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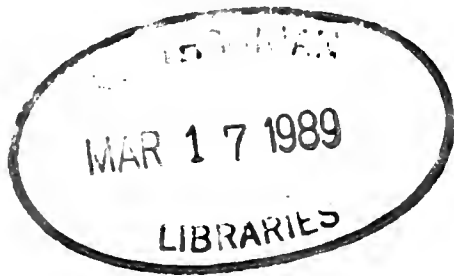
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BY

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FELLOW OF THE ENTOMOLOGICAL SOCIETY OF LONDON



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The Second Published Volume



STRATIOMYIDÆ
AND
SUCCEEDING FAMILIES
OF THE
DIPTERA BRACHYCERA
OF
GREAT BRITAIN

BY
G. H. VERRALL
FELLOW OF THE ENTOMOLOGICAL SOCIETY OF LONDON

DRAWINGS OF J. E. COLLIN, F.E.S.

January 1st, 1909

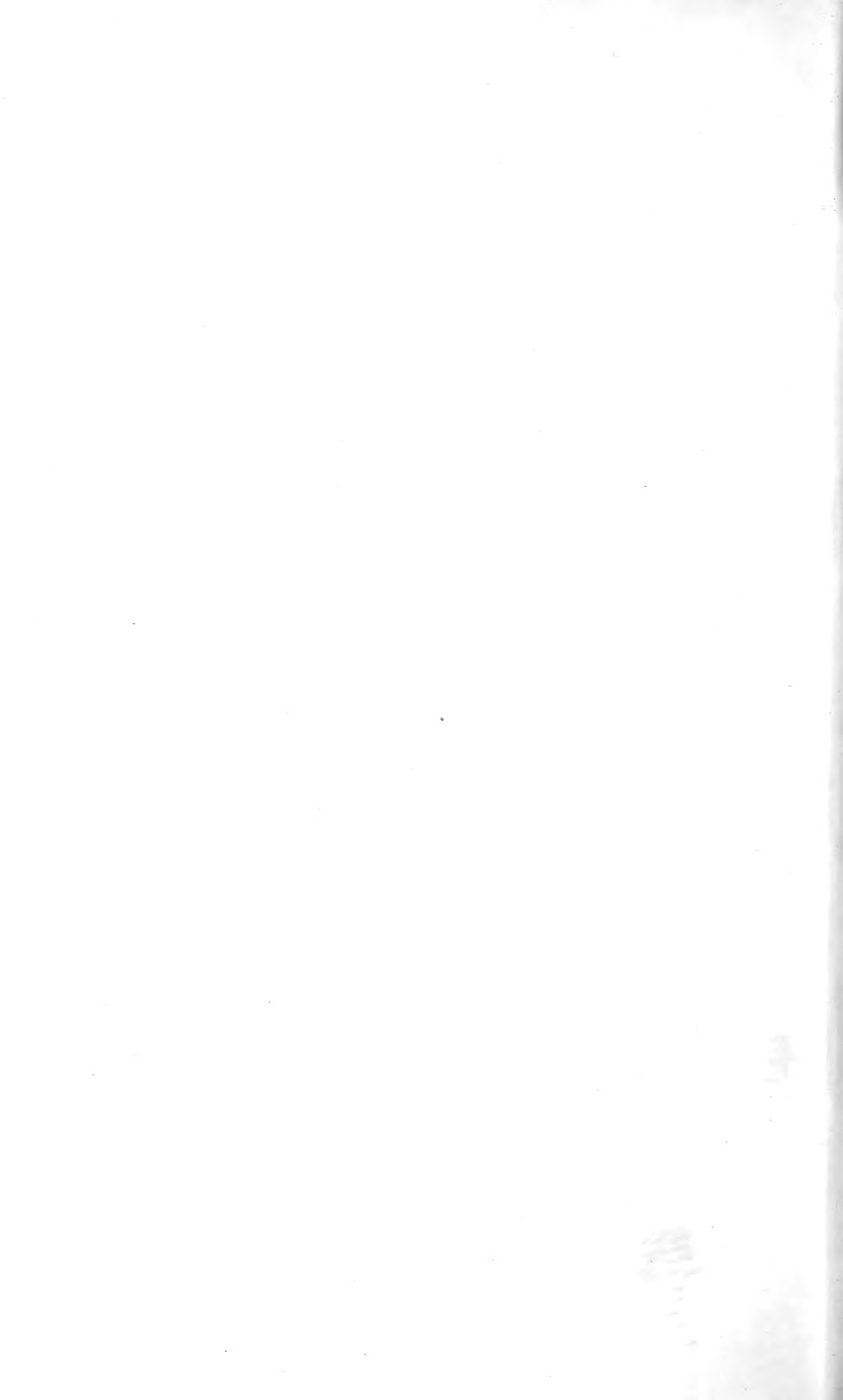
P R E F A C E

THIS volume requires very little preface, even though it has taken a long time to produce. The delay has been partly caused by the abundance, rather than the paucity, of literature upon the subject, as our British species are very few in number as compared with those on the Continent, while the common and more ancient species have, as a rule, been very inadequately described. Very few of the British species can be considered common, while many are exceedingly rare or local, and consequently difficulties have arisen in obtaining specimens in first-class condition and in identifying them.

My special thanks are due to Col. J. W. Yerbury, who has not only given me innumerable specimens which have been taken by him in recent years, but who has criticised in detail every line of the "proofs" as the work has been going through the press; I may not have accepted all his suggestions, but have done so in hundreds of cases. My thanks are also due to Mr P. H. Grimshaw, who has also examined all the "proofs," and has given valuable information as to localities, especially for Scotland. I hope I have acknowledged other help in the body of the work.

G. H. VERRALL.

December 1908.



EXPLANATORY PAGE

THIS is the second volume published of an intended work on the British Diptera. The volume is complete in itself, but yet may be part of an entire work composed of about fourteen volumes as was outlined in the "Explanatory Page" of the first volume. During the eight years which have elapsed since the scheme was first promulgated some modifications have become necessary, but not of a nature to necessitate any serious change.

The present Book would be Vol. V. of the complete work, or a Volume on the STRATIOMYIDÆ, &c., of GREAT BRITAIN.

Two more volumes will be commenced at once; one by myself on the CHIRONOMIDÆ, and one by Mr J. E. Collin on the group which is commonly known as "MUSCIDÆ ACALYPTRATÆ."



DIPTERA.

The DIPTERA are usually separated into two great Suborders, which are called

DIPTERA ORTHORRHAPHA

and

DIPTERA CYCLORRHAPHA.

These two suborders are almost equal in extent, and are distinguished mainly by the form of their pupæ, though other characters exist both in the imaginal and larval stages whereby they can be differentiated.

The distinguishing characters of these two great suborders have been given in the volume which dealt with the SYRPHIDÆ, and it is therefore only necessary to deal with the ORTHORRHAPHA in this volume.

DIPTERA ORTHORRHAPHA.

The ORTHORRHAPHA fall naturally into two great divisions, which are known as ORTHORRHAPHA NEMOCERA and ORTHORRHAPHA BRACHYCERA. These two great divisions are so distinct that Osten Sacken considered each of them to be a suborder equal in rank with the DIPTERA CYCLORRHAPHA, and in confirmation of this opinion it may be noted that practically all the writers before the recognition of the suborders ORTHORRHAPHA and CYCLORRHAPHA used to separate the DIPTERA into the NEMOCERA and BRACHYCERA. It would therefore be only necessary, after excluding the CYCLORRHAPHA, to restore the BRACHYCERA to their old rank; and then (if three suborders of equal rank were accepted) they might well be called the NEMOCERA* (*νήμα*, thread, and *κέρας*, horn), BRACHYCERA (*βραχύς*, short, and *κέρας*, horn), and ATHERICERA (*ἀθήρη*, awn, and *κέρας*, horn).

* More correctly NEMATOCERA, but antiquity and universal use sanctify the name.

Nobody has studied these higher divisions of the DIPTERA more thoroughly than Osten Sacken, and nobody is more competent to diagnose their distinctions; consequently, I cannot do better than quote his formulæ as given in the Berliner Entomologische Zeitschrift, vol. xxxvii., p. 422 (1892).

“ I. Palpi generally four-, or five-jointed,¹ pendulous, and more or less filiform; antennæ many-jointed (more than six-jointed), generally filiform (seldom pectinate), with the majority of the joints of the flagellum of a homologous structure.”²—“*Nemocera*, Latreille.”

“ II. Palpi one or two-jointed, porrect (not pendulous), the second joint more or less clavate, larger than the first, which in this case appears like a handle to the second; the joints of the antennal flagellum, with rare exceptions, not homologous.”³

“ *Orthorrhapha Brachycera* and *Cyclorrhapha Athericera*.”

As additional characters for the NEMOCERA Osten Sacken later on added, “ No macrochætæ; no tegulæ, (*) but the antitegula (*) is almost always distinct; the alula and the axillary excision are but little developed or entirely absent. No discal cell (exceptions: *Tipulidæ*, *Rhyphidæ*). Larvæ with a distinct head in the shape of a horny shell, mandibles with a lateral mobility, opposed to each other like pincers; round-headed larvæ.”

¹ “ It is very probable that the palpi, in most cases, are only apparently five-jointed, the basal joint representing the maxilla, or a portion of it.”

² “ In this paper I have used the word homologous in its ordinary sense, as ‘having the same relative position, proportion, value, or structure’ (Webster’s Dictionary), and not in the narrower sense, used by zoologists: for instance that the hand of man and the fore-foot of a horse are homologous. Observe that the joints of a flagellum, for being pectinate, do not cease to be homologous.”

³ “ ‘Joints of the flagellum not homologous.’ I purposely use this, merely negative, definition, in order to leave room for the endless variety in shape of the third joint of the antennæ of the *Brachycera*.”

(*) Tegula and antitegula = my thoracal and alar squama.

I would therefore give the following characters for the two great divisions of the ORTHORRHAPHIA:—

NEMOCERA.

Palpi pendulous, generally four- or five-jointed and more or less filiform; when, as in *Aëdes* and some genera of *Cecidomyiæ*, there are only one or two joints, the structure of the antennæ and the venation remove all doubts.

Antennæ always with a many-jointed flagellum after the two basal joints, and this flagellum always composed of a number of joints (6-39) of which the majority are similar to each other; these joints usually resemble a string of beads or rings not necessarily all equal in length or pubescence, and some of the joints of the flagellum are frequently verticillate, as in *Cecidomyiæ* (fig. 1), or verticillate plumose, as in *Chironomus* (fig. 3), or rarely pectinate, as in *Ctenophora* (fig. 5), and sometimes remarkably

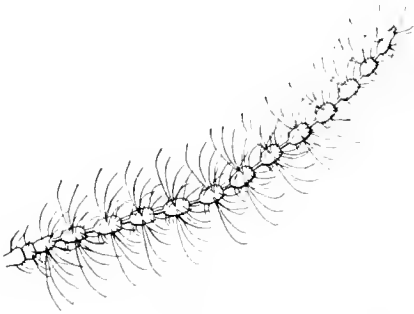


FIG. 1.—*Pezisia veronica* ♂. × 42.

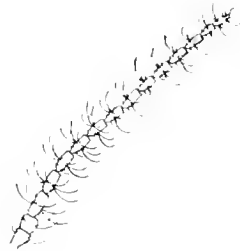


FIG. 2.—*Pezisia veronica* ♀. × 42.

elongate, as in *Macrocera* (fig. 7), and the joints almost always differ in ornamentation and number in the sexes, as may be seen in the female of

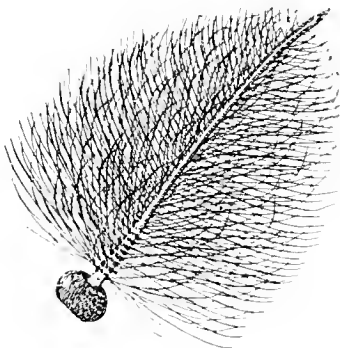


FIG. 3.—*Chironomus* ♂. × 22.

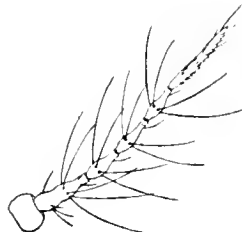


FIG. 4.—*Chironomus* ♀. × 31.

Cecidomyia (fig. 2), or *Chironomus* (fig. 4), or *Ctenophora* (fig. 6); sometimes the flagellum is merely composed of a series of rings rather closely crowded

together, as in *Bibio* (fig. 8), *Simulium* (fig. 9), or *Rhyphus* (fig. 10), and

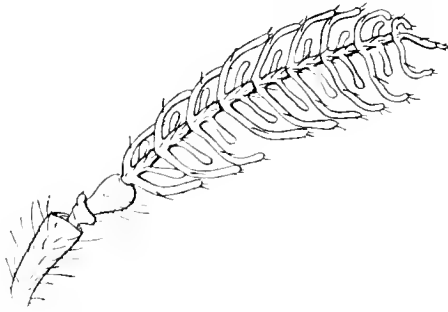


FIG. 5.—*Ctenophora flavcolata* ♂. × 11.

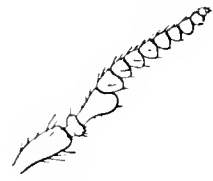


FIG. 6.—*Ctenophora flavcolata* ♀.
× 11.

then an approximation is made towards the annulated antennæ of some



FIG. 7.—*Macrocera centralis* ♂. × 8.

of the BRACHYCERA, such as *Xylophagus* (fig. 11), or the remarkable genus

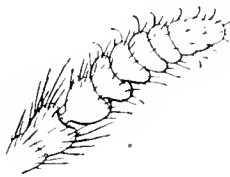


FIG. 8.—*Bibio anglicus* ♂.
× 33.

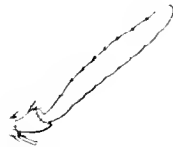


FIG. 9.—*Simulium ornatum* ♂.
× 33.

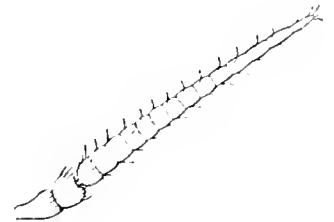


FIG. 10.—*Rhyphus punctatus* ♂.
× 33.

Rhachicerus (fig. 12), but in all such cases the structure of the palpi and the venation remove all doubts. The antennæ are always more or less

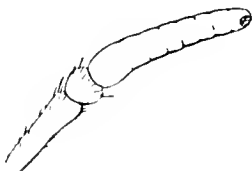


FIG. 11.—*Xylophagus ater* ♂. × 20.

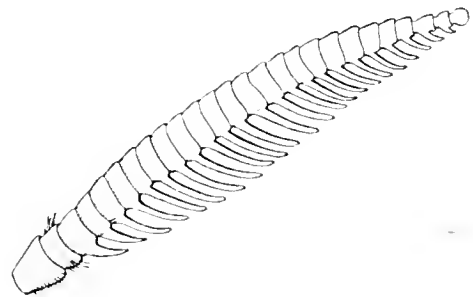


FIG. 12.—*Rhachicerus fulvicornis* ♀.
[After Snellen van Vollenhoven.]

long, often longer than the head and thorax together, and often with very many fewer joints in the female than in the male.

Wings with a venation ranging from very simple, as in *Cecidomyiidae*

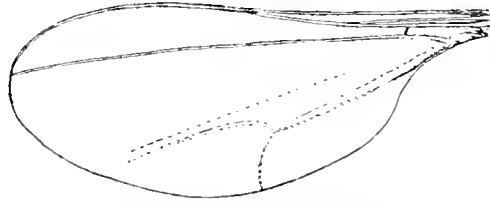


FIG. 13.—*Rhabdophaga subicis*. × 14.

(fig. 13), to very complex, as in *Tipula* (fig. 14), but always *with the anal cell wide open* and becoming wider open at the wingmargin instead of

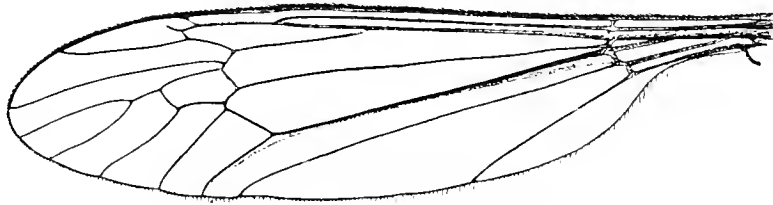


FIG. 14.—*Tipula varipennis* ♂. × 5.

narrowing as in the BRACHYCERA, and this character at once removes all doubt in such genera as *Rhyphus* (fig. 15) of the NEMOCERA, as compared

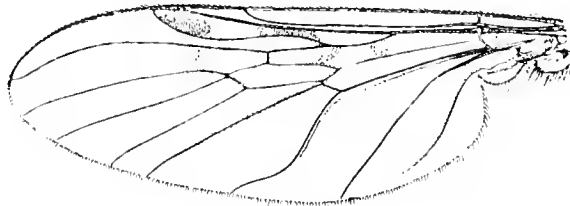


FIG. 15.—*Rhyphus punctatus* ♂. × 10.

with *Leptis* (fig. 16) of the BRACHYCERA in which the anal cell is open, though in most BRACHYCERA the anal cell is closed either at or near the

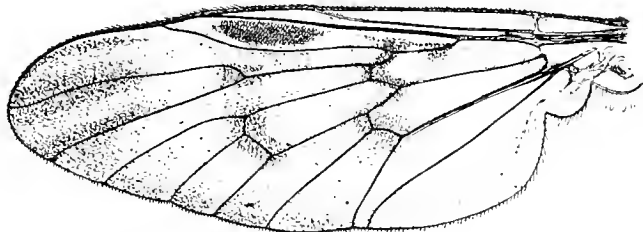


FIG. 16.—*Leptis scolopacea* ♂. × 8.

wingmargin or even withdrawn close to the wing-base. Discal cell rarely present, except in *Tipulidae* and *Rhyphidae*.

Head, thorax, margin of scutellum, and legs without any macrochætæ, unless the bristles which occur in the *Myctophilidæ* may be considered such; but Osten Sacken is of opinion that they are not true macrochætæ, and in that family the palpi, antennæ, and venation locate them at once. Pubescence never dense and erect.

In all cases of doubt as to whether a fly belongs to the NEMOCERA through the palpi being only one- or two-jointed (as in *Aedes* or some genera of *Cecidomyidæ*), the structure of the antennæ and the venation should remove all doubt. When the antennæ are shortened and the flagellum (= third joint) is apparently only annulated (as in the *Bibionidæ*, *Simulidæ*, or *Rhyphidæ*), then the antennæ never bear any terminal style or arista, and the venation is either completely distinct from any of the BRACHYCERA, or if rather similar to that of the BRACHYCERA (as in *Rhyphus*) the widened end of the anal cell determines its position, and in these cases the many-jointed pendulous palpi are distinct.

Brauer gives the following characters for the larvæ of the NEMOCERA, as distinguishing them from those of the BRACHYCERA: "Larvæ with horizontally biting upper jaws; or with the mouth parts quite rudimentary, in which case the larvæ are peripneustic and have 13 segments."

BRACHYCERA.

Palpi porrect (not pendulous), one- or two-jointed (sometimes rudimentary); if two-jointed the second joint is more or less clavate, and larger than the first which appears to be a handle to the second joint.

Antennæ after the two basal joints (of which the first is sometimes so small as to be practically imperceptible) with a third joint (or flagellum) of most varied structure (though similar in both sexes), but which is most

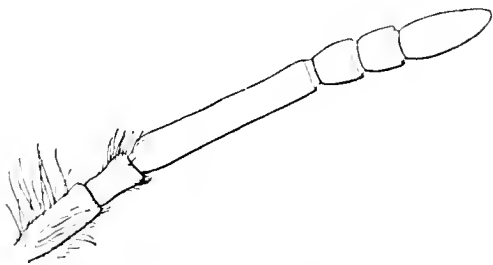


FIG. 17.—*Hexatoma pellucens* ♂. × 13.

commonly a solid joint with an apical (or sometimes dorsal) style or arista. This joint may be annulated to such an extent that it resembles the flagellum of some of the NEMOCERA, as for instance in *Xylophagus* (fig. 11), or *Hexatoma* (fig. 17), or *Cænomyia* (fig. 18), or even as in the extraordinary *Rhachiccerus* (fig. 12), and in these cases there is no terminal style

or arista, but the venation (especially the anal cell) and the porrect palpi at once separate them from the NEMOCERA; others have this third joint very different from the two basal joints but still annulated, though the

annulations are considerably soldered together as in *Stratiomys* (fig. 19), or

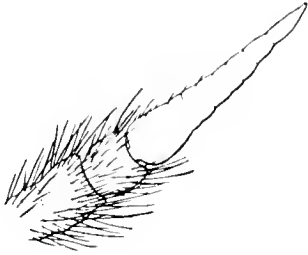


FIG. 18.—*Cu nomgia ferruginea* ♂. × 22.

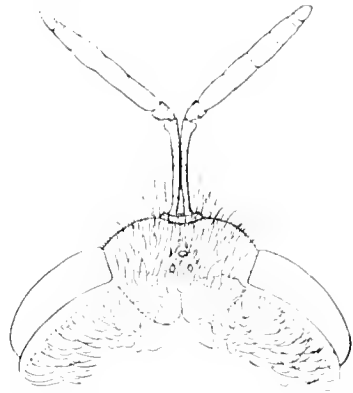


FIG. 19.—*Stratiomys furcata* ♀. × 8.

Sargus (fig. 20), or *Tabanus* (fig. 21), and in these the terminal style or arista often becomes apparent. As a proof that these forms show a connecting link from the NEMOCERA to the ATHERICERA it may be noted that all

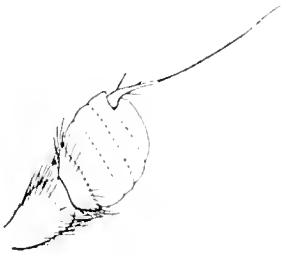


FIG. 20.—*Sargus iridatus* ♀. × 30.

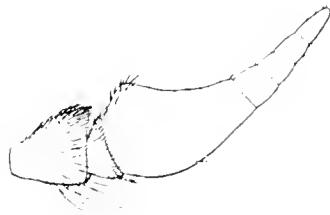


FIG. 21.—*Tabanus autumnalis* ♀. × 20.

species with an annulated third antennal joint belong to the EREMOCHLETA (those groups which exhibit no macrochaetae); after the EREMOCHLETA the third antennal joint is always solid (the *Mydaiidae* have an apparently

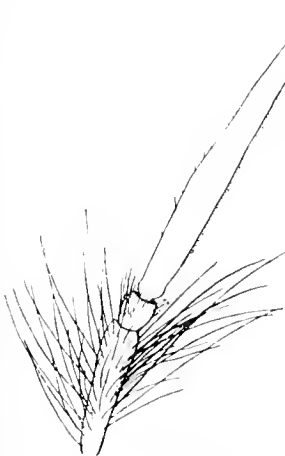


FIG. 22.—*Bombylius major* ♂. × 23.

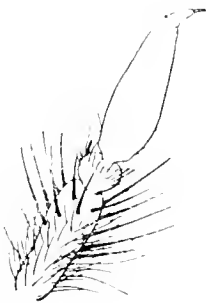


FIG. 23.—*Thereva nobilitata* ♀. × 30.

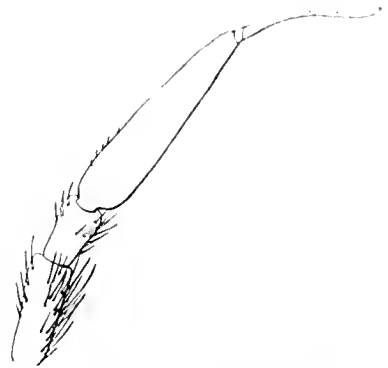


FIG. 24.—*Asilus crabroniformis* ♂. × 22.

jointed flagellum of quite a distinct type) and the terminal style or arista (if any) becomes more regular as in *Bombylius* (fig. 22), or *Thereva* (fig. 23), and when the ENERGOPODA of Osten Sacken are reached and macrochaetae become the almost universal rule this is still more the case, as in *Asilus*

(fig. 24), though not always, as in *Laphria* (fig. 25), until in the families with a very short anal cell (*Empidæ*, *Dolichopodidæ*, etc.) the third antennal joint is comparatively simple, with a terminal style, as in

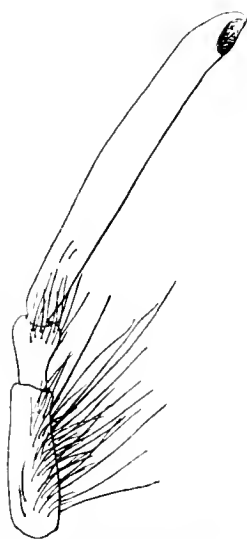


FIG. 25.—*Laphria flava* ♂.
× 26.

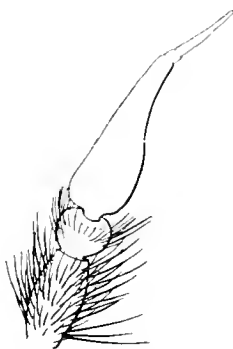


FIG. 26.—*Empis tessellata* ♀.
× 30.



FIG. 27.—*Dolichopus angulatus* ♂.
× 33.

Empis (fig. 26), though the dorsal arista (so characteristic of the ATHERICERA) does not make its appearance until in some genera of the *Dolichopodidæ* (fig. 27). The antennæ are never very long, rarely as long as the head and thorax together, though they are not uncommonly elongate and porrect, and they are almost invariably similar in the two sexes.

Wings with an apparently complex venation (though the complexity

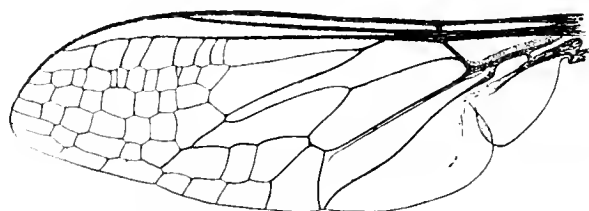


FIG. 28.—*Nemestrina Perzli* ♀. × 5.

is only caused by numerous cross-veinlets), as in *Nemestrina* (fig. 28), or with a venation well developed but of a comparatively simple type which extends through numerous families, until the group of families is reached in which the anal cell is drawn back to the base

of the wing, after which the venation becomes far more simple until it reaches the most simple form in the *Dolichopodidæ* (fig. 29), in which it is



FIG. 29.—*Dolichopus angulatus* ♂. × 12.

almost indistinguishable from many of the ATHERICERA. The *anal cell* is *always contracted near the hindmargin*, even when it is open as in *Leptis*

(fig. 16), and is most commonly closed either at the wingmargin (when it may vary in the same species as to being open or closed), as in *Thereva* (fig. 30), or near the wingmargin, as in *Oxycera* (fig. 31), or it may be closed near the wing base, as in *Empis* (fig. 32), or may become obsolete, as in *Dolichopus* (fig. 29), and in these latter cases the venation and the antennæ

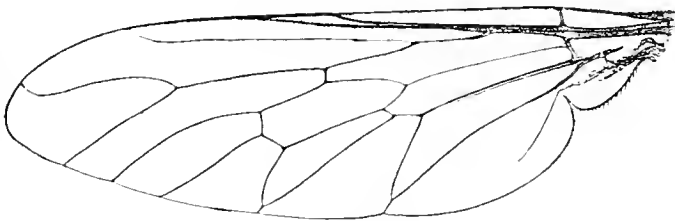


FIG. 30.—*Thereva annulata* ♀. × 10.

indicate the stepping stones to the **ATHERICERA**; discal cell almost always present, though not obvious in some *Empidæ* and in all the subsequent

families. Alula and axillary incision well developed as a rule, though sometimes obsolete. Wing-membrane frequently ribbed or rippled or merely rumpled, being conspicuously ribbed in some of the *Stratiomyidæ*, and rippled or ribbed in the *Tabanidæ*, *Nemestrinidæ*, *Cyrtidæ* (slightly), *Bombylidæ*, *Therevidæ* (slightly), *Mydaidæ*, and *Asilidæ*, but not in the *Leptidæ* or *Scenopinidæ*, though exceptions may occur, as I am unable to trace anything of the kind in the genus *Nemotelus* and in some species of *Dioctria*. Squamæ of very varied development; the alar pair being usually moderately developed, but small in the *Cyrtidæ* and rather small in some *Asilidæ*, while they are difficult to see in the *Bombylinæ* and the *Nemestrinidæ*, well developed in the *Therevidæ*, and moderate to large in the *Tabanidæ*; thoracal squamæ very frequently absent, or only indicated by the membrane of the frenum, in the *Leptidæ*, *Nemestrinidæ*, *Bombylidæ*, *Therevidæ*, *Mydaidæ*, *Scenopinidæ*, *Apioceridæ*, *Asilidæ*, and some of the *Stratiomyidæ*, but large and conspicuous and rather upraised in the *Tabanidæ*, and enormous and depressed in the *Cyrtidæ*.

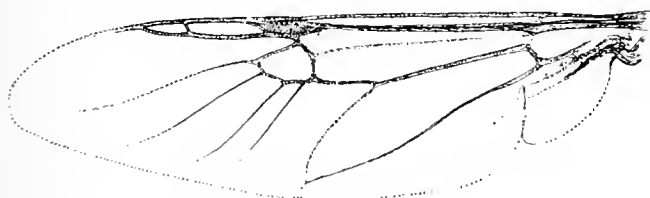


FIG. 31.—*Oxycera pulchella* ♂. × 10½.

Pubescence soft and equal in the **EREMOCILETA**, as there is no trace of long distinct hairs or bristly hairs or anything approaching to a bristle, unless of such a structural nature as the thoracic spines of *Ephippium*, the scutellar spines of *Beris*, *Stratiomys*, etc., or the femoral serration of *Xylomyia*, etc., though the pubescence of the *Leptidæ* is usually more rigid than that of any of the *Stratiomyidæ*; in the **TROMOPTERA** (*Bombylidæ* and *Therevidæ*) strong bristly hairs often occur on the sides of the thorax or on the margin of the scutellum, and some of these hairs represent or form

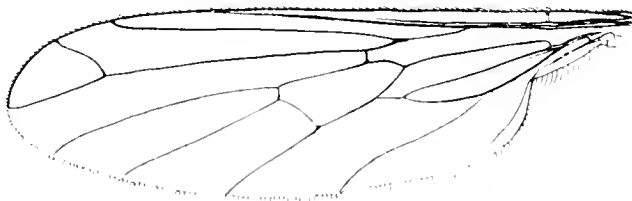


FIG. 32.—*Empis lutea* ♂. × 10½.

characteristic bristles (fig. 33), and at the same time the legs bear small spicules, or even bristly spines on the femora, which are quite distinct



FIG. 33.—*Theresa nobilitata* ♀. × 10.

from any structural serration, and the first indications occur of an apical circle of spurs or spines on the tibiae; the DERMATINA (*Scenopinidae* and *Mydidae*) are of a more coriaceous nature and, though not truly chaetophorous, begin in some species of *Mydidae* to exhibit small spines (not spicules) on the tibiae besides a rather bristly serration beneath the hind femora; the ENERGOPODA (*Apioceridae* and *Asilidae*) and the MICROPHONA (*Empididae*, *Dolichopodidae*) and subsequent families bear distinct

macrochaetae on head, thorax, and legs (unless they are replaced, as in some *Asilidae*, by dense coarse pubescence).

In all cases of doubt as to whether a fly belongs to the BRACHYCERA or the NEMOCERA (and doubt could only arise in some *Stratiomyidae* and *Leptidae*) because of an annulated flagellum-like third joint of the antennae (as in *Rhachicercus*, *Beris*, *Xylophagus*, *Cænomyia*, etc.), the contraction of the anal cell towards the wingmargin provides an infallible character.

Brauer gives the following characters for distinguishing the larvae of the BRACHYCERA from those of the NEMOCERA:—

“Larvae with parallel upwards and downwards or outwards and downwards grinding jaws, which act in piercing, hacking, boring, or sucking. Head not fully developed, only a jaw-case without ganglia present, which, however, sometimes is almost a head because of the outwardly projecting eyes.—Chain of ganglia beginning behind the jaw piece.—Larvae with rudimentary mouth-parts, meta- or amphi-pneustic, and composed of 10-12 segments.”

THE DIPTERA ORTHORRHAPHA BRACHYCERA

may be divided into sixteen families, which have been associated into groups or superfamilies in various ways.

The exact boundary line between the ORTHORRHAPHA and the CYCLORRHAPHA is still rather uncertain, and one of the last students of this subject (de Meijere, Zool. Jahrb., xiv., pp. 87-132, 1900) is of opinion that the *Lonchopteridae* and *Phoridae* should commence the CYCLORRHAPHA rather than close the ORTHORRHAPHA. Osten Sacken's final views (1902) were that the *Phoridae* were true ORTHORRHAPHA, but that they had no “real affinity” with any other family. My own studies have not sufficiently included these difficult questions, and consequently I am unable to give any strong opinion, except to say that I believe the *Phoridae* to have their nearest “affinity” in the *Lonchopteridae*, and the *Lonchopteridae* in the *Dolichopodidae*.

DIPTERA ORTHORRHAPHA BRACHYCERA.

Short Table of British Families.

This short table of families is naturally subject to some exceptions.

- 1 (8) Three well-developed pulvilli (fig. 34). Species absolutely without bristles.
- 2 (5) Third joint of antennæ annulated.
(Conf. *Xylophagus* in *Leptidæ*.)
- 3 (4) Præfurca starting almost opposite the base of the discal cell (fig. 35). Tibiæ without spurs (except in *Xylomyia*). Thoracal squamæ usually small. I. STRATIOMYIDÆ.
- 4 (3) Præfurca starting considerably before the base of the discal cell (fig. 39). Tibiæ spurred on at least the middle pair. Thoracal squamæ large. IV. TABANIDÆ.
- 5 (2) Third joint of antennæ not annulated (except in *Xylophagus*). Posterior tibiæ spurred.
- 6 (7) Thoracal squamæ small. Abdomen elongate, usually conical. III. LEPTIDÆ.
- 7 (6) Thoracal squamæ enormous. Abdomen balloon-like. VI. CYRTIDÆ.
- 8 (1) Two pulvilli only (fig. 42). Species not truly eremochætous.
- 9 (16) Basal cells long; anal cell long and pointed or even open.
- 10 (13) Posterior cells three or four: small cross-vein absent (figs. 43 and 45).
- 11 (12) Furry species. Posterior cells four. VII. BOMBYLIDÆ.
- 12 (11) Bare species. Posterior cells three. IX. SCENOPINIDÆ.
- 13 (10) Posterior cells five; small cross-vein usually present (fig. 44).
- 14 (15) Vertex flush with the eyes; eyes of the male touching. Aërial furry species. VIII. THEREVIDÆ.
- 15 (14) Vertex sunken in both sexes between the bulging eyes; eyes of the male widely separated. Pedestrian usually bristly species. XII. ASILIDÆ.
- 16 (9) Second basal and anal cells short, the anal cell (when present) being closed by a recurrent veinlet or with a blunt end (except in *Hybotinæ*); posterior cells never more than four.
- 17 (22) Longitudinal wing-veins comparatively normal and running out fairly straight to the wingmargin.
- 18 (21) Wings rounded at the tip and with at least one apparent cross-vein near the middle of the wing.
- 19 (20) Upper basal cell about one-third the length of the wing. Proboscis horny and pointed. XIII. EMPIDÆ.
- 20 (19) Upper basal cell very short and indistinct. Proboscis stout and pulpy. XIV. DOLICHOPODIDÆ.
- 21 (18) Wings pointed at the tip and with no apparent cross-vein out on the middle of the wing. Mouth-margin bristly. XV. LONCHOPTERIDÆ.
- 22 (17) Longitudinal veins extremely abnormal, those on the main portion of the wing being very faint (fig. 53). XVI. PHORIDÆ.

DIPTERA ORTHORRHAPHA BRACHYCERA.

Table of Families as distinguished by Venation.

Although there may be a few exceptional cases the families may almost always be distinguished by the venation alone.

- 1 (24) Basal cells all three long (at least one-third the length of the wing); the lower one (anal cell) being often open to the wing-margin, and when closed ending in a point at more than half the length of the anal vein. Alula usually well developed.
(Conf. *Hybotinae* in *Empidæ*.)
 - 2 (21) Posterior cells with their lower margin not running parallel with the wingmargin. Discal cross-vein rarely placed much beyond the middle of the discal cell but commonly before.
 - 3 (18) Upper branch of the discal vein ending after the wing-tip.
 - 4 (7) Prefurea originating almost opposite the base of the discal cell. Venation elaborate, and in all cases including the discal cell.
 - 5 (6) Ambient vein absent. Discal cell always present, pentagonal (except in *Xylomyinae*); fourth posterior cell open (except in *Xylomyinae*).
I. STRATIOMYIDÆ.
 - 6 (5) Ambient vein present (though thin). Fourth posterior cell bluntly closed.
II. ACANTHOMERIDÆ.
 - 7 (4) Prefurea originating well before the base of the discal cell, or (*Cyrtidæ*) the discal cell absent or the venation reduced.
 - 8 (17) Discal cross-vein normal.
 - 9 (16) Posterior cells five (except in *Hilarimorpha*).
- N.B.—The four following families exhibit the most perfect and yet intelligible form of venation in the BRACHYCERA. It is very similar in all four families but is easily distinguished by a practised eye.
- 10 (15) Subcostal vein only moderately long and ending quite simple.
 - 11 (12) Cubital fork large, triangularly wide open, and including the wing-tip.
IV. TABANIDÆ.
(Conf. *Vermileoninae* and *Hilarimorpha*.)
 - 12 (11) Cubital fork usually much longer than wide (but not so in *Vermileoninae* and *Hilarimorpha*), and often hardly including the wing-tip.
 - 13 (14) Discal cross-vein placed near the base (on at least the basal third) of the discal cell. Fourth posterior cell never closed or even contracted. Stigma usually well defined. III. LEPTIDÆ.
 - 14 (13) Discal cross-vein placed at about the middle of the discal cell. Fourth posterior cell often acutely closed and usually contracted.
VIII. THEREVIDÆ.

- 15 (10) Subcostal vein unusually long, and often receiving the radial vein before its tip. Fourth posterior cell frequently closed. Stigma absolutely absent. XII. ASILIDÆ.
- 16 (9) Posterior cells four or three. Cubital fork (when present) usually large and triangularly wide open, including the wing-tip. VII. BOMBYLIDÆ.
- 17 (8) Discal cross-vein absent in British species; but when present placed close to the base of the discal cell, and the continuation of the cell beyond it closed by another cross-vein near (sometimes beyond) the end of the discal cell. Venation in British species very much reduced. VI. CYRTIDÆ.
- 18 (3) Upper branch of the discal vein ending before the wing-tip.
- 19 (20) Venation very much reduced. IX. SCENOPINIDÆ.
- 20 (19) Venation elaborate. Veins near the wing-tip upcurved. XI. APIOCERIDÆ.
- 21 (2) Posterior cells (at least the first and normal fourth) with their lower margin running parallel with the wingmargin. Discal cross-vein near the end of the discal cell.
- 22 (23) Subcostal vein moderate in length and ending simple. "Diagonal" vein present. V. NEMESTRINIDÆ.
- 23 (22) Subcostal vein remarkably long and receiving subsequent veins. "Diagonal" vein not present. X. MYDAIDÆ.
- 24 (1) Basal cells or at least the anal cell short, and (except in *Hybotinae*) with the lower branch of the postical vein recurved so that the anal cell ends in an upper point, or the anal or second basal cell absent. Posterior cells four or less. Alula absent.
- 25 (28) Venation showing at least one apparent cross-vein well out on the disc of the wing. Wings rounded at the tip.
- 26 (27) Basal cells usually long enough to be conspicuous. Radial and cubital veins diverging at about one-third the length of the wing. Cubital vein often forked. XIII. EMPIDÆ.
- 27 (26) Basal cells very short or obsolete. Radial and cubital veins diverging close to the base of the wing. Cubital vein never forked. XIV. DOLICHOPODIDÆ.
- 28 (25) Venation abnormal and not showing any apparent cross-vein out on the disc of the wing.
- 29 (30) Radial and cubital veins long and almost parallel, diverging close to the base and ending almost at the wing-tip. Wing-tip pointed. XV. LONCHOPTERIDÆ.
- 30 (29) Radial and cubital veins forming one strong vein which extends up to near the middle of the costa, and close to which they may diverge; subsequent veins faint and apparently arising from this præfurca. Wing-tip rounded. XVI. PHORIDÆ.

DIPTERA ORTHORRHAPHA BRACHYCERA.

Table of Superfamilies and Families.

- 1 (12) Three equally well developed pad-like pulvilli (fig. 34). Species absolutely eremochæteous.* **EREMOCHÆTA.**

Third joint of the antenna usually annulated, and when a style or arista is present it is apical or subapical. Anal cell always long but closed, or, at any rate, contracted near the wing-margin: cubital vein almost always forked: fourth posterior cell seldom closed: thoracal squamæ often large. Species sometimes blood-sucking, but never predaceous in the perfect state.

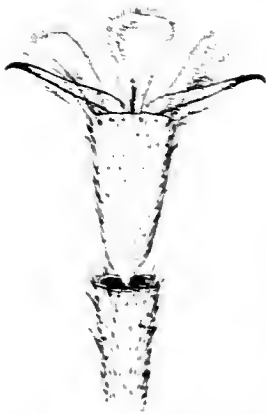


FIG. 34.—*Leptomyia* sp.

Exceptions may occur as follows: the pulvilli may be only two in number (*Lampromyia*), or may be obsolete (*Cænophanes*, etc.); the femora more or less serrate beneath the hind pair (*Xylomyia*, etc.), though the term eremochæteous should be taken as strictly applying to the thorax and scutellum only: the antennal arista apparently only subapical or even subdorsal (*Pachygaster*, *Symphoromyia*, etc.), and the third joint not at all annulated (*Leptida*, etc.): the anal cell only moderately long (*Beris*, etc.), the cubital vein simple (*Pachygaster* sp., *Nemotelus* sp., *Ocyrcera* sp., *Hilarimorpha*, *Cyrtida*, etc.), and the fourth posterior cell closed (*Xylomyia*, *Acanthomerida*, etc.).

- 2 (11) Wing-veins never running parallel with the hindmargin of the wing, but all the veins near or after the wing-tip running out almost straight to the wingmargin.

The veins may become faint, curved, and incomplete (*Stratiomys*, etc.) or obsolete (*Cyrtida*), or if they do run almost parallel with the hindmargin (as in some *Cyrtida*) the thoracal squamæ then are enormous.

- 3 (8) Thoracal squamæ small or obsolete, or if rather large (*Stratiomys*, etc.) then covered on both upper and under surfaces with woolly pubescence, and the abdomen not balloon-like as in the *Cyrtida*, and the fork of the cubital vein very short and wholly placed far before the wing-tip.

- 4 (5) Ambient vein† absent or incomplete, though sometimes (*Berina* and *Xylomyia*) the costal vein is continued for a short distance after the end of the cubital vein: præfurca‡ starting almost opposite the base of the discal cell except in the

* The term "eremochæteous" means being absolutely without strong bristles on the head or thorax, as distinguished from ordinary pubescence or pile.

† The "ambient vein" is a fine vein which runs all round the hindmargin of the wing, being continued after the end of the costal vein.

‡ The "præfurca" is the common base of the radial and cubital veins.

Xylomyiinae; anterior veins often crowded together near the costa and the other veins faint; cubital fork entirely before the wing-tip unless in *Xylomyia*: anal cell always closed. Legs rather short and stout: tibiae without spurs, except in the *Xylomyiinae* and a few *Berinae*. Third antennal joint (flagellum) always annulated. Scutellum often armed with marginal spines. Proboscis never elongate or horny. Perfect insects never blood-suckers.

L. STRATIOMYIDÆ

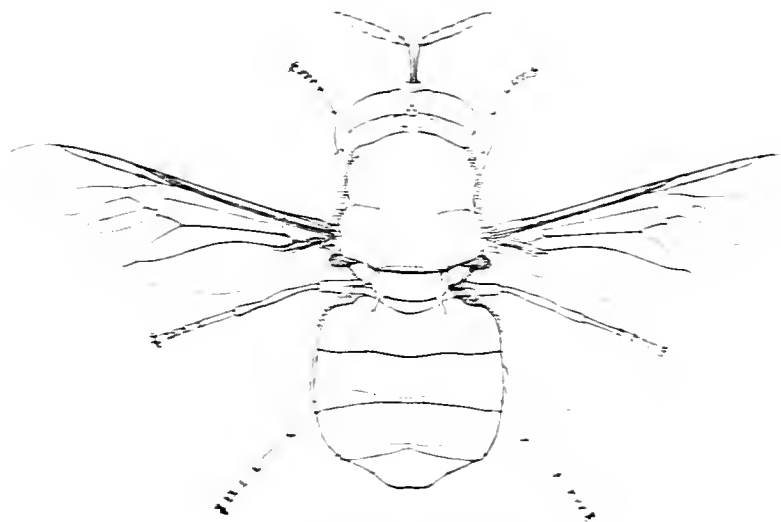


FIG. 33. — *Stratiomya grandis* L. 3.

The *Stratiomyidae* are large to rather small flies, more or less flattened, and with the wings when at rest lying parallel and flat on each other on the flattened abdomen. Their colours are usually black with orange or whitish markings, but all the British *Sarginae* are brilliantly shining green. They may (with the exception of the *Xylomyiinae*) be distinguished from all the Palearctic BRACHYCERA (except a few *Cyrtidae*) by the short præfurca, which starts opposite to, instead of considerably before, the base of the discal cell.

The *Xylomyiinae* are somewhat aberrant, and closely resemble the *Xylophaginae* (*Leptidae*) in many characters, such as the præfurca starting considerably before the base of the discal cell, the continuance of the costal vein as an ambient vein to the end of the second veinlet from the discal cell, the shape of the discal cell and cubital fork, the spurred posterior tibiae, and the sometimes serrulate hind femora, but they may be distinguished from the *Xylophaginae* by the closed fourth posterior cell.

- 5 (4) Ambient vein complete even if faint: anterior veins never crowded together near the costa: cubital fork almost always enclosing the tip of the wing, or at any rate (when present) very nearly doing so. Tibiæ always more or less spurred. Scutellum very rarely armed (*Czernomyia*).
- 6 (7) Gigantic flies. Third antennal joint always annulated. Tibiæ with a short indistinct spur on the middle pair only. Præfurca starting only a short distance before the base of the discal cell:

cubital fork wide open and including the wing-tip; fourth posterior cell always bluntly closed; squamæ absent.

II. ACANTHOMERIDÆ
(not European).

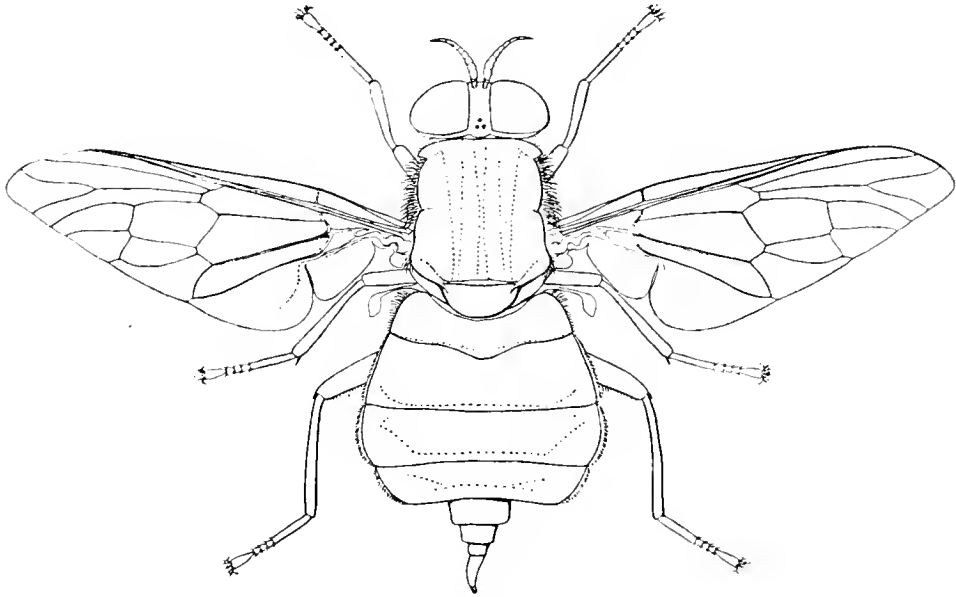


FIG. 36.—*Acanthomera Heydeni* ♀. × 1½.

