphon
Theobaldia (Culicella) morsitans Theobald.
Length of siphonal tuft generally more than two-fifths that of the siphon
Theobaldia (Culicella) litorea Shute.

18 Antenna with unbranched hair and smooth shaft ; abdominal tergites with paired star-like tufts of hairs ; comb teeth arranged in a single evenly aligned row
Aëdes (Finlaya) geniculatus Olivier.
Antenna with branched hair and spinose shaft ; abdomen without stellate tufts ; comb teeth arranged in a patch or, when few in number, in an unevenly aligned row.....19

19 Siphon with 3 or 4 pairs of hairs along dorsal surface ; last one or two pecten teeth widely detached and lying beyond the siphonal tuft
Aëdes (Ochlerotatus) rusticus Rossi.
Siphon without dorsal hairs ; pecten without detached teeth, or if these are present they lie between rest of pecten and siphonal tuft.....20

20 Mouth brushes with those hairs near middle line terminating in a row of minute teeth ; anal papillae not more than about half length of siphon (except in *sticticus* and occasionally *punctor*) ; distal teeth of pecten (except sometimes in *flavescens*) either undetached or, if detached, stouter than remainder, simple or almost simple and strongly curved.....21
All hairs of mouth-brushes simple ; anal papillae nearly as long as siphon ; pecten with one or two of distal teeth detached, but these are similar in type to remainder
Aëdes (Aëdes) cinereus Meigen.

21 One or two distal pecten teeth detached from remainder and differing from them in being stouter, simpler and more strongly curved ; anal papillae generally about half length of siphon.....**Aëdes (Aëdimorphus) vexans** Meigen.
Pecten otherwise ; anal papillae shorter (except in *sticticus* and occasionally *punctor*).....22

22 Anal papillae about 3 × length of saddle
Aëdes (Ochlerotatus) sticticus Meigen.
Anal papillae less than 2 × length of saddle.....23

23 Saddle completely encircling anal segment (4th instar only) ; anal papillae longer than saddle.....**Aëdes (Ochlerotatus) punctor** Kirby.
Saddle not completely encircling anal segment ; anal papillae shorter than saddle (except in *communis* and sometimes in *cantans* and *annulipes*).....24

24 Siphonal tuft arising at 0·55–0·62 × distance from base of siphon to apex
Aëdes (Ochlerotatus) caspius Pallas.
Siphonal tuft arising at less than half distance from base to apex (except occasionally in *dorsalis*, in which it may occur up to about 0·54 ×).....25

25 Comb teeth with median denticle (and sometimes sub-median ones) conspicuously longer and stouter than others (Fig. 179*d*) ; comb with at most 35 teeth, usually fewer (except in *annulipes*, which may have up to 44).....26
Comb teeth with secondary denticles forming a uniform fringe (fig. 179*e*) ; comb with at least 45 teeth, usually more.....30
26 Ventral brush with at least 3 unpaired tufts proximal to barred area (pre-cratal tufts) 27
Ventral brush with at most 2 pre-cratal tufts.....29

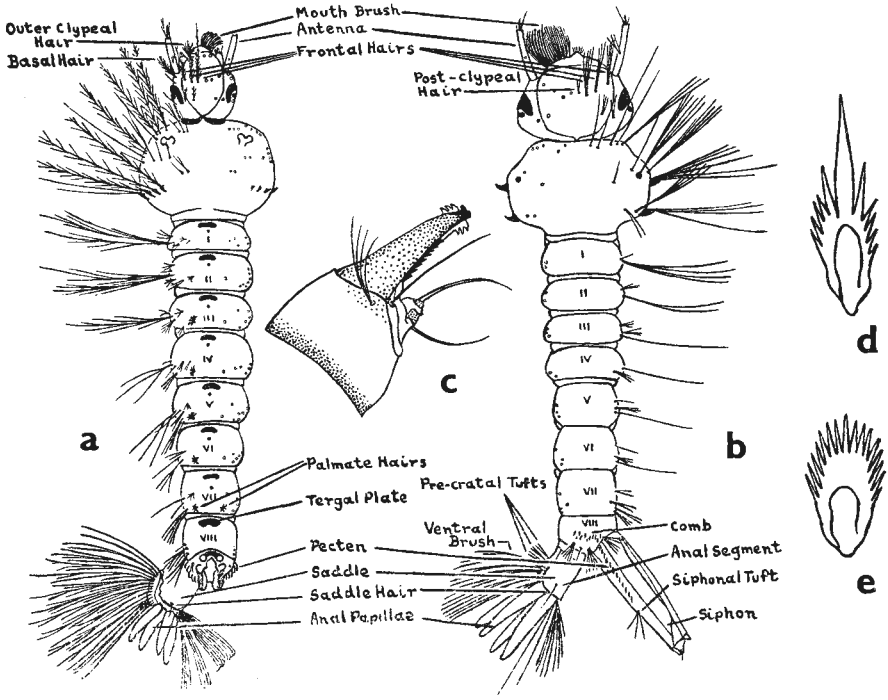

FIG. 179.—a.–b. Larvae in dorsal view. a. Tribe Anophelini. b. Tribe Culicini. c. Siphon in side view. Genus *Taeniorhynchus*. d.–e. Comb teeth. d. *Aëdes* (*Ochlerotatus*) *annulipes* Meigen. e. *Aëdes* (*Ochlerotatus*) *detritus* Haliday. (a–c adapted from Marshall, 1938.)

27 Anal papillae at most 0·8 × length of saddle, often much less ; uncrushed siphon at least 3·2 × as long as its breadth at base ; saddle hair at least 1·3 × as long as saddle ; comb teeth, in fourth instar, 20–35 in number
Aëdes (Ochlerotatus) flavescens Müller.
Anal papillae at least 0·7 × length of saddle, usually more ; uncrushed siphon at most 3·0 × as long as its breadth at base ; saddle hair at most equal in length to saddle ; comb teeth, in fourth instar, 28–44 in number.....28
28 Number of comb teeth in fourth instar 31–44
Aëdes (Ochlerotatus) annulipes Meigen.
Number of comb teeth in fourth instar 28–38. (Usually separable with certainty on breeding place ; see Key to Adults)
Aëdes (Ochlerotatus) cantans Meigen.

29 Anal papillae globular in shape, about one-third length of saddle
Aëdes (Ochlerotatus) dorsalis Meigen.
Anal papillae tapering, about half length of saddle
Aëdes (Ochlerotatus) leucomelas Meigen.

30 Anal papillae at least as long as saddle, often longer
Aëdes (Ochlerotatus) communis De Geer.
Anal papillae at most half length of saddle, often less
Aëdes (Ochlerotatus) detritus Haliday.

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