- 7 (6) Moderate-sized flies. Third antennal joint rarely annulated. Tibiæ always spurred on the posterior pairs, and sometimes on the front pair. Præfurca always starting considerably before the base of the discal cell; cubital fork usually long and bell-mouthed, and usually including the

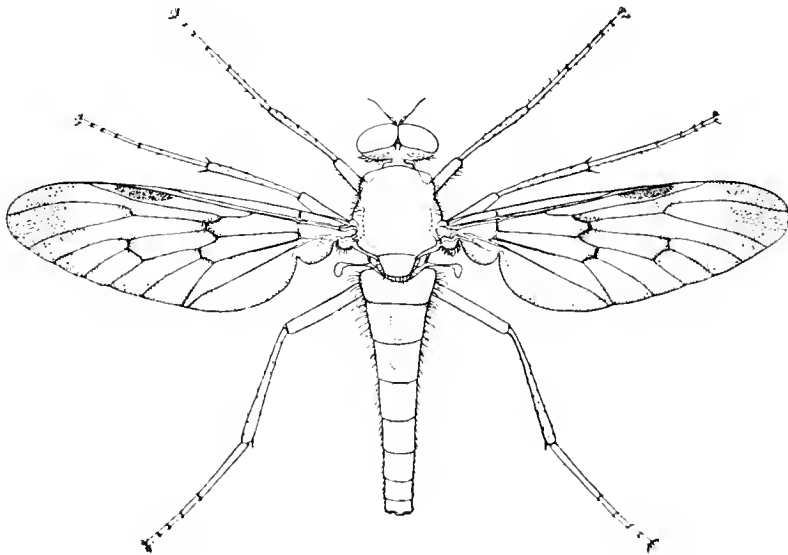


FIG. 37.—*Leptis scolopacea* ♂. × 3.

wing-tip; fourth posterior cell very rarely closed, and then only in a point near the wingmargin. Posterior cells five, or very rarely (*Hilarimorpha*) four; anal cell sometimes just open at the wingmargin; thoracal squamæ absent. Legs,

and especially the tarsi, rather long and not stout even though strong; front coxæ long. Scutellum unarmed, except in *Cænomyia*. Perfect insects (with extremely rare exceptions), not blood-suckers.

III. LEPTIDÆ.

The *Leptidæ* are rather large to rather small elongate flies, not at all flattened, but with a rather conical abdomen and with long wings. Their colours are usually sombre, but many of the larger species have extensive orange markings on the abdomen, while others bear very fugitive golden pile. They may be distinguished from the allied families by the spurred tibiæ, the practical absence of the thoracal squamæ, and (with the exception of the *Xylophaginae* and *Cænomyiinae*) the simple third antennal joint; they also bear a characteristic pubescence, which is of a sparse equal bristly nature, though quite devoid of strong bristles (= macrochætæ).

The *Xylophaginae* and *Cænomyiinae* have a distinctly 8-annulated flagellum, and are consequently allied to the closing subfamilies of the *Stratiomyidæ*, which also agree with them in having the tibiæ more or less spurred; the entire ambient vein distinguishes them but is not a very obvious character, and further details of distinction are given under their descriptions. The arista may sometimes appear to be subdorsal (*Symphoromyia*) because of the peculiar formation of the third antennal joint (fig. 38).

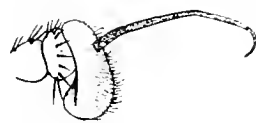


FIG. 38.—*Symphoromyia immaculata* ♂. × 43.

- 8 (3) Thoracal squamæ conspicuously large. Scutellum never armed.
- 9 (10) Head large and conspicuous, semicircular anteriorly, but fitting posteriorly squarely on the front of the thorax, and about as wide as, or wider than, the thorax; antennæ with the third

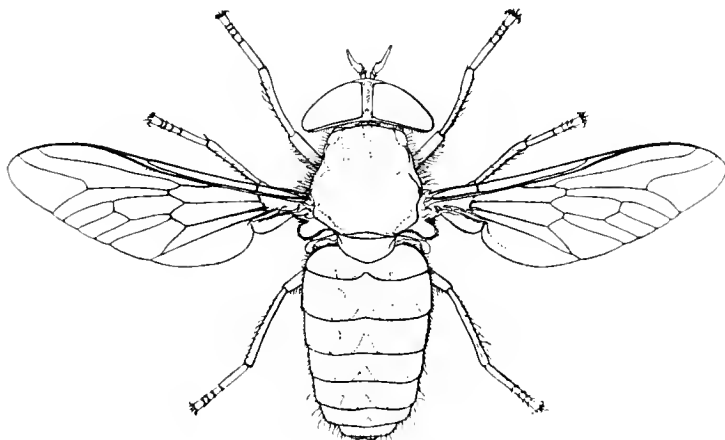


FIG. 39.—*Tabanus maculicornis* ♀. × 3.

joint annulated, but very rarely flagelliform (*Hexatoma*, etc.), and the basal annulation much larger than the others so as to almost reduce the other annulations to a thick jointed style, and never with any approximation to an arista. Thorax and abdomen rather flat and broad, never at all gibbous; genitalia never prominent. Venation normal; cubital fork very wide open; posterior cells always five; small cross-vein always present; ambient vein distinctly entire. Tibiæ always spurred

on the middle pair, and sometimes on the hind pair. Thoracal squamæ large, but not enormous; rather raised and not concealing the halteres. Perfect insects all blood-suckers and never small.

IV. TABANIDÆ.

The *Tabanidæ* are the well-known biting "Horse Flies,"* which annoy mankind as well as horses and cattle. They are often very large (but hardly gigantic) bulky flies, ranging down to moderate but never small size, and they are square-built with the thorax and abdomen moderately flattened. Their colours are, as a rule, mottled brown and grey, except in the brightly colored species of *Chrysops*, and in life the eyes exhibit most brilliant hues of green with usually purple spots or bands. The proboscis is inconspicuous in all British species, but in many species of *Pangonia* is remarkably long, thin, and porrect. The *Tabanidæ* may be easily known by their general appearance, peculiarly annulated third antennal joint, and their large thoracal squamæ, while the wide open triangular fork of the cubital vein never truly occurs in any others of the EREMOCHÆTA.

The *Pangoninae* may exhibit some little variation in venation, but only of an unimportant nature, such as the closing of the first and fourth posterior cells near the wingmargin through the approximation and fusion of the veins.

- 10 (9) Head very small and inconspicuous, being almost globular and so much depressed as to be overshadowed by the large gibbous thorax, very holoptic in both sexes; antennæ with the third joint never annulated, though sometimes elongate and strap-shaped without any style or arista, but usually very short and with a long apical arista. Thorax and abdomen very

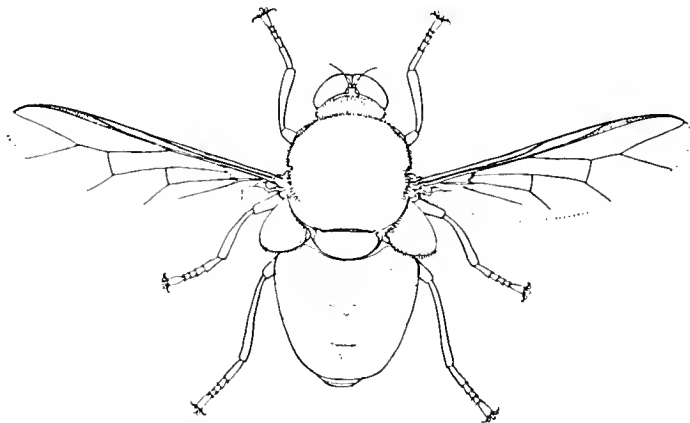


FIG. 40.—*Acrocer globulus* ♂. × 7½.

gibbous, the abdomen being rounded or even inflated like a balloon; prothorax sometimes (*Philopota*) exceedingly developed, and forming a dorsal shield on the front part of the thorax; genitalia never prominent. Venation usually eccentric; posterior cells varying from two to five (or apparently six); small cross-vein usually absent, but sometimes indistinctly present; ambient vein absent; discal cross-vein (when present) close to the end of the præfurca and close to the base of the discal cell, and there is often a second cross-vein placed near

* I use the terms Horse Fly for *Tabanidæ*, and Gad Fly or Bot Fly for *Æstridæ*.

the end of the discal cell. Tibiæ without spurs or with only very short blunt ones. Thoracal squamæ enormous, depressed, and completely covering the halteres. Perfect insects never blood-suckers and never large. VI. CYRTIDÆ.

The *Cyrtidæ* are medium sized to rather small humpbacked flies, with a globular abdomen and comparatively (or very) small wings. Their colours are dark with usually yellow or bone-white markings. The head is usually ridiculously small in comparison with the thorax, and is almost entirely composed of the two eyes. The mouth opening is sometimes closed by a membrane, but in some (not British) species there is a very long, thin, horny proboscis bent back under the body. The larvæ are parasitic on spiders, but (as far as known) the perfect insects are harmless. They may be distinguished from all other BRACHYCERA by the enormous thoracal squamæ and the globular abdomen.

- 11 (2) Wing-veins running parallel with the hindmargin of the wing (fig. 41) in a very different fashion from any other EREMOCHÆTA, and often reticulate.

The venation has some other peculiarities, as there is a "diagonal vein" which runs as a continuation of the cubital vein almost straight from its base to (or almost to) the hindmargin of the wing, and when the discal cross-vein is present, it is placed very near the tip of the discal cell. Antennæ with the third joint simple and bearing a terminal style. Aërial insects of rather large size. V. NEMESTRINIDÆ.

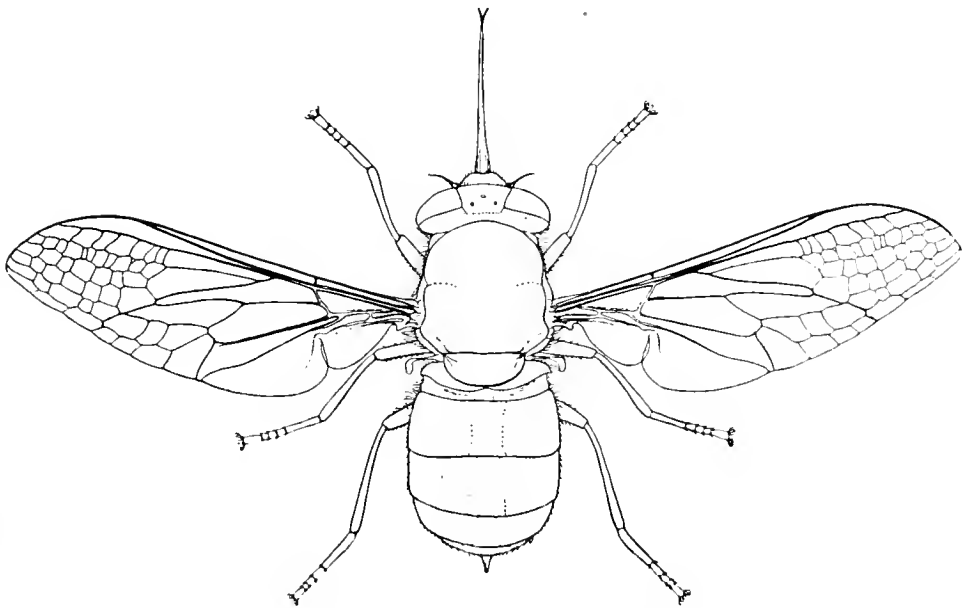


FIG. 41.—*Nemestrina Percei* ♀. × 3½.

The *Nemestrinidæ* inhabit the hot dry regions of the world, and only a few occur in the South of Europe of which none are ever likely to occur in Britain. Some of the species have most peculiarly reticulate wings, and some have the proboscis longer than in any other Diptera. The larvæ are parasitic.

- 12 (1) Two pad-like pulvilli only, the empodium being sometimes absent or sometimes represented by a bristly hair (fig. 42). Species not truly eremochætous.

Third joint of the antennæ never truly annulated, though indications appear in the blunt antennæ of *Scenopinidæ* and in the remarkably jointed style or club of *Mydridæ*, and while any style or arista is apical or subapical in the earlier* groups, it may become dorsal in some of the MICROPHONA. Anal cell almost always closed, long in the earlier* families, but short in the *Empidæ*, and obsolete in the subsequent families; cubital vein almost always with a long fork in the earlier* families, but often simple in the *Empidæ*, and almost always simple in the subsequent families; fourth posterior cell often closed in the earlier* families; thoracal squamæ always undeveloped. Species often predaceous in the perfect state, but never blood-suckers.

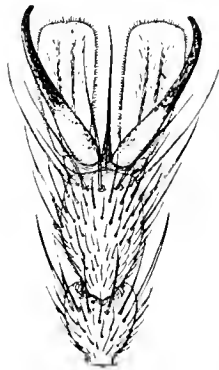


FIG. 42.—*Asilus crabroniformis* ♂.

Exceptions may occur in the pulvilli being obsolete (*Leptogaster*, *Anthrax*, etc.) or (said to be) three in number (*Cyrtosia*). The *Scenopinidæ* and *Mydridæ* appear to be eremochætous, but they are curiously bald flies, and are undoubtedly related to the *Therevidæ* and *Asilidæ*. Some *Asilidæ* are apparently not chætophorous, but that is caused by dense coarse pubescence being substituted for the normal bristles (*Laphria*, etc.). Some *Bombylidæ* (*Platypygus*, *Cyrtosia*, etc.) have the cubital vein simple.

- 13 (24) Basal cells long, the anal cell being open or long and pointed, because the branches of the postical fork only gradually diverge, and the upper branch is usually connected with the discal cell by the small cross-vein, though sometimes (*Bombylidæ*, *Scenopinidæ*, etc.) it forms a part of the lower margin of the discal cell; wing-venation usually elaborate. Cephalic bristles on frons and vertex not strongly developed, though sometimes visible in *Asilidæ*. Often large or very large species and seldom small, and when small usually with long pubescence among the stronger bristles.
- 14 (17) Aërial species almost always clothed with dense furry pubescence. Legs thin and only suitable for alighting, and consequently armed with little more than spicules (not true bristles) on the femora and tibiæ. Eyes nearly always touching in the male (= holoptic), and never bulged out because of a sunken vertex.

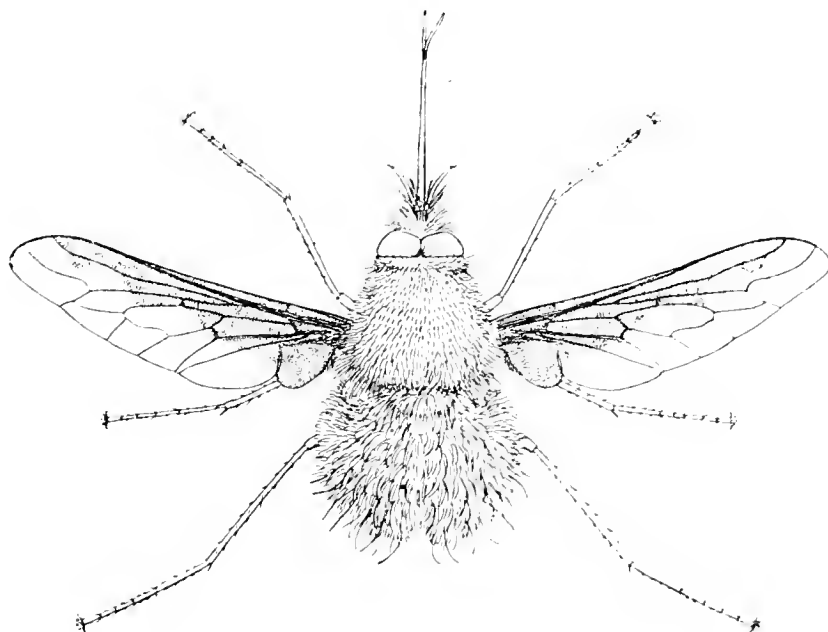
TROMOPTERA.

Sometimes long strong bristles or bristly hairs occur on the thorax and scutellum, and then the legs bear stronger spicules, and in the *Therevidæ* apical circlets of spines occur on the tibiæ. Antennæ with an apical style (if any) which sometimes breaks up into a pencil of hairs. Proboscis very long, thin, and porrect in many *Bombylidæ*. Very rarely some species are quite bare of pubescence (*Glabellula*, *Systropus*, etc.) and the exotic *Systropinæ* are very elongate, very thin, quite bare species.

* The term "earlier" applies to all those families before the *Empidæ*.

- 15 (16) Small cross-vein absent; posterior cells four or three; cubital fork often wide open. Proboscis often long, thin, and porrect, with very small sucker-flaps. Abdomen usually short and rounded. Thorax, scutellum, and legs rarely with definite chaetotactic bristles.

VII. BOMBYLIDÆ.

FIG. 43.—*Bombylius major* ♂. × 3.

The abdomen is very long and thin in the exotic genus *Systropus*, and that genus has no pubescence or bristles except some short spicules on the tibiæ. The *Toxophorinæ* bear some remarkable curved bristles on the thorax and especially on the enlarged shield-like prothorax, but those bristles appear to be of some distinct nature and scarcely lend themselves to chaetotactic arrangement. In the *Anthracinæ* the proboscis is short and the eyes of the male are scarcely more approximated than those of the female, while the abdomen is rather oblong in shape.

The *Bombylidae* are large or rather large or even rather small (*Phthiria*) flies which are usually covered with a dense soft furry pubescence which may obscure all the ground colour and hide any chaetotactic bristles. The true *Bombylinae* have short rounded bodies, and a remarkably long, thin, porrect proboscis. The species are sun-lovers and are never predaceous in the perfect state, but are parasitic in the larval stage on Hymenopterous and Lepidopterous larvæ. The imagines are most perfect hoverers, and almost live in the air during hot sunshine.

- 16 (15) Small cross-vein present; posterior cells five; cubital fork long and only moderately wide open; subcostal vein reaching little more than half the wing. Proboscis short and fleshy, with large sucker-flaps. Abdomen rather elongate, tapering. Thorax, scutellum, and legs with distinct chaetotactic bristles,

which form rows of spicules and an apical rosette on the tibiæ.

VIII. THEREVIDÆ.

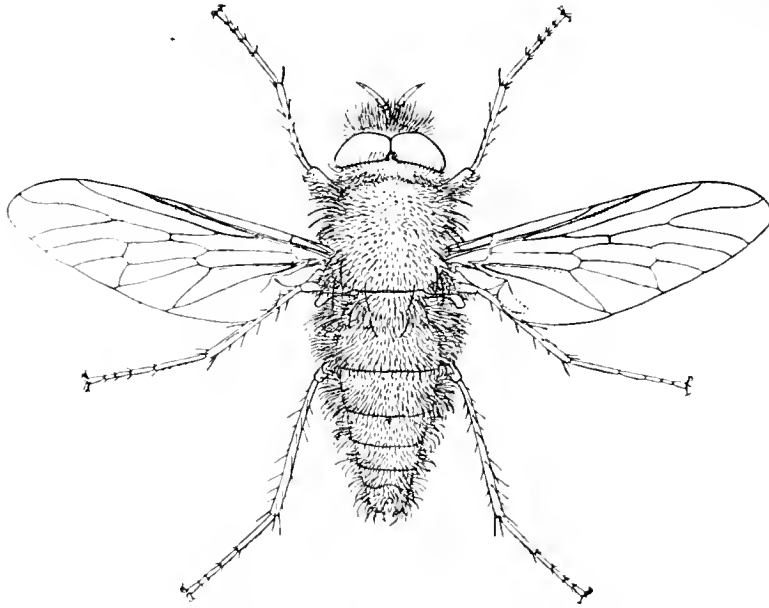


FIG. 44.—*Theresa nobilitata* ♂. × 4.

The *Therevidæ* are moderate-sized flies, which have a conical tapering abdomen somewhat like that of the *Leptidæ* but clothed with furry pubescence. They are the first family of the BRACHYCERA to show conspicuous chætotactic bristles, and the ovipositor of the female is armed with a rosette of spines like many of the *Mydaidæ* and *Asilidæ*.

- 17 (14) Pedestrian species, usually armed with strong bristles and only occasionally (*Laphria*, *Isopogon*, etc.) clothed with dense coarse pubescence, or (DERMATINA) bare of both pubescence and bristles. Legs strong, usually armed with strong bristles on at least the tibiæ and tarsi. Eyes almost always widely separated in both sexes (=dichoptic), and frequently bulging out from the deeply sunken vertex.
- 18 (21) Eremochætous species in the sense that there are no strong bristles on any part of the thorax or scutellum.

DERMATINA.

Usually dark rather leathery-looking species without any bristles or pubescence except sometimes some pubescence on the head, sides of the mesonotum, and basal corners of the abdomen, but there may be spicules on the tibiæ, strong serration beneath the hind femora, and sometimes one or more apical spurs or spines on the hind or even on all the tibiæ. Antennæ with the third joint either elongate without a style or arista (*Scenopinidæ*), or with an apical style which is developed into a (usually) long-jointed club (*Mydaidæ*). Venation with the main (=upper) branch of the discal vein ending before the wing-tip; posterior cells three to five. Very large to rather small species.

The two families composing the DERMATINA are at first glance very dissimilar, but closer study shows that they have many important characters in common. The total absence of thoracic bristles and the discal vein ending before the wing-tip are quite sufficient characters to distinguish them from all others.

- 19 (20) Wing-veins few and simple. Rather small oblong dark colored species bare of all pubescence and bristles. Antennæ with the third joint ligulate, but without any style, arista, or club. Legs short and without any bristles or spicules. Venation with the *upper branch of the postical fork forming the whole lower margin of the discal cell*; subcostal vein short and simple; discal cross-vein near the middle of the discal cell; posterior cells three only.

IX. SCENOPINIDÆ.

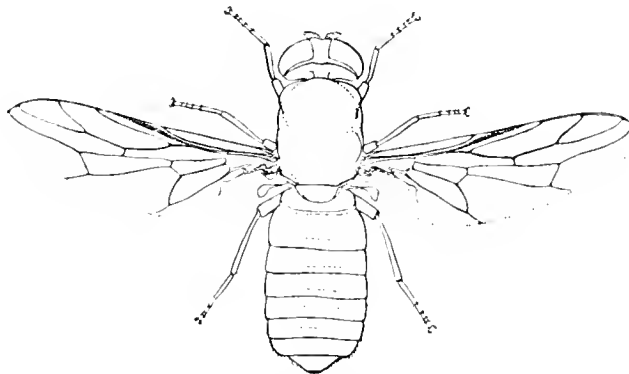


FIG. 45.—*Scenopinus feustralis* ♀. × 6.

The *Scenopinidae* are easily known by their rather small size, simple venation, and peculiar antennæ. They are very few in number, and only the typical genus has been found in Europe.

- 20 (19) Wing-veins numerous and complex. Very large to moderate sized usually dark colored species. Antennæ with a remarkable

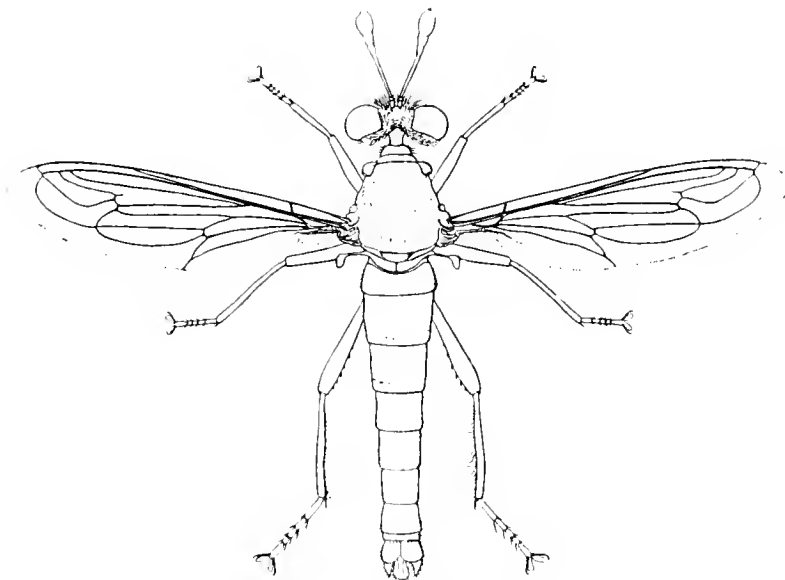


FIG. 46.—*Syllagomydas cinctus* ♂. × 3.

jointed usually clubbed style (except in *Megascelus*). Scutellum small; metanotum very large. Legs powerful; hind femora

usually strongly serrated beneath, and the tibiæ often with rows of spicules and apical spines or with one or more apical spurs on the hind tibiæ. Venation with the *subcostal vein very long and receiving several subsequent veins* before its tip; discal vein curved up and ending before the wing-tip in either the costa or the subcostal vein; small cross-vein present and placed close to the base of the upper branch of the postical fork; discal cross-vein (when distinct) near the end of the discal cell; posterior cells three, four, or five; *præfurca very short* (except in *Megascelus*). X. MYDAIDÆ.

The *Mydaiidæ* are usually gigantic or very large exotic flies, but two or three species of moderate size occur in the south of Europe. Their peculiar venation distinguishes them from all others, but is not very different from that of the *Apioceridæ*.

- 21 (18) Chætophorous species in the sense that there are strong and usually numerous bristles on the thorax, scutellum, and legs, or at least on the sides of the mesonotum, except in the few cases in which dense coarse pubescence is substituted.

ENERGOPODA.

Never bare leathery-looking species. Tibiæ and tarsal joints with apical circlets of spines. Eyes always widely separated in both sexes (=dichoptic) and usually protruding. Antennæ with a simple or jointed apical style or sometimes without any style or arista. Venation with the subcostal vein very long and often receiving the radial vein before its tip; præfurca moderately long; discal cross-vein near the middle of the discal cell; small cross-vein always present or almost so; posterior cells almost invariably five. Very large to rather small species, and the smallest *Asilidæ* usually bear long pubescence as well as bristles.

The two families composing the ENERGOPODA are closely allied, but yet perfectly distinct. Sometimes (*Apioceridæ*) the venation resembles that of the *Mydaiidæ* in that the upper branch of the discal vein ends before the wing-tip, while the radial vein and the upper branch of the cubital vein end in the subcostal, but that occurs very rarely in the *Asilidæ* (some species of *Eraw*). When dense coarse pubescence is substituted for bristles (*Laphria*, etc.) it is of a very different nature from the soft furry pubescence of the TROMOPTERA. The *Asilidæ* are all predaceous.

The ENERGOPODA may be distinguished from the DERMATINA by the presence of strong bristles on the thorax, and from the MICROPHONA by their (usually) larger size and much more elaborate venation, which practically always includes five posterior cells and a long pointed anal cell.

- 22 (23) Face short and without any face-beard overhanging the mouth. Palpi spatulate. Antennæ with a very short style. Scutellum large and concealing the metanotum. Venation rather similar to that of the *Mydaiidæ* as the radial vein and upper branch of the cubital fork curve up and end in the subcostal vein, while the upper branch of the discal vein curves up and ends before

the wing-tip; third veinlet from the discal cell abruptly recurrent and closing the fourth posterior cell.

XI. APIOCERIDÆ.
(not European)

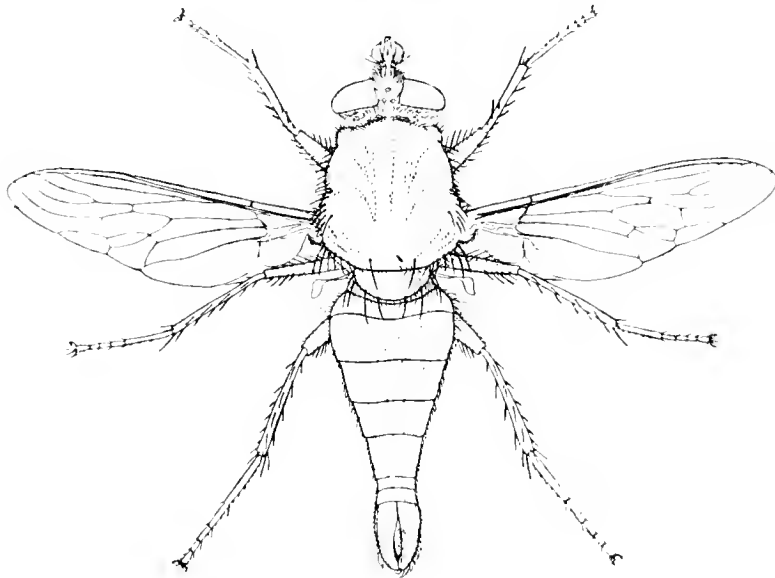


FIG. 47.—*Apiocera marrens* ♂. $\times 2\frac{1}{2}$.

The *Apioceridæ* consist of about a dozen species from America and Australia, one from South Africa, and perhaps one from Ceylon.

23 (22) Face rather long and always bearing (on at least its lower part) a face-beard which overhangs the mouth.

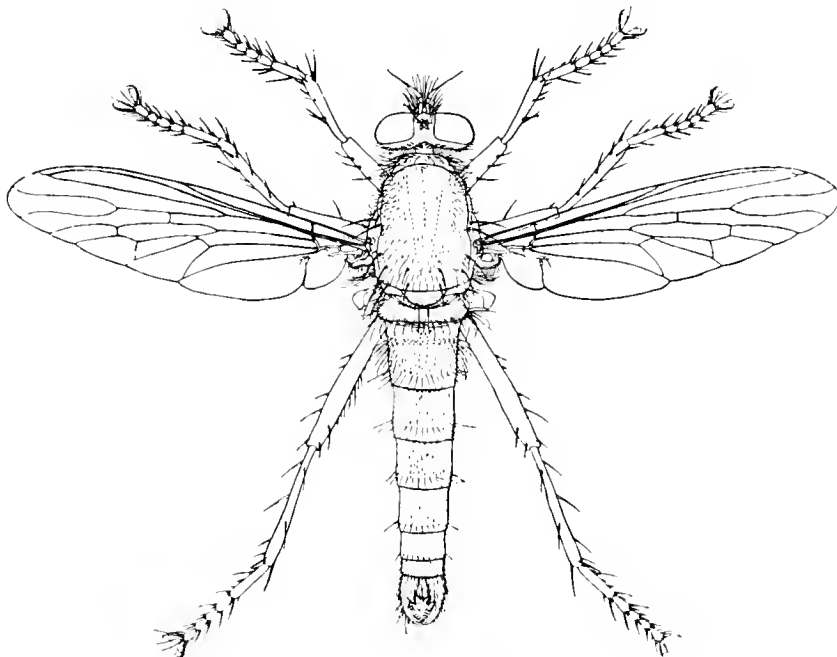


FIG. 48.—*Philonicus albiceps* ♂. $\times 3$.

Palpi never spatulate. Antennæ with or without an apical style or arista. Scutellum large or moderate sized, not concealing the metanotum. Venation not similar to that of the

Mydaidæ, as the lower outer veins do not curve up and run parallel with the hindmargin of the wing (except in a very few species of *Eraæ*), but run out normally to the wing-margin; upper branch of the discal vein ending long after the wing-tip; cubital fork long and not very wide open. Vertical portion of the frons deeply sunken between the protuberant eyes. Head well separated from the thorax by a freely movable neck. Proboscis powerful, horny, and without any fleshy labella, but never elongated. Genitalia usually conspicuous. Predaceous flies, with strong grasping legs, which are armed with bristles especially on the tarsi.

XII. ASILIDÆ.

The *Asilidæ* are large to very large (but occasionally small) powerful predaceous flies, known as the "Robber Flies," *par excellence*. They are not likely to be confounded with the species of any other family, unless they might be with the *Therevidæ* or *Apioceridæ*; from the *Therevidæ* they may be distinguished by the protuberant eyes, absence of soft furry pubescence, and longer subcostal vein, and from the *Apioceridæ* by the very distinct venation (with exceedingly few exceptions), face, palpi, and antennæ. The European species are very numerous and many are very difficult to distinguish, but they have been well worked out.

- 24 (13) Anal cell short except in a few *Empidæ* (*Hybotinæ*) and shorter than the preceding basal cell (when that is present), and the upper basal cell rather long in the *Empidæ* only; postical vein with its lower branch recurrent (except in the *Hybotinæ*) and its upper branch quickly lost in the discal vein; cubital vein simple except in a few *Empidæ*; small cross-vein quite absent; posterior cells apparently never more than four, but usually less; wing-veins altogether few and simple; alula obsolete. Face bare or only slightly pubescent in the MICROPHONA, but with peristomal bristles in *Lonchopteridæ* and side or genal bristles in *Phoridæ*, but with no face-beard or pubescence as in *Asilidæ*. Cephalic bristles usually strongly developed. Species always small and distinctly chætophorous.

The four subsequent families become more and more bristly, and may be distinguished from the ENERGOPODA by their reduced venation, in which there are never more than four and commonly only three posterior cells, and in which the cubital vein is forked in only a few *Empidæ*.

- 25 (30) Wing-veins (including cross-veins) fairly normal, or else the radial and cubital veins extended to almost the wing-tip. Antennæ with three (or rarely two) joints obvious, besides any style or arista.
- 26 (29) Wings rounded at the tip; venation fairly normal, with the radial vein ending considerably before the wing-tip, and with at least one apparent cross-vein well out towards the middle of the

wing, causing the discal cell to be present even if extended back to the wing-base. Face, mouth-margin, and jowls without strong bristles. Thorax rarely with a soft pubescence. Eyes of the male sometimes touching or approximated. Imagines always predaceous. **MICROPHONA.**

- 27 (28) Wings with at least the upper basal cell rather long, as the radial and cubital veins diverge at about one-third of the length of the wing, and the discal cross-vein is distinct; second basal and anal cells sometimes about as long as the upper basal cell, but often shorter or the anal cell absent; discal cell often present and separated from the second basal cell by a cross-vein; cubital vein often forked. Alar squamæ small. Proboscis almost always horny, often long and pointed. Antennæ with the style or arista (if any) almost always apical; Abdomen normally with seven segments; genitalia of the male large and conspicuous. Colour never metallic green in palæ-arctic species. **XIII. EMPIDÆ.**

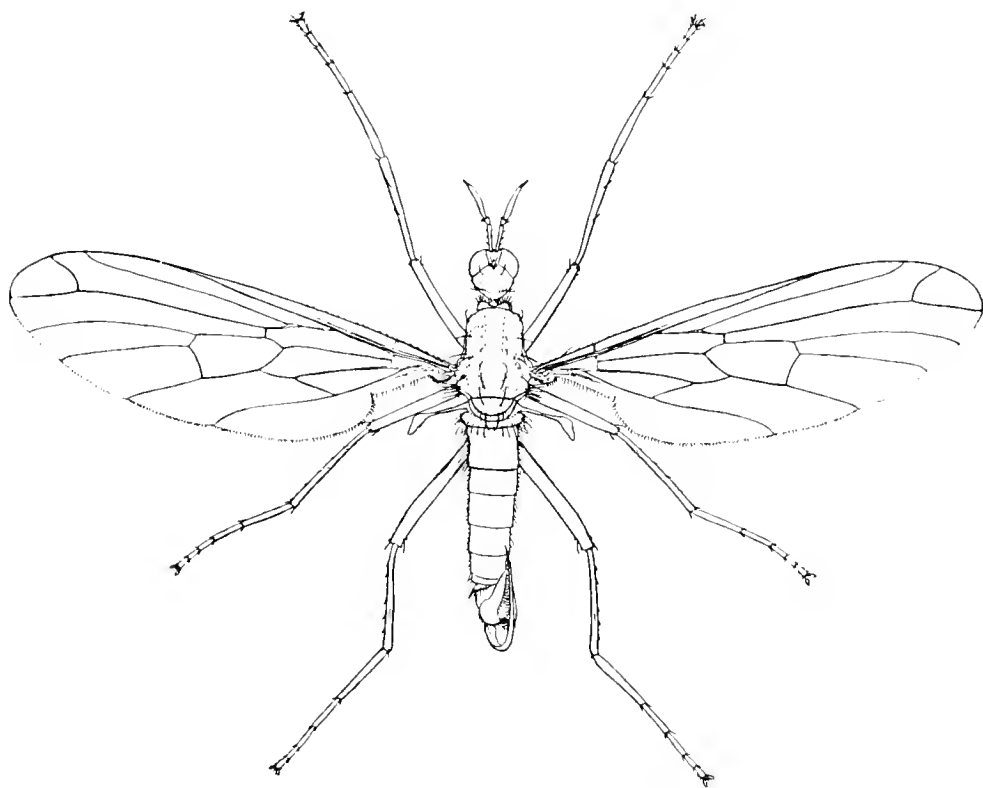


FIG. 49.—*Empis trigramma* ♂. × 6.

In the *Tachydromine* the second basal cell and the anal cell become small or the latter may be absent; but in the *Hybotine* the anal cell is long but not pointed, the lower branch of the postical vein being curved down into the anal vein considerably before the wing-margin; in the *Hybotinae*, however, the second veinlet from the discal cell is missing, and there are only four posterior cells even with the inclusion of the anal cell. The proboscis is thick and almost fleshy in *Clinocera*, etc. The antennæ have a subdorsal arista in *Ocydromia*, etc.

The *Empidæ* are small or occasionally moderately large predaceous flies, and form the last family of the BRACHYCERA in which the basal cells of the wing are rather long, but the general type of the venation has become much more simple than in the previous families. Ordinary pubescence is uncommon amongst them but rows of bristles are usual, and strong bristles commonly occur on the vertex, thorax, and legs.

Dr A. W. Verrall is of opinion that the word *Empididæ* is pedantic and instances *Euelpidæ*.

- 28 (27) Wings with the basal cells very short and indistinct, the second one being merged into the discal cell, and the anal cell very short; radial and cubital veins diverging from a swelling near the wing-base, and the discal cross-vein indistinctly occurring near the same spot; discal cell extended to the base of the wing; cubital vein never forked. Alar squamæ fairly large and bearing long ciliation. Proboscis large and stout and almost always pulpy. Antennæ with the style or arista apical or dorsal. Thorax with rows of bristles. Abdomen normally with only five or six segments (excluding the large male genitalia). Colour usually metallic green. XIV. DOLICHOPODIDÆ.

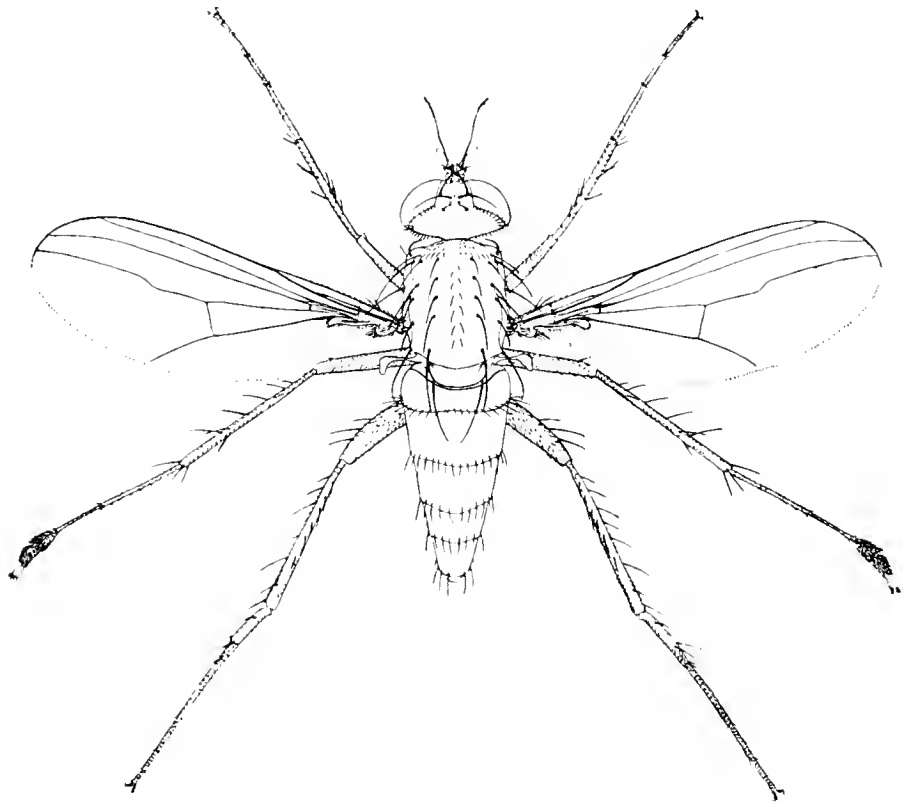


FIG. 50.—*Dolichopus popularis* ♂. × 7½.

The venation is very similar to that of the *Ephydridæ*, from which the *Dolichopodidæ* are distinguished by the antennæ, genitalia, squamæ, chaetotaxy, etc., as well as usually by the metallic green coloration, and in life the *Dolichopodidæ* sit in a very distinct attitude.

The *Dolichopodidæ* are always small flies of aquatic habits, which are almost always of a peculiar metallic green or blue-green colour. They always rest in a characteristic erect attitude, the head and forepart being raised high up, and the insect appearing to be standing on tiptoe.

The term *Dolichopidæ* is incorrect; the nearest defensible approach is *Dolichopodæ*.

- 29 (26) Wings pointed at the tip; venation abnormal, as the radial and cubital veins end close together at almost the wing-tip; no obvious cross-vein, and the discal cell absent or reduced to a short middle basal cell. Face with strong bristles round the mouth-margin. Thorax with bristles but no pubescence. Eyes widely and equally separated in both sexes. Antennæ short and porrect with a long subdorsal arista. Colour always dull yellowish, brownish, or greyish, but never green or metallic.

ACROPTERA—XV. LONCHOPTERIDÆ.

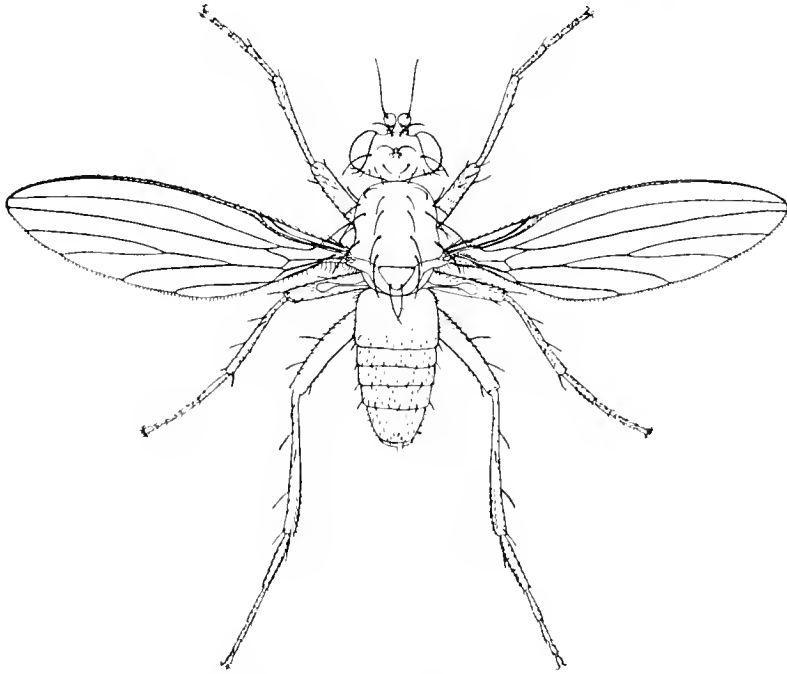


FIG. 51.—*Lonchoptera lutea* ♂. × 10½.

The *Lonchopteridæ* are limited to the genus *Lonchoptera*, which is not known to have any obvious ally in the whole of the DIPTERA. The species are small and very few in number, but some of them are very common. They are easily recognised by their colour and their



FIG. 52.—*Lonchoptera tristis* ♀. × 16.

peculiar venation, and they are the only group of DIPTERA in which the venation is conspicuously distinct in the two sexes (figs. 51, 52). The short basal cells and the divergence of the cubital and radial veins close to the base of the wing may indicate relationship to the *Dolichopodidæ*, while the bristly face and frons may indicate a still closer relationship to the *Phoridae*; and the male genitalia in all three families may indicate affinities.

- 30 (25) Wing-veins extremely abnormal and quite distinct from those of any other DIPTERA;* anterior veins up to the cubital vein

* The genus *Aspistes* in the *Bibtonidæ* has a similar venation.

strong and conspicuous, running into the basal half of the costa, but the subsequent veins very faint and incomplete and abnormally directed; discal, postical, and anal veins very difficult to trace. Palpi porrect, not jointed. Eyes widely and equally separated in both sexes. Antennæ apparently composed of one large joint which bears a very long apical or dorsal arista. Hind legs long and the femora flattened.

HYPOCERA—XVI. PHORIDÆ.

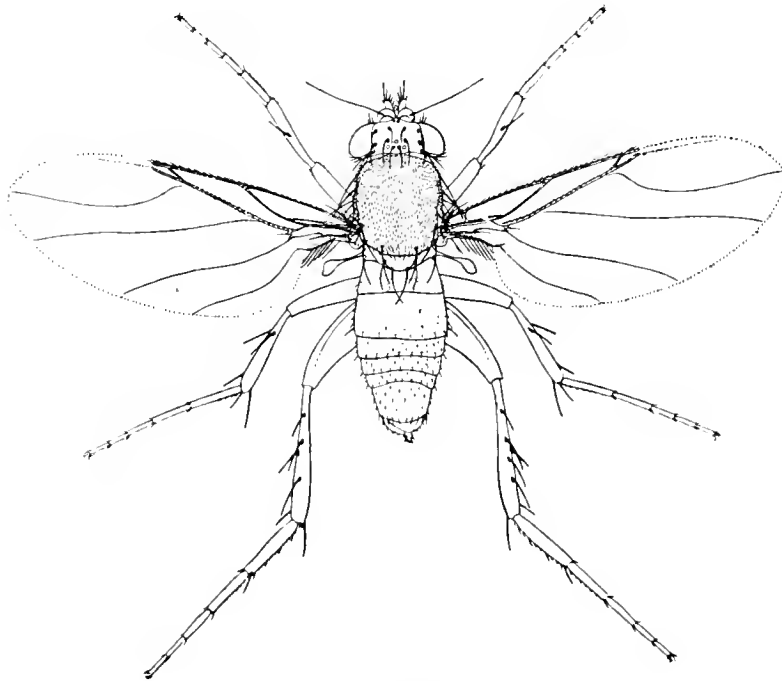


FIG. 53.—*Phora urbana* ♂. × 10.

The *Phoridae* are always small flies of greyish black or yellowish colour, which may be known at once by their peculiarly characteristic venation. They are quick running, humpbacked flies, and some species are always common on windows.

METAMORPHOSES

OF THE DIPTERA ORTHORRHAPHA BRACHYCERA.

The most elaborate systematic worker of recent times upon the metamorphoses of Diptera was Brauer, who classified the whole of the Diptera from larval characters (Denkschr. Akad. Wien., xlvii., 1883), but one of the pioneers was Haliday, who in a little known paper (Nat. Hist. Rev., iv., 177, 1857) indicated the main lines.

This is a subject upon which I have no personal knowledge, and, while I might have made an imperfect translation of Brauer's tables as far as the BRACHYCERA were concerned, I have had the good fortune to get Dr D. Sharp to write an original paper upon the distinctive characters which exist in the larval stage of not only the BRACHYCERA, but also of the families (*Platyporidae*, *Pipunculidae*, and *Syrphidae*) which were included in my previous volume.

Numerous valuable notes and descriptions of larvæ have been given in Part I. of a most excellent work, *DIPTERA DANICA*, published by Lundbeck in 1907—*Stratiomyidæ* to *Cyrtidæ* of this present volume—but unfortunately it is now too late for me to make many quotations, or to refer the following paper back to Dr Sharp.

ON THE METAMORPHOSES OF THE DIPTERA BRACHYCERA

INCLUDED IN THIS VOLUME

AND OF THE

Platypezidæ, *Pipunculidæ*, and *Syrphidæ*

by D. Sharp, M.A.

Figures 54, 59, 60, 61, 65, 66, and 69 are copied from original drawings made by Miss M. A. Sharp.

LARVÆ.

I.—INTRODUCTORY.

In the volume of this series—(*British Flies*, vol. viii., 1901)—previously published, the author summarised on pp. 1-6 the views of Brauer as to the classification of Diptera.

Brauer's system was believed by himself to be a natural—if not a completely final one; and notwithstanding the just criticisms to which it has been subjected it still holds the field. Its chief fault is the division of the great orders into two—and only two—primary divisions.* This fault was in part probably due to Brauer's method of working by means of dichotomic tables. In the summary given (as mentioned above) by Mr Verrall, he alluded on p. 3 to the difficulties of comprehending Brauer's tabular work; and I fully agree with what is there said.

Brauer's system is largely based on the early stages. And he has published tables of these, which he considered to be a complementary part of his system. In the summary given by Mr Verrall these tables of metamorphosis were not included. He now thinks it desirable they should be given, at any rate in part.

We have therefore prepared a translation of those portions that relate to the groups dealt with in this volume, and to the *Syrphidæ*, *Platypezidæ*, and *Pipunculidæ*, the families monographed by Mr Verrall in vol. viii.

The knowledge of Dipterous metamorphosis is still very incomplete, but it has made some progress since the publication, in 1883, of Brauer's tables. We have therefore added some explanatory and supplementary notes relating to the families it is now our object to elucidate.

The larvæ of Diptera are in every case destitute of jointed legs. They usually have the head of peculiar shape, small, or even to all appearance quite absent. The larvæ that most resemble them are the maggot-like larvæ of *Curculionidæ*. The larvæ of *Curculionidæ* have little or no power of locomotion, whereas Dipterous

* Since this was written Professor Miall's criticism of Brauer's two divisions has appeared in *Tr. Ent. Soc.*, London, 1907, p. 273. I quite agree with this distinguished savant in considering the two divisions, Orthorrhapha and Cyclorrhapha, at present incomprehensible.

larvæ can usually move freely by means of projections of the body called pseudopods, or by the aid of short bristles arranged so as to favour progression even in completely maggot-like forms. The spiracles (to which we shall subsequently allude) are also of great aid in enabling us to decide whether a larva belongs to Diptera or not. The more important of the characters available for the discrimination of the kinds of Dipterous larvæ are ; 1, the general form or shape, which is extremely varied ; 2, the nature of the head ; 3, the spiracles.

1. Under the heading of general form may be included the number of segments behind the head. This is said by Schiner to be twelve, three of which are called thoracic segments, and the others abdominal. Frequently the number apparent is less than twelve. There is, moreover, no morphological criterion yet discovered by which the segments can be numbered, and in many cases the segments cannot be satisfactorily delimited in the present state of knowledge. Considerable work at the embryological development is necessary for the satisfactory elucidation of this elementary point. This difficulty is greatly increased by the remarkable variety as regards the head, to which we shall presently refer. In Brauer's larger table it will be noticed that in certain cases he uses a qualified expression instead of segment. In *Blepharoceridae* (not yet discovered in Britain) there appear to be only five or six segments in the larva, while in *Thereva* there are some nineteen or twenty. In the latter case the term "Zwischen-segment" is used by Brauer ; the intercalated segments are supposed to be due to the connecting membranes between certain segments taking on the appearance of true segments.

2. *The head*.—One of the characteristics of Diptera is the frequent occurrence of diminution in size of the head, a character which we find repeated in parasitic Hymenoptera and to a considerable extent in the social Hymenoptera where the larvæ are fed by the parents. The number of Dipterous families in which there is a large head is but small. The most conspicuous case is the mosquitoes or *Culicidae*. This condition of the head is called "eucephalous." At the opposite extreme we find an apparently complete absence of a head, as in the flesh-feeding maggots. This is the acephalous condition. There is no means whatever of framing an anatomical definition of EUCEPHALA and ACEPHALA ; indeed the majority of the families of Dipterous larvæ are in an intermediate state. The term "hemicephalous" larvæ has been used by Dufour and others ; it may be applied to those forms in which the skin of the neck is attached, not to the base of the head, but to the middle of it as in *Tipulidae* and *Stratiomyidae*, cf. our fig. of *Stratiomys* (fig. 54), so that the back part of the head is permanently inside the body. In many such cases the front part of the head can be completely drawn back within the following segments, so that the larva is then to all appearance acephalous. The student must be on his guard as to this point. After the separation of these more or less definite forms of head, there remain a very long series of cases (including most of the families dealt with in this volume) in which the head is reduced to a greater or less extent in size, and in some becomes of peculiar form. In some the head is always held exerted ; these are the forms that approximate to the eucephalous condition. In other cases the larva usually draws its head inside its body, exerting it only for purposes of movement or feeding. These forms (*Tabanidae*, etc.) approximate to the acephalous condition.

3. *The spiracles*.—Dipterous larvæ have the last pair of spiracles largely developed, and they are frequently placed at the actual tip of the body ; when not at the tip they are usually placed dorsally rather than laterally. These are points of distinction as compared with other orders of insects. Moreover when the spiracles are placed at the tip of the body there frequently exist special arrangements for protecting them ; and in these cases, to a superficial examination, these spiracles may appear to be quite absent. In *Tipulidae* this is the case because the extremity of the body consists of soft processes that fold and contract, and so conceal the breathing organs ; but every now and then the processes are expanded and the spiracles become very conspicuous. In the *Stratiomyidae* the posterior spiracles are placed in a special respiratory chamber at the tip of the body, and are therefore difficult of detection.

When the posterior spiracles are the only pair that exists the larva is said to be metapneustic ; when in addition to these there is an anterior pair placed a little behind the head the larva is amphipneustic ; when there are also intermediate spiracles the larva is peripneustic. The frequency of the metapneustic and amphipneustic systems is characteristic of Diptera ; the peripneustic system being the usual one in other orders.

II.—CHARACTERS OF THE LARVÆ OF ORTHORRHAPHA BRACHYCERA.

Translated from *Denkschriften der mathematisch-naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften*, vol. xlvii. (1883) :

I. Suborder : ORTHORRHAPHA.

Larva with a mouth- or jaw-capsule or with a well-differentiated head. Nymph free or enclosed in the larval skin. In either case the larval skin bursts open (*i.e.*, in the first case at the time of pupation of the larva, in the latter case only when the fly first emerges together with the inclosed nymph-skin) through a straight longitudinal dorsal rent on the front end of the body and a rectangularly transverse rent in front, in the form of a T-shaped slit, or sometimes through a transverse rent between the eighth and ninth abdominal segments, and then on a place not previously indicated by a seam (only in some *Cecidomyiidae*). The wings of the fly develop at the same time as the emergence from the nymph-skin. Nervous-system very diverse, the thirteen ganglia either all separate or united into two or more complexes. In the early state there are always two head-, three thoracic-, and eight abdominal-ganglia present.

The imagines are without the lunula above the antennæ and the arched seam above it, and also the ptilinum.

Characters of the Main Groups.

Sectio 1. Orthorrhapha nematocera.—Larva with opposing biting mouth-parts, *i.e.*, with horizontally moving mandibles; or the mouth-parts entirely rudimentary, but then the larva is peripneustic with thirteen segments.

Sectio 2. Orthorrhapha brachycera.—Larva with parallel jaws directed, or working, upwards and downwards or outwards and downwards, which work in a pricking, chopping, boring, or sucking manner.—(Head not well developed, only a jaw-case without ganglia being present, which, however, sometimes is similar to a head because of the outward projecting eyes.)*—Ganglia chain beginning behind the jaw-apparatus.—Larvæ with rudimentary mouth-parts are meta- or amphipneustic and exhibit ten to twelve obvious segments.

(I.) Tribus *Acroptera*.

Only ten segments after the antenniferous and jaw-case-containing segments, of which the last appears like two grown together. Fam. *Lonchopteridae*.

(II.) Tribus *Platygengya*.

Eleven or twelve segments behind the segment that bears the antennæ and mouth-parts, or even apparently more than twelve segments because of subdivision of segments.

Jaw- or head-capsule either entirely closed at the free parts, strongly chitinous both dorsally and ventrally or membranous ventrally, sometimes very long, sometimes short. If only an upper capsule and the chitinous part of the under lip remain free, then it appears flat, formed of straight rods or of a plate running out as a rod, of which the surface-area lies horizontal, or is sometimes absent.

† Hinder stigmata placed on the last segment dorsally or terminally, as horizontal or vertical fissures, in which both the main tracheæ open close together, or as separated plates or tubes lying free or in a pit, enclosed by lips or processes, or there are tracheal gills on the sides of the body instead of stigmata.

Group *Homœodactyla*, *Cyclocera* Schin., pp.

(a) Head-capsule permanently exerted, the free part not retractile into the subsequent segments. (a) *Notacantha* (*Stratiomyidae*, *Xylophagidae*).

(b) Head-capsule retractile, the free part capable of being deeply withdrawn into the following segments :

α The upper—to a great extent internal—part of the jaw-capsule, tubular or elongate pyriform, simple or formed of long narrow intimately connected plates. (b) *Tanystoma*.

1. Hind stigmata united in a perpendicular fissure. (*Tabanidae*).

2. Hind stigmata ending separately in two plates or tracheal gills. *Leptidae*, *Acanthomeridae*.

* The student will do well to treat this parenthesis as metaphysical.

- β. The upper in-grown [or internal] part of the head-capsule resolved into rods, cleft or forming a flat cleft-like plate. The rods sometimes only thickened ribs of thin transparent narrow chitinous plates. (c) *Bombylimorpha*.
1. Hind stigma-plates large, round, terminal and free. Upper jaw-capsule rather large and free, lunulate; the in-grown part short, forked, narrow. Mouth-parts of the mature larva rudimentary. F. *Acroceridæ*.
2. Hind stigma-plates large, round, terminal, placed in a transverse cleft enclosed by lips. Upper jaws hooked, with a straight acumen between them. Lower jaw rudimentary. Upper jaw-capsule with the free part very short, the internal part long. F. *Nemestrinidæ*.
- ++ Hinder stigmata placed on a band or segment before the last, or even on the third from the end, usually small.

Group *Heterodactyla* (Tribus *Orthocera* Schin., pp.).

Hinder stigmata placed on the penultimate segment, or on a flat dorsal band before the last segment. Intermediate segments few or none.

(a) *Procephala* (*Mydaidæ*, *Asilidæ*, *Bombylidæ*).

Hinder stigmata placed sideways on the third segment from the end. Six or more intercalated segments (see fig. 65).

(b) *Polytoma* (*Therevidæ*, *Scenopinidæ*).

(III.) Tribus *Orthogenya*.

Eleven to twelve obvious segments after the divisions bearing the antennæ and mouth-parts.

Jaw-capsule developed at the free end only dorsally as a lunate plate, the in-grown end forming large plates or fish-bone structures. The chitinous skeleton of the lower lip formed of two arched bands standing vertical and contiguous in an angle anteriorly, which bear a certain resemblance in their union to the lower jawbones of mammalia. Hinder stigmata placed terminally on the last segment, sometimes on prolongations. *Empidæ*, *Dolichopoda*.

The preceding table is largely taxonomic and is not very suitable for determining larvæ. Brauer (no doubt feeling this) has added in a footnote a more simple table for the larva of the BRACHYCERA, as follows :

“For determination, without reference to affinities, the larvæ of ORTHORRHAPHA BRACHYCERA may be tabled as follows :

- I. Larvæ with a terminal fissure for the hind spiracles, in which the two main tracheal trunks open near to one another.
- (a) The fissure horizontal or transverse. Head-capsule not retractile. *Stratiomyidæ*.
- (b) The fissure vertical. Head-capsule retractile. *Tabanidæ*.
- II. Larvæ with separated terminal spiracle-tubes or plates.
1. Hinder spiracles placed on last segment.
- (a) Labial plate and rods behind it flat in one plane, or wanting, or soldered with the capsule.
- α Head-capsule not retractile, stigma-plates projecting. *Xylophagidæ*.
- αα Head-capsule retractile.
- β Only ten segments behind the one that bears the antennæ. *Acroptera* [= *Lonchopteridæ*].
- ββ Eleven or twelve segments behind the one that bears the antennæ.
- γ Head-capsule long, in larger part internal, pyriform. *Leptidæ*, *Acanthomeridæ*.
- γγ Head-capsule short, the internal part flat or divided into rods. Spiracles in a fissure, *Nemestrinidæ*.
- Spiracles free, *Acroceridæ*.
- (b) Labial plates and rods meeting angularly, in profile appearing bent. *Dolichopidæ* and *Empidæ*.
2. Hinder spiracles placed anterior to the last segment.
- a. On the penultimate segment. *Asilidæ*, *Bombylidæ*, *Mydaidæ*.
- aa. On the antepenultimate segment. *Therevidæ*, *Scenopinidæ*.”

III.—REMARKS AND ILLUSTRATIONS.

With the aid of the above table of Brauer, and the following illustrations and remarks, the student should be able to decide on the family of any British Brachycerous larva he may have before him.

Suborder: ORTHORRHAPHA BRACHYCERA.

Fam. STRATIOMYIDÆ. Larvæ of eleven very distinct segments and head, this narrow, hemicephalous (fig. 54), usually with an eye-like prominence on each side; no pseudopods: terminal spiracles not visible, being placed entirely inside a chamber, the orifice of which is usually closed or obscure. Habits aquatic or in semiliquid matter. Pupa coarctate. (This is not the case in any other family of ORTHORRHAPHA BRACHYCERA.) The larvæ of this important family though very easily recognised exhibit considerable variety.

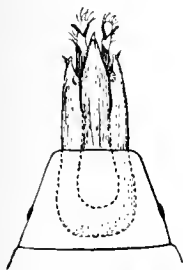


FIG. 54.—Head of *Stratiomys* larva.

1. *Stratiomyinæ*. In this subfamily the last segment is more or less elongate and narrow (fig. 55), and the lips of the terminal breathing chamber are

fringed with fine hairs. The larva is peripneustic. *Stratiomys* and *Odontomyia* are very frequently met with; and according to Haliday the larva of *Orycera* is similar, though the genus is usually placed in *Clitellariinæ*.



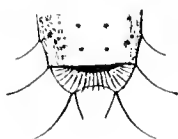
FIG. 55.—*Stratiomys furcata* larva, natural size.

2. *Clitellariinæ*. *Nemotelus* of this subfamily has been described

by Haliday. It has, in addition to the head and eleven segments, a terminal lip visible from the upper side of the body, and this lip bears only a few bristles (fig. 56), not a fringe of hairs. The cleft giving entrance to the breathing chamber is transversely elongate.



FIG. 56.—Larva and last segment from above of *Nemotelus uliginosus*. [After Haliday]



3. *Sarginæ*. Various descriptions and several figures have been published of larvæ supposed to be *Sargus* or its allies; but they are either bad or the identification is doubtful. The larva in the *Sarginæ* is probably very like that of *Nemotelus*. The slit giving entrance to the breathing chamber

may or may not be visible from above, the accounts being unsatisfactory and to some extent contradictory.

4. *Berinae*. The larva of *Chorisops tibialis* has been imperfectly described and figured. It appears to be generally similar to *Nemotelus*, but the cleft of the breathing chamber is not visible from above (fig. 57).

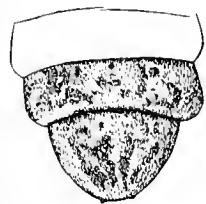


FIG. 57.—Last two segments of *Chorisops tibialis*. [After Handlirsch]

5. *Pachygastrinæ*. Orifice of the respiratory chamber very small, opening on the upper surface of the terminal segment a little before the extremity: the portion of the segment behind this orifice marked off by a more or less short and indistinct suture (fig. 58).

6. *Xylomyiinae*. Orifice of the respiratory chamber forming the posterior extremity of the body, looking backwards and furnished with well-marked lips. Larva amphipneustic (fig. 59).

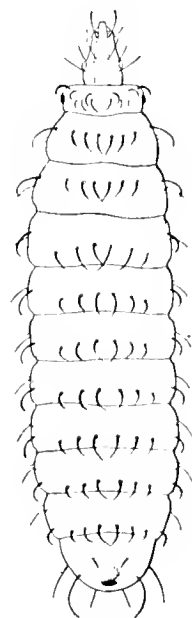


FIG. 58.—*Pachygaster orbitalis* pupa. $\times 10$.

Fam. ACANTHOMERIDÆ. This family does not occur in Europe. The larva has been imperfectly described by Brauer, and more recently by Karl Fiebrig. It is peculiar: thick-skinned, with small head, and large prothoracic segment: retuse behind, and the spiracles concealed

by a flap. It lives in wood. Cf. Brauer, pl. ii., f. 25 ; and Fiebrig in Zeitschr. wiss. Insektbiol., 1906.

Fam. LEPTIDÆ. Head exserted, but small ; behind it eleven segments, the first of these bearing on each side a small spiracle. The terminal segment is about as large as the preceding one, and is (in *Leptis*) marked by longitudinal folds or grooves ; the two ventral of these ribs have slightly longer free tips, so that beneath them there is a small, cup-like depression in which the terminal two spiracles are placed ; these are rather small (and are not accompanied by any chitinous plates as they are in the somewhat similar larva of *Tipulidæ*). The larva is amphipneustic. There are no pseudopods, but on the ventral aspect of the body there is intercalated between each two abdominal segments an area that is a little prominent and bears some asperities that assist in locomotion. The intercalation of these areas appears to cause the curvate form usually assumed. The larva figured (fig. 60) is from the New Forest

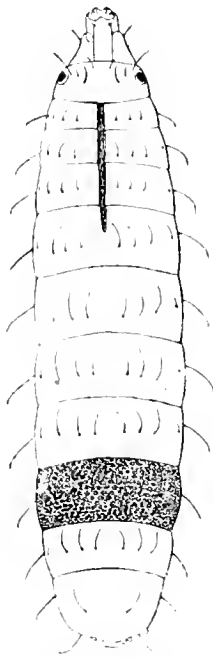


FIG. 59.—Pupa case of *Xylomyia maculata* showing the skin markings on one segment. $\times 4\frac{1}{2}$.

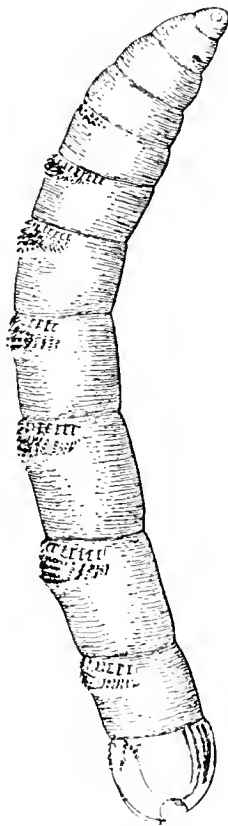


FIG. 60.—Young *Leptis* larva. $\times 12$.

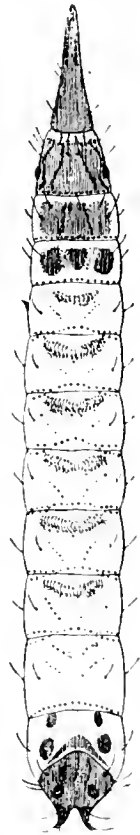


FIG. 61.—*Xylophagus* larva. $\times 4$.

and is no doubt that of *Leptis*, as it agrees with the larva from which Marchal reared *L. tringaria* (Bull. Soc. ent. France, 1903, p. 234), the food being earthworms. *Atherix*, according to Brauer, has the terminal segment divided into elongate free processes, and the intercalated areas of the abdomen replaced by pairs of prominent pseudopods. The larva of *Xylophagus* is so different that it requires special description.

Xylophagus (fig. 61). Head a hard, elongate, and exserted pointed process. The three thoracic segments with strongly chitinised areas dorsally, and the prothoracic segment is hard also beneath ; (these hard and colored areas are variable in extent). There are eleven body-segments. The terminal one has behind a large very strongly chitinised area terminating in two strong hooks ; this area bears the two spiracles ; in front of it, on the same segment, there are four brown marks. On the under surface of this segment there is a peculiar hieroglyph, a brown circle with a hooked wing on each side. At the front margin of each abdominal segment there is both dorsally and ventrally a transverse area bearing very minute brown spines ; the dorsal series being connected with the ventral by two lateral very delicate series of asperities. This larva is amphipneustic, the thoracic spiracles being very evident.

I have had before me I believe the larva of both *X. cinctus* and *X. ater*, but have not noticed any distinction. Brauer's figure (pl. iv., f. 83) of *X. cinctus* shows the

brown marks of the terminal dorsal segment differently placed to what they are in my specimens, but his fig. 80 is hardly consistent with his fig. 83 on this point. The larva is said to be predaceous ; it lives under bark, and can be kept alive for months without animal food.

Fam. TABANIDÆ (fig. 62). Head entirely invaginated. The rest of the body consisting of twelve segments, the last of which is a short slender tube so that the body appears pointed behind, or even at both ends : at the apex of the terminal tube is placed the small spiracular apparatus : the body is surrounded by pseudopods ; there is no prothoracic spiracle, so that the larva is metapneustic.

These larvæ are predaceous, eating small creatures either living or dead ; they are usually aquatic or semiaquatic. The chief body of information about them is Hart's account of the North American forms, 1895. The various genera have a great family resemblance : they are readily recognised by the completely invaginate head, the circles of pseudopods, and the small terminal breathing tube. The anus (placed at the base of the eleventh body segment) is accompanied by two large remarkable prominences.

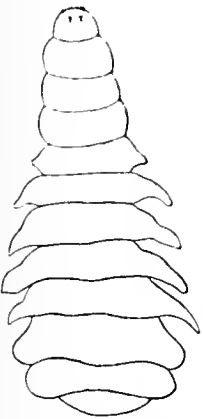


FIG. 63.—Young larva of *Astomella Lindenii*. [After Brauer]

Fam. NEMESTRINIDÆ. Head very small, retractile ; body-segments twelve. Posterior spiracles terminal, well separated, placed in a transverse fissure. Amphipneustic. This family is not likely to be found in Britain. The only known larva lives inside the bodies of coleopterous insects in their early stages. Only one or two naturalists have been able to study it, and the above-mentioned characters are gathered from Brauer.

Fam. CYRTIDÆ (fig. 63). The larvæ are parasitic in spiders. The head is very minute, and the posterior spiracles, according to Brauer, are accompanied by peculiar large plates.



FIG. 62.—*Tabanus atratus* larva. [After Hart]

Fam. BOMBYLIDÆ (fig. 64). Larva parasitic. Young larva consisting of a small exerted head and twelve segments : elongate and slender : each thoracic segment with a pair of long setæ : the penultimate segment bearing two separated spiracles. When adult the larva is very obese, has lost its long stiff bristles, and looks very different. The anterior part of the pupa is armed with strong spines. The British species of *Bombyliidæ* are probably all connected with bees, but many of the foreign forms live at the expense of insects of other Orders.

TherevidÆ. Elongate and slender, cylindrical, consisting of a head and twenty segments ; head moderately large, exerted. Amphipneustic. The thoracic spiracle placed on the second body-segment ; the abdominal spiracle placed at the side of the fourth segment from the apex ; the terminal segment small. No pseudopods, but there are a few fine bristles on the anterior three segments. The increased number of segments is supposed to be due to some of the true segments being divided into two. Few larvæ are known. That figured (fig. 65) was found by Mr Martineau in decayed turnips.

Fam. SCENOPINIDÆ. Larva like that of *Thereva*. It has been found in houses, and it is still doubtful whether it is predaceous or not.

Fam. MYDAIDÆ. Larva said to be similar to that of the rapacious *Asilidæ*.

Fam. APIOCERIDÆ. Larva probably unknown. The one described by Brauer as possibly belonging to the family is probably a *Therevid*.

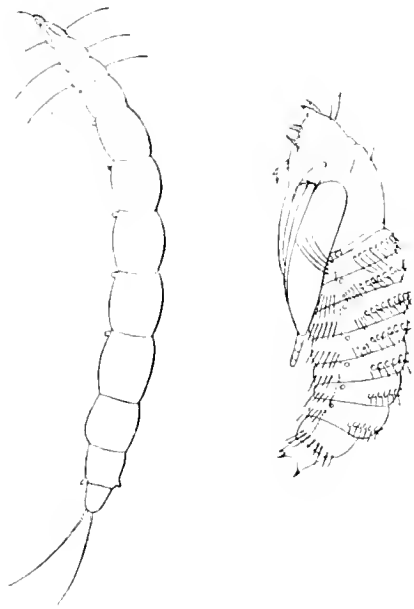


FIG. 64.—Young larva and pupa of *Bombylius pumilus* Niels. = *minor* L. [After Nielson]

Fam. ASILIDÆ. Larva cylindrical, consisting of a head and eleven or twelve body-segments. Head moderately broad, exerted, armed in front with stout teeth (differing according to kind). Amphipneustic: the abdominal spiracles not terminal, but placed dorsally on the penultimate segment (or on an area intercalated between the last segment and the true penultimate). The middle segments of the body may

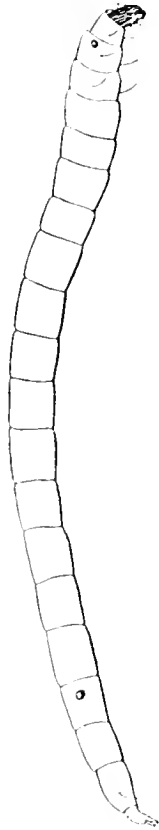


FIG. 65.—Larva of *Thereva nobilitata*.



FIG. 66.—*Laphria* (?) larva. $\times 3$.

bear either circles of pseudopods, or areas intercalated on the ventral aspect between two segments. The larvæ are reputed to be either predaceous or to feed on roots. That figured (fig. 66) was found in the burrows of coleopterous insects in a fir tree, and probably belongs to the genus *Laphria* (cf. Braner, pl. iv., figs. 60, 61, 63).

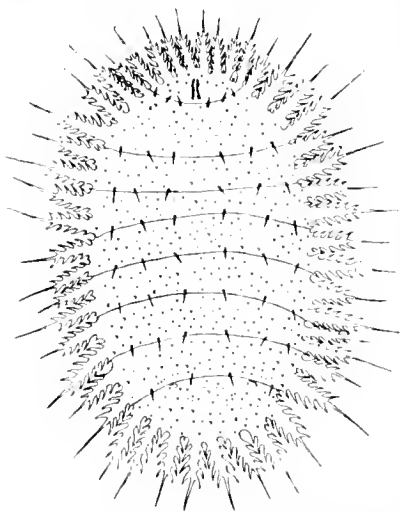


FIG. 67.—Larva of *Callimyia amœna*, seen dorsally. [After de Meijere]

Suborder: CYCLORRHAPHA. *Sectio Aschiza* Becher.

In the three families the pupa is coarctate (cocoon-like), the final transformation occurring in the skin of the larva. The head is to all appearance wanting,* but is really present, though in the *Syrphidae* only revealed by dissection.

Fam. PLATYPEZIDÆ. Larva broad and depressed; from above appearing to have only nine or ten segments, but really consisting of a head and ten or eleven segments, the head and the first following segment being placed entirely on the under surface (exserted; that is, inferior, but not invaginated): the sides of the body with long outstanding bristles, and sometimes deeply indented and serrate (*Callimyia*) (fig. 67). Amphipneustic, the posterior spiracles not, or but little prominent, rather widely separated, placed at the base of the last segment; anterior spiracles prominent on the prothoracic segment beneath the body.

These peculiar larvæ live in various kinds of agarics. For that of *Platypeza* see Bergenstamm, Verh. Z.-b. Ges. Wien., 20, 1870, p. 37, pl. 3.

* Dr Perkins assures me that he considers the larva of *Pipunculus* to be acephalous, as in *Muscidæ*.

Fam. PIPUNCULIDÆ. Larva acephalous and with very indistinct parts of the mouth: segmentation obscure, but the segments probably ten or eleven: amphipneustic, anterior spiracles small, posterior conspicuous, placed close together, not at the tip of the body, but some considerable distance before it. Puparium provided with spiracular tubercles on the second (?) segment, and with or without more anterior minute spiracles. Posterior spiracles as in larva. Dehiscence of the pupa occurs by detachment of the dorsal plate, through which the spiracular horns project.

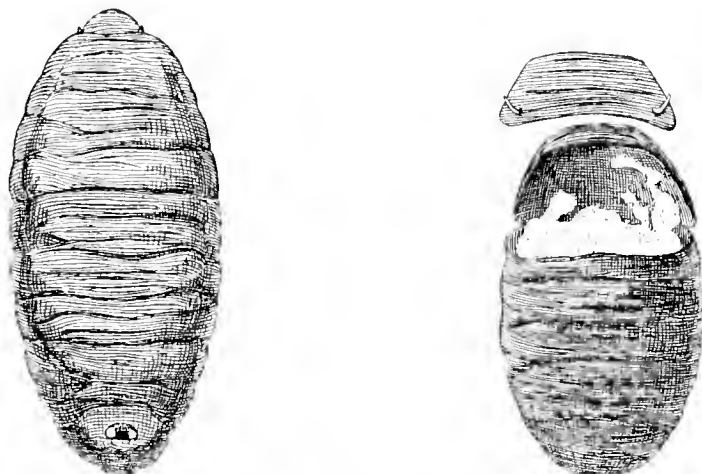


FIG. 68.—*Pipunculus juvenator* larva and *P. Korbulei* puparium, showing the dehisced dorsal plate bearing the spiracular horns. [After Perkins]

The larvæ are parasitic, living in the interior of other insects, usually of Homoptera. Our chief source of information about them is Perkin's Bull-exp. Stat. Hawaii, i., 1905, p. 128, pl. vii.: but some important points are not mentioned.

Fam. SYRPHIDÆ. Larva apparently acephalous; of about eleven segments, but this point often difficult of discrimination. The skin usually rough (often pigmented, especially in subfamily *Syrphinae*). Amphipneustic, the abdominal spiracles placed quite close together at the tip of the body; the prominence sometimes very hard. In the case of *Eristalis*, not hard, but forming a flexible tube that may be capable of extension to several times the length of the body. Puparium with thoracic spiracle-horns, that may be short or long, and sometimes with smaller anterior horns that mark the position of the larval spiracles. The abdominal spiracles also prominent, and usually but little different from the condition they exhibit in the larva.

The larvæ of this extensive family show a great range of variety in habits and in form. The *Chilosia* group inhabit vegetable stems, etc., and *Merodon* bulbs; a great many of the *Syrphinae* are aphidiphagous. *Eristalis* larvæ are fond of the grossest filth. *Xanthandrus comtus* attacks and devours lepidopterous larvæ, and *Catabomba pyrastris* has been reared from lepidopterous pupæ. Notwithstanding the large number of notices of *Syrphidæ* larvæ in entomological literature, there are but few good descriptions or figures, and I have been unable to form intelligible diagnoses of the subfamilies from the larval characters.

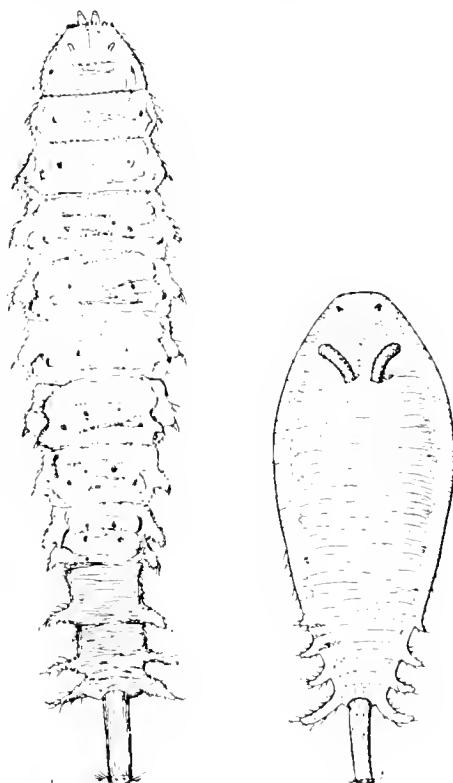


FIG. 69.—*Xylota sylvarum* larva and puparium. $\times 7$.

ARRANGEMENT.

The systematic arrangement adopted by Bezzi in 1903 in the latest Katalog der Paläarktischen Dipteren is only a slight modification of the one proposed by Brauer in 1883, and is as follows :

DIPTERA ORTHORRHAPHA BRACHYCERA.

PLATYGENYA	{	HOMCEODACTYLA	{	NOTACANTHA	{	STRATIOMYIDÆ.		
		TANYSTOMA		XYLOPHAGIDÆ.				
		HETERODACTYLA	{	BOMBYLIMORPHA	{	CENOMYIDÆ.	{	TABANIDÆ.
				PROCEPHALA		LEPTIDIDÆ.		
ACROPTERA	{	POLYTOMA	{	ACROCERIDÆ.	{	MYDAIDÆ.		
		ORTHOGENYA		NEMESTRINIDÆ.				
				ASILIDÆ.		BOMBYLIDÆ.		
				DOLICHOPODIDÆ.		THEREVIDÆ.		
				LONCHOPTERIDÆ.		SCENOPINIDÆ.		

In Brauer's scheme the PHORIDÆ were placed under the CYCLORRHAPHA, Sectio ASCHIZA, Tribus HYOCERA, in company with the PLATYPEZIDÆ; the ACANTHOMERIDÆ were between the TABANIDÆ and the LEPTIDÆ, and the APIOCERIDÆ were between the MYDAIDÆ and the ASILIDÆ. Brauer also used the terms STRATIOMYIDÆ, LEPTIDÆ, MYDAIDÆ, BOMBYLIDÆ,* EMPIDÆ, and DOLICHOPODA, and he apparently included *Cenomyia* in his XYLOPHAGIDÆ.

In 1880 and 1882 Brauer had used the following terms derived from Schiner.

$$\text{CYCLOCERA} = \begin{cases} \text{NOTACANTHA.} \\ \text{TANYSTOMA.} \end{cases}$$

AND

$$\text{ORTHOCERA} = \begin{cases} \text{BOMBYLIMORPHA.} \\ \text{PROCEPHALA.} \\ \text{POLYTOMA.} \end{cases}$$

but Schiner (1868) included the LEPTIDÆ in his ORTHOCERA.

* Haliday defended the use of such names as *Bombylidæ* rather than the proper etymological form *Bombyliadæ* in order to preserve the uniformity of the termination, and quoted *Deucalidæ* from *Deucalion*.

The arrangement proposed by Osten Sacken in 1896 was as follows :

EREMOCHÆTA . . .	$\left\{ \begin{array}{l} \text{STRATIOMYIDÆ (incl. } Xylomyiinae\text{).} \\ \text{TABANIDÆ.} \\ \text{ACANTHOMERIDÆ.} \\ \text{LEPTIDÆ (incl. } Xylophaginae \text{ and } Cœnomyiinae\text{).} \end{array} \right.$
TROMOPTERA . . .	$\left\{ \begin{array}{l} \text{NEMESTRINIDÆ.} \\ \text{CYRTIDÆ.} \\ \text{BOMBYLIDÆ.} \\ \text{THEREVIDÆ (incl. } Scenopinidae\text{).} \end{array} \right.$
MYDAIDÆ	MYDAIDÆ.
ENERGOPODA	$\left\{ \begin{array}{l} \text{ASILIDÆ (incl. } Apiocerinae\text{).} \\ \text{DOLICHOPODIDÆ.} \\ \text{EMPIDÆ.} \\ \text{LONCHOPTERIDÆ.} \\ \text{(?) PHORIDÆ.} \end{array} \right.$

The CYRTIDÆ are the same as Brauer's ACROCERIDÆ.

The arrangement I have adopted in this work is very nearly the same as Osten Sacken's, but is somewhat modified as follows :

EREMOCHÆTA	$\left\{ \begin{array}{l} \text{STRATIOMYIDÆ.} \\ \text{ACANTHOMERIDÆ.} \\ \text{LEPTIDÆ.} \\ \text{TABANIDÆ.} \\ \text{NEMESTRINIDÆ.} \\ \text{CYRTIDÆ.} \end{array} \right.$
TROMOPTERA	$\left\{ \begin{array}{l} \text{BOMBYLIDÆ.} \\ \text{THEREVIDÆ.} \end{array} \right.$
DERMATINA	$\left\{ \begin{array}{l} \text{SCENOPINIDÆ.} \\ \text{MYDAIDÆ.} \end{array} \right.$
ENERGOPODA	$\left\{ \begin{array}{l} \text{APIOCERIDÆ.} \\ \text{ASILIDÆ.} \end{array} \right.$
MICROPHONA	$\left\{ \begin{array}{l} \text{EMPIDÆ.} \\ \text{DOLICHOPODIDÆ.} \end{array} \right.$
ACROPTERA	LONCHOPTERIDÆ.
HYPOCERA	PHORIDÆ.

This volume deals with the EREMOCILÆTA, TROMOPTERA, DERMATINA, and ENERGOPODA.

I am indebted to my namesake, Dr A. W. Verrall of Trinity College, Cambridge, for the formation of the words DERMATINA (*δερμάτινος* = the leathery one) and MICROPHONA (*μικρός φόνος* = murderer of little things). I use the word MICROPHONA as being in accord with the other names of the superfamilies in referring to the perfect insects, while the term ORTHOGENYA of Brauer was derived from the embryonic characters, and also was imposed as of equal rank with the PLATYGENYA.

My arrangement is identical with that of Aldrich in his Catalogue of

North American Diptera (1905) excepting in the exchange of places between the *Leptidæ* and *Tabanidæ*, and in the fact that Aldrich uses no superfamilies or subfamilies; Aldrich, however, reversed the sequence of the genera in the *Stratiomyidæ*. The main points upon which I have differed from Osten Sacken are as follows:—

Firstly; I include the *Nemestrinidæ* and *Cyrtidæ* in the EREMOCHÆTA instead of doubtfully leaving them in the TROMOPTERA, and my reason for this is that those two families agree with the EREMOCHÆTA of Osten Sacken in being absolutely eremochætous and in having three pulvilli. I consider the combination of these two important characters separates them naturally and scientifically from the other TROMOPTERA, while it unites them with the EREMOCHÆTA. My interpretation of the EREMOCHÆTA exactly coincides with Brauer's HOMEOACTYLA, and, as Brauer's system was mainly founded on embryonic characters, the coincidence becomes a very strong confirmation of its accuracy. I prefer Osten Sacken's title for the group because it is founded upon the perfect insects, besides being a better word. The TROMOPTERA (as interpreted by me) are composed of only the *Bombylidæ* and *Therevidæ*, as I remove the *Scenopinidæ* to the next superfamily even though I believe in their affinity to the *Therevidæ*; in this arrangement there is great divergence from Brauer's views.

Secondly; I have differed from Osten Sacken in removing the *Scenopinidæ* from the TROMOPTERA altogether, and in uniting them with the *Mydaidæ* in a common superfamily, for which I propose the name of DERMATINA. Osten Sacken had already treated the *Mydaidæ* as a superfamily in themselves, and although Brauer widely separated the *Scenopinidæ* and *Mydaidæ* in the arrangement I have quoted above, he had in the previous year most elaborately worked out the relationship of *Scenopinus* and proved over and over again its affinity to the *Mydaidæ*, in fact so much so that he wrote "Jene kurzfühlerigen Mydaiden "scheinen den unzweifelhaftesten Übergang zu *Scenopinus* zu zeigen"; it is again remarkable that when working on independent lines we have arrived at the same result. The term DERMATINA (*δερμάτινος*) refers to the leathery appearance of most of the species, which are however not leathery like the PUPIPARA but in the sense of a dull dark smooth body-surface entirely devoid of bristle and pubescence.

Thirdly; I have acknowledged the family rank of the *Apioceridæ*, as I cannot associate them with the DERMATINA because they are distinctly chaetophorous, nor is it possible to associate them with the *Therevidæ* because of the very distinct venation, in which the subcostal vein is long and the veins on the apical part of the wing are curved up so much that the upper veinlet from the discal cell ends before the wing-tip. Osten Sacken at one time contended that they were true *Asilinæ* (allied to some species of *Erax*), but he subsequently considered that they were entitled to be considered a subfamily of equal rank with the *Asilinæ*. I am

however of opinion that the scarcely excavated vertex, very short beardless face, short eollar, spatulate palpi, and upturned veins about the tip of the wing distinguish them so much from the *Asilidae* that they cannot remain in the same family, though I group them in the same superfamily.

Fourthly; I have reduced Osten Sacken's ENERGOPODA to the *Apioceridae* and *Asilidae* only. The *Asilidae* form an enormous but very well-defined group, and in my opinion they are more closely allied to the *Therevidae* than they are to the *Empidae*. The ENERGOPODA may be distinguished from the MICROPHONA (*Empidae* and *Dolichopodidae*) by their more elaborate venation (with five posterior cells), and by their powerful strongly armed legs but weak cephalic bristles. The *Empidae* and *Dolichopodidae* are undoubtedly closely allied to each other and have a more simple venation (tending towards the ATHERICERA), weaker less strongly armed legs, and more strongly developed cephalic bristles; they are moreover large groups of species of much smaller average bulk, and (both being predatory) may bear the name of MICROPHONA (murderers of little things); they have already been closely associated by Brauer upon embryonic characters, and he bestowed upon them the title of ORTHOGENYA (*ὀρθός γένος*) in contradistinction to his PLATYGENYA (*πλατύς γένος*). I do not adopt the name ORTHOGENYA for them, because that title was of co-ordinate rank with Brauer's PLATYGENYA, which was a group including *all* the previous families of the BRACHYCERA, while I desire to indicate a superfamily of only equal rank with the EREMOCHLETA or TROMOPTERA.

The *Lonchopteridae* still remain a very distinct small family of rather uncertain location which I leave at present under the old superfamily name of ACROPTERA. J. C. H. de Meijere in *Zool. Jahrb.*, xiv., pp. 87-132, T. 5-7 (1900) has dealt at considerable detail with the larva of *Lonchoptera*, and has come to the conclusion that the family would more properly commence the CYCLORRHAPHIA than end the ORTHORRHAPHIA, but the more I study them the more I come to the opinion that their proper place is between the *Dolichopodidae* and *Phoridae*. The *Phoridae* are also a remarkably distinct and well-defined family concerning whose position there have been numerous differences of opinion. For a long time they were believed to belong to the CYCLORRHAPHIA, and whilst some writers (myself included) placed them near the *Borboridae*, others associated them with the *Platypezidae* under the superfamily name of HYPOCERA; more recent opinions tend to place them in the ORTHORRHAPHIA though standing upon the border line, and I have come round to this opinion myself. The term HYPOCERA was originally founded for them only, and not being in a position to dogmatise as to their affinities I leave them for the present by themselves under that superfamily name.

Other families have been proposed but have been merged into one or other of the sixteen families now accepted, though some are still retained by other writers. The old family *Xylophagidae* (retained by Bezzi in his

Katalog of 1903) formed a convenient receptacle for any *Stratiomyidae* with spurred tibiae and a commencement of an ambient vein together with any *Leptidae* which have an annulated third antennal joint; but I have followed Osten Sacken in dismembering and submerging the family. The *Cenomyidae* (with spurred tibiae, annulated flagellum, ambient vein, and armed scutellum) are now known to be rather closely allied to the *Aylophaginae* and are therefore treated as a subfamily of the *Leptidae*; they had however been previously united by Westwood under his interpretation of the *Cenomyidae*. Westwood also formed a family called *Beridae* for the *Aylomyinae* and *Berinae* combined. The *Chiromyzidae* comprise a few South and Central American species which have been bandied about between the *Stratiomyidae* and *Cenomyidae*, but which according to the origin of the præfurca must be allied to the *Berinae* and consequently belong to the *Stratiomyidae*. The *Anthracidae* have long since been universally recognised as a subfamily (*Anthracinae*) of the *Bombylidae*.

A paper entitled "Notes pour la Classification des Diptères," published by Aug. Lameere in Mémoires de la Société entomologique de Belgique, xii. (1906), exhibits a most extraordinary lack of knowledge of Diptera in general. To begin with, the author seems to have had an idea that Osten Sacken divided the Diptera into only NEMOCERA and BRACHYCERA, thus completely failing to comprehend Osten Sacken's idea of the BRACHYCERA; then he endeavours to separate Osten Sacken's NEMOCERA ANOMALA from the NEMOCERA altogether, and to associate them with the BRACHYCERA. Throughout the paper the author exhibits such an absolute want of personal study of the Diptera and of their literature as to render his writings worse than useless for students.

DEVELOPMENT OF CHARACTERS.

It is very interesting to observe the gradual development of numerous characters leading from the NEMOCERA to the BRACHYCERA, and then to trace those characters through the various families of the BRACHYCERA on to the ATHERICERA.

Venation.—The anal cell is always wide open in the NEMOCERA, and although it has a tendency in the *Rhyphidae* to contract about its middle it widens out again towards the wingmargin, and in conjunction with this character the *Rhyphidae* bear a general superficial resemblance to some of the *Leptidae*, and further still the *Rhyphidae* belong to the few NEMOCERA which possess a discal cell, so that in many ways they indicate the change towards the BRACHYCERA. In the BRACHYCERA, on the other hand, the postical vein begins by forking in a rather gradual fashion, so that its lower branch approximates to or even joins the anal vein near the wingmargin, and then the anal cell is either strongly contracted or even closed, and in some cases (*Beris*, etc.) the lower branch of the postical vein curves down so abruptly that the anal cell is closed some considerable distance before the wingmargin; moreover, in all the earlier families of the BRACHY-

CERA (up to the end of the *Asilidæ*) the anal cell is very distinct and long, but when the MICROPHONA are reached the anal cell becomes very short, and (with the exception of some *Hybotinæ*, which thereby naturally form the first subfamily of the *Empidæ*) the lower branch of the postical vein bends down so abruptly or even recurrently as to close the anal cell quite close to the base of the wing (or the anal cell disappears altogether), and this continues through the ATHERICERA with a few exceptions; some of these exceptions however occur where they would be least expected, such as amongst the *Trypetidæ* or *Ortalidæ*. The discal cell is present in almost all the BRACHYCERA until after the *Asilidæ*, so that with the curtailment of the anal cell the discal cell also becomes at first uncertain and then disappears; in many families the upper branch of the fork of the postical vein is connected with the discal cell by the small cross-vein, but sometimes this small cross-vein is absent and the upper branch of the postical fork then forms for a greater or less distance the lower margin of the discal cell, or sometimes (*Scenopinidæ*) almost the whole lower margin; in the *Empidæ* the discal cell often disappears and even when present has almost all its lower margin formed by the upper branch of the postical vein, and in the succeeding families of the BRACHYCERA the discal cell entirely disappears, but reappears again in a different form in the *Syrphidæ* and other families of the ATHERICERA. The closed fourth posterior cell (or its equivalent) becomes a strong feature in the *Acanthomeridæ*, *Mydaidæ*, *Apioceridæ*, and *Asilidæ*, but is rare in other families, though it occasionally crops up as in *Xylomyia*, *Lampromyia*, etc.

The antennæ gradually change from a flagellum composed of numerous joints in the NEMOCERA, in which the joints range from being extremely individualised in the *Cecidomyidæ*, to the more solid annulated flagellum of *Bibionidæ* or the remarkable pectination of *Ctenophora*, to a more solid joint in the BRACHYCERA, in which however the earlier families retain an obvious similar annulation, and even in the remarkable genus *Rhachicerus* imitate the pectination; this annulation of the flagellum becomes less and less distinct, and at the next stage (*Tabanidæ*) the first annulation grows much larger than the others and reduces these others into a sort of style, and thenceforward the style becomes more and more solid though still with indication of joints, and often ends in a thin hair, until in passing to the next stage the third joint of the antennæ becomes a solid round, ovate, conical, reniform, or elongate joint, and usually has a thin more or less hair-like apical arista; in some *Leptidæ*, etc., this arista may appear to be placed rather dorsally in consequence of the peculiar shape of the third joint, but it is not until the *Dolichopodidæ* are reached that the arista becomes decidedly dorsal, and then when the BRACHYCERA are passed it becomes normally dorsal and only exceptionally apical. The absolute absence of any style or arista in the ligulate antenna of *Scenopinus*, and the remarkable club-like style of *Mydaidæ*, ought to give some clue to the relationship of the DERMATINA. The

sexual differences in the antennæ are very pronounced in most of the NEMOCERA VERA of Osten Sacken, but disappear in his NEMOCERA ANOMALA and in all the subsequent DIPTERA.

The clothing is usually absent in the NEMOCERA, though coarse pubescence of a peculiar nature occurs in many *Bibionidæ*, *Psychodidæ*, *Culicidæ*, and a few *Mycetophilidæ*, and bristles may occur on the thorax and legs of a different chaetotactic nature from those in the BRACHYCERA; but it is not until the *Therevidæ* are reached that regular strong bristles occur in the BRACHYCERA, but thence onwards through the *Asilidæ* powerful bristles occur on the thorax and legs, until they become the rule in the MICROPHONA and subsequent families right away through the ATHERICERA, with occasionally lapses such as in *Pipunculidæ* and *Syrphidæ*. In the families after the *Asilidæ*, the cephalic bristles begin to develop and soon become an important feature. The first indications of bristles on the legs show as apical tibial spurs, and then spicules occur in rows on the tibiæ (*Leptidæ*, *Bombylidæ*, etc.), and these spicules steadily develop until they become conspicuous (*Therevidæ*) and ultimately develop into strong spines (*Asilidæ*); a serration beneath the hind femora occasionally occurs even in the EREMOCÆTA (*Xylomyia*), but does not seem to bear much affinity to the stick-like spicules which occur there in the *Bombylidæ*, nor to the stouter bristles which are frequent in the *Asilidæ*; the serration in the otherwise almost eremochætous *Mydaidæ* may be of a similar nature to that which occurs in *Xylomyia*. The strong bristles on the legs reach their highest development in the pedestrian *Asilidæ*, and Osten Sacken has pointed out that this character becomes weak in ærial families, which accounts for its absence in *Pipunculidæ* and *Syrphidæ*. The soft eremochætous pubescence of the *Stratiomyidæ* becomes coarser in the *Tabanidæ* and assumes a slightly bristly nature in the *Leptidæ*, after which the first indications of macrochætæ occur in the densely furry *Bombylina*, but these macrochætæ are hidden away in the pubescence and are sometimes more strongly developed in the females; in the later subfamilies of the *Bombylidæ* (such as the *Toxophorina*) the dense pubescence becomes reduced and the macrochætæ are correspondingly developed, while the converse holds good in some *Asilidæ* in which the normal strong bristles on both thorax and legs are replaced by dense coarse pubescence (*Laphria*, etc.). An affinity may exist in the facial and frontal bristles of the *Lonchopteridæ* and *Phoridæ*. The gradual growth of a minute pubescence on the metapleuræ to the fan of bristly hairs or even strong bristles which occur in most *Asilidæ* (with a remarkable lapse in *Stenopogon*) and *Empidæ* is of interest, and in the *Muscidæ* (*sensu latissimo*) remarkable strong bristles of another type usually occur on the mesopleuræ and metapleuræ. The postocular festoon is a row of strong bristles which occurs in most *Asilidæ* on the upper part of the back of the head and rather overhanging the eyes, and the commencement of this may be found in some *Tabanidæ* and *Leptidæ*, or may even be indicated by the erect

ciliation which occurs in some species of *Sargus*, while it becomes an important character in the *Dolichopodidæ*. "Touch hairs" are some very fine hairs which stand out from the normal dwarf bristles beneath the joints of the front tarsi and on the apical portion of the front tibiæ in many *Tabanidæ* and *Leptidæ* and other widely divergent Diptera, and which evidently indicate in some cases affinity, but more likely in other cases only a similarity of habit intended to effect some peculiar purpose; at one time I thought they were intended to provide blood-sucking species with exceedingly delicate feelers, so that they could alight on a victim without the slightest sense of touch being felt by the latter, and I am still of opinion that they serve this purpose in many cases.

Sexual ornamentation is very rare in any marked degree in the BRACHYCERA except in the MICROPHONA, though brighter colours naturally often exist in one sex. The ornamentation of the legs, however, reaches its height in the males of the *Dolichopodidæ* and in the females of the *Empidæ*, and the males of some *Dolichopodidæ* (*Psilopus*, etc.) exhibit some extraordinary sexual characters in the antennæ.

The details of character development might be prolonged to any extent, but scarcely come within the scope of this volume.

DIPTERA BRACHYCERA.

EREMOCHÆTA.

Three pad-like almost equal pulvilli. Whole insect without macrochætæ.

Head usually holoptic in the male, and sometimes (*Cyrtida*, *Systropina*) in both sexes, but on the other hand occasionally (*Xylophagus*, etc.) dichoptic in both sexes; vertex and frons never sunken enough between the eyes to make the eyes protrude. Eyes very frequently brilliantly colored in life and with conspicuous bands or spots; facets usually enlarged on the upper or front part in the male. Antennæ polymorphic.

The words used by Osten Sacken in 1892 (Berl. Entom. Zeitschr., xxxvii., p. 429) when detailing the characters of his "superfamily" EREMOCHÆTA were:

"No macrochætæ; three well-developed pulvilli; heads in the male predominantly holoptic and eyes very often bisected, with larger facets above than below; the eyes in both sexes often variegated in different colors; the structure of the antennal flagellum polymorphous, more inconstant here than in any other group of diptera; tegulæ undeveloped in the *Leptida* and *Acanthomerida*, very small in the *Stratiomyida*, and in full development only in the *Tabanida*. Axillary excision, ahula and anti-tegula, in most cases, distinctly developed. Discal cell, as a rule, present; five posterior cells, sometimes four, through the partial or total obliteration of a vein. Legs rather smooth. Larvæ with elongate heads, composed of horny plates; mandibles not opposed to each other, but moving with a more or less vertical mobility, and thus foreshadowing the hook-shaped mandibles of the larvæ of the *Cyclorrhapha* (Long-headed larvæ, Langköpfe of Marno)."

Osten Sacken however included only "the families *Stratiomyida*, *Tabanida*, *Acanthomerida*, and *Leptida* (plus *Xylophagidæ*)," relegating the *Nemestrinida* and *Cyrtida* to his superfamily TROMOPTERA; but after an examination of those two families I have ventured to include them in the *Eremochæta*, because I do not find one word in the above quotation which would not apply to them. I am also impressed with the fact that they agree with the previously mentioned families in possessing three almost equal pad-like pulvilli and in being absolutely eremochætous, while the other TROMOPTERA have only two pulvilli and are not absolutely eremochætous. It may not be a matter of much importance where the boundary line is drawn between the EREMOCHÆTA and the TROMOPTERA,

but the association of two such sharply marked characters facilitates their study. The remaining TROMOPTERA (*Bombylidae* and *Therevidae*) and all the remaining BRACHYCERA may then be distinguished by their possessing only two pad-like pulvilli, with the empodium either absent or reduced to a simple bristle; so that there can be no confusion with the EREMOCHÆTA even in those cases where bristles are replaced by dense or coarse pubescence.

Other details given by Osten Sacken (Entom. Month. Mag., xxvii., 37, 1891) are worthy of quotation. In separating *his* EREMOCHÆTA from the NEMOCERA and the rest of the BRACHYCERA, he says, "1. The eyes (in the " male) are predominantly holoptic; exceptions are either only apparent " (as subcontiguous eyes, or, in the *Sargidae*, approximate eyes in one " genus, and absolutely contiguous ones in the very next one) or very " rare (*Xylophagus*, with broadly dichoptic eyes in both sexes, some " Australian *Chiromyza*, *Hermetia*, and some others may be considered as " exceptions; but even *Xylophagus* has in *Canomyia* a close relative, " which is holoptic; and so has *Hermetia* in its Australian relative " *Massicyta* *); 2. bisected eyes, with larger facets above than below (in " the male) are of very frequent occurrence; 3. eyes of variegated colour " are more common in this Section than in any other of the whole order of " *Diptera*, principally in the *Stratiomyidae* and *Tabanidae*; 4. the antennæ " in the group *Eremochaeta* are characterised by what I should call a " morphological restlessness; there is no other group of *Diptera* in which " the structure of the antennæ varies so much, even in closely related " genera. These various forms offer a complete transition from the thread- " like antennæ with homologous flagellar joints, characterizing the *Nemocera* " (such antennæ occur, for instance, in *Subula varia*, and in *Xylophagus*), " to the disc-and-arista type, which becomes so common in the other " great division, the *Cyclorrhapha*. This transition is effected by the " joints of the proximal portion of the flagellum tending to coalesce and " to form a compound joint in various shapes, while the joints of the " distal portion gradually pass into the form of a simple bristle. Portions " of the antennæ are often beset with more or less long and dense hairs, " but the analogue of what I called *sensitive hairs* in the *Nemocera*, forming " a verticil, a pencil, or a plume, does not occur here; 5. There are *three* " *well-developed pulvilli*, which is one of the most characteristic features " of the *Eremochaeta*; exceptions are rare. The legs are generally smooth, " without those bristles and spines that distinguish the *Asilidae*, and, in a " lesser degree, the *Bombylidae* and *Therevidae*."

ARRANGEMENT.

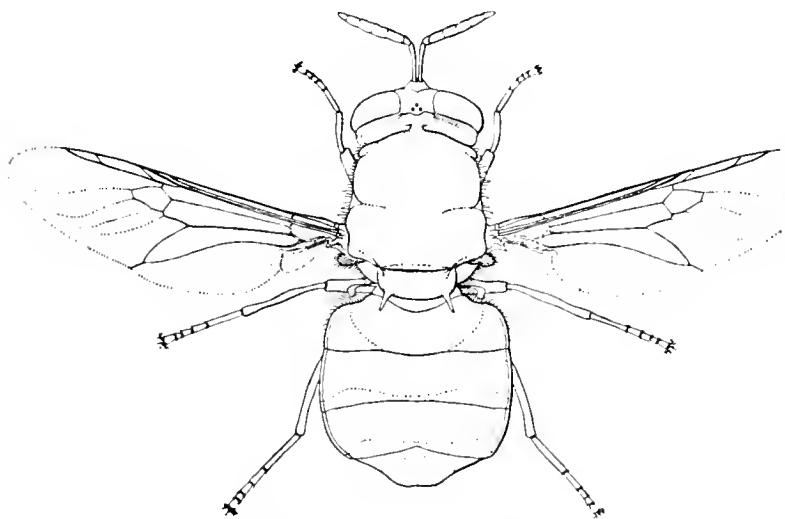
I have (perhaps wrongly) departed from the usual sequence of *Stratiomyidae*, *Tabanidae*, and *Leptidae*, in that I have placed the *Leptidae*

* "The genera *Psammorycter*, *Lampromyia*, and *Phencus*, forming the group *Psammorycterina*, Loew, have a narrow front in both sexes, and in this character, as in their whole appearance, seem to mimic the *Asilidae*; but here again their close relative, *Triptotricha*, has a holoptic head in the male."

second. My reasons for this are the evident gradations through *Beris* and *Xylomyia* to *Xylophagus* and *Cænomyia*, though I can appreciate the opinion that the annulated third antennal joint and the soft pubescence of the *Tabanidæ* show closer alliance to the *Stratiomyidæ*; I am however inclined to place the annulations of the third antennal joint of the *Tabanidæ* as only the commencement of the jointed style which subsequently prevails. The *Acanthomeridæ* also are obviously intermediate between the *Stratiomyidæ* and *Leptidæ* and may lead on to the *Tabanidæ*. The presence of "touch-hairs" beneath the front tarsi of the *Leptidæ* and *Tabanidæ* show affinity, as may also the biting habits of some species of *Symphoromyia*, and then the spurred tibiæ of the *Leptidæ* would lead on to the *Pangoninæ*, though others may see closer relationships between *Atherix* and *Chrysops*. There may be stepping-stones, though I write with little confidence, from the *Tabanidæ* through the long proboscis of the *Paugoninæ* to the *Nemestrinidæ*, and then the superfamily would end with the *Cyrtidæ*, from which "*Natura non facit saltum*" to such tromopterous *Bombylidæ* as the bare humpbacked *Glabellula*, *Platypygus*, etc.

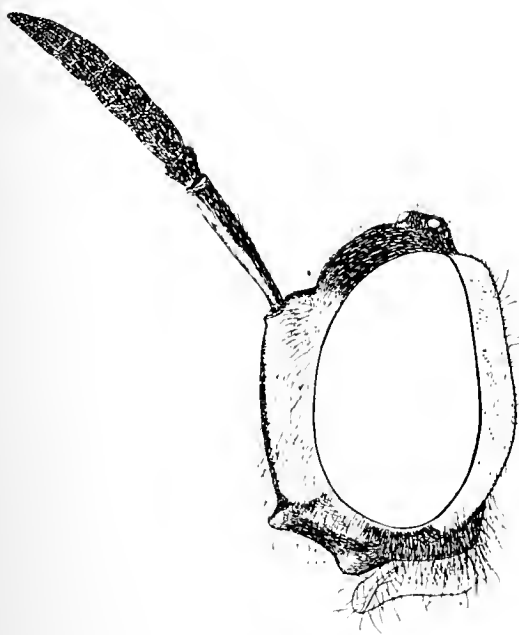
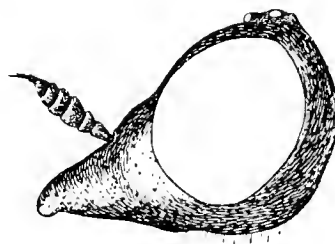
Short characters for the distinction of the families are given in the tables on pages 11 to 30, and fuller details and comparisons are given under the characteristics of each family.

I. STRATIOMYIDÆ.

FIG. 70.—*Stratiomys potamida* ♀. × 3.

Orthorrhaphous brachycerous eremochætaous flies of rather large to rather small size, which have the flagellum of the antennæ annulated, the tibiæ without spurs (with rare exceptions), the ambient vein absent (except to a partial extent in *Xylomyinae*), and the squamæ inconspicuous.

Head short, hemispherical or flattened, as broad as the thorax, and absolutely without any sign of bristles. Face ranging from the soft arch of *Stratiomys* (fig. 71) to the produced polished snout of *Nemotelus* (fig. 72), not retreating below the antennæ, sometimes uniformly pubescent or bare and sometimes only the eye-margins bear-

FIG. 71.—*Stratiomys potamida* ♀. × 11.FIG. 72.—*Nemotelus nigricornis* ♀. × 30.

ing fine pubescence; jowls small but continuous from the face to the back of the head; back of the head usually rather inflated, at least on the lower part, and often showing (especially in the female) a ribband of pale colour against the eyes; vertex slightly raised, and the three ocelli always clearly distinct. Proboscis fleshy,

sometimes rudimentary, but never elongated nor adapted for biting. Palpi not conspicuous, one- to three-jointed. Eyes of the male usually contiguous on the frons, but of the female widely separated; when the eyes are hairy in the male they

are almost always nearly bare in the female, and when the facets are enlarged on the upper part of the eyes in the male they are always all small and equal in the female. Antennæ porrect, approximated at the base (fig. 73) and really three-jointed, but the third joint (or flagellum) is always annulated and often to such an extent as to resemble six or more joints, while there is often an apical style or a long thin apical or subapical bristle (or arista).

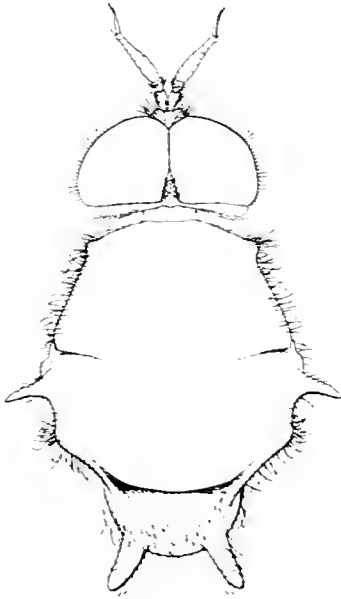


FIG. 73.—*Ehippium thoracicum* ♂.
× 7.

Thorax rather quadrangular, always more or less pubescent and sometimes villose, but the pubescence is always all of one nature, and there is no trace of bristles or longer hairs, though occasionally strong structural spines occur on the sides of the thorax near the wing-base (fig. 73); mesopleuræ with a bare space for the reception of the front femora; prothoracic plate rather broad and oblong or trapezoid. Scutellum unarmed, or frequently armed with one or two pairs of structural spines on the margin (which may vary to three or four more or less irregular pairs), and these are proved to be structural by the ordinary pubescence of the disc being continued on to the tip of the spines (fig. 74).

Abdomen composed of from five to seven or even eight obvious segments, usually ovate and sometimes flattened (*Pachygastrinæ*, *Clitellarinæ*, and *Stratiomyinæ*), but sometimes elongate and with almost parallel sides (*Sarginæ*, *Berinæ*, and *Xylomyinæ*):

colour usually blackish, and often with bright yellow (*Oxycera*, *Stratiomys*, etc.) or greenish (*Odontomyia*, *Oxycera*, etc.) spots or markings, or with conspicuous white markings in the male (*Nemotelus*) which are absent in the female, or with conspicuous reddish orange coloring (*Beris*), and brilliantly green in all our British *Sarginæ*. Pubescence slight or moderate, never concealing the ground colour and all of one nature, as there are no traces of bristles or even long hairs.

Legs of normal shape and size, fairly strong and entirely destitute of any bristles or unusual ornamentation (except a serration beneath the hind femora in some *Xylomyinæ*), never thickly pilose, though a moderate pubescence may occur on the femora; front coxæ not unusually long; tibiæ without any spurs except in the *Xylomyinæ* and in a few *Berinæ*. Pulvilli and the pad-like empodium apparently forming three almost equal pulvilli.

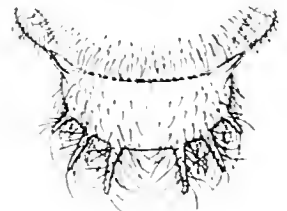


FIG. 74.—
Beris chalybeata ♂.

Wings with either the peculiar characteristic venation of *Stratiomys* (fig. 70) and its allied genera, in which the anterior veins as far as the end of the cubital vein are crowded together on the fore part of the wing and the posterior veins are remarkably faint, or with almost the normal venation of this group of families but with the præfurca (=the common stem of the radial and cubital veins) commencing almost opposite the base of the discal cell, except in the *Xylomyinæ* (fig. 75), and this character (as far as the EREMOCHÆTA are concerned) is peculiar to the *Stratiomyidæ* with the exception of a few *Cyrtidæ*; costal vein not reaching to the tip of the wing and with no ambient vein after it, or with the ambient (or costal) vein extended almost to the wing-tip (*Berinæ*), or with the ambient vein extended in the aberrant *Xylomyinæ* far beyond the wing-tip to the end of the second veinlet from the discal cell; mediastinal, subcostal, and radial veins crowded together (except in the *Xylomyinæ*); cubital vein simple, or more commonly forked but with the fork always commencing long after the end of the discal cell and its upper branch ending in the costa long before the wing-tip, while the lower branch also ends before the wing-tip except in *Xylomyinæ*; discal vein always enclosing a discal cell, though the lower margin of the cell may anastomose with a portion of the upper branch of the postical vein; discal cell emitting two, three, or apparently four veinlets to or towards the posterior wingmargin, but after excluding the last one when it happens to be the upper branch of the postical vein there are normally three veinlets, because when only two are visible (*Pachygaster*, *Beris*, etc.) it is the third

veinlet which is obsolete or missing, and usually these three veinlets run towards the wingmargin without any complication, but in *Xylomyinæ* the third veinlet bends rather abruptly down and joins the upper branch of the postical vein a little before the wingmargin, and thereby causes a closed fourth posterior cell; postical vein with its usual fork, and very easily distinguished in spite of its upper branch sometimes (in the absence of the small cross-vein) forming part of the lower margin of the discal cell and being sometimes (*Xylomyinæ*) united before its tip with the third veinlet from the discal cell, and in spite of its lower branch curving down and becoming connected with the anal vein near or long before the wingmargin; anal cell always closed; discal cross-vein always distinct and placed near or considerably

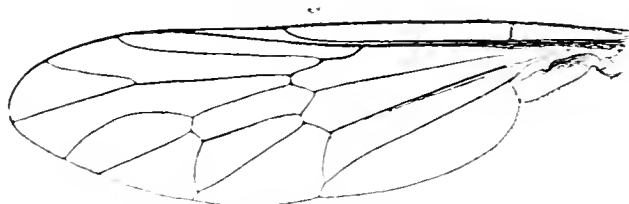


FIG. 75.—*Xylomyia maculata* ♀ . . . 9.

before the middle of the discal cell; lower (small) cross-vein sometimes present and sometimes absent; posterior cells normally five, but when the third veinlet from the discal cell is absent there are only four, all open to the wingmargin (except the fourth one in *Xylomyinæ*); when at rest the wings lie flat on the abdomen with one wing entirely covering the other. Wing-membrane almost always ribbed or wrinkled and densely though minutely pubescent, but occasionally smooth and bare (*Nemotelus*, etc.), or very slightly uneven (*Xylomyia*). Squamæ rather variable in development; alar pair always obvious but not at all large, and bearing a short fringe: thoracal pair sometimes absent (*Pachygaster*, *Berinae*, and *Xylomyinæ*), sometimes tongue-shaped (*Sargus* and some *Clitellarinæ*), or sometimes large and conspicuous and clothed all over the upper and under surfaces and on the margin with dense almost woolly pubescence (*Stratiomys*). Halteres with a rather large knob, but often concealed beneath the thoracal squamæ when the latter are large.

This family would be well distinguished from its allies were it not for the aberrant *Xylomyinæ*, as the origin of the præfurca (=the common stem of the radial and cubital veins) being almost opposite the base of the discal cell is a character not shared by any other family of the EREMOCHÆTA, except a few *Cyrtidæ*; if the *Xylomyinæ* be excluded from consideration it is most related to the *Leptidæ* through the *Berinae*, but the *Leptidæ* do not have an annulated third antennal joint except in their aberrant groups, and they always have at least some of the tibiæ spurred, while in *Stratiomyidæ* the tibiæ are spurred in only some species of *Berinae* (which include only one European species); on the other hand, in the true *Leptidæ* the wings are never ribbed or rippled and the ambient vein is continued (even though thin) round the wingmargin, the cubital fork is long and even its upper branch does not end before the wing-tip. Consequently the only difficulties lie between the *Berinae* and *Xylomyinæ* on the one side, and the *Xylophaginæ* and *Cænomyinæ* on the other side—omitting the exotic *Arthroceratinæ* and *Acanthomeridæ*—and the boundary line between these is not easy to define in the perfect insects, though the *Berinae* like all other *Stratiomyinæ* may be at once distinguished through the origin of the præfurca being opposite the base of the pentagonal discal cell; the *Xylomyinæ* may be artificially known by the closed fourth posterior cell; the *Xylophaginæ* have spurred tibiæ and an open fourth posterior cell; and the *Cænomyinæ* are distinguished from all the *Stratiomyidæ* by the long bell-mouthed cubital fork-cell.

The following contrasts may be noted between the more typical *Stratiomyidæ* and *Leptidæ*.

STRATIOMYIDÆ

(excl. *Berinae* and *Xylomyiinae*)

- a* Third joint of the antennæ flagelliform and distinctly annulated.
- b* Scutellum often armed.
- c* Abdomen rounded or oblong.
- d* Pubescence soft.
- e* Tibiæ without apical spurs.
- f* Præfurca starting opposite the base of the discal cell.
- g* Discal cell almost always pentagonal.
- h* Costal vein ending before the wing-tip at the end of the cubital vein.
- i* Cubital fork (if any) short, and with its lower branch ending long before the wing-tip.
- k* Wing-membrane almost always ribbed or rippled.
- l* Thoracal squamæ often developed.

The *Berinae* possess all the above characters except *e h* and *k*, and are only partially failing in them.

The *Xylomyiinae* fail in *b e f g h i l*.

LEPTIDÆ

(excl. *Xylophaginae* and *Cœnomyiinae*)

- a* Third joint of the antennæ simple and not annulated.
- b* Scutellum never armed.
- c* Abdomen conical.
- d* Pubescence rather stiff.
- e* Tibiæ on at least the posterior legs spurred.
- f* Præfurca starting far before the base of the discal cell.
- g* Discal cell hexagonal.
- h* Costal vein continued as a thin ambient vein all round the hindmargin of the wing.
- i* Cubital fork (absent in *Hilarimorpha* only) long, and with its lower branch ending after the wing-tip.
- k* Wing-membrane smooth.
- l* Thoracal squamæ absent.

The *Xylophaginae* fail in *a c d i*.

The *Cœnomyiinae* fail in *a b c d*.

The *Tabanidæ* are the only other family with an annulated third antennal joint, but in the great majority of them the basal part of that third joint is large (fig. 76), and well distinguished from the remainder of the joint, which forms an annulated cone, and that cone seems to indicate a step towards the jointed style which so frequently occurs in the subsequent families. No confusion is likely to occur between the *Tabanidæ* and the *Stratiomyidæ*, as the large comparatively bare thoracal squamæ and the triangularly wide open cubital fork (of which the lower branch ends far after the wing-tip) at once distinguish the former, and the venation of the *Tabanidæ* is very distinct in many other respects from that of any of the *Stratiomyidæ*.

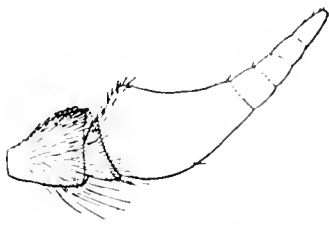


FIG. 76.—*Tabanus autumnalis*, ♀.
× 20.

In short, in British species (after excluding the very distinct *Tabanidæ*) an annulated third antennal joint indicates a Stratiomyid or a *Xylophagus*, while spurred tibiæ indicate a Leptid or a *Xylomyia*, and *Xylomyia* may be distinguished from *Xylophagus* by its closed fourth posterior cell. In European or exotic species other forms occur which are not so easily separated.

The *Stratiomyidæ* comprise about 1000 described species from all parts of the world, of which rather more than 200 are Palearctic, and about 53

British. Of the 200 Palæartic species about 160 belong to four genera (*Nemotelus*, *Oxycera*, *Stratiomys*, and *Odontomyia*), and these four genera are well represented in Britain. Very few, if any, species show any marked powers of flight, and none are known to hover;* they occur rather sluggishly on flowers or may be swept up in low herbage (*Nemotelus*, *Oxycera*); the *Sarginæ* with their brilliant metallic green coloring love to rest on the leaves of shrubs in the bright sunlight, and many of them are then very active when alarmed; the males of *Nemotelus* sometimes engage in an aerial dance over marshy ground, while the males of *Chorisops tibialis* may often be seen dancing in small companies beneath the branches of trees.

The metamorphoses of a considerable number of species are well known, and they prove the close relationship of *Pachygaster*, *Sargus*, *Beris*, *Xylomyia*, etc. The eggs are laid on plants at the margin of water or even on the surface of the water, and the larvæ are carnivorous or live on decaying vegetable matter in water or in the earth; the young larvæ resemble the old ones, and in many species the larvæ are capable of remarkable elongation, which has given them the name of "rat-tailed maggots," a name also used for the larvæ of some species of *Eristalina*. Further details are given under various genera, but my remarks are only compilations as I have no knowledge of the subject myself.

ARRANGEMENT:—The Palæartic species of *Stratiomyidæ* readily fall into about six subfamilies, of which the *Berina* and *Xylomyina* show a distinct tendency towards the *Leptidæ* in the more numerous visible segments of the elongate parallel-sided abdomen, in the more elongate cubital fork, and in the longer hexagonal discal cell; these two subfamilies may therefore be placed last (next to the *Leptidæ*), the *Xylomyina* being last of all because of the spurred tibiæ and especially because of the præfurca = (common stalk of the radial and cubital veins) originating long before the base of the discal cell, though the armed scutellum of *Cænomyia* in the *Leptidæ* might indicate some relationship to the *Berina*; of the remaining subfamilies the very distinct *Pachygastrina* are usually placed first, though the presence of only two veinlets emerging from the discal cell, the long portion of the upper branch of the postical vein which forms the lower boundary of the discal cell, and the short anal cell would seem to indicate relationship to the *Berina*; on the other hand, the long-bodied species of *Sargus* are more probably correctly placed next to the *Berina*, as is shown by the increasing cubital fork, etc.; between the *Pachygastrina* and the *Sargina* come the *Clitellarina* and *Stratiomyina*, which might well form only one subfamily as they are separated only by the weak character of the presence or absence of the small cross-vein. A sequence is thus arrived at from the small short-bodied unicolorous species of *Pachygaster* on to *Nemotelus nigrinus* and the rest of the *Clitellarina*, and thence through *Pynomalla* to the *Stratiomyina*, and through unicolorous *Odontomyia* to the short-bodied *Sargina* (*Microchrysa*, etc.), and thence through the long-bodied *Sargina* to the *Berina* and *Xylomyina*. Other affinities may exist in the bright metallic coloring of the *Sargina* and most of the *Berina*; in the short rounded third antennal joint and the long arista of *Pachygastrina* and *Sargina*, in the antennæ of the aberrant *Oxycera tenuicornis* and the *Berina*, etc., etc.

* I consider the word "hover" to indicate the apparently motionless poise in the air of an individual specimen while the wings are rapidly vibrating, but "dance" to indicate the rhythmical movement in the air of a small group of specimens.

Types of venation of the STRATIOMYIDÆ.

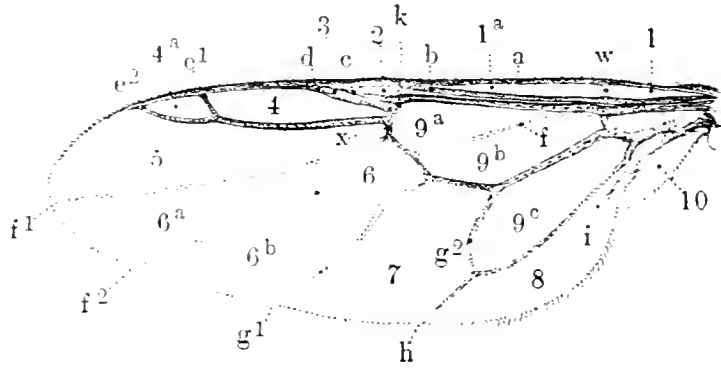


FIG. 77.—Pachygastrinae (*Pachygaster atra*).

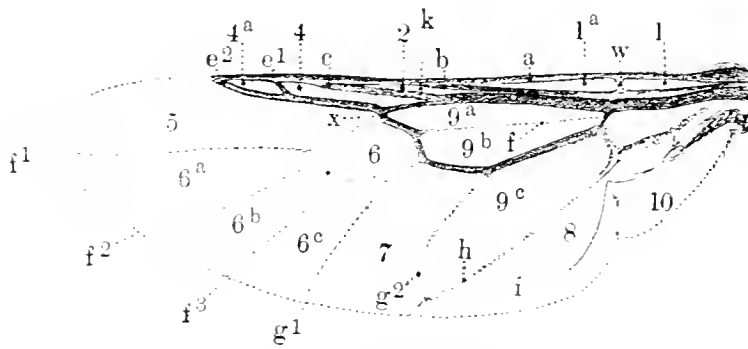


FIG. 78.—Clitellarinae (*Nemotilus uliginosus*).

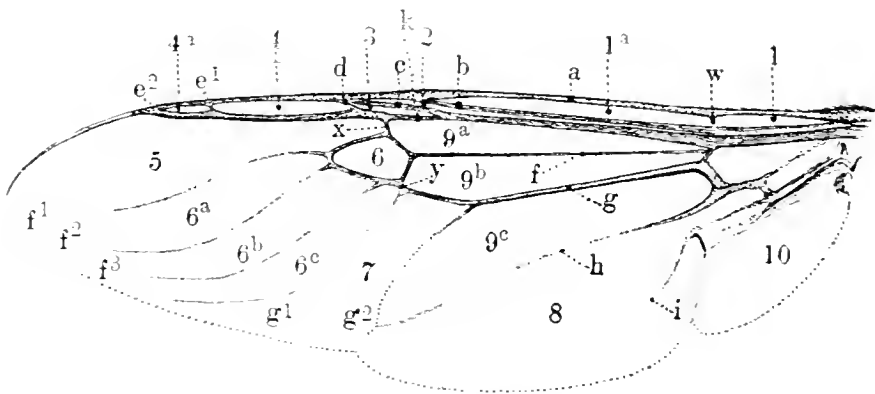


FIG. 79.—Stratiomyinae (*Stratiomys Jureata*).

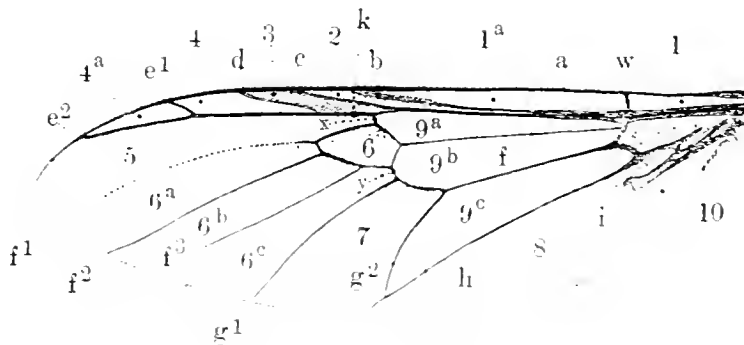


FIG. 80.—Sarginae (*Sargus tridatus*).

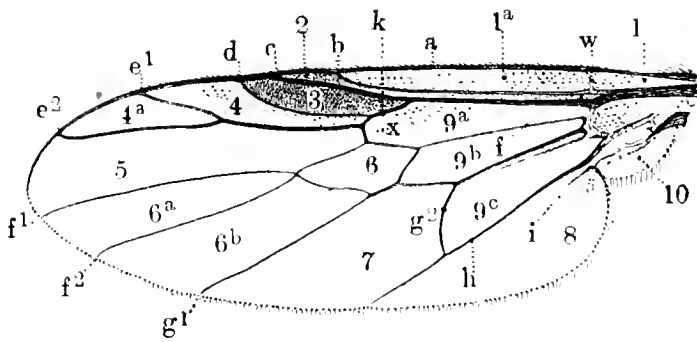


FIG. 81.—*Berina* (*Beris callata*).

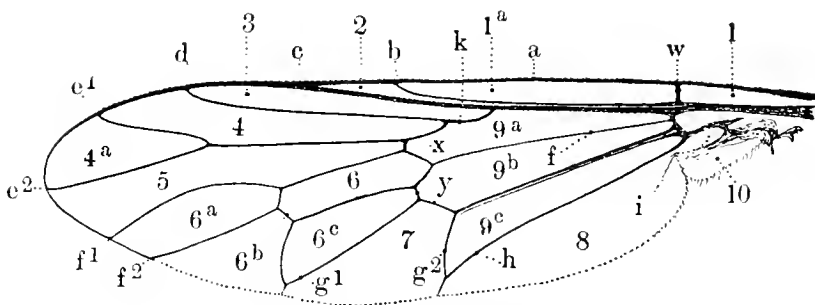


FIG. 82.—*Xylomyia* (*Xylomyia maculata*).

Longitudinal (or long) veins.

- a* Costa (or costal vein).
- b* Mediastinal (or auxiliary) vein.
- c* Subcostal (or 1st longitudinal) vein.
- d* Radial (or 2nd longitudinal) vein.
- e* Cubital (or 3rd longitudinal) vein.
 - e*¹ Upper branch } of the cubital fork.
 - e*² Lower branch }
- f* Discal (or 4th longitudinal) vein.
 - f*¹ Upper veinlet } from the discal cell.
 - f*² Second veinlet }
 - f*³ Third veinlet }
- g* Postical (or 5th longitudinal) vein.
 - g*¹ Upper branch of the postical fork (sometimes forming a part of the lower margin of the discal cell).
 - g*² Lower branch of the postical fork.
- h* Anal (or 6th longitudinal) vein.
- i* Axillary vein.
- k* Præfurca = the common stem of the radial and cubital veins.
 Ambient vein = the continuation of the costal veins round the hindmargin of the wing.

Cross (or transverse) veins.

- w* Humeral cross-vein.
- x* Discal (or middle) cross-vein.
- y* Lower (or small) cross-vein.
- Anal cross-vein = *g*² = the lower branch of the postical fork.

Cells.

- 1 Costal (*or mediastinal*) cell.
- 2 Subcostal cell.
- 3 Marginal cell.
- 4 Submarginal cell.
 - 4^a Second submarginal (*or cubital*) cell (*or cubital fork-cell*).
- 5 First posterior (*or subapical*) cell.
- 6 Discal cell.
- 6^a Second posterior cell.
- 6^b Third posterior cell.
- 6^c Fourth posterior cell.
- 7 Postical (*or 5th posterior*) cell (*or postical fork-cell*).
- 8 Axillary cell.
- 9^a Upper (*or 1st*) basal cell.
- 9^b Second (*or middle*) basal cell.
- 9^c Anal (*or 3rd basal*) cell.
- 10 Alula.

Notes on the Venation of the STRATIOMYIDÆ.

The most characteristic points in the venation of this family lie in (1) the præfurca and its origin; (2) the cubital vein and its fork; (3) the discal cell and the veinlets issuing from it; and (4) the postical vein and its fork. The last two of these include the small cross-vein.

(1) THE PRÆFURCA is the common base of the radial and cubital veins, and originates from the subcostal vein. In the *Stratiomyidæ* (except in the *Xylomyinæ*) it has the distinctive peculiarity of originating opposite the base of the discal cell, while in all the other families of the BRACHYCERA (with the exception of some *Cyrtidæ* and the concluding families) it originates very considerably before the base of the discal cell. In many points the *Xylomyinæ* exhibit characters indicating an affinity to the *Leptidæ*.

(2) THE CUBITAL VEIN forks from the radial vein at the end of the præfurca, and is the vein above the discal cell which is (except in the *Sarginæ*) connected to the discal cell by the discal cross-vein; in the *Sarginæ* this discal cross-vein connects the discal cell with the præfurca. The cubital vein is occasionally simple (figs. 84, 91), but is usually forked; the fork may be very short and inconspicuous (fig. 79), or may be long and conspicuous (fig. 82), but always originates after the end of the discal cell, and (except in the *Xylomyinæ*) both branches of the fork end in the costal vein before the tip of the wing.

(3) THE DISCAL CELL is always present, and is connected above by the DISCAL CROSS-VEIN with the cubital vein (except in the *Sarginæ* when it is connected with the præfurca), and usually below by the SMALL CROSS-VEIN with the upper branch of the postical vein, but sometimes the upper branch of the postical vein touches the discal cell (fig. 79) or even anastomoses for a more or less extent (fig. 77) with the under side of the discal cell, in which case the small cross-vein is absent. The discal cell is almost always pentagonal (except in the *Xylomyinæ*) and emits two or three veinlets (irrespective of the upper branch of the postical vein) towards the wing-margin, and the number of the posterior cells varies from four to five, according to the number of these veinlets; two of these veinlets issue from what may be called the end of the discal cell, and may occasionally appear to issue by a common stem, or on the other hand either of them may be more or less obsolete; the third veinlet may be entirely missing (fig. 77), or may be abortive (figs. 151, 152), or may be complete, or may (in the *Xylomyinæ*) unite near the wingmargin with the upper branch of the postical vein (fig. 82).

(4) THE POSTICAL VEIN is always a strong vein on the hind part of the wing which invariably splits into two long branches. The upper branch is usually connected with the discal cell by the small cross-vein, but sometimes it touches the discal cell (in which case the small cross-vein is absent), and sometimes it forms for a greater or less distance the lower margin of the discal cell. The lower branch almost

invariably connects at or near the wingmargin with the anal vein and thereby causes a closed anal cell, and in the *Pachygastrinæ* and *Berinae* it curves down sharply and connects with the anal vein far before the wingmargin. The absence of an ambient vein, by which term is meant a thin vein continued after the end of the lower branch of the cubital fork all round the wingmargin to the alula is a peculiarity in the venation of the *Stratiomyidæ*; in the *Berinae* this vein is present for a short distance, and in the *Xylomyinæ* it extends to the end of the second veinlet from the discal cell, but in the allied *Xylophaginae* it is complete though faint. The crowding of the strong veins together near the costa with a corresponding faintness of the posterior veins is characteristic of the more typical subfamilies, and altogether the venation of the *Stratiomyidæ* (with the exception of the *Xylomyinæ*) should enable them to be at once distinguished from any other family of the Diptera.

* * I am unable to agree with Girschner's study of the venation of the NOTACANTHA, Ann. Mus. Hung. iv. 279, V. (1906), in which he is of opinion that the vein which I call the upper branch of the cubital fork is in reality a lower branch of a radial fork, and that the radial vein has been anastomosed with the cubital along what I call the stem of the cubital fork; Girschner has arrived at this opinion through a study of the convex and concave veins, but I think he has overestimated their value, as his fig. 5 (*Sargus*) would make the præfurca a basal portion of the cubital vein, while in all his other figures it would be the basal portion of the radial vein. Also I cannot agree with him that the ordinary radial vein is missing in *Nemotelus*; I am of opinion that it simply runs along very close to the subcostal vein.

Short Table of British Subfamilies of STRATIOMYIDÆ.

- 1 (8) Abdomen with only five or six obvious segments.
- 2 (5) Small cross-vein absent.
- 3 (4) Discal cell emitting only two veinlets (fig. 77) irrespective of the upper branch of the postical vein. PACHYGASTRINÆ.
- 4 (3) Discal cell emitting three veinlets (fig. 78) irrespective of the upper branch of the postical vein. CLITELLARINÆ.
- 5 (2) Small cross-vein present.
- 6 (7) Antennæ without any terminal style or arista, or at the utmost with a short one. STRATIOMYINÆ.
- 7 (6) Antennæ with a long thin terminal arista. *Discal cross-vein connecting the discal cell with the præfurca.* SARGINÆ.
- 8 (1) Abdomen with at least seven obvious segments.
- 9 (10) Præfurca commencing opposite the base of the discal cell; fourth posterior cell wide open. BERINÆ.
- 10 (9) Præfurca commencing far before the base of the discal cell; fourth posterior cell closed. XYLOMYINÆ.

The *Clitellarinæ* and *Stratiomyinæ* are perhaps unnaturally separated, as the presence or absence of the small cross-vein is sometimes a debatable point.

Table of British Subfamilies of STRATIOMYIDÆ.

- 1 (8) Abdomen with only five or six obvious segments (figs. 85, 87, etc). Cubital vein often not forked or with only a small indistinct very short fork (fig. 83). Tibiæ never spurred.
Species (except in some *Sarginae*) with a broad short ovate abdomen. Flagellum with not more than six annulations.
- 2 (5) Small cross-vein absent (fig. 83), because the upper branch of the postical vein forms a portion of the lower margin of the discal cell.

- 3 (4) Discal cell emitting only two veinlets (fig. 83) towards the wing-margin irrespective of the upper branch of the postical vein.

PACHYGASTRINÆ (p. 64).

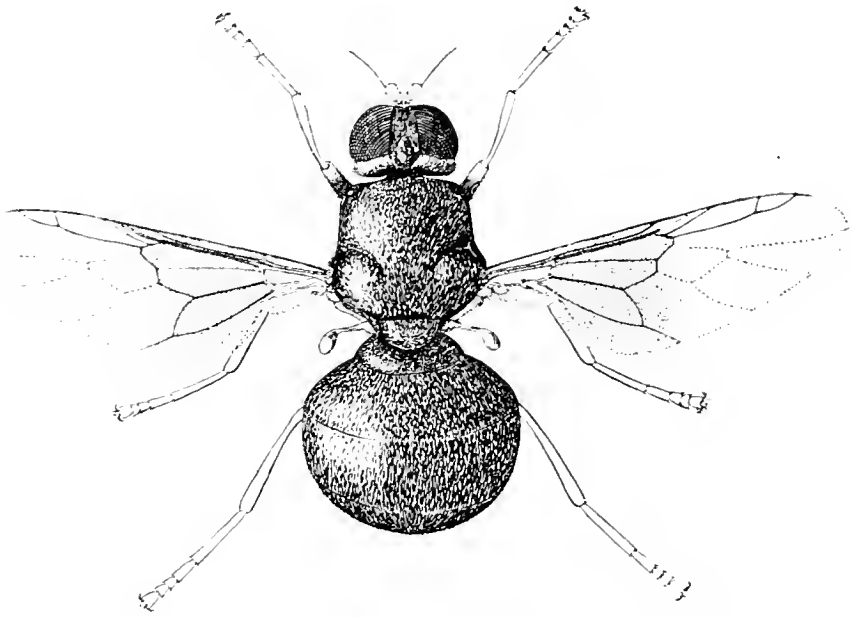


FIG. 83.—*Pachygaster atra* ♀. × 12.

Small black flies with a peculiar venation, because the discal cell is large and apparently pentagonal and has its lower side formed for a long space by the upper branch of the postical vein, so that if any species of *Clitellarinæ* (or even of the other subfamilies) have the veinlets issuing from the discal cell obsolete, they can as a rule be at once known by the short portion of the postical vein which forms the bottom of the discal cell. Abdomen short and squat. Antennæ with a globular third joint, which has a long subterminal arista (fig. 83). Scutellum unarmed.

- 4 (3) Discal cell emitting three veinlets (fig. 84) towards the wing-margin irrespective of the upper branch of the postical vein.

CLITELLARINÆ (p. 80).

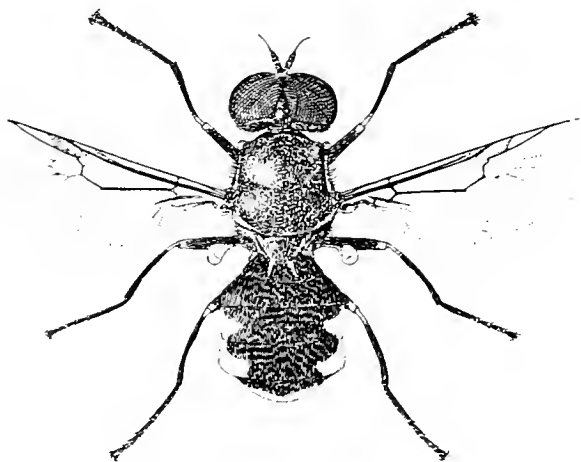


FIG. 84.—*Oxycera nigripes* ♂. × 8.

Small black flies, which sometimes have conspicuous white markings on the abdomen (*Nemotelus*), or which have handsome yellow or

green markings (*Oryzera*), or large flies with conspicuous reddish coloring (*Ephippium*). Antennæ at the utmost with only a short terminal style. Scutellum usually with a pair of marginal spines.

The *Clitellarinae* hardly form a subfamily distinct from the *Stratiomyinae*, but I have followed Brauer in separating them.

- 5 (2) Small cross-vein present (fig. 85), and consequently the upper branch of the postical vein never quite touching the discal cell.
- 6 (7) Antennæ without any terminal style or arista, or at the utmost with a short one. Discal cross-vein as usual connecting the discal cell with the stem of the cubital vein.

STRATIOMYINÆ (p. 127).

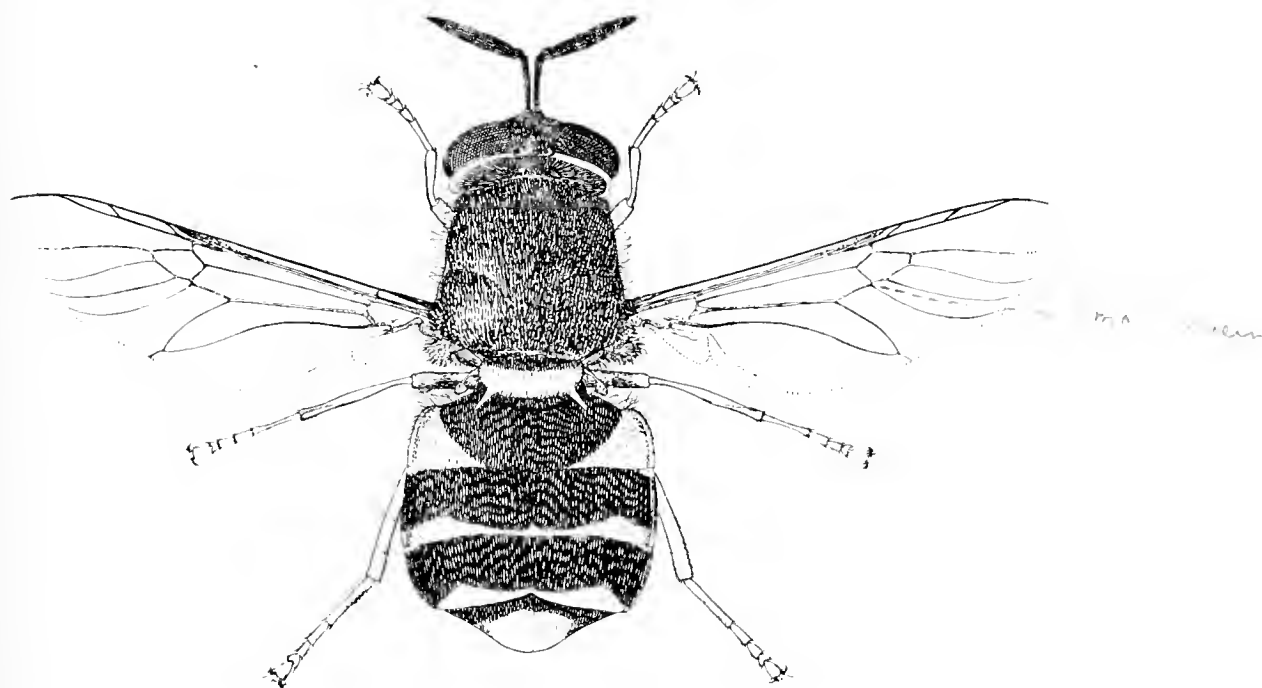


FIG. 85.—*Stratiomys potamida* ♀. × 4.

Large or moderately large flies, colored black, or black and yellow, or black and green. Discal cell small; anterior veins crowded together, but the exterior and posterior veins faint and often incomplete. Abdomen broad and flattened. Scutellum (practically) always with a pair of marginal spines. Antennæ with a long annulated third joint.



FIG. 86.—*Sargus iridatus* ♀.
× 30.

- 7 (6) Antennæ with a long thin subapical arista (fig. 86). *Discal cross-*

vein connecting the discal cell with the praefurca and hence the radial vein apparently twice forked (fig. 87).

SARGINE (p. 162).

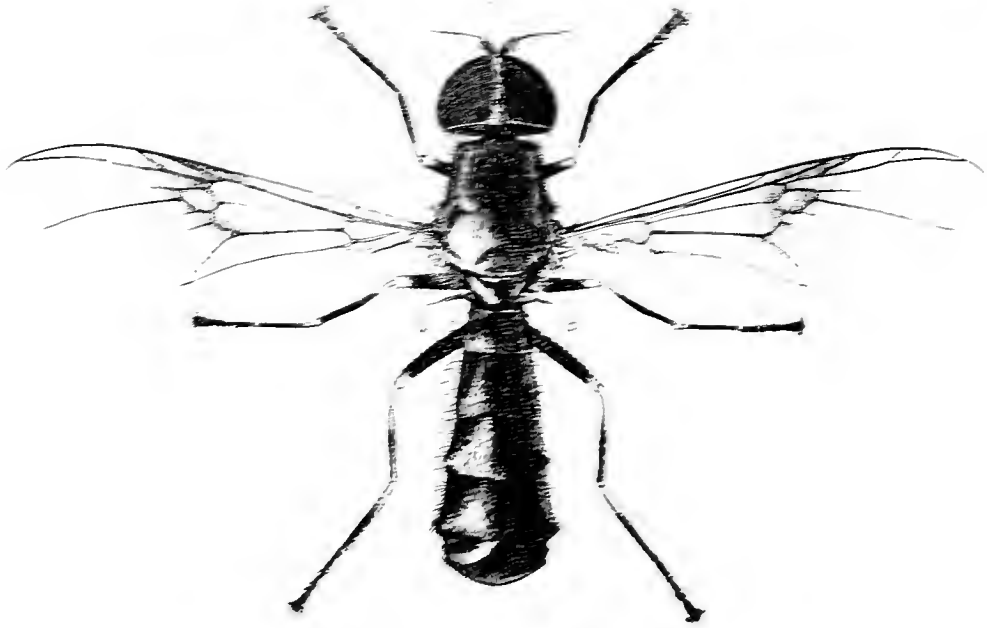


Fig. 87—*Eremochletoidea* sp. n.

All the British species are brilliantly shining green in colour, and most of them (*Sargis*, etc.) have an elongate rather narrow abdomen. Scutellum always unarmed.

- 8 (1) Abdomen with at least seven obvious segments (figs. 88, 89). Cubital vein almost always with a long conspicuous fork (fig. 89). Tibiæ (at least the middle pair) often spurred.

Moderately small to moderately large flies. Abdomen long and almost parallel-sided but never brilliantly green. Antennæ with an elongate normally 3-articulated third joint which may have a very short style.

- 9 (10) Praefurca (= common stem of the radial and cubital veins) commencing almost opposite the base of the discal cell; fourth posterior cell (or its equivalent) wide open (fig. 88); discal cell emitting only two veinlets to the wingmargin or sometimes an abortive third; anal cell closed a considerable distance before the wingmargin. Tibiæ without spurs in all the British species. Costal vein ceasing abruptly just after the tip of the lower branch of the cubital vein; scutellum with four or more marginal spines. BERINÉ (p. 196).

Moderately small species of oblong shape, easily recognised by their venation and by their many-spined scutellum. Thorax without any yellow markings even between the humeri and the wing-bases.

- 10 (9) Praefurca commencing far before the base of the discal cell; fourth posterior cell closed (fig. 89) because the third veinlet from the discal cell joins the upper branch of the postical vein before the wingmargin; discal cell emitting three veinlets;

anal cell extended almost to the wingmargin. Costal vein continued faintly as an ambient vein beyond the tip of the first veinlet from the discal cell. Posterior tibiæ spurred. Scutellum unarmed.

XYLOMYIÆ (p. 217).

Moderately small or moderately large species, which closely resemble the *Xylophaginar*, but which are distinguished from all the other *Stratiomyidæ* by the præfurca commencing far before the base of the discal cell, and from all the Palearctic EREMOCHELETA by the closed fourth posterior cell.

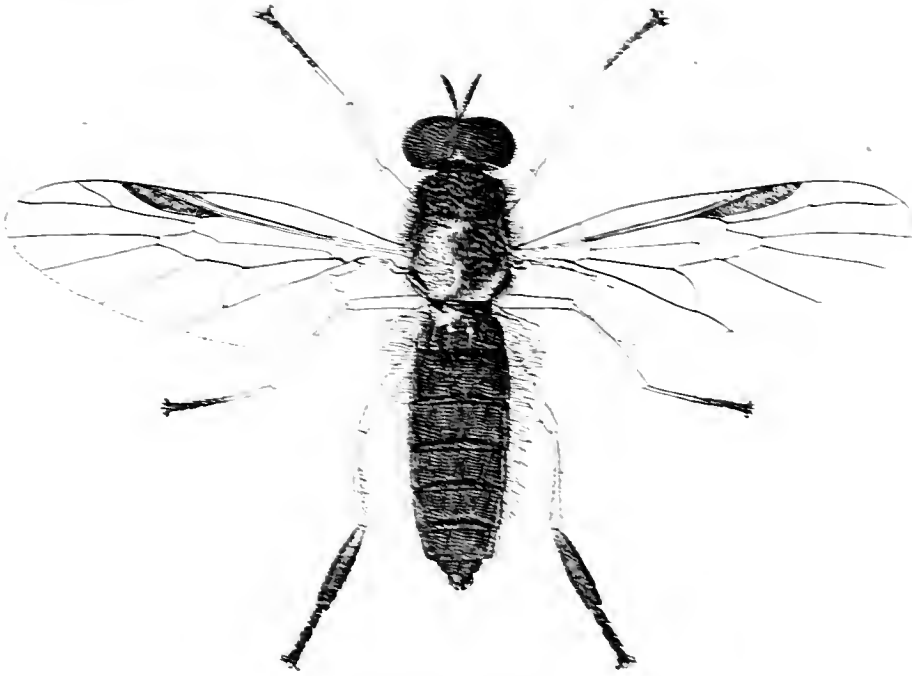


FIG. 78.—*Stratiomya* sp. ♂.

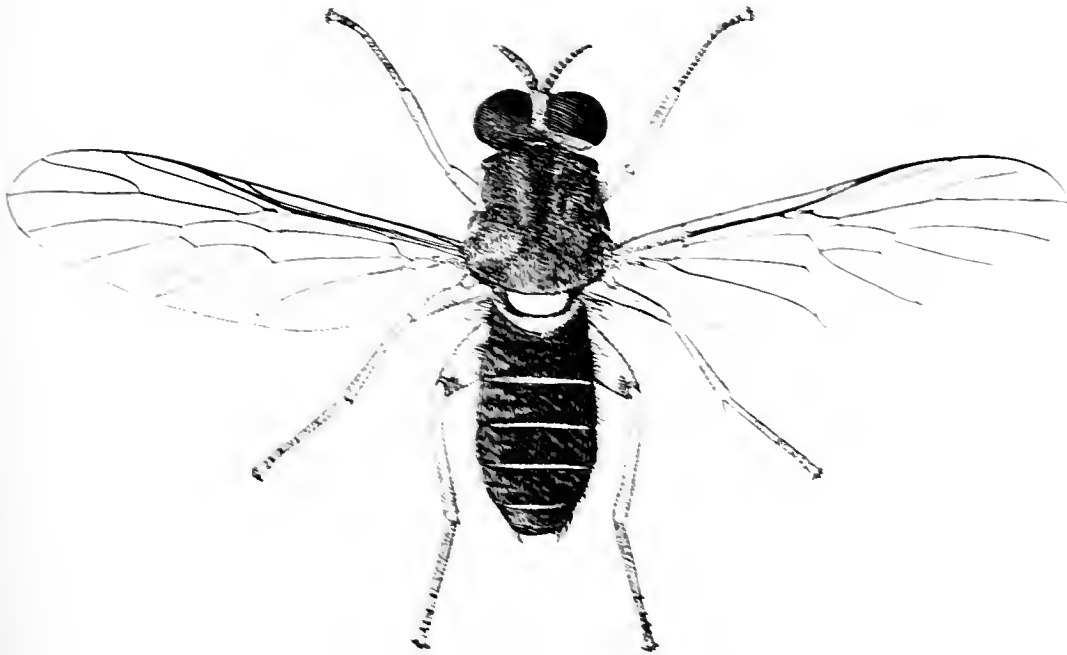
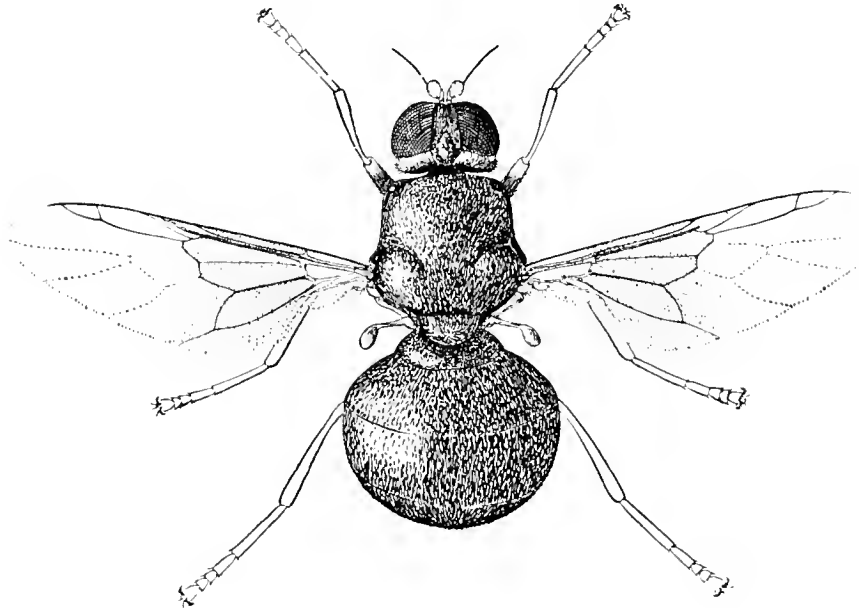


FIG. 80.—*Xylomyia marginata* ♂.

PACHYGASTRINÆ.

FIG. 90.—*Pachygaster atra* ♀. × 12.

Abdomen with only five or six obvious segments. Venation with the lower cross-vein absent, so that the upper branch of the postical vein forms for a long distance the lower margin of the discal cell; discal cell emitting only two veinlets irrespective of the upper branch of the postical vein; cubital fork short or absent. Tibiæ without any spurs.

Eyes bare (unless in *Artemita*, a South American genus). Antennæ with the third joint annulated and globular in the European genus, and with a long subterminal arista.

Thorax subquadrate. Scutellum unarmed in *Pachygaster*, but armed in some exotic genera.

Abdomen broad and rounded in *Pachygaster*.

Legs rather short; tibiæ without any spurs.

Wings with only two veinlets issuing from the discal cell besides the upper branch of the postical vein, because the small cross-vein is absent and the upper branch of the postical vein forms part of the discal cell for a considerable distance. Four posterior cells, all of which are widely open; anal cell closed long before the wingmargin. Wing-membrane in *Pachygaster* not rippled but minutely and densely pubescent. Alula distinct but not much developed. Alar squamæ very little developed; thoracal pair absent. Halteres with a rather large knob.

The essential characters of the *Pachygastrinæ* lie in the small number of abdominal segments, whereby they are distinguished from the *Berinae* and *Xylomyiinae*; in the two veinlets only from the discal cell (irrespective of the upper branch of the postical vein), whereby they are distinguished from all except some *Berinae* and some *Stratiomyinae*; and in the total absence of the lower cross-vein, whereby they are distinguished from the *Sarginae* and *Stratiomyinae*; beyond these characters *Pachygaster* is distinguished from all except the *Sarginae* by the long subterminal arista.

The *Pachygastrinæ* comprise about twenty genera from nearly all parts

of the world, but only one genus (*Pachygaster*) is known in Europe and North America. The metamorphoses of many species of *Pachygaster* are well known and are mentioned under each species; the larvæ live in débris under the bark of decaying trees, where they probably feed on the frass of wood-boring Coleoptera. The perfect insects are very sluggish, but may occasionally be found flying in large numbers.

One European genus.

1. PACHYGASTER.

1. PACHYGASTER.

Pachygaster Meigen, Illig. Mag., ii., 266 (1803).

Small squat almost bare flies, with a short ovate abdomen. More or less shining black, but with the tibiæ and tarsi always mainly pale yellow.

Head flattened beneath, and consequently short and flat when viewed from in front. Proboscis short and partly withdrawn, but with fairly large sucker-flaps; palpi small and inconspicuous. Eyes practically bare, usually touching on the frons in the male (but not in *P. orbitalis*) but widely separated in the female, very large in both sexes. Antennæ short, placed just below the middle of the head when seen in profile; third joint enlarged, orbicular, with four slight annulations and a long subterminal arista; arista usually bearing a very short dense pubescence which has the effect of making it appear thickened except at the extreme tip.

Thorax proportionately long, slightly broadened behind, arched, and with a deep transverse suture which is V-shaped at the middle, while outside and behind the V the disc of the thorax is inflated. Pubescence on the disc short and rather inconspicuous even though dense. Scutellum long and rather triangular, with a shallow transverse channel before its tip, and without any marginal spines, but extending far beyond the mesonotum.

Abdomen very short, broader than long and broader than the thorax, ovate and strongly arched, with five obvious segments. Genitalia narrow and usually concealed.

Legs simple; femora longer than the tibiæ; basal joint of all the tarsi nearly as long as the other four joints together. Pubescence very slight.

Wings (figs. 91, 94) with a venation rather like that of *Beris*, but the cubital vein is much shorter and the apparently pentagonal discal cell rests for a much longer space (in fact for about half its length) on the upper branch of the postical vein; discal cell emitting only two veinlets to the margin from its upper part, because the lower (apparently third) veinlet is really a continuation of the upper branch of the postical vein while the normal third veinlet is absolutely missing; cubital vein usually distinctly forked (but not in *P. minutissima*, fig. 91); discal vein very faint or even imperceptible on its basal part up to the beginning of the discal cell, and its primary upward and downward fork forms an almost flat base to the discal cell; lower branch of the postical vein united to the anal vein well before the wing-margin, and thereby causing the anal cell to be closed and with a long pedicel.

This genus is the only one of the subfamily which is known to occur in Europe, and is well distinguished from all others (if *Neopachygaster* be considered a synonym) by its antennæ being placed at about (or but little below) the middle of the head when viewed in profile, and by its short orbicular third antennal joint which bears an almost (though not quite) apical long thin almost bare arista, and by its unarmed scutellum.

Pachygaster is recorded from almost all Europe (but not by Bousdorff from Finland), North America, and Asia (including New Guinea), and according to Austen is represented in the British Museum by a specimen

from Hobart, Tasmania. Macquart's *P. rufitarsis* from Pondicherry does not (according to his figure of it) belong to this subfamily, but more likely to the *Sarginae*. Only five well-distinguished species are known to occur in Europe, all of which are now recorded from Britain, Scandinavia, and Germany. The metamorphoses are unusually well known as all the species have been bred, and in fact some of the species are much more easily found as larvæ or pupæ than as imagines. The larvæ have been found in the rotten part of decaying trees and possibly feed on the decayed wood, but more probably on the detritus and frass caused by wood-boring Coleoptera. Notes upon this subject are given under each species and especially under *P. orbitalis*, and attention is drawn to the frequency of each species affecting its own particular kind of tree, or possibly the Coleoptera which affect particular kinds of trees. Perris considered the larvæ to be closely allied to those of *Sargus*, while Austen has considered them allied to *Beris*. In the perfect insects the venation is very similar to that of *Beris*, while the antennæ are allied to those of the *Sarginae*, and more especially to those of the genus *Microchrysa*.

Synonymy.—*Pachygaster* has been a well-recognised homogeneous genus for nearly a century, but in 1901 Austen proposed a new genus *Neopachygaster* for a species which he called *N. meromelana* Perris, but which I recognise as *P. orbitalis* Wahlberg; the only distinctive characters given by him are the separated eyes in both sexes, and the posterior orbits not produced into a prominent ridge in either sex, but I can only consider these characters as of specific value, especially as Austen suggests that *P. Leachii* might possibly be separated generically from *P. atra*, and Dr Sharp hints at another genus for *P. minutissima*, which would leave only *P. atra* and *P. tarsalis* in true *Pachygaster*, and as these two species differ remarkably in the shape of the head and eyes we should soon have a genus for each species. Aldrich (Cat. N. Amer. Dipt. 192) has indicated a North American species which would apparently agree with *Neopachygaster*. The type of the genus must be *P. atra* Panzer, and Meigen claimed priority for the name *Pachygaster* (1803) over *Vappo* Latreille (1804).

Table of Species.

- | | | |
|---|--|------------------------|
| 1 | (2) Cubital vein not forked (fig. 91). | 1 <i>minutissima</i> . |
| 2 | (1) Cubital vein forked (fig. 94). | |
| 3 | (6) Wings with the basal half blackish when contrasted with the apical half. | |
| 4 | (5) Antennæ dull black in the male, bright ochre in the female.
<i>Scutellum short, rim rounded.</i> | 2 <i>atra</i> . |
| 5 | (4) Antennæ reddish at the base, but with the third joint darkened in both sexes. <i>Scutellum longer, sharp rim</i> | 3 <i>tarsalis</i> . |
| 6 | (3) Wings entirely hyaline. | |
| 7 | (8) Femora black except at the extreme tip. | 4 <i>orbitalis</i> . |
| 8 | (7) Femora yellow except for a blackish ring near the tip of the hind pair. | 5 <i>Leachii</i> . |

1. **P. minutissima** Zetterstedt. Cubital vein not forked, but strongly up-curved so that it ends near the radial vein.

The smallest European species of the genus; easily distinguished by the absence of any fork to the short up-curved

cubital vein, and by its clear wings, black femora, and touching eyes of the male.

♂. Head broad and flattened, being nearly twice as wide as deep when viewed from in front, and a little longer than deep in profile; face and frons shining black and small, unless seen from below; frons with a deep longitudinal channel; face with short pale grey pubescence near the eyes and with broad side-cheeks; jowls broad but shallow, shining black, and clothed with rather abundant dark brownish pubescence which becomes longer and is whitish grey behind the mouth opening; the jowls pass on to the distinctly inflated lower part of the back of the head; upper half of the back of the head not in the least inflated, but on the contrary rather sunken and with no apparent pubescence; vertex bare, shining black, long and narrow, extending fully half way from the occiput to the antennæ, and leaving the eyes touching for a long space (eight or ten facets) almost down to the antennæ; ocelli slightly raised, but the ocellar triangle practically bare. Eyes in profile very short ovate, being rather longer than deep and with a slight angle between the jowls and the beginning of the back of the head; facets on the lower two-fifths smaller than those on the upper three-fifths, and with the straight dividing line rather sharply defined; in dry specimens the large facets are usually light brown and the small facets more or less black brown except against the margin of the eye. Antennæ dull brownish black, placed below the most forward part of the head; arista shorter and less thin than in *P. atra*.

Thorax shining black, but a little dulled by the dense minute punctuation and the very minute adpressed grey pubescence; pleuræ more shining because they are less punctate, and the sternopleuræ with more obvious light grey pubescence; prothorax with almost a tuft of minute whitish grey pubescence. Scutellum similar to the hind part of the thorax, rather elongate, and with a transverse channel well before the tip.

Abdomen short ovate, being broader than long and considerably broader than the thorax, brightly shining black, sparsely punctate, and with inconspicuous though not scarce rather erect but very short dark grey pubescence, which becomes rather longer about the basal corners. Belly shining black, with rather sparse adpressed minute but fairly conspicuous whitish grey pubescence. Genitalia small, protruding from the middle of the hind margin of the fifth segment, and consisting of two narrow small blackish brown lamellæ and a shorter stouter middle piece which is reddish brown on the middle of its base.

Legs dull luteous; coxæ, trochanters, and femora blackish brown, except at the extreme tip of the femora; hind tibiæ rather browned, and the tips of the four last joints of the anterior, and the three last joints of the hind, tarsi slightly darkened above. Pubescence very slight, but there is a slight pale fringe behind the front femora, and a more distinct darker fringe behind the middle femora; hind femora almost bare.

Wings almost hyaline, but with the subcostal cell and the stigma opaque pale greyish yellow; cubital vein short and up-curved, without any sign of a fork (fig. 91); subsequent veins very pellucid. Squamæ blackish brown, with

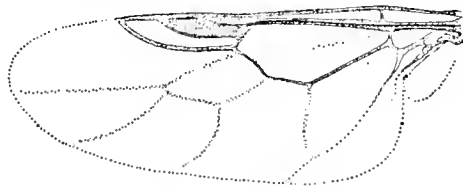


FIG. 91.—*Pachygaster minutissima* ♂. × 20.

dark grey fringes. Halteres blackish or brownish, with the upper part of the large knob usually brownish yellow or sometimes even dirty whitish.

♀. Very much like the male. Frons bare, shining black and broad, being nearly half the width of the head at the top and more than one-third its width at its narrowest part which is just above the antennæ; down the middle there

is a distinct furrow. Face rather inflated, with the pubescence so short that it appears to be bare; jowls broad, shining black, and bearing much shorter pubescence than in the male; lower part of the back of the head considerably inflated and bearing minute pale grey pubescence, while the upper half is less inflated and is shining black and bare. Eyes in life with a beautiful purple streak across the middle. Antennæ dull orange, third joint large and conspicuous; arista tinged with orange, and as in the male short and not thin.

Thorax and scutellum shining black as in the male, with sometimes the points of the humeri and the postalar calli chestnut.

Abdomen shining black as in the male, but with no longer pubescence about the basal corners and no projecting genitalia.

Legs as in the male, but with scarcely any pubescence on the femora, and with no darkening at the tips of the tarsal joints; trochanters brownish.

Wings with the anterior veins brownish yellow up to the end of the cubital vein. Squamæ much paler than in the male, with smoky margins and pale fringes. Halteres dull brownish-yellow, with the knob whitish.

Length about 2.75 mm.

This species varies a little, and in the only English specimen of the male I have seen the head is in profile quite as deep as long, and when seen in front not twice as wide as deep; I have, however, seen continental specimens almost the same. The var. *unicolor* of the female is very pronounced, as the antennæ are almost blackish brown instead of conspicuous orange, and the only two specimens I have seen (which probably came from Jaenicke) are slightly smaller. The English specimen of the male has the knob of the halteres brownish yellow on the top. A variety of *P. tarsalis*, mentioned under that species, in which the fork of the cubital vein is practically absent, disposes of Dr Sharp's suggestion that a new genus should be formed for *P. minutissima*.

P. minutissima was first known as British from a male, which was taken by Mr C. G. Lamb at Horrington, near Wells in Somersetshire, in July 1902, and recorded by Dr D. Sharp in the Entom. Mon. Mag., 1903, p. 221, and since then a number of specimens have been bred by Dr Sharp and Mr C. G. Lamb from larvæ found under the bark of fir trees (*Pinus sylvestris*) at Craigmore, near Nethy Bridge in Inverness, in July 1906; the majority of the larvæ however like Perris' specimens waited for emergence until the spring of 1907. My description is mainly made from two males given me by Mik from Lower Austria and from a female taken at Asch in Bohemia; I have however closely compared English specimens, and also several specimens in Bigot's collection which were labelled *pini*, *tenellus*, and *unicolor*. It is recorded from Scandinavia, France, Germany, and Austria, and is associated with *Abies* or *Pinus*. Perris (Annales Soc. Entom. France, 1870, p. 210) found the larvæ on *Pinus maritimus* "souvent en sociétés très-nombreuses, sous les écorces des pins labourées par les larves des *Tomieus* et des *Hylurgus*, parmi les détritits et les excréments laissés par ces larves, et dont elles se nourrissent"; he further stated that their growth is slow, being not less than ten months, as the eggs are laid in June or July in the channels of *Tomieus*, and do not hatch until April or May in the following year; he gave a detailed description of the larva, pupa, and perfect insect, accompanied by ten figures.

Synonymy.—I see no reason to consider, as Jaenicke suggested, that Zetterstedt had any admixture of another species under his name of *P. minutissimus*, and consequently Jaenicke's *P. tenellus* becomes a simple synonym, and even his var. *unicolor* had been previously observed by Zetterstedt (Dipt. Scand., xi., p. 4261). Perris' *P.*

pini is also a synonym, as Mik has already observed, and I can to a large extent confirm this from three specimens in Bigot's collection which he probably obtained from Perris, and which, though in very bad condition, I consider only *P. minutissima*.

2. *P. atra* Meigen. Wings conspicuously blackened on the basal half. Antennæ black in the male, orange in the female. Back of the head considerably inflated.

Easily known by the diagnostic characters, though allied to *P. tarsalis* (figs. 83, 90).

♂. Head when viewed in profile longer than deep, and when viewed from in front more than one and a half times broader than deep (fig. 92). Face and frons when viewed from in front well below the middle of the head and forming a small black triangle, but as the head is so much flattened the face is fairly large when seen from beneath; the face bears moderate blackish pubescence, and in certain lights there is a very narrow pale eyemargin which bears very short pale pubescence; the flattened lower part of the head causes the jowls to be shallow, but the lower part of the back of the head is very considerably inflated and bears inconspicuous though dense short blackish pubescence,

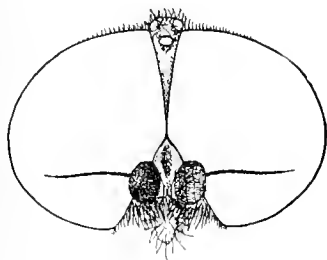


FIG. 92.—*Pachygaster atra* ♂. × 33.

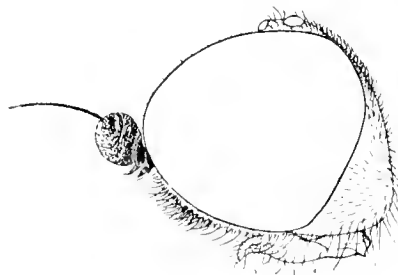


FIG. 93.—*Pachygaster atra* ♂. × 33.

while the upper part of the back of the head is shining black, and is inflated and bearing very short dense black postocular pubescence (fig. 93); vertex long, narrow, and pointed, extending considerably more than half way from the occiput to the antennæ, and in fact leaving the eyes touching for about only four facets; ocellar triangle with some very tiny inconspicuous blackish pubescence. Eyes irregularly circular when viewed sideways, not absolutely bare but with very slight inconspicuous short hairs; facets without any distinct difference in size or colour in dry specimens. Antennæ dull blackish; two basal joints with some black bristles beneath and at their tips; arista long and thin, in some lights almost whitish, but the very minute dense pubescence makes it appear a little thickened except at the tip.

Thorax shining black, but dulled by the very dense coarse punctuation and the very dense short blackish pubescence; the pubescence is however very much longer, more erect, and denser than in *P. Leachii*, and in certain lights is slightly greyish; pleuræ more bare than the disc of the thorax and more shining because less punctate, especially on all the impunctate brilliantly polished middle part of the mesopleuræ. Scutellum resembling the hinder part of the thorax in colour and pubescence.

Abdomen shining black, but dulled by the very dense punctuation, and every puncture bears a tiny blackish grey bristle; about the sides of the base there are some longer finer almost black hairs. Belly shining black, with short depressed scattered pale grey pubescence. Genitalia exerted from about the middle sixth of the last abdominal segment, dull orange.

Legs rather pale yellow even to the last joint of the tarsi, but the femora all black except at the extreme tip; tibiae (especially the hind pair) with a darkened ring soon after the base; coxæ blackish; trochanters brownish; pubescence very slight, but a little exists on all the femora; claws blackish.

Wings (fig. 94) with a blackish tinge on almost the basal half, reaching up to the end of the two large basal cells and still further into the postical fork cell; in some lights the blackish part contrasts very strongly with the yellowish or hyaline outer part, the part of the costa immediately after the darkened part being yellowish; veins strongly marked and blackish on the blackened part, yellowish on the radial and cubital, and faint but distinct on the hyaline part; cubital vein very distinctly forked just after the middle of the costal portion of the submarginal cell. Squamæ small, blackish with blacker margins and fairly long blackish fringes. Halteres blackish, rather shining.



FIG. 94.—*Pachygaster atra* ♀. × 13.

♀. Frons and face shining black; eyes separated at the top by about one-third the width of the head and gradually approximating until near the antennæ, where they are separated by about one-fourth the width of the head, after which they gradually diverge again down to the mouth; pubescence on the frons light grey and so minute as to be hardly visible, but obvious fairly dense and greyish black on the flat face; back of the head shining black, puffed out on the lower part to almost half the width of the eyes, and even on the upper part widely and conspicuously inflated, and all bearing a slight greyish pubescence. Antennæ all dull orange; arista long, pale yellowish.

Thorax and scutellum almost as in the male, but bearing only short decumbent grey pubescence, which is however longer and greyer than in *P. Leachii*.

Abdomen as in the male, but with short universal decumbent grey pubescence; ovipositor (when exerted) long and narrow, orange.

Legs as in the male.

Wings with the blackish basal half more contrasted against the subsequent pale part with its yellow anterior veins.

Length about 3.5 mm.

This species is easily distinguished from all the others, except *P. tarsalis*, by the blackish tinge on the basal half of the wing, while from *P. tarsalis* it may be known by its differently colored antennæ and its much more inflated back of the head. *P. tarsalis* is also a larger stouter insect, and has the blackened basal part of the wing usually less pronounced, and has a pair of slightly silvery shimmering spots on the frons in both sexes, though most distinct in the female; those female specimens of *P. tarsalis* which have orange antennæ may be distinguished by the larger size of the antennæ, besides other characters.

P. atra is the commonest species of the genus, but yet is by no means common. I once found the female occurring in numbers on the windows of the hotel near Weybridge Station, and on July 8, 1904, the males were swarming by hundreds about two bushes out on the open part of Chippenham Fen, when four females were also obtained but probably through sweeping the bushes; Mr C. Morley once found it abundant on bracken (*Pteris aquilina*) at Foxhall in Suffolk. I am inclined to think that the life of the male is a very short one. My records are not so numerous as I expect they ought to be, as I have notes from only Devonshire, Dorset, Kent, Middlesex, Suffolk, Cambridgeshire, Hereford, Glamorgan, and Haddington, from May 19 to July 27. It is recorded from extreme

North Europe to the Adriatic, and probably occurs over all Europe. The metamorphoses are well known, and I quote from Macquart (Dipt. du Nord de la France, 1826), "Ces larves, dit M. Carcel dans sa lettre d'envoi, se trouvent dans le *detritus* du bois d'orme. Tant qu'elles prennent de la nourriture, elles se tiennent dans la partie basse et humide. Je suis sûr qu'elles ont besoin de plus d'une année pour leur développement; mais je ne sais si ce terme va au-delà de deux ans, ce que je présume. Près de se transformer, la Larve s'élève vers la surface, y reste immobile, sans changer de peau, et passe à l'état de nymphe. Sa dépouille sert de coque à celle-ci sans changer de figure. Si on l'ouvre on trouve cette nymphe sous la forme de l'insecte parfait, mais ayant toutes ses parties enveloppées d'une mince pellicule, et n'occupant qu'une partie de son domicile. Enfin la dernière transformation s'opère."

Besides being bred from the detritus of the Elm (*Ulmus*), it is said to have been bred from *Populus alba* and *Pinus sylvestris*, but I do not feel full confidence as to the larvæ on these being those of *P. atra*, as they may possibly have belonged to one of the other species. Also from what we know of *P. minutissima* (*P. pini* Perris) it is very probable that the "*detritus*" may be the frass of wood-boring *Coleoptera*; though the metamorphoses of *P. orbitalis*, as proved by Dr D. Sharp's researches, are made in the sodden-wet rotten wood of Holly (*Ilex*).

3. *P. tarsalis* Zetterstedt. Wings rather blackened on the basal half. Antennæ brownish in both sexes, or sometimes orange in the female. Back of the head but little inflated.

The largest and stoutest European species.

♂. Head about as long as deep when viewed in profile (fig 95). Face and frons forming a small rather shining black triangle; frons with a deep middle channel, and the two consequent raised sides with a slight silvery shimmer caused by minute closely adpressed pubescence; face with very short and very inconspicuous even though dense pubescence; jowls extremely narrow; back of the head a little inflated on the lower third and bearing rather short blackish pubescence there, but hollowed rather than inflated on the upper part (fig. 95) and apparently bare; vertex shining black, long and narrow, extending about half way towards the antennæ and leaving the eyes touching for about ten facets; proboscis brownish yellow. Eyes practically bare; facets on the larger upper part of the disc larger than those near where the eyes touch, and distinctly larger than those on the lower part. Antennæ dull brownish, rather yellowish brown on the two basal joints, but usually more or less darkened or even blackened at the tip of the third joint; basal joints with only minute pale bristles beneath; arista yellowish, long, and thin except at the base.

Thorax and scutellum moderately shining black, but rather dulled by the dense and coarse punctuation; pubescence dense but most exceedingly minute and depressed backwards; mesopleuræ polished purplish black on their middle. Scutellum long, and with a distinct transverse furrow before the tip.

Abdomen shining black, but a little dulled by the very dense rather coarse punctuation, while from every puncture a tiny short black or grey decumbent

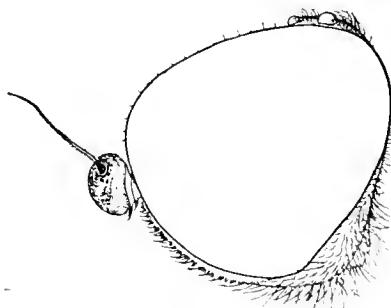


FIG. 95.—*Pachygaster tarsalis* ♂.
× 33.

bristle arises. Belly shining black, with more conspicuous short depressed blackish to greyish pubescence. Genitalia small.

Legs rather obscure pale yellow even to the last joint of the tarsi, but the femora all black except at the extreme tip; coxæ black; trochanters brownish; hind tibiæ sometimes obscurely darkened except at the tip. Pubescence practically none, though a short inconspicuous ciliation exists behind the anterior femora.

Wings with a rather inconspicuous (or sometimes conspicuous) blackish tinge on about the basal two-fifths, but pale yellowish hyaline on the rest especially at the stigma; veins on the blackish part blackened up to the end of the basal cells; radial and cubital veins yellow and thicker than the faint pale yellow veins on the apical part of the wing; cubital vein forked well beyond the middle of the costal margin of the submarginal cell. Squamæ brownish yellow to greyish black with short greyish black fringes. Halteres dull brownish black, but the base of the stem dull orange.

- ♀. Frons shining black, with a longitudinal middle channel; frons about one-fourth the width of the head at the top and scarcely or only very gradually narrowing down almost to the antennæ; above the base of each antenna is a rather silvery patch, but the frons has a scattered erect dark pubescence which is so minute that it may be overlooked; back of the head moderately inflated, slightly more so on the lower than on the upper part, shining black and apparently bare, because any pubescence is so exceedingly minute. Antennæ with the third joint much larger than in the male, dull brownish or even quite orange, with the annulations rather distinct.

Thorax and scutellum so densely and coarsely punctate that they are almost dull black; humeri in perfect specimens with a chestnut dot, but the postalar calli black. Pubescence light grey, very tiny and decumbent on the disc, but more obvious on the scutellum and on the lower part of the pleuræ.

Abdomen as in the male, but the ovipositor long, narrow, and brownish.

Legs as in the male, but there is short pubescence on the middle femora, and more obvious minute pale pubescence on the hind tibiæ.

Wings as in the male.

Length about 3.75 mm.

This species varies a little in the colour of the antennæ and tibiæ, but may always be easily distinguished from *P. atra* by its larger and more robust appearance and by the shape of the head. It shows some relationship to *P. orbitalis* in the slight silvery gloss on the frons just above the antennæ, but is easily distinguished by the touching eyes of the male and by the absence of the silvery sides of the face in both sexes, and also by the darkened basal part of the wing. A curious variety of the female was taken in the New Forest by Miss M. A. Sharp, in July 1904, in which the fork of the cubital vein is so indistinct as to be almost absent; the length and direction of the cubital vein and the size at once distinguish it from *P. minutissima*.

P. tarsalis was introduced by me as a British species in 1886 from a female without history in the late Mr Wilson Saunders' collection; and Dr D. Sharp recorded (Entom. Mo. Mag., Sept. 1903) three specimens caught in the New Forest in the summer of 1903 on an old broken Beech (*Fagus*); several females were again taken in July 1904 and bred in considerable numbers in subsequent years, and in 1907 Dr Sharp bred several specimens from larvæ found on Pine (*Pinus*) at Nethy Bridge. There is a female in the British Museum which was bred from rotten Poplar (*Populus*) on June 18, 1898, by Mr A. Beaumont, and Lundbeck says the larvæ occur also on "oaks and apple-trees." A male bred indoors by Dr Sharp in 1905 appeared as early as April 30. It is recorded from southern Sweden to middle Germany.

Synonymy.—Not much doubt can attach to Zetterstedt's original description of *P. tarsalis*, and Loew has pointed out that *P. robustus* of Jaennicke is obviously only the same species. Considerable doubt must however arise concerning *P. meromelas* Dufour, especially as two males in Bigot's collection (on one pin and with a pupa case (fig. 100) attached), which were evidently so named by Léon Dufour himself, are only *P. tarsalis*, and two others (upon another pin) are a female *P. tarsalis* (with orange antennæ) and a probable male *P. orbitalis*. It is notable also that the only specimen of *P. tarsalis* which had previously been bred (as mentioned above) came from a rotten poplar. I have dealt with this at greater length under the synonymy of *P. orbitalis*, because that has usually been considered a synonym of *P. meromelas*. An additional ground for confusion has evidently arisen in that both Jaennicke and Loew professed to know the male of *P. orbitalis* or *meromelas* in specimens which had the eyes touching, a circumstance which tends to prove that they both must have had males of *P. tarsalis* before them when they described the supposed male of *P. orbitalis*. It appears, therefore, that neither Jaennicke, Loew, or Léon Dufour knew what they meant in both sexes under the names of *P. argentifer* and *P. meromelas*. I find that I have a note about three specimens of *P. meromelas* in Dufour's collection, now in the Jardin des Plantes at Paris; they consist of two males of *P. tarsalis* accompanied by a very long-haired pupa, and a broken third specimen which is certainly not *P. orbitalis*.

4. ***P. orbitalis*** Wahlberg. Wings all hyaline; femora black except at the tip. Eyes separated, and the sides of the face silvery white, in both sexes.

A shining black species with hyaline wings and black femora.

♂. Head (fig. 96) about one and a half times higher than long when seen in

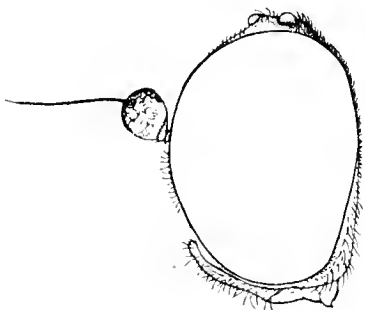


FIG. 96.—*Pachygaster orbitalis* ♂. × 33.

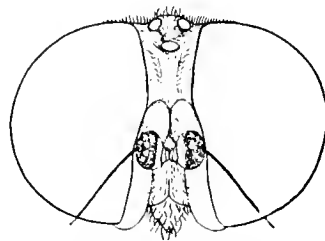


FIG. 97.—*Pachygaster orbitalis* ♂. × 33.

profile. Frons practically bare, at its narrowest part (fig. 97) about one-sixth or one-seventh the width of the head, but slightly widening up to the vertex and down to the antennæ, shining black with the shining black ocellar triangle considerably elevated and surrounded by a polished triangle which is continued rather widely down the middle to the white patches above the antennæ, while the sides of the frons are slightly duller and are very sparsely punctate; above the antennæ there is a pair of large almost silvery white patches which occupy the whole width from eye to eye, but which have a narrow channel dividing them. Face steadily widening downwards from the antennæ to the lower angle of the eyes, where it is nearly one-third the width of the head; the whitish patches above the antennæ are continued down the sides of the face as conspicuous almost silvery white eyemargins, which leave only about the middle third of the face black; pubescence absent except for the white down on the eyemargins; jowls very narrow, black, and merging into the very slightly inflated lower part of the back of the head; higher up on the back of the head there is a very narrow shining black rim almost behind the edge of the eye, on which is a very short though close black postocular ciliation; vertex shining black, with minute black pubescence behind the ocellar triangle; proboscis black, pubescent, mainly retracted into the mouth-

opening. Eyes broad ovate, but when viewed sideways slightly flattened behind, and when viewed from in front of course flattened against the frons and face; facets all equal; the eyes in life have a greenish hue with evasive purplish brown markings on the upper half, and with a median horizontal purplish brown band extending four-fifths of the way across from the front margin. Antennæ orange, with either the tip of the third joint blackened or all its margin except across the base or even still more darkened except at its base; the two basal joints slightly bristly beneath, and the third joint faintly annulated; arista blackish, thin, and long, being about three times as long as the antennæ.

Thorax shining black, but dulled behind the suture by dense punctuation; this dense punctuation extends above the suture about the middle part but then grows sparser until all the front part of the thorax is bare, brilliantly polished, and impunctate; moreover, the suture is very deeply and broadly impressed and at the middle extends backward V-shaped, and outside and behind the slopes of the V are large post-sutural humps of which the front part is impunctate; and in addition, right out on the forepart of the disc well away from the suture or any margin, there is on each side a rounded patch which is almost but not quite impunctate and bare; with the exception of the impunctate portions the disc of the thorax bears conspicuous short depressed white pubescence; pleuræ mainly bare and polished, but rather before the hind-margin of the mesopleuræ there is a rather conspicuous band of brilliant white pubescence, and the lower part of the sternopleuræ bears a few short clear white hairs. Scutellum moderately elongate, dulled by rather dense punctuation, and with minute dull white pubescence.

Abdomen shining black, rather obscured by punctuation and by the tiny dark (in some lights grey) bristles which arise from each punctuation; pubescence longer and greyish about the basal corners. Belly black, with minute sparse white pubescence. Genitalia (when visible) rather large, ending in a pair of rather long oval dark brown small lamellæ.

Legs yellow, but the coxæ and the basal five-sixths of the femora black or blackish; trochanters obscurely brownish; pubescence on the femora slight, pale, and inconspicuous.

Wings hyaline, but soon after the base the subcostal vein is blackish and the costa brownish up to the base of the pale yellowish grey stigma, where the darkening abruptly terminates; basal veins rather thick and rather conspicuously yellowish, as well as the postical vein as far as the base of the discal cell, and then similarly thick and colored veins extend up the inner side of the discal cell and on up to the end of the cubital fork; all the other veins rather faint; fork of the cubital vein almost before the middle of the sub-marginal cell. Squamæ obscurely blackish glassy with yellowish margins and pale fringes. Halteres with the large knob yellowish white, but with the stem darkened.

♀. Very similar to the male, and in fact very difficult to distinguish. Frons (fig. 98) at its narrowest part about one-fifth the width of the head; white

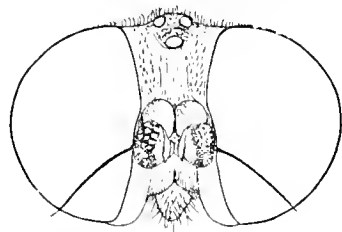


FIG. 98.—
Pachygaster orbitalis ♀. × 33.

patches above the antennæ more conspicuous; back of the head slightly more inflated. Antennæ with the third joint distinctly larger and sometimes all darkened.

Thorax with shorter and less conspicuous white pubescence especially on the front part. Ovipositor (when exerted) long, narrow, and yellowish.

Legs with occasionally a small darkened patch behind the middle of the front tibiæ.

Wings with the two dark veins, especially the subcostal, sometimes more conspicuous or sometimes only brownish yellow.

Length about 2.25 mm.

This species is easily distinguished from all the other European species by the silvery white eyemargins to the face, while the male is distinguished

by the widely separated eyes on its frons. When I say from all other European species I must call attention to a specimen in Bigot's collection, which is one out of four exponents of *P. meromelas*, as this specimen has the frons only about one-tenth the width of the head, and the silvery pubescence on its thorax has a tendency to run into five stripes on the forepart, between which are polished bare impunctate intermediate stripes; the antennæ are dark and the third joint is especially small and dark; the eyes are almost round, and the wings have the subcostal and costal veins yellowish and not blackened; this specimen may be a distinct though closely allied species, but I think it is only a remarkable variety.

P. orbitalis was first recorded as British by Mr E. E. Austen in the Entomologist's Monthly Magazine for October 1901, under the name of

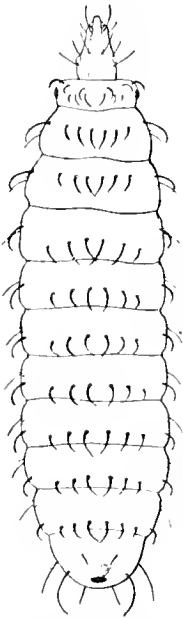


FIG. 99.—*Pachygaster orbitalis* pupa. $\times 10$.

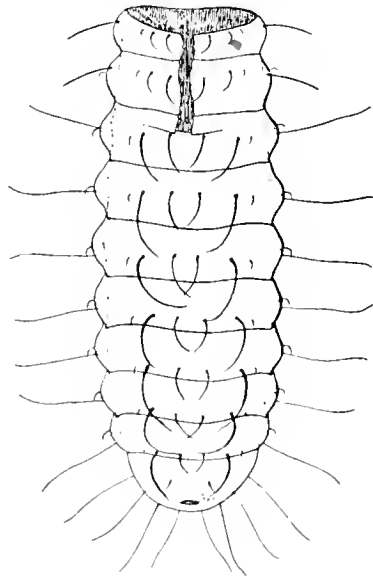


FIG. 100.—*Pachygaster tarsalis* pupa case, $\times 10$; identified by Dufour as *P. orbitalis*.

Neopachygaster meromelæna. A number of specimens were bred from larvæ and pupæ found by Dr D. Sharp in a decaying Holly (*Ilex*) at Bank near Lyndhurst in the New Forest on June 1, and the perfect insects emerged from June 8 to 28. Dr Sharp has since found it again in the same tree and in other similarly decaying hollies; it was bred in abundance in July 1904, and through the guidance of Dr Sharp I obtained and bred a large number in 1905. The pupæ (fig. 99) I obtained were found under the thin bark of decaying holly trees down near the base of the trees where the bark was more or less moist. Mr F. Jenkinson caught one specimen at Lyndhurst on July 3, 1901. Dr Sharp has informed me that the débris in which the larvæ occur may be in an almost liquid state, but that the larvæ will bear complete drying up and will recover again upon the application of moisture. It is somewhat remarkable that Dr Sharp should have found the larvæ on decayed Holly only, as the species had been previously supposed to be associated with dead Poplars (*Populus*). I have strong reasons for believing that the various species of *Pachygaster*, when properly identified, will be found to be almost confined to their own group of trees or rather to the débris and frass of wood-boring Coleoptera which live in

certain trees, such as *P. orbitalis* to Holly (*Ilex*), *P. atra* to Elm (*Ulmus*), *P. minutissima* to Pine (*Pinus*), *P. tarsalis* to Beech (*Fagus*), and Poplar (*Populus*), and *P. Leachii* to Oak (*Quercus*). At present we have a record of *P. atra* from beneath the bark of *Pinus sylvestris*, but as this record was made by Schilling, who was not a dipterologist, in 1829, when *P. minutissima* was unrecognised, it is easy to imagine that an error might have arisen; I believe, however, that Dr Sharp has bred *P. tarsalis* from Beech, Poplar, Elm, and Pine. Carcel's record of *P. atra* in rotten wood in an Elm (*Ulmus*) is undoubtedly correct as it was tested by Macquart; *P. minutissima* (= *P. pini* Perris) has been associated only with Pine (*Pinus*); *P. meromelas* was bred by Dufour, who was a very imperfect dipterologist, from beneath the bark of an old dead Poplar (*Populus*), and his species has been hitherto believed to be synonymous with *P. orbitalis*, but I believe a mistake has been made in this, and that his species is really a synonym of *P. tarsalis*; *P. Leachii* has been bred from a *Boletus* found in a hollow oak (*Quercus*), which may well mean that it lived on the detritus from some Coleopterous larvæ which fed on either the *Boletus* or on the Oak (*Quercus*), and it has also been bred from old turnip stems (*Brassica Rapa*); *P. orbitalis* according to Wahlberg "Hab. in ligno Populi cæso," but he does not absolutely say that it was bred from *Populus*, though it may be presumed that it was. Now that so much attention has been drawn to the larvæ of this genus, which can apparently be easily reared, while the perfect insects are usually very uncommon, we may hope that further investigations will be made with a view to determining the exact nature of their food. *P. orbitalis* is known with certainty from Scandinavia, Germany, and France.

Synonymy.—There can be but little doubt that this is the true *P. orbitalis* of Wahlberg (1854), because he says "orbitis infra antennis late argenteis," and he gives amply sufficient distinctive characters as against the four other known European species; the only point in his description which can be demurred to is "nervis pallidis," because the subcostal vein at any rate can scarcely be considered pale on its basal part; Wahlberg failed to recognise the male, which is not to be wondered at, as he naturally would expect it to differ from the female in the usual way. The next comparatively certain synonym is *P. argentifer* of Jaenicke (1866), but either his supposed male must have been only *P. tarsalis* or his word "unbehaart" as applied to its eyes must have been a misprint for "ungenähert"; such an error on the part of Jaenicke is not improbable because in his description of *P. Leachii* he gave "hinterschienen" when he meant "hinterschenkel," but when he went on to describe the male of his *P. argentifer* as having "die Schwinger...schwärzlich...auch der Stiel schwarz," it became certain that his male did not belong to *P. orbitalis*. Loew (1870) disposed of *P. argentifer* as an absolute synonym of the species which he called *P. meromelas*, and I think he was quite right inasmuch as I think Loew made just the same mistake as Jaenicke about his male, so that his (single) male was also only *P. tarsalis*; in support of this contention it is quite certain that Loew if he had known the true male of *P. orbitalis* could not have failed to notice the broad frons, and, as I shall say under my remarks about *P. meromelas* of Dufour, the bred specimens of *P. tarsalis*, or perhaps I should say the immature specimens, show very little darkening on the basal half of the wing. *P. meromelas* of Léon Dufour (1841) is in my opinion impossible to identify now either by description or by types; the description is as follows:

"Ater, pedibus pallis, femoribus nigris; alis immaculatis nervis à basi ad medium atris antennis rufo-fuscis."

"Long. 1 1 2 lin.—Hab. in populetis Gallie meridionali-occidentalis.

"Cette espèce, dont les caractères sont constans, a la taille et la physionomie du *P. pallipennis*, qui est commun sur les feuilles de nos noisetiers, mais elle en diffère par la couleur noire des cuisses et des nervures de la moitié postérieure des ailes:

“les tibias ont aussi un peu de brun vers leur base.” This description at once excludes *P. atra* and *P. Leachii*, both of which were well known to Dufour, and it may be concluded that it excludes *P. minutissima*; it is therefore limited to *P. tarsalis* and *P. orbitalis*; Loew, in adopting the name, was evidently influenced by the words “alis immaculatis” and by the type specimen which he possessed, but in bred or immature specimens of *P. tarsalis*, especially when the wings are folded, the darker base of the wing becomes very vague, and I think I can prove that the type specimens are valueless; further, close examination of Dufour’s description notes the words “nervis à basi ad medium atris antennis rufo-fuscis” which apply better to *P. tarsalis*, and most fatal is “les tibias ont aussi un peu de brun vers leur base,” a character which essentially does *not* apply to *P. orbitalis*, but does apply to *P. tarsalis* more than to any other European species of *Pachygaster*; beyond this I am impressed by the omissions in Dufour’s description, such as the silvery orbits, the whitish halteres, and the broad frons of the male, which are characters that I believe could not have been overlooked; I am also impressed with the food-plant, as we have evidence that *P. tarsalis* breeds in Poplar, while *P. orbitalis* seems to have a very strong partiality for Holly. Dufour’s figure of the larva of *P. meromelas* favours *P. tarsalis*, but his description of the pupa agrees with *P. orbitalis*. As to type specimens, Bigot was much better off than Loew as he possessed four against Loew’s one; the two specimens above the label “*P. meromelas* ♂ Landes L. Duf (nom^{t.})” are on one pin and are accompanied by a pupa case (fig. 100), and are both *P. tarsalis* ♂; the two labelled “*P. meromelas* ♀ Landes L. Duf (nom^{t.})” are also on one pin, the lower one being *P. tarsalis* ♀ and the upper one either a remarkable variety of *P. orbitalis* ♂ or an undescribed species which I have noticed in my remarks above. Under these circumstances I consider that Dufour’s *P. meromelas* cannot be recognised either from description or from known types, and that at any rate it cannot be accepted as the name for the species now under discussion, and that it is equally certain that the male of Jaennicke’s *P. argentifer* and Loew’s *P. orbitalis* do not belong to this species but probably to *P. tarsalis*. Loew, in 1872, suggested that this species might be the *Nemotelus frontalis* of Olivier, *Encycl. méth.*, viii., 184 (1811), but I cannot help believing that Olivier’s species referred to *Nemotelus nigrinus*, especially as he seems to have fully recognised the characters of the genus *Nemotelus*. It is also suggested that Fallén had this species mixed up with his *Sargus pachygaster*, because he notes, “Alae vel hyalinae vel saepius ad basin dimidiato-nigrae :—Halteres albi.”

5. **P. Leachii** Curtis. Wings without any blackish hue on the basal half. Legs yellow with only a blackish ring near the tip of the hind femora.

A neat shining black species with hyaline wings and pale yellow femora.

♂. Head in profile quite as long as high, but not circular because the front part bulges out and the hind part is flattened. Face and frons forming a very small shining black triangle when viewed from in front, but, as the under side of the head is very much flattened, the face when viewed from below is not so very small and bears some very short pubescence; frons quite bare; jowls very small, shining black; back of the head shining black and slightly puffed out on the lower part but disappearing higher up behind the eyes; vertex shining black and bare, very long, narrow and pointed as it extends half way from the occiput to the antennae; ocelli slightly raised and with minute dark pubescence behind; proboscis brownish yellow. Eyes very nearly bare, touching for about one-third (but below the middle) of the distance between the occiput and the antennae; facets on the upper part larger than those on the lower part, but without any distinct contrast; in life they are reddish brown on the large facets and dark brown on the small facets, but without much contrast in colour. Antennae orange, but with the two small basal joints blackish or at least brownish and bearing tiny bristles beneath; arista long, thin, whitish yellow, rather densely but so minutely pubescent as to appear merely slightly thickened except at the tip.

Thorax shining black, thickly but not coarsely punctate in front of the

suture and with the actual front part quite impunctate and consequently bare and polished, but rather more coarsely punctate behind the suture; pubescence very minute, recumbent, and scarcely visible in front of the suture because it is blackish there, but rather more obvious after the suture because it is greyish yellow there; pleuræ with scarcely any pubescence, and with nearly all the mesopleuræ impunctate and very brilliantly polished. Scutellum shining black, slightly dulled by the dense coarse punctuation and by minute blackish pubescence.

Abdomen shining black, rather densely but not very coarsely punctate, and each punctuation bearing a tiny decumbent blackish bristle, though towards the tip these tiny bristles become scarcer and more greyish. Belly brightly shining black, and bearing fine rather sparse, depressed, almost whitish, short pubescence. Genitalia (when exerted) about as wide as a third of the hindmargin of the fifth abdominal segment, blackish with slight orange colorings.

Legs yellow, slightly obscure on the femora; tarsi pale yellow even to the last joint, though the tiny claws are black; coxæ blackish; trochanters yellow; hind femora with a rather indefinite blackish ring just before the tip. Pubescence very slight, but there are some tiny pale hairs behind the anterior, and in front of the hind, femora.

Wings almost hyaline and minutely pubescent all over, but the stigma is pale yellowish and the veins pale brownish yellow on the anterior part up to the end of the cubital vein and farther still along the costa and on the stem and lower fork of the postical vein, while the other veins are very faint; fork of the cubital vein distinct and almost perpendicular, well beyond the middle of the submarginal cell. Squamæ blackish, with brownish orange margins and fringes. Halteres with large blackish knobs, but with brownish orange stems.

- ♀. Very much like the male. Frons shining black, at the top about one-third the width of the head but gradually diminishing in width down to the transverse channel a little above the antennæ where it is about one-fifth the width of the head; after this the eyes very gradually diverge down to the mouth; pubescence on the frons so short and sparse as to be almost imperceptible even though pale, unless viewed absolutely sideways, but more visible on the very short face; lower part of the head so much flattened that the jowls can hardly be traced when viewed sideways, but when seen from beneath they are fairly wide and are shining black; back of the head obviously puffed out, especially on the lower part, but not so much as in *P. atra*, and bearing very inconspicuous tiny pale pubescence. Eyes more circular than in the male. Antennæ all dull orange, with the third joint larger than in the male and sometimes slightly brownish.

Thorax and scutellum rather more densely punctate than in the male, except on the impunctate front part of the thorax, and both bearing very short decumbent light grey pubescence except on the bare polished parts.

Abdomen with more uniform tiny decumbent greyish bristles; ovipositor (when visible) long and yellowish.

Legs more whitish yellow, and the blackish marking just before the tip of the hind femora sometimes reduced to a blotch on the front part, and sometimes with even that only brownish.

Wings almost as in the male. Squamæ paler, being brownish or orange. Halteres with the knob more brownish.

Length about 3.35 mm.

This species is very easily distinguished from the other four European species by its yellow femora, while its hyaline wings with the forked cubital vein distinguish it from all except *P. orbitalis*.

P. Leachii is by no means a common species in England, though I expect it will be found to be much more widely distributed than is known at present, and perhaps when its breeding habits are known it may be found more commonly. Perris (Ann. Soc. Ent. France, 1870, p. 212) stated that he bred it from larvæ found in a *Boletus* in a hollow oak, or as

he stated later on (l. c., 1876, p. 180) in rotten wood taken from the hollow in an old oak, and again (l. c., p. 193) he said that he bred two specimens from old turnip stems? ("pieds de navet en fructification"). I have records from Cornwall (Scilly Isles, Penzance and St Ives), Somerset (near Wincanton), Devonshire (Torcross and Leach's original discovery), Dorset (Glanville's Wootton and Wareham), Sussex (Three Bridges), Cambridgeshire (Cambridge, Chippenham Fen), Suffolk (Farnham), Gloucestershire (Mr C. J. Wainwright), Herefordshire (Tarrington), and Glamorgan (Porthcawl), from June 21 to August 12, so that at present the records are almost restricted to the southern half of England. Abroad it is recorded from Scandinavia, France, Belgium, Switzerland, Austria, and Hungary.

Synonymy.—No doubt can arise concerning Curtis's original description and figure, but Walker introduced an unfortunate complication in his *Insecta Britannica* Diptera by twice referring to the dark marking on the hind "tibiae" when he meant the hind "femora," and strange to say Jaenicke in *Berl. Ent. Zeitschr.*, x., p. 221, says, "Die Hinterschienen sind vor der Spitze breit braun geringelt," which Loew incorrectly quoted as "schwarz geringelt." Walker also incorrectly described the halteres as pale yellow, a character which could only apply to *P. orbitalis*. Macquart's *P. pallipennis* is an obvious synonym. It is worthy of note that in Curtis's original edition (1824) of *British Entomology*, figs. 2, 3, being the head and antennæ, are apparently drawn from *P. Leachii*, but in the reprint (issued in 1862) a fresh drawing has been made for fig. 3, which has probably been made from *P. atra*.

CLITELLARINÆ.

Abdomen short, with only five or six obvious segments. Lower cross-vein absent, so that the upper branch of the postical vein forms for a short distance the lower margin of the discal cell; discal cell emitting

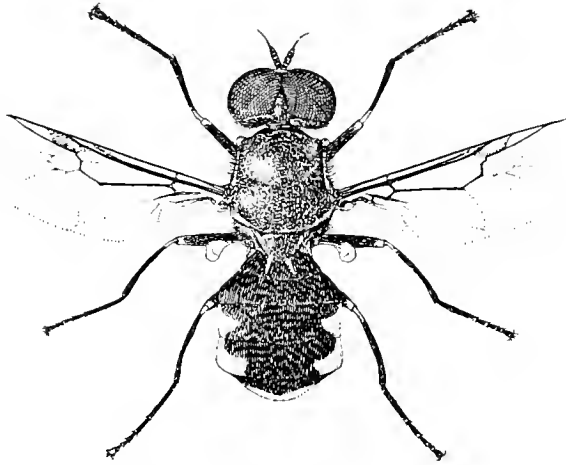


FIG. 101.—*Orycera nigripes* ♂. × 8.

three veinlets irrespective of the upper branch of the postical vein; eubital fork short or absent. Tibiæ without any spurs.

Antennæ with or without a short apical or subapical arista, or with a short style, almost homologously jointed or with the annulated third joint obviously oval.

Thorax squarely built. Scutellum with two marginal spines (*Orycera*, etc.) or unarmed (*Nemotelus*, etc.).

Abdomen short and broad, often arched, oval or conical, and sometimes even broader than long, but usually a little longer than broad, with only five or six apparent segments.

Legs stoni, moderate in length; tibiæ without any spurs.

Wings with three incomplete or faint veinlets issuing from the discal cell, besides the upper branch of the postical vein which appears to issue from the discal cell because the small cross-vein is absent, and therefore the upper branch of the postical vein forms for a varying distance the lower margin of the discal cell; five wide open posterior cells (if the subapical and postical cells be included). Wing-membrane minutely and densely pubescent in all the European genera except *Nemotelus*, but in that genus practically bare; ribbed in *Orycera*, rippled in *Ephippium* and *Lasiopa*, but with only slight folds in *Nemotelus*, *Clitellaria*, and *Pycnomalla*. Alulæ large, folded against the scutellum when at rest. Squamæ (alar) moderately small, and with a short fringe; thoracal pair either absent, or moderately developed, and when developed with a long delicate fringe and with both the dorsal and ventral surfaces pubescent.

The essential characters of the *Clitellarinæ* lie in the small number of abdominal segments, whereby they are distinguished from the *Berinae* and *Nylomyiinae*; the three veinlets from the discal cell, irrespective of the upper branch of the postical vein, whereby they are distinguished from the *Pachygastrinae* and some *Berinae* and *Stratiomyinae*; the absence of the lower cross-vein, whereby they are distinguished from the *Sarginae* and *Stratiomyinae*. The boundary line between them and the *Stratiomyinae* is very slight at times, as (in *Ephippium* for example) the upper branch of

the postical vein sometimes touches the discal cell for so minute a space that it may almost be taken for the small cross-vein, but in such cases the species are taken as belonging to the *Clitellarinæ*; the antennæ of *Pycnomalla* are rather similar to those of *Stratiomys*.

The *Clitellarinæ* comprise about fifteen genera from almost all parts of the world; rather more than a hundred species have been recorded from the Palæartic region, but nearly fifty of these belong to *Nemotelus*, and about forty to *Oxycera*. In Britain we have only these two genera (unless *Ephippium* should re-occur), and about fifteen species. The metamorphoses of a few species are known and are mentioned in the descriptions.

Table of the European Genera of CLITELLARINÆ.

- 1 (2) Basal antennal joint three or four times as long as the second; the six-ringed flagellum apparently forming one long peg-shaped joint with a short conical terminal style. PYCNOMALLA.
Large *Stratiomys*-like species.
- 2 (1) Basal antennal joint at the utmost twice as long as the second joint or shorter.

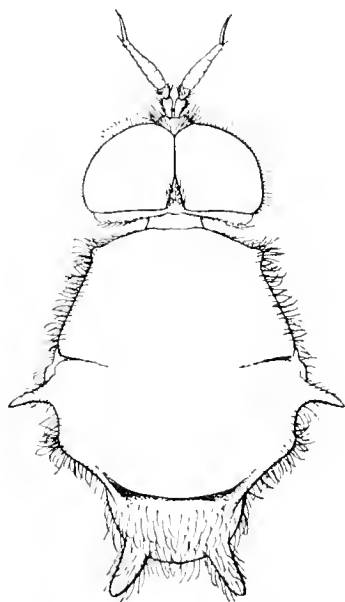


FIG. 102.—*Ephippium thoracicum* ♂. × 7.

- 3 (8) Scutellum armed with two marginal spines.
- 4 (5) Thorax with a strong spine on each side just before the wing-base (fig. 102). 2. EPHIPIUM.
Large red and black flies.
- 5 (4) Thorax without any strong spine on its sides.

- 6 (7) Antennæ more or less elongate, and with a thickened style (fig. 103) (conf. *Oxycera tenuicornis*). CLITELLARIA.*
Middle-sized dark colored softly pubescent flies.

- 7 (6) Antennæ short, and with a subterminal arista (fig. 104) except in *O. tenuicornis* (fig. 110). 3. OXYCERA.
Rather small or small usually black and yellow flies.

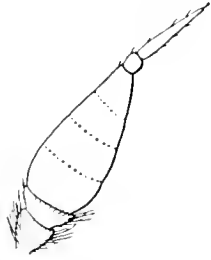


FIG. 103.—*Clitellaria cinerascens* ♀. × 22.

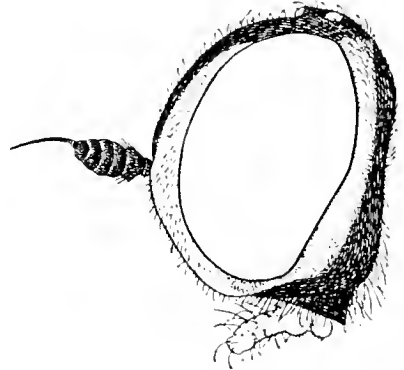


FIG. 104.—*Oxycera Morrisii* ♀. × 27.

- 8 (3) Scutellum unarmed.

- 9 (10) Face produced roundedly (fig. 105). LASIOPA.
Middle-sized dark colored flies.

- 10 (9) Face produced more or less snout-like (fig. 106). 4. NEMOTELUS.
Small black or black and white flies.

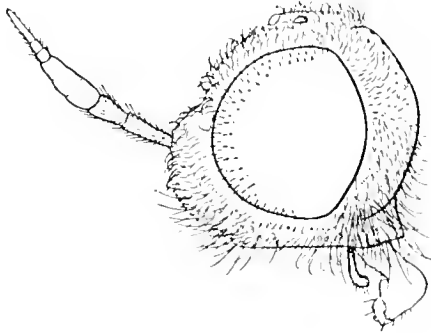


FIG. 105.—*Lasiopa villosa* ♀. × 15.

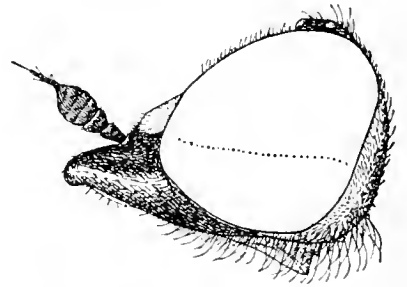


FIG. 106.—*Nemotelus uliginosus* ♂. × 22.

PERITTA Becker (*Zeitschr. Hymen. Dipt.*, vi., 10, 1906) apparently belongs to the *Clitellarinae*, even though Becker says “nov. genus “*Odontomyiinarum*,” because he says “Aus der Diskoidalzelle entspringen “4 deutliche Längsadern,” and beyond that he says that the scutellum is unarmed which is a character that I believe never occurs in the *Stratiomyinae*. The latter character would place it near *Lasiopa*, with which the form of the face seems to agree, but it is said to have antennæ like *Oxycera*, a six-segmented abdomen in the female, and bare wings. When founding the genus Becker had seen only two females from Algeria.

* There can be no doubt that Meigen established the genus *Clitellaria* in 1803 for *Stratiomyia ephippium*, but he enlarged the scope of the genus in 1822, and as a genus had previously been proposed for *S. ephippium* I see no objection to Meigen's name remaining for the rest of his enlarged genus, and consequently I do not see any need for Kertész's new name *Adoxomyia*.

2. EPHIPIUM.

Ephippium Latreille, Hist. Nat. Crust. Ins., iii., 448 (1802).

Ephippiomyia Bezzi, Zeitschr. Hym. Dipt., ii., 191 (1902).

Head rather small but as wide as the front part of the thorax; face arched, but not projecting in profile beyond the eyes, densely pubescent; palpi long and densely hairy. Eyes of the male touching for a long space on the frons and with the facets all equal in size, of the female widely separated; densely hairy in both sexes. Antennæ about as long as the head; basal joint cup-shaped, not much longer than the second; third joint elongate, indistinctly annulated until near its tip, and ending in a long pointed apical style.

Thorax slightly longer than broad, contracted in front, and with a conspicuous hornlike spine on each side just before the wing-base (fig. 102); humeri raised in a blunt projection. Scutellum well elevated at its base above the level of the hind-margin of the thorax, and bearing two very large thick hairy marginal spines set well apart.

Abdomen ovate, flattened, slightly broader and longer than the thorax and scutellum together.

Legs strong; front coxæ large.

Wings with the venation of the *Clitellariæ*, but the small cross-vein almost exists as the upper branch of the postical vein only touches the discal cell for a minute space; veinlets from the discal cell usually complete. Wing-membrane strongly rippled but not ribbed. Alulæ unusually large, so that when the wings are closed they are folded up against the sides of the scutellum. Alar squamæ absent; thoracal pair small but distinct, hardly pubescent on the surfaces.

This genus is distinguished from all others by the remarkable spines on the thorax just before the wing-base.

Ephippium contains only two Palæartic species, one of which is only known from Japan, while the other occurs over most of Europe and is said to have been taken in England. The metamorphoses have often been observed, and the larva (according to Märkel and Heyden) appears to be parasitic in the nests of *Formica fuliginosa*, though Westwood (Introd. Mod. Classif. Ins., ii., p. 533) refers to von Roser who found a larva in a rotten nut tree, and stated that although it was more than half grown when found yet it was two years in arriving at the perfect state.

Synonymy.—The genus *Ephippium* was founded by Latreille in 1802, and he then gave "Exemples. *Stratiomys microleon*; *ephippium* F."; he made no mention of the peculiar spines on the thorax, but his name alone would prove that he intended it to apply to "*ephippium*" rather than to "*microleon*." In 1805 (Hist. Nat. Crust. Ins., xiii., p. 341) he placed *Stratiomys ephippium* Fab. as his first species and renamed it *Ephippium thoracicum*, and in 1809 he redescribed the genus in more detail and gave as one character "*Thorax utrinque unidentatus*," and at the same time relegated *microleon* to *Stratiomys*.

I have not seen his description in Dict. d'hist. nat., xxiv., p. 192 (1804), but it was then that he first gave the new specific name of *thoracicum* in accordance with the custom of those days when raising an old specific name to generic rank. The genus has several times been sunk under *Clitellaria* under a misapprehension that that name held priority, and in such cases the specific name *ephippium* has been retained. In Scudder's Nomenclator (1882) a name *Ephippium* has been recorded as having been established by Bolten. Mus. (ed. 2, p. 116) Moll., Biv. in 1798, and apparently upon that authority Bezzi in 1902 changed the name to *Ephippiomyia*; I have however tried to obtain particulars about the supposed name of 1798, but I cannot even trace the existence of the work in which it was supposed to have been founded; the description (if any) may have been given unscientifically, and until evidence of a clear nature is forthcoming, I must decline to change the name which had stood unchallenged for exactly a hundred years.

The genus *Potamida* Meigen (1800) was I believe not established under the Rules of Nomenclature, and consequently has no claim of priority.

1. *E. thoracicum* Fabricius. A large conspicuous fly. Thorax red; abdomen, etc., black.

A large black fly which has the whole disc of the thorax bright red.

♂. Head comparatively small, being about as wide as the front part of the thorax. Face and frons shining black, and flush with the eyes though the face is arched; both face and frons covered with long porrect dense black pubescence; frons with a narrow middle furrow; jowls and lower part of the back of the head small and the latter hardly inflated, but both bearing dense black pubescence; all round the hindmargin of the eye there is a fairly broad equal greyish black eye-collar which is without any long pubescence, but which bears a minute adherent forwards-directed scaly pubescence which is fairly conspicuous and whitish, but on the upper part (which is obscurely tinged reddish) this minute pubescence is inconspicuous because it is darker; vertex conspicuously elevated, shining black, rather small even though produced to a long point, and bearing rather short abundant black pubescence; proboscis large, dull black; palpi long and jointed, the end joint being linear and projecting forwards from the head, and this joint has a brownish tinge and is clothed with long black bristly hairs which spread out at the tip like a birch broom. Eyes densely clothed all over with moderately long black pubescence; touching for about one-third the distance between the vertex and the antennæ; facets all equal. Antennæ dull black, in profile inserted a little below the middle of the eye, about as long as the head; the two basal joints transverse cup-shaped, but the basal joint has a short narrower stem which makes it rather longer than the second one; both basal joints clothed with rather conspicuous black bristly hairs; third joint (including the style) about two-and-a-half times as long as the two basal joints together, and gradually tapering to a point; third joint (without the style) about as bulky as the two basal joints for about half its length, after which it quickly contracts to about half the diameter and then maintains that size up to the style; it is very indistinctly annulated until the last two rings, which are distinct (especially the last one), and these two rings bear minute dorsal bristles at the tip; style long thin and pointed being more than half as long as the third joint, and bearing at its tip a minute thread-like arista, and also bearing some minute bristles about its base as well as two or three more before half its length.

Thorax densely covered all over its disc (except just in front and on its side-margins) with felt-like matted red pubescence which practically conceals the black ground colour; it gradually widens from the humeri to the postalar calli and is slightly longer than its broadest part; away from the red disc it is all deep black and moderately shining; humeri standing out as blunt points, and the dorso-pleural suture deeply impressed; just after the thoracic suture and just before the wing-base there is on each side a long erect horn-like spine, which is shining black and pointed, and which bears on its basal part a few rather short black bristly hairs. Pubescence, besides the red felt, consisting of some inconspicuous short reddish orange hairs scattered amidst the red felt, and of fairly abundant rather long black hairs on all the black part of both thorax and pleuræ. Scutellum shining black, though roughly densely and coarsely punctate, conspicuously raised above the level of the hindmargin of the thorax, and bearing on its margin two very large upturned thick shining black spines, which are longer than the scutellum itself and which are hardly reduced to a point at their tip; these spines are densely clothed with conspicuous coarse black pubescence except just at the tip, which is bare and usually rather brownish.

Abdomen shining black, ovate, flattened on all the disc but distinctly margined, rather broader and rather longer than the thorax and scutellum together, densely but finely punctate, composed of five almost equally long segments (basal segment rather the shortest); pubescence on the four basal segments apparently none, as all over the disc it is black or rusty black and very short and dense, but there are a few longer black hairs about the basal corners, and the hairs on the absolute sidemargins are slightly longer and are

rusty black. On the fifth segment the pubescence is light grey and more conspicuous, as it is longer and less depressed. Belly shining black and apparently bare, but slightly dulled by the dense very short depressed rusty black bristly pubescence. Genitalia small, only a pair of small elongate oval lamellæ being visible.

Legs black, but the junctions of the joints of the tarsi are reddish and the soles appear red from the dense short red pubescence; the legs are strongly built, the front coxæ being large and strong, the hind femora slightly clavate in consequence of a little enlargement beneath about a third before the tip, and the hind tibiæ shortened, curved, slightly dilated for a long space before the middle, and more distinctly dilated about the tip quarter. Pubescence behind the anterior femora just existing though inconspicuous, but on all the rest of the legs short, adherent, and all black or rusty black. Pulvilli orange, the middle one shorter and more pad-like than the other two; claws obscurely orange at the base.

Wings very strongly blackish all over, the outer part being only a little faded; the three veinlets from the discal cell to the wingmargin and the upper branch of the postical vein almost straight and usually quite complete, though sometimes the third one fails to reach the wingmargin; origin of the radial vein very far removed from the base of the wing and almost opposite the base of the discal cell; fork of the eubital vein very short; upper branch of the postical vein just touching the discal cell for so minute a space that a small cross-vein almost exists, lower branch joining the anal vein well before the wingmargin; wing-membrane strongly rumpled all over but not ribbed; alulæ blackened and with a slight dark fringe. Alar squamæ absent; thoracal pair small but distinct, brownish black with long blackish fringes, but only microscopically pubescent on the surfaces.

- ♀. Very much like the male. Eyes as hairy as in the male, separated on the frons by about one-fifth the width of the head; frons shining black, parallel-sided for about its upper half, after which it is a little wider but again almost parallel-sided, and the lower half of the face is again a little widened, so that altogether there is not much difference in the width of the space between the eyes at the vertex and at the mouth; frons with a large shallow transverse depression soon after its middle and with a narrow middle furrow down its lower part, closely punctate all about the shallow depression and only a little less so above that, but with a shining almost impunctate space just below that; face shining, with a rather large circular depression just under the antennæ; frons, face, jowls, and lower part of the back of the head with dense erect black pubescence, except that usually the frons is partially or wholly brownish orange haired between the ocelli and just before the antennæ, or a slight greyish pubescence may extend still further down outside the antennæ; all round the back of the eyes there is a broad distinct almost flat eye-collar (wider than in the male on especially the upper part), the flat upper part of which bears short adherent but conspicuous grey forwards-directed pubescence, but on the lower part such pubescence is browner and rather inconspicuous though a narrow greyish border extends all along under the lower part of the eyes; palpi distinctly orange red.

Thorax, abdomen, legs, wings, squamæ, halteres, etc., practically as in the male, but the middle pulvillus is more like the other two.

Length about 12 mm.

This species has no ally in Europe. It varies very little, but I have seen two or three specimens in which the third veinlet from the discal cell distinctly fails to reach the wingmargin, and in one of these the first veinlet disappears for a short distance at about a third from its origin; in the female the amount of brownish pubescence on the frons varies a little.

E. thoracicum has at the present time but faint claims to be considered a British species, but I have included it because I have very little doubt about its having been taken at Darenth Wood in Kent, and at Coombe Wood in

Surrey, in the earlier part of the last century. Walker says "Very rare; has been found in Coombe Wood, Surrey and in Darenth Wood, Kent. In the British Museum, and in Mr Desvignes' collection (E.)." Donovan figured it in 1813, and said it was taken at Coombe Wood on June 4, 1812, by George Milne, Esq., Kent, and that it had occurred in the woods about Highgate, while Swainson is said to have taken three specimens at one time. Stephens said (Illustrations of British Entomology, Suppl. 27) that he possessed a pair which had been "taken in June in "Coombe Wood." The late Mr J. C. Dale kept a note-book upon British Diptera which is now in the possession of the Hope Museum at Oxford, and in it is the following note concerning this species: "Coombe Wood, Surrey, Trunks of Trees, June 4, 1812, G. Milne, Highgate, Middlesex." Of the three specimens in Dale's collection one male and one female were labelled "Desvignes' coll.," and on the female was the label "Coombe Wood," but the other female bears no history. It would appear from this that Donovan figured it the year after G. Milne took it. I remember being present at Stevens' Auction Rooms when J. C. Dale bought Desvignes' specimens. The possibility of its having occurred in Britain is rendered probable by the occurrence of a specimen at Venlo in the Netherlands, and through Macquart including it in his *Diptères du Nord de France*. It has been bred from the nest of *Formica fuliginosa*, and a full account has been given by Märkel in *Germer's Zeitschrift*, v., p. 266 (1844), and Latreille when describing the species in 1809 said "larva in arboribus?" It has been recorded from Central and Southern Europe.

Synonymy.—This species was first described by Fabricius in his *Systema Entomologica* (1775) under the name of *Stratiomys ephippium*; in 1802 Latreille established the genus *Ephippium*, and in 1804 according to the custom of the time renamed the species *thoracicum*; an attempt has been made to change the generic name upon the grounds of its pre-occupation in the *Mollusca* and in that case to reinstate the specific name "*ephippium*," but I cannot agree with that because of the reasons I have already stated.

3. OXYCERA.

Oxycera Meigen, Illig. Mag., II., 265 (1803).

Handsome black and yellow or black and green flies of moderate or small size; almost bare and usually of a black ground colour with conspicuous yellow or green spots and markings, but the pale markings are sometimes so much extended as to become predominant.

Head broader than deep when seen from in front; face and frons in the male forming a flat almost equilateral or squat triangle, as the eyes touch on the frons while the jowls are hardly visible, but in the female the frons and face are almost equally wide from the vertex to the mouth; lower half of the back of the head considerably puffed out and bearing moderately long pubescence; vertex in the male elongate, with the ocellar space more or less elevated; proboscis retracted, but with broad sucker-flaps. Eyes touching in the male for a considerable distance, but widely separated in the female; ranging from being practically bare in both sexes to being densely hairy in the male, and then the eyes of the female may bear some slight pubescence; in the male the facets on the larger upper part are conspicuously larger and usually abruptly contrasted in size with the small facets on the smaller lower part, and very frequently there is a strong contrast in colour in dried specimens

(*i.e.*, light brown and dark brown) between the two sets of facets. Antennæ moderately long, with the two basal joints almost equal in length, but the third joint (or flagellum) peg-shaped and with four annulations followed (except in *O. tenuicornis*) by a two-jointed subapical bristle (fig. 107), which bears at its tip a microscopical filament-like arista.

Thorax oblong, rather arched, with the humeri and the postalar calli prominent. Pubescence fairly dense but not very conspicuous, and leaving a large triangle on the mesopleuræ bare and polished. Scutellum with one conspicuous pair of subapical spines.

Abdomen short and almost rounded, strongly arched, and with five obvious segments.

Legs simple.

Wings (figs. 108 and 109) with the normal venation of the *Clitellarinæ*. Cubital vein with or without a fork; discal vein faint, and the discal cell emitting three veinlets towards the wingmargin of which the third is often missing, and besides these three the upper branch of the postical vein appears to issue from the discal cell close to the second basal cell because there is no small cross-vein, and consequently the upper branch of the postical vein forms for a short distance the lower margin of the discal cell; none of the veinlets issuing from the discal cell nor the upper branch of the postical fork reach the wingmargin; wing-membrane rippled, very minutely but very densely pubescent. Alula well developed. Squamæ (alar) moderately well developed, but the thoracal pair practically absent or represented by a small or large long fringed lobe.

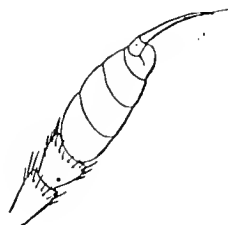


FIG. 107.—
Oxycera pulchella ♀. × 32.

This genus is well distinguished from the rest of the Palæarctic *Clitellarinæ* by its armed scutellum, and by the comparatively short antennæ which have a short basal joint and a subterminal arista (except in *O. tenuicornis*). The Central-American genus *Aochletus* must be almost if not quite inclusive of *O. tenuicornis*, as Osten Sacken says it is “an *Oxycera* with a stout terminal joint to the antennæ, instead of an aristic form style”; but his statement that *Aochletus* has after the fourth joint of the flagellum “an elongated body, a little longer than the two preceding joints taken together, without any distinct articulations, and placed somewhat at an angle to the axis of the antenna,” does not at all agree with *O. tenuicornis*; I have therefore retained that species in the genus *Oxycera*, with which it agrees in all other characters, especially as I look with suspicion on all genera in the *Stratiomyidæ* which are formed on the terminal joint of the antenna alone.

Oxycera is recorded from all Europe, Asiatic Russia, Celebes, Africa (Caffraria), and North and South America, but apparently Europe and Northern Asia form the headquarters of the genus, as about forty species are known to occur there, of which eleven are now described as British and one or two more (*O. leonina* and *O. Falleni*) are likely to occur.

The metamorphoses are well known, as Heeger in Sitz. Acad. Wiss. Wien., xx. (1856) has figured and described in much detail the larvæ of *O. Meigenii* and *O. trilineata*, while Haliday in Nat. Hist. Rev., iv., 193 (1857) described and figured the larva of (probably) *O. Morrisii*. Haliday says that this “larva occurred among the Confervæ and March-antia on the face of a dam serving for an outlet to the superfluous water of a mill-race, and continually moistened by a shallow but rapid fall of running water”; he considered the larva allied to *Nemotelus*. I have usually taken the perfect insects by sweeping in the neighborhood of water or marshy ground, though I have seen *O. pulchella* on the leaves of shrubs.

Table of Species.

- 1 (8) Cubital vein simple (fig. 108).

N.B.—This character is very important, though it often requires very close examination to avoid being overlooked, as the outer margin of the stigma may be misleading.

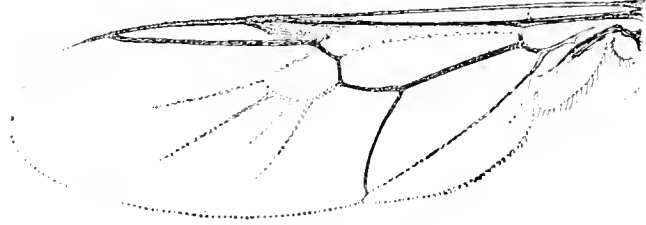


FIG. 108.—*Oxycera formosa* ♀. × 18.

- 2 (3) Abdomen yellow at the tip only. Wings with a conspicuous darkening about the middle. 1 *analis*.
- 3 (2) Abdomen with side spots as well as the tip yellow. Wings without any darkening about the middle.
- 4 (7) Thorax moderately shining. Scutellum and legs more or less black.
- 5 (6) Legs with more than the knees pale. Scutellum often mainly pale. Small, weak species. 2 *pygmæa*.
- 6 (5) Legs with only the knees pale. Scutellum black. Smallish, sturdy species. 3 *nigripes*.
- 7 (4) Thorax brilliantly shining. Scutellum and legs conspicuously yellow. 4 *formosa*.
- 8 (1) Cubital vein forked (fig. 109).
N.B.—Compare note under 1 (8).

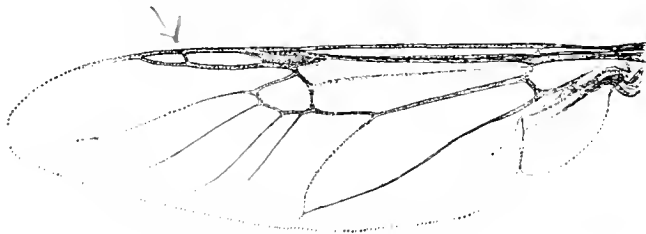


FIG. 109.—*Oxycera pulchella* ♂. × 10½.

- 9 (10) Antennæ elongate, and without any terminal arista (fig. 110).
Small species. 5 *tenuicornis*.

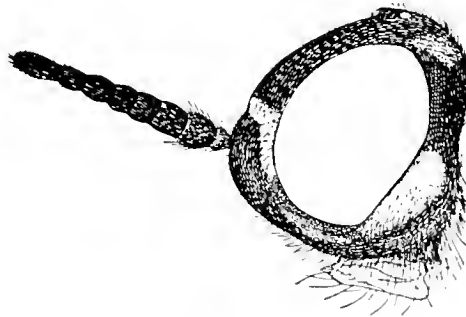


FIG. 110.—*Oxycera tenuicornis* ♀. × 32.

- 10 (9) Antennæ barely half as long as the head, and with a subterminal arista (fig. 111).

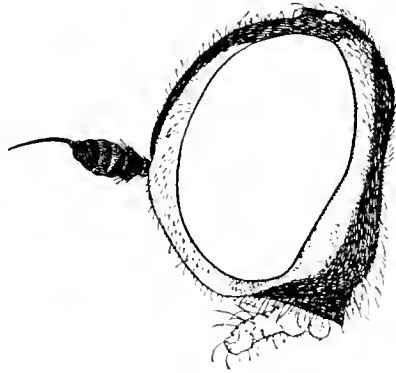


FIG. 111.—*Oxycera Morrisii* ♀. × 27.

- 11 (20) Face more or less conspicuously black, on at least the middle.
 12 (13) Scutellum with only the tip yellow. 6 *Morrisii*.
 13 (12) Scutellum practically all yellow.
 14 (15) Abdomen yellow at the tip only. Wings without any darkening about the middle. 7 *terminata*.
 15 (14) Abdomen with side spots as well as the tip yellow.
 16 (17) Abdominal spots all united on the sidemargin. 8 *pardalina*.
 17 (16) Abdominal spots isolated. Rather large species.
 18 (19) Legs extensively yellow. 9 *pulchella*.
 19 (18) Legs nearly all black. 10 *dives*.
 20 (11) Face all (or nearly all) green or yellow. 11 *trilineata*.

O. leonina is likely to occur in Britain and is closely allied to *O. terminata*, but has a pale spot at the base of the abdomen as well as one at the tip.

1. *O. analis* Meigen. Cubital vein not forked. Abdomen with only the tip yellow. Wings conspicuously darkened about the discal cell.

A medium-sized species which is very easily distinguished by the diagnostic characters.

♂. Face and frons forming a small black almost equilateral triangle which is moderately shining; frons with a moderate middle depression; face and frons clothed all over with short inconspicuous, though not scarce dark greyish pubescence, and this pubescence increases in length under the eyes to the jowls (though the space under the eyes is very narrow), and it becomes more conspicuous on the moderately puffed-out lower part of the back of the head; upper part of the back of the head reduced to a mere line against the eyes, and with a dense short black postocular ciliation; vertex black, rather shining, long and pointed; ocellar triangle and the adjoining part of the occiput with some distinctly longer black pubescence; proboscis yellow. Eyes touching for about one-third the distance between the occiput and the antennæ, clothed with obvious and rather dense black pubescence; facets on the upper part large and rather light brown, sharply separated from the smaller dark brown facets on the lower part. Antennæ dull black, rather short, as even with the style included they are scarcely equal to half the length of the eye; style shorter than the annulated joint.

Thorax and scutellum shining black and very densely punctate, with a narrow yellow line running from the black humeri to the wing-base and with

the margins of the postalar calli indistinctly brownish ; pubescence blackish, rather dense but of various lengths while some of it on the disc is greyish ; on the pleuræ the pubescence is abundant and longer and is greyish, but leaves a large bare and polished triangle on the mesopleuræ. Scutellum all black and bearing short black pubescence but with its pair of spines dirty orange with their extreme tip (and sometimes the extreme base) blackish ; metanotum all shining black.

Abdomen shining black with only the extreme tip pale yellow, and with all the disc a little obscured by very dense punctuation ; pubescence inconspicuous but fairly long about the base and sides, mostly black but dark grey on the disc after about the middle. Belly shining black with sparse punctuation, and with short sparse greyish pubescence. Genitalia protruded, mainly blackish but with short thick brownish yellow terminal lamellæ.

Legs black and orange ; coxæ and trochanters black ; femora shining black but with the tip rather broadly orange ; anterior tibiæ orange with sometimes just a small blackish spot beneath near the middle, but the hind tibiæ mainly blackish with the base and tip and the upper side obscurely orange ; tarsi all orange, though sometimes the posterior pairs have the base of the two last joints blackish. Pubescence slight and inconspicuous, but a slight greyish pubescence exists behind the anterior femora, near the base of the hind femora, and about the coxæ and trochanters.

Wings slightly brownish, with the discal cell and its neighborhood and the margin of all its veins conspicuously blackened and sometimes forming an almost sharply defined blackish blotch about the discal cell, but sometimes with the middle third of the costa almost blackish brown and spreading down as a cloud across the discal cell and down the postical vein to the base of its fork and even darkening the postical vein to its origin ; the other anterior veins (up to the end of the cubital) rather darkened, but the hinder and outer veins very faint ; cubital vein without any trace of a fork. Squamæ small, blackish with dark grey fringes. Halteres clear pale orange, with the base of the stem blackish brown.

- ♀. Frons brightly shining black with sometimes tiny orange spots almost on the occiput where the swollen back of the head ends against the narrowed vertex ; frons nearly half the width of the head, and with a considerable depression just above the antennæ and a faint narrow depressed line down the middle ; the space between the eyes narrows very slightly from the vertex to about the middle of the frons and thence widens very slightly down to the mouth, where it is scarcely wider than at the top of the vertex ; pubescence on the frons very short and very inconspicuous, all dark except for a few grey hairs just above the antennæ ; face shining black, retreating, and small because the antennæ are placed below the middle of the head, but on the extreme eye-margins there is an obscure but obvious orange streak from about the level of the antennæ to about half-way down the face ; pubescence on the face short but rather conspicuously whitish grey ; space beneath the eyes still very shallow, but the back of the head from bottom to top very considerably and nearly equally puffed out though slightly narrowed about the middle, and all shining black with short inconspicuous greyish pubescence ; no longer pubescence about the vertex. Eyes with very short, sparse, inconspicuous dark pubescence ; facets all small and equal.

Thorax colored as in the male but less coarsely punctate, and the yellow side lines and the markings about the postalar calli more distinct in pale specimens ; pubescence all grey and short. Scutellum entirely yellow except at the extreme base and side corners or all along the actual margin.

Abdomen as in the male, but with shorter pubescence. Ovipositor very much resembling the male genitalia.

Legs as in the male.

Wings with the dark middle blotch less conspicuous in pale specimens. Squamæ with paler fringes.

Length about 5 mm.

This species does not vary much as far as my experience goes, but Loew says that it varies a good deal in the abdominal markings ; he states

that traces of yellow spots occur not uncommonly at the hind corners of the third and fourth segments, and that commonly in the female but rarely in the male two small isolated yellowish spots occur out on the fourth segment at some distance from the foremargin and still further from the sidemargins, and that sometimes even the third segment may bear a similar pair of spots. The only variation I have noticed lies in the presence or absence (or obscure presence in the female) of a pair of yellow spots right at the back of the vertex, and I have never seen these spots conspicuous in a British specimen, though I have seen them quite yellow in a specimen from Kowarz's collection and in that same specimen the base of the annulated antennal joint is orange.

O. analis is very uncommon in England, and is one of those species which have been found in only Dorset and Herefordshire; it occurs occasionally at Glanville's Wootton in Dorsetshire, where Curtis found it from June 18 to July 1 "on small oaks in a copse"; Dr J. H. Wood has taken it at Wall Hills near Ledbury in Herefordshire, and Colonel Yerbury has taken it in that neighborhood, while Mr C. J. Wainwright caught three specimens at West Malvern in Herefordshire. Dr Wood has informed me that he found it on a marshy bog on the sedgy margins of old silting-up pools. My records range from June 1 to July 17. Although Kertes's Katalog gives "Europa" as its distribution I can only find records from Middle Europe, and it does not seem to occur far north or far south.

Synonymy.—Walker's description is very bad, but can only refer to this species; one female in Bigot's collection was labelled *O. terminata*?

2. *O. pygmæa* Fallén. Cubital vein not forked. Scutellum more or less black about the base. Legs considerably blackish brown, but with obvious yellowish parts. Small, weak species.

A small species very much like *O. nigripes* but paler and weaker.

♂. Face and frons forming a rather wide triangle and covered with almost silvery white tomentum, but with just the middle of the face inconspicuously barer and blacker, and the frons with just the top angle and a narrow middle line blackish; the white tomentum extends round under the eyes and about half-way up the back of the head against the eyes; this lower half of the back of the head is considerably puffed out and bears very short pale pubescence; upper part of the back of the head flush with the eyes and bearing only a grey pubescence, but there is still a long whitish pubescence on the absolute back of the head; vertex black, rather long and pointed, extending down almost half-way to the antennæ; just above the ocelli there is a very short pale pubescence; proboscis orange. Eyes touching for about one-third the distance between the occiput and the antennæ, and bearing very inconspicuous wide-scattered short hairs; facets on the larger light brown upper part conspicuously and abruptly larger than those on the smaller dark brown lower part. Antennæ moderate in length for an *Oxycera*, dull black; style slightly longer than the annulated joint.

Thorax moderately shining black because it is so roughly and densely punctate; humeri with a small round yellow spot which is extended as a yellow line along the top of the mesopleuræ, and this yellow line widens when near the wing-base; these yellow markings are continued across the pteropleuræ and down the front of the metapleuræ, and also usually exist as a spot on the top hind corner of the sternopleuræ; postalar calli conspicuously orange,

except in very dark specimens. Pubescence yellow, rather short and depressed, but abundant enough to be fairly conspicuous, while it is longer, whiter, and still more obvious (because it is more erect) on the front and hind parts of the pleuræ; mesopleuræ with middle and upper parts bare and polished. Scutellum usually with only the basal third black and the rest (including the two spines) orange, but sometimes the whole scutellum is black and the spines blackish orange; it is more shining and less punctate than the thorax and is almost bare; metanotum rather dull black.

Abdomen moderately shining black, but the disc (especially on the second segment) so crowdedly punctate as to become rather dull; the third and fourth segments have a yellow spot at each hind corner, and these spots are connected along the yellow sidemargins and just encroach on to the extreme hind corners of the second segment, while the whole tip of the abdomen (*i.e.*, the apical half of the fifth segment) is also yellow and is connected narrowly along the sidemargins with the other yellow markings. Pubescence very minute and inconspicuous, black or blackish grey and stubby on the disc but pale about the tip, while as usual it is longer and paler about the basal corners. Belly shining black, with a small pale yellow spot on the base of the first segment, and a large pale yellow spot on the base of the second segment which may be isolated or may be transverse and connected with the yellow sidemargins; or the belly may be yellow with a large black spot on each of the third, fourth, and fifth segments; pubescence ubiquitous, but short, depressed, pale and inconspicuous.

Legs blackish brown on the basal half or three-quarters of the anterior femora and on still more of the hind femora, with the orange colour extending more on the under side than dorsally; trochanters yellowish, and sometimes even also part of the coxæ and the base of the femora; tip of the femora dull orange; anterior tibiæ usually with a rather small brownish ring about their middle which extends all down the front side to the tip, or sometimes the tibiæ all blackish brown except on the orange base and extreme tip; hind tibiæ all brownish black except on the obscurely orange base and extreme tip; tarsi black, but the base of the posterior pairs orange. Pubescence slight, there being only a few pale hairs behind the anterior femora and a rather sparse minute depressed pale pubescence on the femora and tibiæ.

Wings almost hyaline but the stigma light brownish yellow; anterior thick veins light brown, but the posterior thin veins almost pellucid; cubital vein not forked, and the hyaline part of the submarginal cell as long as the stigma. Squamæ (alar) very small, blackish brown with brownish fringes; thoracal pair absent. Halteres yellow.

♀. Frons about two-fifths the width of the head, but very variable in colour; the normal form (fig. 112) is deep orange with a fairly wide (a quarter of the

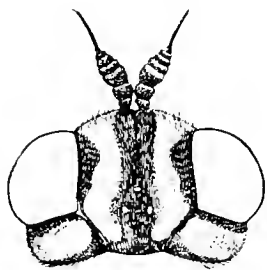


FIG. 112.—
Oxyceira pygmaea ♀. × 25.

frons) black middle stripe and a long large arched black spot against each eye, which leave two conspicuous deep orange irregular stripes starting separately a little behind the ocelli and running down almost to the antennæ, but widening out so that they practically extend to the eyemargins at the sides of the ocelli and at their end a little before the antennæ; but pale forms occur in which the frons is orange with only a rather narrow black middle stripe which occupies the vertical triangle and runs into the black face just above the antennæ, while a very narrow black channel is extended diagonally on each side from the black vertex to the black margin against the eyes on the upper two-thirds of the frons; a very dark form has the frons black with obscure bluish orange markings which consist of two large badly defined broad spots extending from behind the ocelli to half-way down the frons and of two badly defined roundish spots a little above the antennæ, while the upper third of the back of the head behind the eyes is blackish orange but blacker still on a small spot on its middle close against the eyemargin; pubescence of the frons very short, pale and rather sparse. Face black with its sides broadly covered with silvery whitish dust, and all the face bearing very short

whitish pubescence, and the pubescence becomes rather longer on the black sides of the mouth; back of the head inflated to half the length of the eye, orange except on a long black streak against the upper third of the eye, and glossed with silver on all the lower part; absolute back of the head black; pubescence very short and all pale. Eyes small; facets all equal.

Thorax with the yellow line from the humeri usually rather wider and more connected and more conspicuous than in the male, and the spot on the sternopleure larger. Pubescence on the thorax and scutellum more conspicuous.

Abdomen with its margin all yellow from the middle of the second segment to the tip and widening out on the third and fourth segments but very narrowly connected with the tip. Belly with a small yellow spot on the middle of the base of the first segment, and yellow on most of the middle of the second segment, and on the hindmargins of the third, fourth, and fifth segments.

Legs orange with a broad shining brown or blackish (sometimes incomplete) ring on all the femora a little before the middle; coxæ and trochanters paler than in the male, but the rest of the legs as in the male.

Wings as in the male. Squamæ and their fringes paler.

Length about 3 mm.

This species is easily distinguished by its simple cubital vein and its partially darkened legs and scutellum; it varies a good deal in the extent of black coloring on these parts and on the frons of the female, but not to such an extent as to cause any doubt. Its nearest ally is the next species, *O. nigripes*, but that is a larger and more squarely built species besides being much blacker.

O. pygmaea is probably the commonest of our small British species of *Oxycera*, but yet is decidedly local though abundant in its localities. My records are limited to but very few counties, but Curtis and Dale recorded it from various localities in South Dorset, and Curtis stated that it was common at Seaton in Devonshire; Colonel Yerbury has taken it in Woolmer Forest in Hampshire, and he and Dr Wood have of course found it abundantly in various localities in Herefordshire, whilst I found it in numbers at Tuddenham Fen in Suffolk; the Royal Scottish Museum possesses it from Aberlady in Haddington, and if *O. nigripes* is only a form it has occurred near Inchnadamph in Sutherland. The records extend from June 22 to July 20. Dr Wood considers that it prefers the wettest parts of small bogs. It is recorded from South Sweden to Austria.

Synonymy.—This has been very commonly called *O. muscaria* Fabr., because of Meigen's mistake (Syst. Besch., iii., 346) in stating that they were synonymous, but *O. muscaria* is now considered to be a very distinct South European species. The var. *affinis* of Dale has I believe never been described, and it is possible that my *O. nigripes* may be only a strong dark northern form, though at present I prefer to retain it as distinct because of its larger size and squarer build.

3. *O. nigripes* Verrall. Cubital vein not forked. Scutellum all black. Legs black with only the knees orange. Larger than *O. pygmaea*.

Very much like *O. pygmaea* but rather larger and stouter, and altogether much blacker (figs. 84, 101).

♂. Head longer in proportion to depth when seen in profile, and comparatively broader when seen from in front, than in *O. pygmaea*. Face with the black middle portion more defined, and the lower margin of the eyes running less straight from the puffed-out lower part of the back of the head to the front; upper part of the back of the head less hollowed out from the eyes. Eyes less round, touching for a short distance, almost bare; facets separated in size as

in *O. pygmaea*, but the space occupied by the small facets seems to be larger in proportion. Antennæ dull black or brownish black; third joint longer and more distinctly annulated; arista stouter than in *O. pygmaea*, quite as long as the annulated third joint, and with a more obviously thickened basal joint.

Thorax moderately shining black, thickly punctate, and with the orange markings reduced in amount; humeral point only, and a narrow line running thence along the upper margin of the mesopleuræ to the wing-base and extended obscurely under that and irregularly on to the end of the thorax, orange; postalar calli brownish orange. Pubescence short, depressed, and more brownish yellow than in *O. pygmaea*, though often pale greyish yellow towards the sides and sometimes blackish on the disc; on the pleuræ longer, more erect and greyish white, except on the polished bare middle and upper parts of the mesopleuræ. Scutellum all black, but the spines sometimes brownish orange; pubescence inconspicuous, very short, and brownish yellow; metanotum black, with a slight greyish dust.

Abdomen shining black, but very thickly punctate on the disc of the second, and part of the third, segments; orange markings usually as in dark specimens of *O. pygmaea* but with the lateral spots rather larger, and in one of my four specimens the sidemargins of the third and fourth segments are only obscurely brownish orange and running out near the hind corners as obscure orange spots, of which those on the fourth segment are the largest and brightest, while the apical half of the fifth segment is isolatedly brownish orange; pubescence rather more brownish or greyish yellow about the basal corners. Belly shining brownish black, with all the middle part of the second segment and the hindmargin of the third segment obscurely orange, or with at least most of the disc of the second, third, and fifth segments slightly browner than the rest; pubescence ubiquitous, short, recumbent, and pale.

Legs black (hardly at all brownish black), with just the knees and the extreme tip of the posterior tibiæ rather obscurely orange; trochanters rather yellowish. Pubescence moderate and whitish behind the femora.

Wings hyaline, but the stigma brown and the anterior thick veins dark brown. Squamæ with light grey fringes.

- ♀. Frons black with four orange spots (fig. 113) of which the two larger ones commence just behind the ocelli as in *O. pygmaea*, and extend about half-way down the frons but never extend to the eyes; the two smaller spots are a little above the antennæ but in the same line as the elongate upper spots, almost round and occasionally indistinct or even absent. Face with the middle black part more sharply defined and occupying about the middle third; back of the head even more puffed out, and the black streak against the upper part of the eyes rather suddenly widened at its lower end and extended half-way (or even quite) across the orange band, and this orange band is paler below this interruption, and sometimes so much so as to be blackish orange above and pale yellow below, but the lower part has less silvery gloss than in *O. pygmaea*.

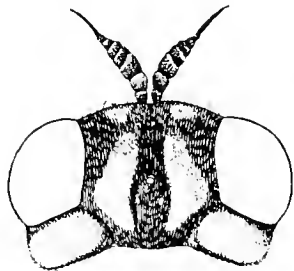


FIG. 113.—
Oryzera nigripes ♀. × 25.

Antennæ longer and blacker than in *O. pygmaea*, and with the third joint more distinctly annulated; the fourth annulation being very similar to the basal joint of the style; style stouter than in *O. pygmaea*.

Thorax as in the male, but occasionally the extreme tip of the scutellum is dark reddish orange.

Abdomen with the pale markings more restricted than in *O. pygmaea*, so that the tip is almost (or sometimes apparently quite) isolated.

Legs as in the male, but sometimes almost as orange as in very dark specimens of *O. pygmaea*.

Wings as in the male.

Length about 4 mm.

This species, as far as is known to me, varies but very little, but as all the fifteen specimens I have seen were caught in a space of about six

yards square that is not surprising. The very limited variations occur in the amount of pale markings on the frons of the female, the pale band behind the eyes of the female, the extreme tip of the scutellum in the female, and to a small extent the amount of pale coloring on the legs. All these variations tend towards *O. pygmaea*, but the more I study the specimens the more I believe them to be distinct, because of the larger and stouter build, the longer larger antennæ which have the basal joint of the thicker style more dilated, and the less silvery inflated lower part of the back of the head, besides the darker coloring and thoracal pubescence.

O. nigripes has occurred on only July 20 and 21, 1886, in some abundance on a small grassy glade by the side of the small river which flows down Ben More of Assynt, about a mile from Inchnadamph in Sutherland. In the same very limited spot *Orimarga virgo* also occurred, and both species could be caught by sweeping.

Synonymy.—There should be no synonymy for a new species, but I cannot help believing that some of the records of *O. pygmaea* must refer to this species, especially when authors have been limited in their material like (for example) Jaenicke in his remarks in Berl. Ent. Zeitschr., 1866, p. 226, and it is possible that similar specimens caused J. C. Dale to propose the name *O. affinis* for what was subsequently considered a variety of *O. pygmaea*; while Loew in Berl. Ent. Zeitschr., i., p. 32 mentions that the female of *O. pygmaea* is very variable in the extent of the yellow marking of the head. *O. nigripes* may be only a large stout dark mountain form of *O. pygmaea*, but I am disposed to consider it a distinct species. Although the name *O. nigripes* appeared in my List of British Diptera, 1888, it has remained until now a mere catalogue name, as no previous description has been given, and why therefore it appears as a good species in Kertész's Katalog with *O. pardalina* Walk. (nec Meig.) as a synonym is strange, especially as I consider that Walker's *O. pardalina* is only a bad description of Meigen's *O. pardalina*.

4. *O. formosa* Meigen. Cubital vein not forked. Thorax brilliantly shining; scutellum and legs entirely yellow.

A small species easily known by its brilliantly shining thorax and completely pale legs.

♂. Face and frons forming a small black equilateral triangle; jowls almost absent, but the lower part of the back of the head moderately inflated and bearing moderately long greyish white pubescence; vertex raised and forming a triangle apparently only rather longer than broad as any prolongation forward is very narrow and inconspicuous, bearing tiny pubescence above the ocelli; proboscis in life conspicuously whitish yellow. Eyes touching for about two-thirds the distance between the occiput and the antennæ, practically bare; facets on the upper two-thirds conspicuously larger than those on the lower third and the contrast rather abrupt; in life the eyes are rich brownish red with green reflections, and with a narrow almost equal deep purple band all across at the top of the small facets. Antennæ not long, all black or with the two basal joints sometimes brown; arista almost as long as the annulated third joint and with a tiny white apical hair.

Thorax brilliantly shining black, practically impunctate and almost bare as the pubescence is reduced to some minute sparse pale hairs which do not extend to the broad middle front part of the disc; a large yellow spot on each side extends from the humeri above the dorso-pleural suture to the transverse thoracic suture, while the humeral knob and a line all along the upper margin of the mesopleuræ are also yellow, and this line is irregularly but obviously continued under the wings to the end of the pleuræ just below the base of the halteres, and there is an obvious yellow spot on the top part of the sternopleuræ; postalar calli conspicuously yellow, and the yellow colour extends a

little upwards on to the disc and forwards to the wing-base and behind almost to the yellow scutellum; in one specimen there is a pair of small orange spots near the centre of the disc; pubescence on the pleuræ reduced to a few pale hairs on the front and back parts. Scutellum bright yellow and practically bare; spines orange; metanotum shining black.

Abdomen shining black but rather dulled on the disc through the crowded coarse punctuation; the third and fourth segments bear on the sides large yellow spots which are connected along the sidemargins with the yellow tip, and this yellow tip is equal all across and does not extend triangularly on to the disc; the yellow sidemargins extend up on to the hind corner of the second segment; pubescence very short, black and stubby on the disc but pale about the tip, and longer and pale about the basal corners. Belly (in life) yellow with blackish bands across the third, fourth, and fifth segments and sometimes less distinctly across the second and sixth, the bands on the third and fourth segments being broadest; pubescence very short and very scattered, bristly and apparently all black. Genitalia yellow.

Legs (including coxæ, trochanters and even last joint of all tarsi) entirely yellow, so that only the claws are black. Pubescence almost absent, but some short very inconspicuous pale hairs occur behind the femora.

Wings (fig. 108) hyaline, but the mediastinal and subcostal cells and the stigma yellowish; stigma at its outer end margined so strongly as to almost indicate a fork of the cubital vein; anterior veins pale yellow but distinct; hyaline part of the marginal cell after the stigma longer than the stigma. Squamæ (alar) small and blackish with light grey fringes; frenum blackish. Halteres orange.

- ♀. Frons mainly yellow but with the middle of the top of the vertex broadly black, and with a black broad rather irregular stripe extending from that down the middle of the frons to the antennæ, and also a narrower black line sloping from the black vertex forwards to the upper frontal corner of each eye; all the face and jowls black as well as the absolute back of the head (connected with the black vertical space), but there is a broad shining clear yellow postocular collar; there is some short whitish pubescence on the lower part of the back of the head, but nowhere else on the head. Eyes in life dark reddish brown with greenish reflections, and with a rather narrow almost equal purple band just above the middle extending all across except close to the hindmargin.

Thorax shining black, but the yellow markings almost predominate as they only leave three broad black lines and two black spots; the middle black line is broad and extends from the extreme front of the thorax (where it extends all across) to the hindmargin; the side lines are rather close to the middle one but are much shortened anteriorly, and the middle line is widened out considerably before the hindmargin so that the three black lines coalesce; above the wing-base (but margined anteriorly by the suture) there is on each side a rather large roundish black spot, and in dark specimens this spot is connected with the black side lines, and the line of the suture seems to narrowly connect the three middle lines; pleuræ black on all their lower part, but yellow on the upper part and on the upper part of the hypopleuræ. Pubescence as in the male.

Abdomen black with the margin yellow all round (including the side-margins of the two basal segments), and this margin widening out on to the disc of the third and fourth segments (but less so on the second) sometimes in a broadly rounded manner and sometimes pointedly triangular, and sometimes widened at the tip. Belly with the black bands smaller. Ovipositor with the lamellæ all orange.

Legs, wings, etc., as in the male.

Length about 3.25 mm.

This species is well distinguished by its simple cubital vein, its brilliantly shining thorax, and its entirely pale scutellum and legs; but I possess a male of an undescribed closely allied species from probably Central Asia which has the front tarsi almost all blackish brown. The

principal variation I have seen is caused by the presence of a pair of small yellow spots on the disc of the thorax of the male, each spot being well isolated and placed just behind the suture, and one such specimen was taken by Mr C. Morley at Barnby Broad in Suffolk on July 2, 1904, and I have seen a second similar specimen. My description has been made from quite freshly killed specimens, but in dry specimens the yellow markings usually become orange.

O. formosa occurs in rather numerous colonies, each colony occupying a very small space, in a few localities in England. I have records from Dorset (Glanville's Wootton), Hants (Woolmer Forest), Sussex (near Lewes and at Guestling), Surrey (near Reigate?), Suffolk (on *Pteris* and flowers of *Spiraea ulmaria* at Foxhall, taken by Mr C. Morley), Norfolk (Wroxham), Cambridgeshire (in Willow Beds near Whittlesford, and in Chippenham Fen in wet spots on the drive through the Forty Acre Wood), Glamorganshire (Porthcawl in abundance), and of course in several localities in Herefordshire. Dr Wood states that it occurs on marshy bogs or on the sedgy margins of old silting-up pools. My records extend from June 23 to August 10. It is recorded from many parts of Europe, extending southwards to Italy but apparently not further north than South Sweden.

Synonymy.—Meigen originally described this species from details sent to him by Wiedemann, but at the same time described it as *O. muscaria* Fabr. in more detail and from personal knowledge; he subsequently (Syst. Besch., iii., 346) discovered this synonymy and corrected his mistake, but at the same time fell into another mistake by stating that his *O. pygmaea* was the true *O. muscaria* Fabr., while all the time *O. muscaria* of Fabricius was an Italian species of which *O. flavipes* Loew is probably a synonym.

5. *O. tenuicornis* Macquart. Cubital vein forked. Antennæ remarkably elongate and without any terminal style (fig. 114). Legs all black, except at the front knees (♂), or with at least the apical half of the front tibiae and all the front tarsi black (♀).

A very distinct species, because of its long antennæ which apparently have no terminal style.

- ♂. Face and frons forming a rather flat shining black triangle; face with rather broad whitish bands down the sides, upon which there is a very short inconspicuous whitish pubescence, but upon the rest of the face there is a fairly abundant erect black pubescence; face in profile slightly prominent in front of the eyes, but its lower part almost flush with the eyes, as is also the front part of the jowls, and the whitish sides of the mouth are very narrow; back part of the jowls and lower part of the back of the head distinctly inflated and moderately shining black, and the pubescence on the lower part of the jowls and all about the back of the mouth longer and rather conspicuously greyish white, but the upper half of the back of the head almost flush with the eyes and bearing a short dense black stubby postocular ciliation; vertex shining black, considerably elevated, and with only short and slight black pubescence. Eyes bare (sparse microscopical hairs occur), practically touching for almost half the distance between the occiput and the antennæ; facets on more than the upper half large and (in death) pale reddish brown, but the small facets on less than the lower half blackish, and the contrast between the two rather sharply defined. Antennæ dull blackish, very long, being as long as the head itself in profile; two basal joints short and bearing tiny black bristles; third joint practically bare and formed of six distinct annulations, of which the last one

is twice as long as the penultimate and these two joints form the apical style of which the tip may be microscopically pubescent.

Thorax shining black, brighter than in *O. pygmaea* but not nearly so bright as in *O. formosa*, and not densely punctate, with a rather narrow yellow line from the humeri to the wing-base and thence (sometimes obscurely) on to the postalar calli; pubescence on the disc short, dense, and black, but longer on the front part, while all about the sides it is longer and is greyish black; on the pleuræ it is longer and is greyish white except on the large bare middle part of the mesopleuræ. Scutellum shining black, and bearing short inconspicuous black pubescence; spines long and dull obscure yellowish or even blackish yellow; metanotum shining black.

Abdomen all shining black except narrowly and sometimes only indistinctly on the yellowish hindmargin of the last segment, moderately densely punctate, but not enough to make it appear dull; pubescence on the disc black and so minute as to be almost imperceptible, but about the basal corners and sides longer and blackish or greyish. Belly all black, and bearing only very short inconspicuous pubescence. Genitalia, when protruded, mainly blackish, and with a pair of short thick lamellæ.

Legs black, with the front knees rather broadly orange, and the basal joint of the hind tarsi obscurely orange. Pubescence very slight, but just perceptible behind the anterior femora.

Wings slightly smoky blackish or brownish, with a fairly conspicuous brown or almost blackish stigma, and with the basal and anterior veins darkened; the darkened basal veins extend only to the base of the discal cell, but the rest of the discal cell is clearly visible though faint; cubital fork placed at about the middle of the submarginal cell. Squamæ (alar) small, blackish, with grey fringes; thoracal pair absent except for an obscure line. Halteres with large orange knobs.

- ♀. Frons nearly half the width of the head, brilliantly shining black and very sparsely punctate, with a pair of widely separated pale yellow almost occipital spots well remote from the upper eye-angles, and with a pair of long narrow transverse pale yellow stripes just above the antennæ which unite rectangularly with the equally narrow whitish yellow facial sidemargins, and these in their turn extend down to the mouth and usually connect under the eyes with the large

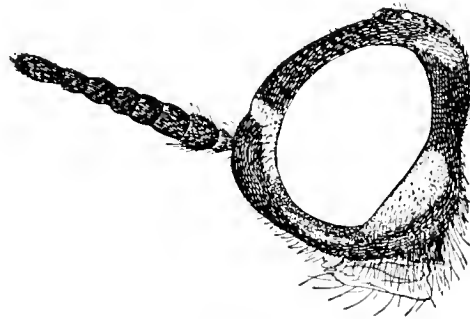


FIG. 114.—*Oxyera tenuicornis* ♀. × 32.

spot on each side behind the lower part of the eyes; face, which is hardly broader than the frons, consequently nearly all shining black; pubescence on the frons and face very slight and very sparse and all pale yellow, but on the moderate-sized jowls and on the lower part of the back of the head longer and more distinct; back of the head all very much puffed out, but slightly narrowest about the middle though broad even there, and with a large long pale yellow spot on each side against the eyemargin just below the middle; on the polished black part of the head above this spot there is scarcely any pubescence, but behind the ocelli there is a minute forward-directed pubescence. Eyes small but remarkably bulging. Antennæ as in the male (fig. 114).

Thorax shining black, finely and sparsely punctate; humeral knobs and a line along the upper margin of the mesopleuræ yellow, more broadly than in the male and continued rather vaguely beneath the wing-base along the

under margin of the metapleuræ; postalar calli conspicuously yellow; pubescence very short and slight, whitish and sloping backwards on the front part but sloping rather forwards on the rest of the disc, longer and more obvious on the pleuræ except on the bare middle part of the mesopleuræ. Scutellum and its spines entirely yellow, with practically no pubescence.

Abdomen shining black, with the tip and narrow sidemarginal lines (except on the basal segment) yellowish, but the sidemarginal lines hardly connect with the tip, as that consists of only the extreme hindmargin of the last segment and the base of the genitalia; pubescence all very minute. Genitalia brownish orange.

Legs mainly darkish orange, but at least the tip part of the front tibiæ and all the front tarsi black; femora usually slightly obscured about the middle, and there are variable and badly defined dark markings on the posterior legs to the extent that sometimes the tibiæ are all black except about the base and at the extreme tip, and the tarsi black except on the basal joint of the hind pair; or on the other hand, the posterior tibiæ may have only vague dark markings, and the basal joint of the middle tarsi and the two basal joints of the hind tarsi may be orange; or again, the front femora may be clear orange, and the hind femora may have a broad obscure ring about the middle.

Wings altogether more hyaline than in the male, with the darkened veins and the stigma sometimes more yellowish. Alar squamæ dull brownish with paler brownish fringes. Halteres whitish yellow.

Length about 4 mm.

This species requires no comparison with any known European one because its antennæ dissociate it from all the other species of the genus, but in other respects it would come near *O. terminata*. It varies considerably as mentioned above in the colour of the posterior legs, and even the black tip to the front tibiæ may vary from three-fifths to two-fifths, but yet that and the black front tarsi give a good distinctive character. I believe this is the first occasion upon which the male has been described, except for Brunetti's statement in *The Entomologist*, xxii., p. 84 (1889) that the legs of the male are "all entirely black," which is as incorrect as his statement that the legs of the female are "yellow with black tarsi tips."

An extraordinary variety of the male (fig. 115) was taken at Torquay on June 8, 1901, which may be immature, but which gives such remarkable abdominal markings that they may afford a clue to the true relationship of this abnormal species. The abdomen is blackish brown with three pairs of very large subquadrate obscurely yellowish spots on the second, third, and fourth segments, so that on these segments the abdomen may be described as obscurely yellowish with a fairly broad black dorsal line and narrower hindmargins, though when seen from above the front corners of the segments are indefinitely triangularly obscured; the basal segment is nearly all indistinctly yellowish, and the hind half of the fifth (and apparently all a sixth) segment yellowish; genitalia blackish, with a pair of short thick brown lamellæ. Belly black, with the yellowish upper markings indistinctly showing through. Legs black, tip third of the front femora and basal third of the front tibiæ orange; posterior tibiæ black with the base obscurely brownish orange; hind tarsi entirely black;

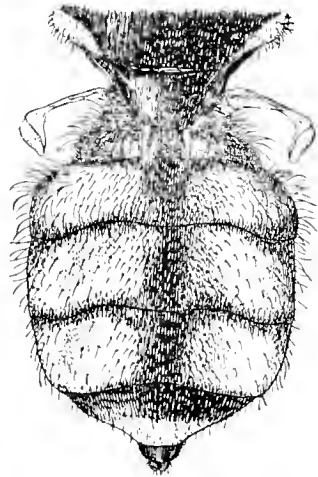


FIG. 115.—*Oxycera tenuicornis*
♂, var.

pubescence behind the anterior femora slight and greyish white. Alar squamæ glassy whitish, with a rather darkened margin and with short pale fringes. The abdominal markings of this specimen are entirely distinct from those of any known *Oxycera*, and are in proportion more like those of *Odontomyia ornata*; perhaps some day the discovery of the larva and the examination of immature imagines may lead to important results.

A male in Bigot's collection from Colorado labelled *O. Crotchi* Osten Sacken, has the antennæ of almost identical structure; it may be correctly named but has only the basal joint of the antennæ blackish, the other joints being mainly reddish orange; it has no basal pair of abdominal spots and the strong wing-veins are yellowish without any trace of reddish; it is by no means allied to *O. tenuicornis* except in the structure of the antennæ.

O. tenuicornis is very local, and is apparently confined to the extreme west of Europe and (according to Becker) to the Canary Isles. Macquart first described it in 1834 from a female taken near Bordeaux, and Mr J. C. Dale caught one female at Glanville's Wootton in Dorsetshire in 1842; a few other specimens were taken near this last locality by Mr C. W. Dale at various times, but it was not until 1897 that any other locality was known. In 1897 and subsequently it has been taken in considerable numbers in various localities in Herefordshire (Devereux Pool, Woolhope, and Shobdon Marsh) by Dr J. H. Wood and Colonel Yerbury; Mr C. G. Lamb has taken it at Milford in Hampshire; Colonel Yerbury found it fairly common at Porthcawl in Glamorgan, and informed me that some specimens were sitting on the leaves of Privet (*Ligustrum*), while others were obtained by sweeping the nearly dry bed of a stream in the sand-hills; Mr C. J. Wainwright took three females at Shaldon in Devonshire, and it occurred sparingly in the marshy ground near the river Deben in Suffolk on July 1, 1907. Dr J. H. Wood states that its habits are similar to those of *O. analis*. The dates range from June 18 to July 15, but I have mentioned above an extraordinary variety which was taken on June 8, 1901, at Torquay in Devonshire by Mr C. J. Wainwright.

Synonymy.—Macquart's original description of his *O. tenuicornis* in Suite à Buffon, Diptères, t. i., 251 (1834) is as follows:

"5. *O. ténuicorne*.—*Oxycera tenuicornis* Nob."

"Long. 2 lig. ♀. Semblable à l'*O. muscaria*. Troisième article des antennes plus grêle et plus allongé que dans les autres espèces; style court et peu distinct. Quatrième segment de l'abdomen un peu bordé de jaune. Moitié postérieure des jambes noire; postérieures noires."

"De Bordeaux; cabinet de M. Mahieu."

Macquart's *O. muscaria* was undoubtedly our *O. pygmaea*, as is proved by its size ("1¼ lig."), and his description of the antennæ could apply to only this species. By "quatrième segment de l'abdomen un peu bordé de jaune," which Loew considered "unbestimmt und unklar," he obviously referred to the last abdominal segment, and by "Moitié postérieure des jambes noire" he evidently meant that the end half of the front tibiæ was black, which is one of the strongest characters of this species. Loew probably had seen only the original female specimen from which Haliday had described the species, and consequently he could have had no idea of the range of variation in the species.

J. C. Dale's original description of *O. longicornis* in Ann. Mag. Nat. Hist., viii., 431 (1842) was obviously written by Haliday and is as follows:

"Curtis's Guide, genus 1217, OXYCERA."

O. longicornis.—"Nigra, maculâ laterali verticis, orbitâ internâ supra antennis repandâ, thoracis vittâ laterali, scutello et abdominis limbo flavis; antennis capitibus longitudine apice parùm attenuatis. ♀.

"Mr Haliday has this unique species, and I cannot give the exact measure, but it is about the size of *O. muscaria*."

"Nigra subglabra. Antennæ solito longiores et graciliores, articulis extremis parùm attenuatis, unde stylus indiscretus: os flavum: orbita postica et interna flavæ, hæc supra antennas in margine frontis inflexa. Vertex utrinque maculâ flavâ. Thorax vittâ laterali flavâ pone alas dilatatâ. Scutellum flavum. Abdomen limbo tenui flavo. Halteres albidî. Alæ hyalinæ nervis introrsum flavicantibus. Pedes cum coxis ferruginei: tibiæ anticæ apice, posteriores medio, tarsi antichi toti, posteriores apice fuscî."

"Seems very much similar to Macquart's *O. tenuicornis*, but the peculiar marking of the head may afford a distinction, as Macquart leaves us to infer that his agrees in that with *O. muscaria*, very different from yours."—*Hal. MSS. (in litteris)*.

Of course the *O. muscaria* of the above description refers to *O. pygmaea*. Walker's description of *O. terminata* in *Ins. Brit. Dipt.*, i., 23 (1851) probably refers to the female of *O. tenuicornis*, but what he meant by "abdominis vittis duabus posterioribus flavis" nobody has ever been able to understand, and he made no reference to the long antennæ; his *O. longicornis* refers again probably to Dale's original female specimen.

6. *O. Morrisii* Curtis. Cubital vein forked. Scutellum with only the tip yellow. Abdomen with five transverse whitish yellow isolated spots.

A very distinct species.

- ♂. Face and frons forming a small rather flat triangle; face with well-defined whitish side-stripes which are covered with dense short white tomentum, and the frons with less defined whitish side-bands, so that the extreme top of the frons, the middle of the frons, and all the middle of the face are black; face almost disappearing below the eyes but the jowls and the back of the head rather shining black, and all this part bearing fairly abundant rather long white pubescence; lower part of the back of the head puffed out, but the upper part hollowed out behind the eyes and without any trace of any postocular ciliation there when viewed from in front; vertex shining black, long and pointed, extending nearly half-way to the antennæ; behind the ocelli there is a slight dark fringe across the occiput, but there is practically no pubescence in front of them. Eyes touching for about a third of the distance between the occiput and the antennæ, and bearing very inconspicuous short sparse pubescence; facets on the larger upper part large and light brown, but those on the smaller lower part small and dark brown, the two parts being abruptly divided and contrasted. Antennæ dull black, short for an *Oxycera*; basal joints sometimes brown; arista longer than the annulated joint.

Thorax shining black; humeri yellow, and also a narrow line running from them to under the wing-base where it moderately widens, and then after an interruption reappearing as two or three spots on the back part of the pleuræ, and there is sometimes a small spot on the upper part of the sternopleuræ; postalar calli yellow. Pubescence fairly abundant and conspicuous though not dense enough to obscure the ground colour, whitish and bent forwards, rather long on the front part of the disc and on the front part of the pleuræ and on the hind part of the mesopleuræ, leaving the middle of the latter bare and shining but perpendicularly wrinkled. Scutellum shining black with the tip and the long spines yellow; pubescence very short and slight; metanotum shining black.

Abdomen shining black, with five isolated whitish yellow transverse spots which are placed at the hind corners of the third and fourth segments and at the tip; the side spots rather oblong, about three times as long as broad, and sloping upwards from the hind corners; tip spot a flattened triangle. Pubescence practically absent on the disc, being very short, sparse, and inconspicuous, but there are a few longer pale hairs as usual about the basal corners. Belly shining black, with all the middle of the disc of the second segment whitish yellow, as well as the hindmargins of the third and fourth segments and all the tip; pubescence ubiquitous, but very short and inconspicuous.

Legs black and orange; the black parts being the base of the coxæ, a ring on the middle third of the front femora, the apical half of the posterior femora except the tip, a small incomplete ring about the middle of the front tibiæ which is extended outside down to the tip, most of the posterior tibiæ except the base and tip and under side, all the front tarsi and all the posterior tarsi except the two basal joints, though many of these parts are only darkened instead of being black. Pubescence very slight and inconspicuous, but there are a few pale hairs behind the anterior femora.

Wings hyaline, stigma pale yellowish brown, and the anterior veins darker brownish yellow; the two submarginal cells together are about as long as the stigma, and if the veins themselves be included those two cells are almost equally long on the costa, but the open part of the second cell is shorter than that of the first. Squamæ small; margin blackish brown or blackish with a pale fringe. Halteres bright canary yellow or orange.

♀. Frons fully one-third the width of the head, shining black with the lower two-thirds of the sides yellowish white and very gradually widening downwards

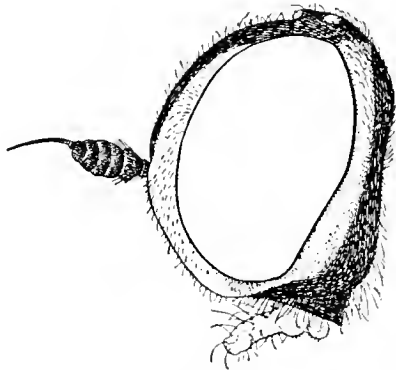


FIG. 116.—*Oxycera Morrisii* ♀. × 27.

but not touching the eyemargins on their upper part, and on the face these sides become more whitish and are continued all the way down, leaving the middle of the face sharply black, while the whitish sides are connected under the eyes by a narrow streak with the whitish yellow postocular band, and this band is narrower than usual and allows the black back of the head to be seen when viewed sideways; this postocular band terminates just after the upper corner of the eye, widening a little and sometimes becoming more orange on the upper part. Pubescence on the frons and face very slight, short, and inconspicuous, but on the lower

part of the back of the head longer and more obvious.

Thorax with very much shorter pubescence and consequently more shining; the yellow side lines larger and more conspicuous.

Abdomen with scarcely any pubescence. Belly yellow with large black spots on the sides of each segment, or even more black than that.

Legs with the darkened part of the anterior femora more brownish, and on the hind femora more restricted.

Length about 4 mm.

This species seems to vary but little unless in the amount of darkening on the femora and tibiæ. I believe the male has never been previously described. It has no known close allies, as its forked cubital vein, its extensively black scutellum and legs, and its isolated whitish yellow abdominal spots easily distinguish it.

O. Morrisii is a rather rare species, but occurs in marshy places in so many widely separated localities that I expect it only requires favorable conditions. I have records from Cornwall (Padstow, C. G. Lamb), Dorset (Lyme Regis, Curtis, Glanville's Wootton and Charmouth, J. C. Dale), Essex (Abbey Wood), Cambs (Wicken Fen, not uncommon in July 1875), Hereford (Pembridge, Colonel Yerbury), and Durham (Castle Eden Dene, J. C. Dale), while it was probably near Belfast that Haliday repeatedly took it when he found and described (Nat. Hist. Review, 1857, p. 193) what he believed to be the larva. My dates only extend from July 4 to July 25. It is at present recorded from only England and (probably) Ireland.

7. *O. terminata* Meigen. Cubital vein forked. Abdomen black with only the tip yellow. Wings without any dark cloud about the middle.

A well-marked very distinct species; easily distinguished from *O. analis* by the absence of any dark cloud on the wings.

♂. Face and frons forming a small black triangle, and in profile flush with the eyes, though the frons in some lights has a whitish sheen. Face small, clothed with rather dense short black pubescence, which becomes longer, thinner, and pale greyish about the jowls and the back of the mouth; jowls very small and when viewed sideways not produced from the eyes; back of the head scarcely puffed out on the lower part, while the upper part is almost hollowed out and bears no pubescence against the eyes, though there is a rather long straggly pubescence right out on the lower part of the back of the head; behind the ocelli there is a black pubescence, and even the pointed front end of the vertical space bears a minute pubescence. Eyes almost bare, as they bear only some sparse microscopical pale hairs; they are touching for two-thirds the distance between the occiput and the antennæ; facets very considerably enlarged on the prominent front part and only a little smaller on the upper part, but abruptly and very conspicuously smaller on the lower third. Antennæ orange on the two basal joints, but blackish on the third joint; all the joints short, and the style twice as long as the annulated third joint.

Thorax moderately shining black with narrow orange side lines from the humeri to the wing-base, and with slight indications of orange on the most raised parts of the postalar calli, rather coarsely and rather densely punctate. Pubescence short and black on the disc, sloping forwards except just on the front part where it slopes backwards; but longer and pale grey about the sides to a broad extent above the suture, and the pale grey pubescence extending (only shorter) almost to the middle of the disc above the suture, being quite distinct there from the short dense black pubescence; pleuræ with longer greyish white pubescence except on the large bare part of the mesopleuræ. Scutellum all brownish yellow except at the extreme base and corners, and sometimes even to the tip of the spines, but sometimes the tip of the scutellum and the spines are rather darkened; metanotum black, only slightly shining.

Abdomen moderately shining black, with the hindmargin of the last segment orange but not in any triangular shape; rather coarsely and rather densely punctate on the disc; pubescence very short and greyish black, but longer about the basal corners. Belly all black, with inconspicuous grey pubescence.

Legs dull orange, with only the coxæ and a fairly well-defined broad ring after the middle of the hind femora black, though the last three or four joints of the tarsi may be slightly obscured; claws black at the tip; in dark specimens the anterior femora are darkened all about the middle, and the black ring on the hind femora extends almost to the tip, while the hind tibiæ show a distinct, and the anterior tibiæ a faint, dark space about the middle. Pubescence almost imperceptible.

Wings with no sign of any dark blotch about the middle, but the anterior veins darkish brown up to the base of the discal cell, and to the end of the cubital vein, and down the stem of the postical vein; the veins forming the outer margin of the discal cell, and the veinlets issuing from it, are very faint but just visible; fork of the cubital vein at about the middle of the sub-marginal cell. Alar squamæ small and blackish, with a small tuft of greyish yellow hairs at the lower angle; thoracal pair only represented by a raised line. Halteres bright orange.

♀. Frons brightly shining black, distinctly more than one-third the width of the head and only sparsely punctate, bearing a very short fine greyish white sparse pubescence; there is a silvery white (ranging to obscure dull dark orange) spot on each side almost level with the antennæ; sides of the face very narrowly whitish; back of the head below the middle against each eye with a rather small long obscure orange spot, which is however often glossed with white, and there is a tiny elongate orange spot at the top of the vertex on each side near the upper eye-angles, but all these spots on the head vary

in size and colour; the back of the head is all almost equally and considerably inflated, shining black and almost impunctate. Eyes bare; facets all equal and small. Antennæ as in the male, but with the third joint rather larger and less blackish or even as orange as the others.

Thorax with the narrow whitish yellow line from the humeri to the wing-base very gradually widening; postalar calli hardly brownish; pubescence greyish white all over, fairly abundant and conspicuous but not so short as in *O. analis*.

Abdomen black, with only a triangular yellow spot at the extreme tip; pubescence all short and greyish white. Belly shining black, and bearing very short whitish pubescence.

Legs similar to those of the male, but the blackish ring near the tip of the hind femora sometimes extended on the under side; tarsi hardly obscured towards the tip.

Wings with the basal and anterior veins more yellowish, and the outer and posterior veins very faint. Alar squamæ smoky with a blackish margin and with the small tuft pale greyish. Halteres yellowish white.

Length about 4.25 mm.

This species cannot well be confounded with any other known European one, as *O. analis* has the whole of the veins round the discal cell conspicuously blackened so as to form a distinct dark blotch about the middle of the wing, and is also a larger species with a simple cubital vein; *O. leonina* is more allied but has a conspicuous yellow spot at the base of the abdomen, and *O. terminata* is distinguished from all others by the absence of any side spots on the abdomen. A very large female taken by Dr J. H. Wood at Stoke Wood on July 24, 1897, has a pair of isolated dark orange spots on the frons a little above the antennæ and well separated from the silvery side spots; it also has the legs duller orange. Other females when closely examined show traces of a similar pair of spots, but all the head spots vary in size and range in colour from obscure dark orange to glistening white, while the legs are subject to obscure darkenings on the femora and tibiæ.

O. terminata is very rare in Britain, though I do not doubt the Dorsetshire records of Dale and Curtis about seventy years ago. Dr J. H. Wood has taken several specimens since 1897 at Stoke Wood, near Tarrington, and he found it not uncommon in the Monnow Valley on July 3, 1906; Mr C. J. Wainwright took one female at West Malvern on June 8, 1901, in company with *O. analis*; all these localities being in Herefordshire. Dr Wood's captures ranged from June 20 to July 24. Its distribution is only known to extend from Denmark to Austria.

Synonymy.—Walker's *O. terminata* which has "*Abdomen with a narrow yellow border from the middle to the tip*" cannot possibly refer to this species, but (as Loew surmised) must refer to the female of *O. tenuicornis*. In Bigot's collection there were two males and two females labelled *O. terminata*, but both the males were *O. flavipes* and one female was *O. analis*, though the other female was *O. terminata* with the third joint of the antennæ and the ring on the hind femora only brownish.

8. *O. pardalina* Meigen. Cubital vein forked. Scutellum all yellow. Abdomen with united yellow markings round the margin. Legs mainly yellow.

A medium-sized handsome species.

♂. Face and frons forming a small shining black triangle, but there are very indistinct narrow yellowish eyemargins about the middle of the face; face with inconspicuous though not scarce short pale greyish pubescence, which is continued on over the very shallow space under the eyes to the longer whiter pubescence on the jowls and lower part of the back of the head; lower part of the back of the head shining black and but little puffed out, while the upper part is flush with the eyes and bears only very short dark pubescence; vertex shining black, long and pointed, and with some very short black pubescence behind the ocelli; frons bare and with a middle channel. Eyes touching for nearly half the distance between the occiput and the antennæ, clothed with short dense dark pubescence on the large facets but with still shorter and sparser pubescence on the small facets; facets on the large upper part large and pale brown, abruptly contrasted with the small blackish brown facets on the smaller lower part. Antennæ short, brown; arista long, being as long as the whole antenna.

Thorax shining black, with a yellow line running from the humeri to beneath the wing-base and thence on vaguely to the end of the pleuræ; postalar calli yellow; pubescence rather short and mainly black, but longer and greyer about the sides above the suture, fairly dense; pleuræ with longer, whiter, and much more conspicuous pubescence, but bare and polished on the usual depressed middle part of the mesopleuræ. Scutellum yellow with just the basal corners black, and with the long spines yellow but sometimes black at the tip; pubescence very short and inconspicuous, pale unless on the extreme basal margin; metanotum shining black.

Abdomen shining black with yellow side-markings and tip, densely punctate on the two basal segments and on the disc of the third and fourth; at each hind corner of the third segment there is a comparatively small triangular yellow spot, which only touches the hindmargin at the extreme side, and which extends on to the upper corner of the fourth segment and is narrowly connected along the sidemargin with a similar spot at each hind corner of the fourth segment; this latter pair of spots may extend vaguely considerably upwards on to the disc, and they are very narrowly connected on the actual sidemargin with the large apical spot, and this latter spot occupies all the middle part and end of the last segment; pubescence moderately long and greyish about the sides of the two basal segments but not very conspicuous, and very short, stubby, depressed, and black on the rest until it becomes greyish after the middle of the fourth segment and on to the tip. Belly shining black, with short rather sparse pale pubescence. Genitalia blackish, but the small terminal lamellæ brownish yellow.

Legs nearly all rather dull yellowish, but the hind femora considerably obscured even to an indication of a dark ring after the middle, while the hind tibiæ may be similarly darkened; coxæ and trochanters mainly blackish; front tarsi blackened except on the under side of the basal joint, and the posterior tarsi with the last three joints blackened. Pubescence practically reduced to a slight pale fringe behind the anterior femora.

Wings slightly brownish, but more notably so from the base to the end of the cubital cell but not including the veins which margin the outer end of the discal cell; cubital fork short but distinct, leaving the cubital cell about half as long as the submarginal. Squamæ (alar) small, smoky with blackened margins and pale fringes; thoracal squamæ absent, but the end of the frenum near the angle with a pale fringe. Halteres dull clear orange with just the base of the stem darkened.

♀. Frons distinctly more than one-third the width of the head, and the space between the eyes very faintly widening from the vertex to the mouth, brightly shining black with variable whitish or orange markings; there is always a conspicuous large white or yellow spot (varying somewhat in size and colour) on the postocular collar against the top angle of each eye, and lower down on the frons are two spots beginning just below the ocelli and well away from the sides which may extend downwards irregularly until they spread outwards at their lower end and quite (or almost) connect with the pale sides of the face, or they may be less extended and broken into two pairs of rounded spots which may be even small and widely separated, but still the lower spots are almost connected

with the pale sides of the face. Face with conspicuous broad glistening whitish sidemargins, and these margins are continued narrowly round under the eyes and extend broadly and conspicuously up the lower third of the back of the head, but the upper part of the back of the head is shining black, and the eye-collar is as wide as a third of the eye; pubescence inconspicuous but universal, mostly very short and pale but longer about the jowls and brownish on the frons. Eyes almost bare; facets all equal in size. Antennæ brownish orange, with the tip annulation and the arista dark brown.

Thorax shining black, with the yellow side-lines on the top margin of the mesopleuræ widening towards the wing-base and (as well as the postalar calli) more extensively yellow, and in addition there is a pair of widely separated whitish yellow straight lines on the disc extending from the extreme front margin (where they are slightly widened) to more than half-way between the suture and the hindmargin; sternopleuræ with a pale yellow spot on the top corner. Pubescence all very short and depressed though rather abundant, greyish white, but longer and whiter on the pubescent parts of the pleuræ. Scutellum more whitish yellow, with the spines yellow to their very tip.

Abdomen marked as in the male but with the yellow markings slightly larger, and these markings vary very considerably on the fourth segment; usually the extreme hind corners of the second segment are yellow and united with the triangular yellow spots on the third segment, and these latter occupy all the sidemargins of the third segment and are connected along the sidemargins with the yellow spots on the fourth segment, and these spots on the fourth segment may extend considerably more across the disc and are in their turn rather narrowly connected with the large yellow triangle on the fifth segment, which may extend right up to the foremargin of that segment; the spots on the fourth segment are sometimes narrowly united near the hindmargin. Pubescence short, light grey, and depressed, but longer about the basal corners. Ovipositor dull yellow, long and rather narrow when extruded.

Legs very much as in the male, but the hind tibiæ less darkened.

Wings almost as in the male. Squamæ rather less blackish. Halteres whitish, with the base of the stem blackish.

Length about 5 mm.

This species varies a good deal in the female in the extent and intensity of the yellow markings on the frons and abdomen and to a small extent in the dorsal lines on the thorax, but it may be distinguished from all other European species by its moderate size, its forked cubital vein, its connected abdominal side-spots, and its almost wholly yellow legs.

O. pardalina is a rare British species of which I had seen only one female specimen until 1901; that specimen was given to me by Dr T. A. Chapman and was presumably taken near Abergavenny, but Dr J. H. Wood has taken a considerable number of specimens in the neighborhood of Tarrington in Herefordshire during the last few years, and Colonel Yerbury has also taken it at Woolhope, Pembridge, and Cusop; I know of no other records except those given by Curtis and Dale from Dorset about seventy years ago. Dr Wood has informed me that the species appears to like the margins of small overgrown streams in hilly districts. The records extend from July 9 to August 20. It is recorded from all across Central Europe, but not from North or South Europe unless Zetterstedt's *O. maculata* is a synonym.

Synonymy.—There has been considerable confusion over the use of the name *pardalina*, but I accept Loew's interpretation of it when he described both it and the allied species *O. amœna* in 1857; nevertheless the solitary representative of *O. amœna* in Bigot's collection was a normal female of *O. pardalina*! Zetterstedt's *O. maculata* may be a variety with the scutellum mainly black, and as his species was described from one female only taken before 1837 in Lapland it may well be a small dark form of *O. pardalina*. I cannot make anything of Walker's *O. pardalina* except a bad description of the true species.

9. *O. pulchella* Meigen. Cubital vein forked. Abdomen with only two pairs of isolated side-spots and the tip yellow. Tibiæ yellow. Eyes of the male conspicuously hairy.

A large handsome species, distinguished by its five spotted abdomen and its yellow tibiæ.

♂. Face and frons forming a triangle (though with rather bowed sides) of which the base is slightly shorter than the sides; face black and clothed all over with dense greyish black pubescence; frons black, but with a pair of conspicuous shimmering whitish (in some lights almost silvery) spots on the upper part which leave the extreme top and a narrow dividing line black; lower black part of the frons bearing black pubescence but the upper part (including the spots) bare; jowls very small, but a long whitish pubescence extends under the eyes round on to the moderately puffed-out lower part of the back of the head; upper part of the back of the head sunken down behind the eyes, but a long greyish yellow pubescence can be traced on the actual back of the head; vertex shining black, rather small, and bearing rather long but not dense brownish yellow pubescence; proboscis yellow. Eyes touching for quite half the distance between the occiput and the antennæ, densely clothed with conspicuous long blackish or greyish black pubescence; larger facets on the larger upper part abruptly separated from the smaller facets on the smaller lower part but not much contrasted in colour in dry specimens (*vide* female). Antennæ rather long, brownish black; two basal joints with minute black bristles; third joint long and bare and bearing on its fourth annulation a dorsal arista which is almost as long as the annulated joint, and which is orange after its blackish base.

Thorax moderately shining black, densely and coarsely punctate, with a conspicuous large yellow spot on each side extending against the dorso-pleural suture from the humeri to the transverse suture; postalar calli conspicuously yellow and the yellow colour extending a little anteriorly on to the disc; beyond these markings the humeri are yellow, and also a line along the upper margin of the mesopleuræ to the wing-base which widens there considerably down the upper hind corner of the mesopleuræ, but there are no subsequent yellow markings. Pubescence ubiquitous, long, erect, and abundant (except on the middle of the mesopleuræ), but not obscuring the ground colour, yellowish brown, but more pale yellow on the front and back parts of the pleuræ. Scutellum orange, with the tip of the long straight spines blackened; pubescence yellow; metanotum shining black, moderately punctate and pubescent.

Abdomen moderately shining black, but dulled by the dense coarse punctuation, and with five conspicuous yellow spots; a large yellow spot slopes upwards from each hind corner of the third and fourth segments to almost the front margin, and the pair of spots on the third segment are still widely separated at their tips, but those on the fourth segment rather closely approximate; the spots on the third segment are larger than those on the fourth; tip of the abdomen also yellow, and none of these five yellow spots are connected on the sidemargins; pubescence on the disc minute, stubby, and black, but longer and greyish about the basal corners. Belly shining black with the middle of the disc of the second and third (and sometimes the fourth) segments yellowish, but most so on the second segment, and the yellow dorsal spots show over the sidemargins; all thickly but not so crowdedly punctate as on the dorsal surface; pubescence on the basal half rather long and whitish.

Legs black and orange; the black portion comprising the coxæ, trochanters, and basal five-sixths (except the extreme base) of the femora, and also the last four joints of the front tarsi and the last three joints of the posterior tarsi, while the hind tibiæ are sometimes a little darkened about the middle; pubescence behind the anterior femora more distinct than usual in an *Oxycera*, and all whitish. Pulvilli yellowish brown; claws small and black.

Wings (fig. 109) slightly smoky with all the veins distinctly marked; stigma

and subcostal cell yellowish brown, and the stronger anterior veins more pronouncedly yellowish brown than the weaker posterior veins, though these latter are by no means faint; all the veins enclosing the discal cell are almost blackish brown, and cause some trace of a dark cloud about the middle of the wing; upper branch of the cubital fork ending about half way between the ends of the radial vein and the lower branch of the cubital fork. Squamæ (alar) not large, blackish with moderate pale grey fringes; thoracal squamæ blacker still and forming a small lobe on which is dense long black pubescence.

- ♀. Frons orange, with the middle of the back of the vertex black and widening out and occupying all the space between the eyes until after the ocelli, and then the black colour slopes off outwardly from the eyes and is continued down the middle in a broad black stripe (more than a third the width of the frons) as far as the antennæ, and this black stripe is also continued down the middle of the face (though rather more narrowly); the yellow sides of the face (which have a whitish eyemargin commencing from about a third of the way up the frons) are not connected with the yellow postocular band because the narrow stripe below the eyes is darkened; yellow postocular band broad above but rather diminishing downwards until on about the lower half of the head it becomes rather silvery and the puffed-out black back of the head can be seen; pubescence general and whitish, but very short and inconspicuous except on the lower part of the head. Eyes with very short though not scarce dark pubescence; facets all equal in size; in life there is a purple band across a little above the middle, and the eyes above and below that are dark green but have the margins of the purple band lighter green. Antennæ (fig. 107) dull black, but often dark reddish orange from the beginning of the second joint to the end of the third annulation of the third joint.

Thorax rather similar to that of the male but the yellow markings are more extended, so that on the postalar calli the yellow marking spreads more upwards on to the disc, and there are two narrow widely separated yellow lines on the front part (though not quite to the front) which disappear at the suture, or only extend a short distance further after an interruption at the suture; pubescence on the disc very much shorter than in the male and all whitish, but on the pleuræ it is still rather long and conspicuously whitish.

Abdomen almost bare, with similar but brighter yellow markings, and in addition the middle of the basal segment is yellow. Belly more yellow.

Legs with the base of the posterior femora orange and sometimes broadly so; pubescence on the femora short and inconspicuous.

Wings more hyaline. Squamæ (alar) with very short fringes unless near the angle, but the thoracal squamæ with long whitish grey fringes.

Length about 7 mm.

This species has no close ally in Britain, as its yellow tibiæ distinguish it at once from *O. dives*, and the reputedly British *O. Fallenii* has three pairs of isolated abdominal spots.

O. pulchella is not very rare in England as I have records from Devon (Salcombe), Dorset (Glanville's Wootton), Kent (Belvedere), Surrey (Denmark Hill in garden), Suffolk (Felixstowe), Norfolk (West Runton), Hereford (Tarrington and Woolhope), Monmouth (Abergavenny), and Glamorgan (Porthcawl). I believe it more often occurs in odd specimens than in local abundance, and I think it is less attached to marshy ground than most of the other species. My dates only range from July 10 to 31. Kertész's Katalog records it from all Europe, but it is strange that Lundbeck does not seem to have met with it in Denmark.

Synonymy.—Walker revived Scopoli's name of *rara* for this species and possibly correctly, but too much uncertainty is attached to Scopoli's name. Moses Harris's name of *Musca tardigradus* undoubtedly refers to this species as his description is a good one; if however Meigen's name of *pulchella* be supplanted Scopoli's name has priority.

10. *O. dives* Loew. Cubital vein forked. Abdomen with five isolated yellow spots of which the second pair resembles the first pair in shape. Tibiæ black. Eyes clothed with dense black hairs.

A rather large very dark species.

♂. Face and frons forming a small black almost equilateral triangle but so densely punctate as to be rather dull, clothed with dense long black pubescence of which that on the frons is directed rather upwards; jowls and lower part of the back of the head mainly indicated by their abundant long black pubescence; upper part of the back of the head clothed with thinner, shorter, and scarcer pubescence; vertical triangle bearing long and rather abundant forwards-directed pubescence; proboscis orange. Eyes apparently touching for about one-third the distance between the occiput and the antennæ, but a row of black hairs exists between them which is longer than the contiguous pubescence on the eyes, and this latter pubescence is remarkably long, dense, and black, except that the hairs about the lower hind corners of the eyes may be rather greyish; facets on the larger brown upper part much larger than those on the smaller black lower part and the line of contrast well marked. Antennæ black or brownish black; two basal joints with short black bristles; third joint slightly longer than the two basal joints together; arista slightly longer than the annulated third joint.

Thorax black, considerably dulled by the dense coarse punctuation; humeral knob yellow, and also a line along the upper margin of the mesopleuræ, and this line begins rather narrow but widens a little downwards as it approaches the wing-base; there is also a small rounded yellow spot on each side at the point where the thoracal suture bends backwards; postalar calli sharply yellow as sloping oblong spots. Pubescence mainly long, dense, and black, but the hairs on the lower part of the pleuræ are thinner in texture and may be rather greyish. Scutellum bright yellow; spines orange but with the apical two-fifths black; pubescence black and rather long but sparse; metanotum shining black, transversely rugose.

Abdomen shining black, but obscured by the dense coarse punctuation on the second and third segments; the punctuation on the fourth and fifth segments is more scattered and hence the disc there is more shining; there are five large isolated yellow spots, being a pair on each of the third and fourth segments and one at the tip; the pairs of spots are large, but do not quite reach either front- or hindmargin of their segment, and they are rounded on their inner margin; the pair on the fourth segment are similar to those on the third but are slightly more transverse, and consequently the middle half of the dorsum is left black on the third segment, but as the fourth segment is narrower and the spots more transverse less than the middle third of that segment remains black; all these spots extend over only the hinder half of the sidemargins of each segment; tip with a large shallow transverse spot which is arched anteriorly but emarginate at the middle, and which leaves the whole foremargin of the segment black though more narrowly so on the middle. Pubescence all very short and black, though as usual rather longer about the sides of the two basal segments, dense where the punctuation is dense, but sparse where the punctuation is sparse. Belly all dull black; pubescence greyish black, fairly long and dense on the basal segments but short and blacker on the rest. Genitalia small and almost concealed but forming a flattened black arch and at the end there is a pair of short brownish-black pale-haired lamellæ.

Legs mainly black, but all the knees narrowly and the extreme tip of the tibiæ orange; tibiæ and tarsi with a brownish appearance which is mainly caused by the dense closely recumbent very short pubescence, though the base of the hind tarsi may be rather orange; soles of all the tarsi gilded; front femora shining anteriorly and bearing a slight black posterior ciliation. Pulvilli brownish orange; claws black.

Wings conspicuously blackened but slightly bleached near the tip and hindmargin; costal cell and base rather yellowish; veins mainly brownish black, but the basal half of the costal vein (excluding the base itself) and the

base of the lower branch of the postical fork yellowish; stigma small and inconspicuously pale brownish black; cubital fork distinct and the first sub-marginal cell longer than the stigma. Squamæ (alar) black with a tinge of grey in the black fringes. Halteres bright orange.

- ♀. Frons black with a pair of large orange spots almost on the lower half; these spots begin just where the frons bends over from the vertex, and each is of elongate oval shape but extends outwards at the lower outer corner and reaches the eyemargins and then extends down against the eyes to almost the level of the antennæ, after which very narrow whitish eyemargins extend down the sides of the black face until they widen out in a small yellow spot against each lower eye-angle; the black middle stripe of the frons is barely one-third the width of the frons, but the yellow spots do not touch the eyes until they extend outwards as mentioned above; frons quite one-third the width of the head and with almost parallel sides, and the face slightly wider, and both bearing inconspicuous drooping greyish pubescence; jowls inflated and shining black, but with a narrow whitish margin against the eyes which extends up the inflated lower part of the back of the head and forms there an elongate rather inconspicuous yellow spot; rest of the back of the head inflated and shining black, but with a large elongate shining orange spot on the upper half of the head which does not touch the eyes, and which is narrowest below but extends upwards to a level with the upper eye-angle and then slopes towards the occiput, so that the black connection between the vertex and the occiput is only half as wide as the space between the upper eye-angles; pubescence on the back of the head very slight and depressed; ocellar space elevated and the three ocelli obscurely yellowish. Eyes bearing fairly dense rather short black pubescence. Antennæ with the annulated third joint greyish; arista blackish to its tip.

Thorax shining black with orange side-spots and two dorsal stripes; dorsal stripes extended straight to the front part but interrupted at the suture, and only extended for about one-third the space after the suture (though Loew says that a small spot may sometimes occur after each of them); the stripes are rather wider apart than each is from the side-spots; humeral knob and a narrow line to the wing-base along the upper margin of the mesopleuræ orange, and above these side-lines there is on each side a triangular isolated orange spot above (but resting on) the suture; postalar calli broadly orange and extending triangularly to a point in the direction of the isolated spots; the narrow side-lines widen considerably near the wing-base but otherwise the pleuræ are black (unless the pteropleuræ are brownish). Pubescence minute, stubby, and greyish black on the disc, but longer, softer, and greyish white on the pleuræ.

Abdomen less dulled by punctuation; the two pairs of orange side-spots large and broadly ovate and only narrowly separated from each other, and occupying the sidemargins except at the basal corners of the fourth segment and on an extremely narrow actual margin; the first pair of spots leave the middle half of the disc black, but the second pair only rather more than the middle third; apical spot more separated from the second pair of spots than they are from the first pair. Belly shining black with a small basal orange spot, and the orange dorsal spots shining through on the margin.

Legs blacker; knees narrowly orange, and the hind trochanters obscurely orange as well as the extreme tip of the tibiæ and the soles of the tarsi.

Wings with a brownish orange tinge.

Length about 7 mm.

This species is easily distinguished by its brilliant black and yellow markings, rather large size, and almost wholly black legs. My description has been made from a male taken by Mr A. E. J. Carter (and given to me by him) and from a female without history (but apparently British) in the Entomological Club collection; it seems to be but little known, but has a very close ally on the continent in *O. locuples* Loew; this latter species seems to be rather common in places as Becker records (Berl. Ent. Zeit., xxxi., 97) the capture of fifty males and forty females at St Moritz, and

it differs from *O. dives* by having a large oblong yellow spot on each side of the thorax (where the small isolated spot occurs in *O. dives*) which extends more or less towards the humeral spot and usually connects with it, and by the last pair of abdominal spots in both sexes being more narrowly transverse, so that they are far more separated from the previous pair than is the case with *O. dives*; in my male specimen of *O. locuples* the last pair of spots are quite as widely separated from each other as in my specimen of *O. dives*, but in the female of *O. locuples* they are much closer to each other as they leave only the middle sixth of the dorsum black; the female of *O. locuples* has, I believe, always and the male sometimes (Becker says eleven out of forty) a third (basal) pair of abdominal spots, while the female has the frontal side spots larger and extending upwards almost to the upper ocelli, and the spots on the back of the head narrowed downwards but extending to the jowls; the legs of *O. locuples* are rather more yellow. Becker states that *O. locuples* varies considerably in its yellow markings, but he does not hesitate in considering it quite distinct from *O. dives*.

O. dives is very rare in Britain and I only know of four or five specimens. Walker first recorded it in 1851 as "Rare. In the collection of the Entomological Club. (E.)," and Brunetti (Entom., xxii., 86) stated that there was a large *Oxycera* in the Entomological Club collection allied to *O. pulchella*, but that it was not *O. dives*; I have however closely examined the specimen, and have made my description of the female from it, and have no doubt as to its determination; it has no history attached to it, but from its pin and general appearance I should think it was British. The next record is that of C. W. Dale (Entom. Month. Mag., April, 1898) who took a male at Rannoch on June 9, 1896; his record says June 18, but the specimen in his collection bears the date of June 9. Lastly Mr A. E. J. Carter (Entom. Month. Mag., January, 1904) took three males on the hills at Aberfoyle, near the waterfall known as Rob Roy's Leap, one on July 6th, one on July 8, and one on July 9, 1903, at rest on bracken (*Pteris*) in sheltered spots. Both the localities are in Perthshire, and I know no reason for Walker attaching (E.) to the Entomological Club specimen. It is recorded from only Central Europe.

11. ***O. trilineata*** Fabricius. Cubital vein forked. Thorax and abdomen green (or yellow) with black markings. Face practically all green (or yellow).

A very distinct species, because of the predominant green (or yellow) markings.

- ♂. Face and frons forming a small green (or yellow) triangle, but the sides of the face glossed with white; face and frons practically bare, but a very short pubescence exists on the face and is continued under the eyes to the small jowls and on to the back of the head, where it becomes longer and rather conspicuously whitish; the absolute back of the head is black, with the lower third very little inflated (for an *Oxycera*) and with a silvery postocular margin, and there is a faint pubescence extending upwards from this for a short distance; the ocellar space and the long pointed frons shining black, but behind the ocelli and extending somewhat on to the occiput is a conspicuous bright yellow spot which bears very short yellow pubescence. Eyes bare, touching for nearly half the distance between the occiput and the antennæ; in life greenish with a brownish red band on the dividing line of the facets; facets on more than the upper half large and in dried specimens reddish purple, but on the

sharply contrasted lower part small and blackish purple. Antennæ all reddish orange, rather short, being less than half as long as the length of the eye; arista longer than the annulated joint.

Thorax black with green (or yellow) stripes and markings, or practically green with three broad black stripes down the disc which become united on the hindmargin; middle black stripe considerably widened on its front half and extended right over the front, while the two side stripes are a little abbreviated forwards because the green lines connect in front; pubescence most evident on the front part of the middle black stripe, but existing everywhere, sloping inwards, and yellow. Pleuræ black, but green (or yellow) on the upper half of the mesopleuræ, the whole pteropleuræ, and on the adjoining part of the sternopleuræ; pubescence fairly long and conspicuous on the front and back parts of the pleuræ, but leaving the upper and middle parts of the mesopleuræ bare for the reception of the front femora. Scutellum and its spines pale green (or yellow), but the extreme tip of the spines black; pubescence practically none; metanotum black, with pale pubescence, but the sides between the metanotum and the metapleuræ are more or less green or yellow.

Abdomen mainly green (or yellow); but if black be taken as the ground colour the green (or yellow) markings occupy all the base of the basal segment and extend considerably on to the middle of its disc, all the sides of the second segment broadly and also an arc or shallow triangle on the middle of its foremargin, similar markings on the third segment only the side spots are larger, all the fourth segment except long narrow black spots on the fore and hind margins, and practically all the fifth segment; pubescence very slight and inconspicuous, though there are some dullish white hairs about the basal corners and on the disc of the fourth and fifth segments. Belly all greenish yellow (or yellow) with obscure darkenings on the third and extensively on the fourth segment. Genitalia orange at the tip.

Legs all dull orange, even to the coxæ and to the extreme tip of the tarsi, though the hind coxæ may be blackish about the base anteriorly. Pubescence limited to some slight and pale hairs behind the anterior femora and beneath the base of the hind femora.

Wings very hyaline, but the anterior veins (excluding the discal) distinct and yellowish; cubital vein forked, and the open part of the second submarginal cell a little shorter than the first; discal vein so faint about its base as to be sometimes almost imperceptible. Squamæ (alar) yellow and fairly large, but with no fringe until the lower corner; thoracal pair nearly semicircular and with long pale yellow fringes. Halteres with light green or clear yellow knobs, but with the base of the stem more or less brownish.

- ♀. Head greenish yellow (or yellow) with a narrow middle black line down the frons, which line is slightly widened on its upper part, and with the eyemargins on the upper three-fourths of the frons narrowly but inconspicuously black, and these three black lines are connected at the top by a conspicuous black line which extends from the upper corners of the eyes across the ocelli; frons barely one-third the width of the head; back of the head very considerably puffed out and continuously shining yellow and bare on the upper part, but whitish near the eyes, and with whitish pubescence on the lower part.

Thorax usually almost as in the male, but the greater part of the metapleuræ and hypopleuræ greenish (or yellowish), and sometimes there is a narrow elongate black spot just above the base of each wing (of which I have seldom seen a trace in the male).

Abdomen usually as in the male, but sometimes (and strangely in those females only which have the narrow sharply marked black spot above the wing-base) with the green side spots on the second and third segments connected on the foremargins with the middle green arc, and sometimes the entire hindmargins of the second, third, and fourth segments narrowly black.

Legs, wings, etc., almost as in the male.

Length about 5 mm.

This species varies exceedingly in the colour of the pale markings from clear green to clear yellow (though I think they are always green in the

living insect), but it does not vary much in the extent or distribution of the markings except as mentioned above under the female. I cannot believe that the specimens which have a black spot above each wing-base are distinct, even though the distinct abdominal markings occur in those same specimens, and consequently I cannot believe in Loew's *O. proxima* being anything more than a variety in which there are the same black spots on the thorax and a somewhat different variation on the second abdominal segment (on which Loew says the two black bands are united). Sometimes the last annulation of the antennæ and the arista are brownish; Brunetti (Entom., xxii., 84) stated that "a not uncommon variety known " as *collaris* is yellow instead of green," but I have never met with that name used elsewhere. Its metamorphoses have been described by Heeger (Sitzber. Akad. Wien, xx., 1856). Some closely allied species occur in European and Asiatic Russia, but they have the belly much more black.

O. trilineata is probably the commonest British species of the genus, but yet is by no means common. I have records from Devon, Dorset, Somerset, Hampshire, Sussex, Kent, Surrey, Essex, Cambs, Suffolk, Hereford, Glamorgan, Renfrewshire, and Haddington, while Duncan says it is common in Ireland. My dates extend from July 4 to September 2. It is one of the commonest species in Europe, and is recorded from middle Scandinavia to Sicily.

Synonymy.—A variety, with clear yellow for the ground colour, represents *Musca hypoleon* of the Linnean Collection according to the specimen nearest the middle of the label, the other specimen attached to the same label being *O. pulchella* (t. Haliday Stett. ent. Zeit., xii., 137). Brunetti's var. *collaris* was apparently a name imposed by himself as I cannot trace it elsewhere. Lundbeck calls attention to the fact that Brünniche described this species in 1761 but without a name, and that Pontoppidan gave it the name of *græca* in 1763 but gave no description.

4. NEMOTELUS.

Nemotelus Geoffroy, Hist. des Ins., ii., 542 (1764).

Rather small flies of obviously black ground colour, but usually with conspicuous white spots or markings in the male which may almost cover the dorsal surface of the abdomen.

Face very short in depth but conspicuously produced forward into a snout (figs. 118, 119), and the part of the frons just before the antennæ often with a pair of white spots which usually coalesce in the male; mouth opening large and long, with a long geniculate rather thin proboscis which bears small sucker-flaps; palpi very small and thin, with a few little bristles at the tip. Eyes usually apparently bare but sometimes distinctly hairy, large and very closely approximated on the frons of the male, but small and widely separated on the frons of the female, and while only the lower part of the back of the head protrudes in the male (in profile) the head protrudes all round the eyes in the female; facets on about the upper two-thirds conspicuously dilated in the male in obvious contrast to the smaller facets on the lower third. Antennæ rather long; two basal joints about equally long and almost bare; third joint elongate, pegtop-shaped, with four distinct annulations and a two-jointed terminal style which ends in a very thin hair and which bears about two minute hairlike plumes on its thickened part.

Thorax almost quadrate but rather longer than broad, black with usually at least a white spot on the humeri which may be connected by a thin line with a white spot at the hind top corner of the mesopleuræ, and these white markings give good specific characters in both sexes; mesopleuræ with the usual bare space for the reception of the front femora unusually large and depressed. Scutellum without any marginal spines; metanotum usually pubescent on its disc.

Abdomen broader than the thorax but hardly longer, short and elliptic, rather arched, and with five or six visible segments; always with a black ground colour, but usually with peculiarly characteristic white markings which may predominate all over the middle part in the male, but which are commonly reduced in the female to a whitish margin and a row of small dorsal spots, and usually in both sexes there are whitish markings on the belly. Genitalia inconspicuous but probably affording good specific distinctions.

Legs simple; tibiæ and tarsi usually extensively whitish; front legs very widely separated from the posterior pairs, these latter being close together.

Wings (fig. 117) of the Stratiomyid type in having the veins to the end of the

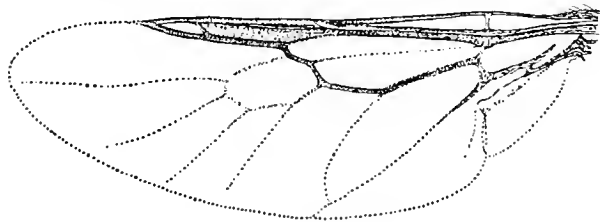


FIG. 117.—*Nemotelus uliginosus* ♂. × 14.

cubital crowded together on the foremargin and with the veinlets from the discal cell faint; subcostal and radial veins almost anastomosing, so that the radial is lost unless it is indicated by a slight fold just below the subcostal; cubital vein starting a little before the base of the discal cell and connected by the discal cross-vein with the discal cell on the basal third of the latter, and usually (but not always) forked before its tip, and ending at about three-quarters the length of the costa; upper branch of the postical vein forming the lower margin of the discal cell for nearly half the length of the latter; wing-membrane practically bare and without any ribs or ripples. Squamæ small, but the alar pair distinct and the thoracal pair forming a small roundish lobe which bears a long delicate fringe. Halteres in no way concealed.

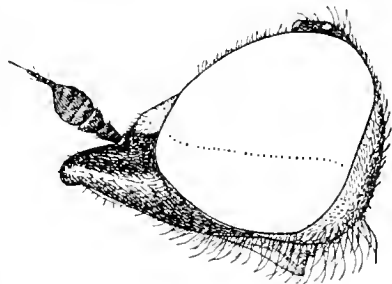
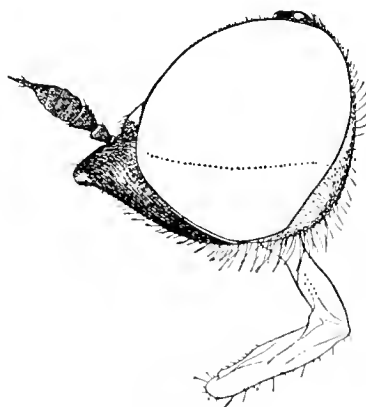
This genus may be easily recognised among the *Clitellarinæ* by its unarmed scutellum and its produced snout-like face.

Nemotelus is a very well-marked genus and is composed of a large number of closely allied but yet usually easily distinguished species, and it is unpardonable for anybody when describing a new species not to mention its nearest allies and its distinguishing characters from them, as it is not fair to subsequent students to have to wade through a detailed description in order to find the position of the *supposed* new species in the genus. The genus is recorded from all Europe, Asia Minor, North Africa and down the Eastern side to the Cape, America from Canada to Patagonia, Cuba, Jamaica, etc., but nearly all the species are Palæartic or North American. About seventy species have been described, of which about fifty are Palæartic, but I have been able to recognise only four as inhabitants of Britain; and I hardly expect to find any more. The metamorphoses of *N. uliginosus* were given in detail by Haliday in Nat. Hist. Rev., 1857, 194, and he found the larvæ “common under dried-up Confervæ and other vegetable matter strewed on the ground, especially “in marshy spots on the shore.”

The species frequent marshy ground, especially on the sea-coasts, and usually occur in abundance, while it is by no means unusual to find two species in company; they however also occur inland, and possibly *N. nigrinus* is entirely a fresh-water species. I once saw the males of *N. uliginosus* performing an aerial dance about two feet from the ground in the marshy land near Landguard Fort in Suffolk, and in this dance the white markings on the abdomen became very conspicuous.

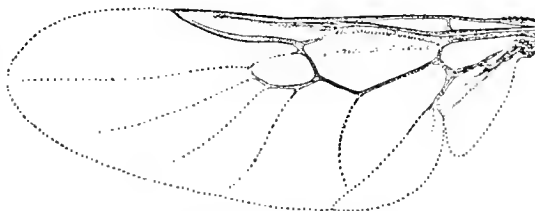
Table of Species.

- 1 (12) Cubital vein forked (fig. 117). Abdomen with whitish markings.
 2 (7) Males. Eyes touching on the frons. Abdomen with extensive conspicuous white markings.
 3 (6) Snout moderately long (fig. 118).
 4 (5) Belly mainly whitish; third dorsal segment wholly white, but the fourth wholly black. 1 *pantherinus*.
 5 (4) Belly nearly all black; third dorsal segment wholly white, and the fourth with the hindmargin white. 2 *uliginosus*.
 6 (3) Snout short (fig. 119). Belly with a large whitish spot; third dorsal segment white with a round black spot (or more) on it. 3 *notatus*.

FIG. 118.—*Nemotelus uliginosus* ♂. × 22.FIG. 119.—*Nemotelus notatus* ♂. × 22.

- 7 (2) Females. Eyes widely separated on the frons. Abdomen with small white spots or markings.
 8 (11) Snout moderately long.
 9 (10) Frons without any whitish streaks just above the antennæ. Whitish margin of abdomen almost equal. 1 *pantherinus*.
 10 (9) Frons with whitish streaks just above the antennæ. Whitish margin of abdomen dilated at junction of segments. 2 *uliginosus*.
 11 (8) Snout short. Whitish margin of abdomen extended considerably along the hindmargins of segments. 3 *notatus*.
 12 (1) Cubital vein simple (fig. 120). Abdomen all black. 4 *nigrinus*.

The three species with the forked cubital vein may appear to be difficult to distinguish considering their manifold variations in markings, but they are really quite distinct; and as species of *Nemotelus* always occur gregariously there should be no difficulty in naming them, even if two species should occur in company.

FIG. 120.—*Nemotelus nigrinus* ♀. × 15.

1. **N. pantherinus** Linné. Face moderately produced; frons white in the male but unspotted black in the female. Abdomen of the male mainly white both dorsally and ventrally, but black dorsally at the base and on the last two segments except on the sidemargins and on the hindmargin of the fifth segment; abdomen of the female black with an almost equal whitish margin and the usual white dorsal spots.

♂. Face shining black, but with an obscurely brownish stripe down the top of the snout; frons all white (except immediately above the antennæ) with a narrow middle channel, and the front margin of the white part scarcely notched at the middle; face in combination with the frons produced out to an almost pointed cone or snout more than one-third the length of the eye in profile and not at all curved over at the tip; frons bare, but the face bears a short sparse adpressed pale pubescence which is continued along under the eyes and which gradually becomes longer and more erect on to the lower hind corner of the eye, after which it becomes rather shorter again up the back of the head; near the eyes on the lower half of the back of the head there is a very short closely adherent pale grey postocular pubescence; vertex shining black, long and pointed, with some very short whitish pubescence between and behind the ocelli; ocelli yellow; proboscis geniculate, long, and black. Eyes apparently touching for about one-third the distance between the occiput and the antennæ, but a minute fine pubescence extending from the vertex almost down to the white frons shows that they are not absolutely touching; facets on the upper two-thirds dilated and much larger than those on the lower third, so that on the upper part the eyes are made to bulge over the occiput; in life the eyes are all dark green or blue green. Antennæ dull brownish black, placed in a depression just before the middle of the snout; the annulated third joint longer than the basal two together, and bearing at its tip the style, which is about as long as the last three annulations of the third joint together, and which is reduced on its apical quarter to a fine hair, whilst there are about two tiny plumes situated at about half its length.

Thorax and scutellum shining black and finely punctate, with a small whitish yellow spot on the humeri and usually (but not always) with a narrow line from it to the wing-base and thence down between the mesopleuræ and pteropleuræ; postalar calli slightly brownish. Pubescence rather abundant but rather short, whitish yellow, erect or sloping forwards, and universal except on the depressed middle part of the mesopleuræ; rather shorter on the scutellum.

Abdomen shining whitish (in life) or pale yellowish, but black on the middle part of the basal segment, and thence on to the middle of the second segment (for from one- to two-thirds of its length) as a semicircular or almost triangular black spot, and the fourth and fifth segments mainly shining black, but the actual margin of the abdomen all round is white (in life) or pale yellow, and usually on the fourth segment there are two long shallow white (in life) or yellow spots on the extreme foremargin (sometimes continued to the sidemargins or even continuous right across the foremargin) and one middle spot on its hindmargin, but sometimes the latter spot is missing and so are not unfrequently the spots on the foremargin; pubescence universal and pale yellow, but very short and inconspicuous. Belly all shining yellowish except for the darkened extreme base and a blackish line on the middle of the extreme foremargin of the fifth segment, but sometimes the belly is considerably blackish on the fourth segment and on nearly all the fifth segment, with a slight darkening near the sides of the hindmargin of the third segment extending almost all across and occupying nearly half the segment, and with the fourth and fifth segments mainly black, or even brown at the base with the third segment bearing a brown fascia. Genitalia when extruded with black side lamellæ which have pale pointed tips, between which are rather shorter dull yellowish or darker lamellæ.

Legs black but considerably orange or almost whitish yellow; femora shining black, but with the tip broadly yellow and sometimes the base obscurely brownish; anterior tibiæ orange, with occasionally a slight dark

ring just below the middle or even a blackish postero-dorsal streak there, or with even a broad band on the middle tibiæ from near the middle to almost the tip; hind tibiæ black with the basal quarter and just the tip orange; all tarsi pale orange to the very tip so that the black claws became conspicuous. Pubescence on the coxæ, and a moderately long fringe behind the anterior femora, pale yellow.

Wings glassy hyaline, with very faint veins except for the yellow veins on the front part of the wing from the base to the basal part of the discal cell and thence on to the end of the cubital vein. Squamæ clear pale yellow, alar pair with a whitish fringe, and the thoracal pair forming a somewhat longish lobe which bears a long pretty whitish fringe. Halteres clear yellowish white, with the base of the stem a little darkened.

♀. Very different from the male. Head very elongate triangular; snout almost as long as the eye in profile, and brown dorsally after the antennæ; frons without any white spots, though the sloping smooth spaces can generally be traced on which the spots should exist because the adpressed short white pubescence shows up more obviously above and below these spaces; pubescence short and adpressed but rather obvious (because of its white colour) on the sides of the frons and on the back of the head and to a less extent on the snout, though it is conspicuous on the upper part of the snout between the antennæ and the eyes. Eyes so small that the rather rumpled frons between them occupies more than one-third the width of the head, while the space behind them is widely inflated but not the space below them. Antennæ placed at about two-thirds the length of the snout; third joint larger and more distinctly annulated than in the male.

Thorax more coarsely punctate, and with the white side-markings almost reduced to a small humeral spot. Pubescence greyish white, rather depressed and sloping inwards and forwards, shorter than in the male but still obvious.

Abdomen shining black, with a short triangular white spot on the middle of the hindmargin of the second, third, and fourth segments, but these spots vary somewhat in size and intensity and the one on the hindmargin of the fourth segment is always small and may sometimes be absent; there is also a continuous almost equal white margin all down the sides and round the hindmargin of the fifth segment; segments after the fifth one small and mainly whitish; pubescence whitish and universal, but very short and depressed. Belly all shining black, very sparsely punctate, and occasionally the foremargin of the second segment and the hindmargin of the third and fourth segments narrowly yellowish, while indications of this may occur on the subsequent segments; margin all equally white; pubescence whitish, sparse, and inconspicuous.

Legs as in the male.

Wings, squamæ, and halteres as in the male.

Length about 5 mm.

This species varies a little, but not so much as *N. uliginosus* and *N. notatus*. The white markings of the abdomen of the male are liable to discoloration, especially about the hind corners of the third segment, and a male taken at Tuddenham on June 27, 1880, has a small roundish sharply defined black spot on the third segment close to the middle of the foremargin; the belly of the male varies from being all whitish yellow except for a pair of long transverse reddish spots on the second segment and a small narrow black spot on the middle of the base of the fifth segment to being extensively blackened even to the hind half of the third segment and on all the fourth segment except two spots on the foremargin, and on all the fifth segment except the hindmargin (which widens at the middle almost up to the foremargin), and even partially blackened on the second segment.

More remarkable than any other variety is a male taken by Colonel Yerbury at Kenmare in Co. Kerry on June 30, 1901, which I once thought might belong to a

distinct species, as it is smaller, and has the snout short; eyes rounder; thorax with the humeral spot very small, and the pubescence whiter and slightly shorter; abdomen more milky white with the basal black spot more quadrate, and the fore-marginal white spots on the fourth segment meeting narrowly on the middle and connecting widely with the whitish sidemargins, while the spot on the hindmargin is absent, and the hindmargin of the fifth segment bears two fairly large long white spots which are narrowly connected at the middle and with the sides; belly all whitish yellow except the small black base and the rather blackened hind corners and obscured middle of base of the fourth segment, and the black sides of the fifth segment before the white sidemargins; genitalia possibly different, pale yellow; anterior tibiæ with a broad ill-defined blackish band; tarsi and knees more whitish yellow.

A continental specimen from Kowarz's collection also has the spots on the foremargin of the fourth abdominal segment widely connected with the white sides and narrowly connected on the middle, but the anterior tibiæ without any trace of darkening. The species may be known from its British allies by the small whitish humeral spot and the whitish line from it being not widened near the wing-base, by the more whitish yellow parts of the legs, by its less coarse pubescence, by the (usually) sharply defined whitish second and third and abruptly black fourth and fifth abdominal segments of the male, and by the extensively white belly markings; while the female is known by the absence of any white spots on the frons, and by its whiter pubescence and squamæ.

N. pantherinus is probably abundant in suitable marshy localities in Britain, but my authentic records are limited to Cornwall (Padstow), Devon (Porlock), Sussex (Lewes), Kent (Folkestone), Suffolk (Tuddenham and Barton Mills), Cambs (Burwell and Chippenham), Hunts (Monk's Wood), Hereford (Woolhope), Glamorgan (Porthcawl), and Haddington (Aberlady), besides the peculiar specimen taken by Colonel Yerbury at Kenmare in Co. Kerry; it is of course impossible to be certain as to the species in old records. My dates extend from May 15 to July 5. It is common over Northern and Middle Europe, but perhaps does not occur in the extreme North nor in South Europe.

Synonymy.—Linné's original description of *Musca pantherina* in *Systema Naturæ*, ed. x., 590 (1758) was as follows:

"6. *M. antennis filatis, corpore atro, abdomine dorso maculis tribus, marginibus totidem connatis albis.*"

"*Habitat in Svecia.*"

"*Similis M. Hydroleoni, sed scutellum integrum. Antennæ clavatæ breves. Corpus nudum. Abdomen depressum, marginatum; incisuris margine medio albis et margine laterali.*"

The words "*scutellum integrum*" and "*abdomine dorso maculis tribus, marginibus totidem connatis albis*" can only refer to some female *Nemotelus*. If the word "*totidem*" mean that there were "as many" white spots connected on the margin as existed on the dorsum the description would apply best to *N. uliginosus*, but if it mean "in like manner" it would apply best to *N. pantherinus*; the absence of any note of white spots on the snout would apply to *N. pantherinus* only of our species.

In *Systema Naturæ*, ed. xii., 980 (1767) Linné repeated this description word for word down to the word "*incisuris*" after which he added "*3 margine medio albis et margine laterali; incisuræ 2 ultimæ margine albo. Punctum album utrinque ad basin thoracis.*" This description would still more clearly refer to *N. pantherinus* if the "*Punctum album ad basin thoracis*" refer to the whitish humeri.

But in the meantime in *Fauna Suecica*, ed. ii., 440 (1761) Linné described the species as:

"*MUSCA pantheriana antennis filatis, corpore atro, abdominis dorso maculis tribus, marginibusque totidem connatis albis.*"

“Habitat rarius heic loci.

“DESCR. Minor. Caput nigrum occipite puncto flavo. Antennæ flavescentes. Thorax flavis lineis tribus latis apice connexis. Scutellum flavum. Halteres flavi. Abdomen flavum segmentis margine nigris: tribus prioribus macula nigra trans-versa. Alæ hyalinæ.”

This *diagnosis* is obviously a repetition of the one given in 1758, but the *description* obviously refers to *Oxycera trilineata*, and it seems probable that Linné had recognised his mistake in 1767 when he gave his revised description of *M. pantherina*, as on the same page he described *M. trilineata* and *M. hypoleon*, which are believed to be the green and the yellow forms respectively of *Oxycera trilineata*, and in his description of *M. trilineata* some words occur almost identical with those given in the Fauna Suecica “description” of *M. pantheriana*.

I think it may therefore be accepted that Linné’s name of *pantherina* may be applied to this species, but that his “description” of *M. pantheriana* in the Fauna Suecica applies to *O. trilineata*.

The next name that has been considered applicable to this species is that of *Stratiomys marginatus* of Fabricius, whose original description was:

“10. S. scutello inermi, nigra, abdominis margine tibiisque albidis.”

“Habitat in Anglia. Mus. Banks.”

“Caput nigrum, antennis filatis, basi connatis. Thorax nigro-æneus, immaculatus. Abdomen depressum, atrum, margine maculisque aliquot dorsalibus obsoletis, albidis. Femora nigra, tibiæ pallidæ, alæ albæ.”

This is almost certainly the description of a female *Nemotelus* which occurs in England, and, as *N. notatus* was not recognised as a distinct species until sixty years later, and its female has the whitish abdominal margin extended along the hind-margins, that may be excluded. The words “abdominis margine...albidis” and “caput nigrum” apply more accurately to *N. pantherinus* than to *N. uliginosus*, and consequently Fabricius’ name may be allowed to sink as a synonym of *N. pantherinus*, though I do not for a moment believe that Fabricius recognised the distinction of the regular margin of the abdomen in *N. pantherinus* from the irregular margin of *N. uliginosus*.

2. *N. uliginosus* Linné. Face moderately produced; frons with white markings in both sexes. Abdomen of the male mainly whitish, and the belly of both sexes black with a rather large white spot near the base.

♂. Face shining black, and in combination with the frons produced out to a rather prominent cone or snout (fig. 121) which is more or less brown and slightly curved down at its tip; frons pale yellow or whitish right down to the antennæ with a very narrow dividing middle line; frons bare, but the snout with a little short pale pubescence on its sides and beneath; jowls very shallow but not small, shining black with fairly long sparse brownish yellow pubescence; back of the head slightly puffed out and bearing short brownish pubescence; vertex shining blue black with short pale pubescence behind the ocelli, and there is a rather dense short brownish yellow pubescence extending down between the eyes almost to the antennæ. Eyes bare, almost touching for about one-third the distance between the occiput and the antennæ; facets on the upper two-thirds larger than those on the darker colored lower third, but not very conspicuously so and not bulging over the occiput. Antennæ dull blackish brown, rather long but rather thick, and placed in a depression about half-way down the snout; third joint conspicuously annulated and bearing an apical style, which is nearly as long as the annulated joint and which becomes abruptly thin and hairlike on its apical quarter, while the style itself bears two or three minute plumes.

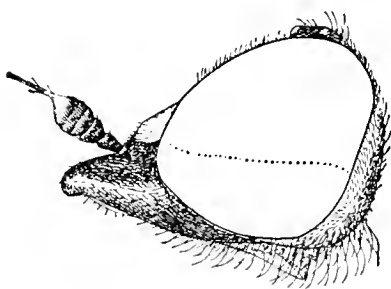


FIG. 121.—*Nemotelus uliginosus* ♂.
× 22.

Thorax and scutellum shining black; humeri with a rather large oval pale

yellow spot which is connected by a narrow line to a widening yellow streak which extends along the upper margin of the mesopleuræ to the wing-base, and which is then turned a little downwards. Pubescence rather abundant, nearly erect and not short, brownish yellow, but longer on the pleuræ, and universal (even to the disc of the metanotum) except on the large middle part of the mesopleuræ.

Abdomen shining whitish yellow, but black on most of the basal segment (except the hindmargin towards the sides) and for nearly half-way down the middle of the second segment, and with rather more than the basal half of the fourth segment black (*vide* variations later on), and most of the fifth segment except a wide flatly arched spot on the hindmargin, but all the actual margin of the abdomen is whitish except perhaps on the last half of the fifth segment; not uncommonly the fourth segment is more whitish until there may remain only three black spots against the foremargin, which may vary considerably in size and shape and may even be reduced to three very small upright narrow black spots, while the whitish part of the fifth segment may occupy all the hindmargin; pubescence universal but very short and inconspicuous, pale yellow. Belly black with the middle third or more of the second segment whitish yellow, and the extreme hindmargins of the third and two following segments obscurely yellowish; the extreme margin is also yellowish; third segment sometimes with just the middle part yellowish, while sometimes the fourth segment has barely the basal half black and even on that a pair of widely separated yellow spots near the foremargin, and the fifth segment may have a broad yellow hindmargin; pubescence sparse, depressed, short, and pale. Genitalia black, with broad brownish lamellæ and outside them a pair of thin black spines.

Legs almost as in the allied species, but there is a slight postero-dorsal darkening on the anterior tibiæ just after the middle even sometimes forming a pale brown ring, and the base and tip of the hind tibiæ are orange on nearly the basal third and the apical quarter so that the black ring occupies hardly half the tibiæ; claws more conspicuously orange at the base.

Wings (fig. 122) very similar to those of the allied species. Alar squamæ

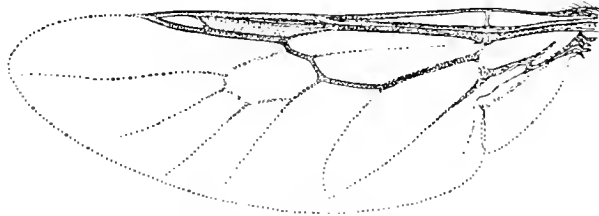


FIG. 122.—*Nemotelus uliginosus* ♂. × 14.

light brownish glassy with a yellow margin and a short pale fringe; thoracal forming brown roundish lobes and bearing a rather long light grey fringe. Halteres yellowish white with the base of the stem a little darkened.

- ♀. Very different from the male. Snout as long as the eyes (in profile); frons rather coarsely roughened which causes it to be less shining, more than one-third the width of the head, and bearing a pair of large conspicuous yellowish white or orange spots a little above the antennæ which slope forwards and almost meet; pubescence scattered, but in perfect specimens forming a large patch on the middle of each side and obvious because it is whitish, and this scattered pubescence extends down the snout and jowls, but is much more dense on the swollen out back of the head, and is more adpressed and conspicuous there. Eyes small; facets all small and equal. Antennæ placed about half-way down the snout and hardly so far forward as in *N. pantherinus*.

Thorax rather thickly punctate; the whitish humeral spot large and connected along the top of the mesopleuræ by a narrow line with the dilating præalar spot on the mesopleuræ. Pubescence short and adpressed, whitish yellow, universal but not abundant.

Abdomen shining black with a whitish yellow or orange spot on the middle of the hindmargin of the second, third, and fourth segments, and these spots though varying in width are almost equal in size; sidemargins continuously yellow or orange and connected along the hindmargin of the fifth segment, but the sidemargins dilate near the hind corners of the second, third, and fourth segments; sixth segment very small but with an obvious yellowish hindmargin; pubescence almost absent as it is so very short, sparse, and whitish yellow; ovipositor forming two small broad brown lamellæ. Belly shining black, with the foremargin of the second segment and the hindmargin of the third and fourth segments obscurely yellowish; sidemargins narrowly but equally yellowish; pubescence rather sparse, but universal and pale yellow.

Legs almost as in the male.

Wings and halteres as in the male. Squamæ yellow, with pale yellow fringes.

Length about 5.25 mm.

This species varies within the usual limits of variation in the species of *Nemotelus*, but may be distinguished from our other British species without much difficulty. *N. notatus* has a shorter snout and whiter belly in both sexes, and usually an isolated round black spot on the abdomen of the male, while the female has the yellow sidemargins extended (even if interruptedly) along the hindmargins; *N. pantherinus* has the side markings of the thorax much smaller and the belly much more white in the male, and the female has no white spots on the frons; individual specimens of all these three species may sometimes be found with one or other of the specific characters rather obscure, but in every case other specific characters enable each specimen to be named with confidence. A male taken at Aberlady on June 23, 1884, had evidently met with some injury to its head in one of its earlier stages, as the head was reduced to practically only one eye, which had a normal occipital inflation on each side on which was the normal rather long pale brownish pubescence, and there was the usual short adpressed forwards-pointing pale postocular pubescence; the proboscis was rather thick, not geniculate, and with an apical outspread pair of large (apparently) sucker-flaps.

N. uliginosus is probably the commonest British species of the genus, as it may occur anywhere in suitable marshy localities, especially salt marshes. I have records from Sussex (Seaford), Kent (Gravesend and Abbey Wood), Suffolk (numerous localities), Cambridgeshire (Burwell), Lincolnshire (Sutton Wash), Merioneth (Barmouth), Kirkcudbrightshire (Southernness), and Haddington (Aberlady), and though many of these localities are on the coast yet some are far inland; Duncan on the authority of Haliday quoted it as common on *Umbelliferae* in Ireland. My dates range from June 23 to September 16. Haliday gave its metamorphoses (fig. 56) in detail in *Nat. Hist. Rev.*, 1857, 194. It is recorded from Northern and Middle Europe, though perhaps not from the extreme North nor from South Europe.

Synonymy.—The original description of *N. uliginosus* was given by Linné in *Systema Naturæ*, ed. xii., 983, as follows:

“22. *M. antennis clavatis mucronatis, abdominis dorso albo: segmentis duobus penultimis striga alba.*”

“*Habitat in Europa, frequens ubi Triglochin crescit.*”

“*Corpus M. domesticæ* $\frac{1}{2}$ *minus. Caput nigrum fronte flava. Antennæ nigrae. Thorax niger, nitidus: lateribus utrinque punctis 2 oblongis albis. Abdomen subrotundum, depressiusculum: dorso album s. luteum, basi media fuscum; segmenta*

"*duo fere ultima, linea transversa nigra lata. Abdomen subtus nigrum marginibus segmentorum albis. Genua alba. Tibiæ pallidæ.*" This description applies almost without doubt to the male of the species now described, and although it is almost certain that Linné did not recognise the close connection of his male *M. uliginosa* of 1767 with his female *M. pantherina* of 1758, there is nothing to be gained by refusing to accept the generally recognised nomenclature of *N. pantherinus* and *N. uliginosus*.

3. **N. notatus** Zetterstedt. Face comparatively shortly produced; frons with whitish markings in both sexes. Abdomen partly white dorsally and ventrally.

♂. Face (fig. 119) moderately shining black, and produced into a short blunt cone or snout of which the small frons forms a part; the snout is brownish dorsally after the antennæ and at the tip, and bears a rather conspicuous short yellow depressed pubescence which extends slightly upwards on to the pale yellow sides of the frons and downwards (becoming longer, sparser, and erect) round under the eyes and on to the moderately inflated lower part of the back of the head; this lower part of the back of the head also bears short adpressed orange pubescence, but on the upper part the dilated facets of the eyes bulge over so that the postocular pubescence practically dies out; frons small, mainly whitish or yellowish or almost orange with a very narrow middle channel which almost (or rarely quite) divides the pale part into two spots, so that at any rate the front margin of the pale part is notched in the middle (and sometimes considerably so), but all the middle front part of the frons and the top hind angle are shining black, and the whole of the frons is bare except for the previously mentioned adpressed yellow pubescence on the lower part; vertex moderately shining black and so very gradually narrowed forwards that it is difficult to say when the eyes appear to touch, and in fact they do not absolutely touch but only appear to do so for nearly one-third the distance between the occiput and the antennæ; there is some very short white pubescence behind the ocelli and on the narrow forward prolongation of the vertex. Eyes microscopically hairy, and as just mentioned almost touching for a considerable space; facets on the upper two-thirds strongly dilated and sharply contrasted with the small darker colored facets on the lower third. Antennæ dull brownish black, fairly long, and placed (in profile) in a depression about half-way between the eyes and the tip of the snout; style short, as it is hardly so long as the last two annulations together of the third joint, and its tip is hairlike, while the style bears near its middle about two tiny side plumes.

Thorax and scutellum shining black and rather thickly punctate; humeri with a fair-sized roundish yellow (or pale yellow) spot which is connected by a narrow yellow (or pale yellow) line with the wing-base, and this line widens very obviously on its hinder half, but there is not much pale coloring down the seam between the mesopleuræ and pteropleuræ. Pubescence fairly abundant and by no means short, obscurely yellowish or even brownish yellow, and almost universal except on the rather large bare middle part of the mesopleuræ.

Abdomen shining yellowish white with (normally) the middle two-thirds of the basal segment black and that colour extending about half or two-thirds of the way down the middle quarter of the second segment and ending in a shallow arc, while the third segment has a round black spot on its middle near the foremargin, and the fourth and fifth segments are shining black except rather narrowly on the hind and side margins but unequally on the hindmargin of the fourth segment; these arrangements of colour are however very variable, as there may be on the third segment besides the round black spot a similar spot close to each side (Brodie, July 14, 1904, in company with normal specimens), while on the fourth segment the yellow hindmargin may resolve itself into three long shallow spots which are scarcely connected, and sometimes the black portion of the fourth segment encroaches a little on to the hindmargin of the third segment as two small spots, and not at all uncommonly these two spots develop and join the middle round spot which

then becomes a more or less triangular black space with a small white spot left on the middle of the third hindmargin; also the yellow sidemargin on the fourth segment may be extremely narrow, and may be missing on the fifth segment; pubescence universal, but rather sparse and inconspicuous, depressed, pale yellow. Belly black with all the disc of the three basal segments broadly yellowish white, but least so on the basal segment and sometimes only narrowly on the foremargin of the third segment; the absolute sidemargins are all yellow though the sides of the belly are black and sometimes the hindmargins of the fourth and fifth segments are yellow; the black sides of the belly generally extend out on to the disc near the hindmargin of the third segment but leave *all* the actual hindmargin of that segment yellow, and sometimes the black sides extend out a little on the middle of the second segment. Genitalia with yellowish lamellæ in the middle, but with two narrow black spines outside them and two others ventrally.

Legs black and yellow; femora shining black except for the broad yellow tip; anterior tibiæ orange, with sometimes a slight darkening just below the middle, and sometimes with a distinct blackish postero-dorsal streak there on the front tibiæ; hind tibiæ black, with the basal quarter and just the tip orange. Pubescence fairly obvious, especially on the coxæ and on a moderately long fringe behind the anterior femora, all pale yellow.

Wings glassy hyaline, with very faint veins except for the distinct yellow veins on the forepart of the wing which extend from the base to the basal part of the discal cell and thence on to the end of the cubital vein. Squamæ clear pale yellow with whitish fringes, the thoracal pair forming a short broad rather circular lobe with a long pretty fringe. Halteres clear yellowish white, with the base of the stem a little darkened.

♀. Very different from the male. Face produced rather less than the length of the eye (in profile); frons shining black, with a pair of small narrow elongate yellowish (white to orange) spots (sometimes very small and obscure) which extend from the eyemargins just above the antennæ across the outer quarters of the frons but which slope rather forwards. Pubescence on the frons moderate and pale (golden to greyish white) except on the bare transverse suture near the antennæ, while below the pale spots it is more abundant on the sides but becomes sparse towards the upper part and tip of the snout; back of the head inflated (though less than in *N. pantherinus*), and bearing dense yellow or whitish adpressed short pubescence which slopes forwards and upwards. Eyes so small that the frons between them occupies more than one-third the width of the head. Antennæ placed slightly beyond the middle of the snout.

Thorax and scutellum shining black, finely but not very densely punctate. Pubescence shorter than in the male but (in good specimens) fairly dense and brownish yellow; metanotum also bearing a little golden to greyish white pubescence on its disc.

Abdomen shining black, with small orange or pale yellow markings which consist of very narrow sidemargins (normally) connecting across the hindmargins of the fourth and fifth segments and extending inwards along the hindmargins of the other segments, but leaving a small triangular isolated orange or yellow spot at the middle of each of these segments; usually this spot on the second segment is widely isolated, while the one on the third segment is approached by the lateral spots; but these pale markings vary to a certain extent, so that the spot on the second segment may be barely isolated or the line on the hindmargin of the fourth segment may break up into three long flattish spots, or the side stripes on the hindmargins may be cut off from the sidemargins and in their turn cause each hindmargin to bear three isolated spots; pubescence scattered, yellow, longer and more obvious on the end segments. Belly shining black, with nearly the middle half of the second segment occupied by a large yellow spot which sometimes extends up the middle of the basal segment, and sometimes there is a yellow triangle or a long narrow yellow stripe on the middle of the hindmargin of the third and fourth segments, while the sixth segment may have an arched spot on the middle of its hindmargin; sidemargins all yellow; pubescence very short,

depressed, and inconspicuous, all pale. Ovipositor with the terminal lamellæ short and brown.

Legs as in the male.

Wings, squamæ, and halteres as in the male.

Length about 5.5 mm.

This species may vary even more than I have mentioned above, and at one time I suspected three males taken at Dyffryn in Merioneth on July 21, 1888, as being possibly a distinct species, because in them the snout appeared to be even shorter and the white spots on the frons more distinctly separated; the black basal patch on the abdomen larger, and the third segment without any isolated rounded black spot, but (in two of the specimens) with a quadrate black spot which was narrowly connected with a pair of flattened black spots on the hindmargin, and thereby left a flat white spot on the middle of the hindmargin; I have however since seen a specimen from Aberlady almost identical with them, and have realised that the white markings of the male vary to a considerable extent (especially in individual localities), so that I now consider them as nothing but a variety. Other varieties worth mentioning are (1) a female from Brodie in which the white frontal spots are reduced to dots, the yellow abdominal sidemargins are very narrow, and there is scarcely a trace of yellow along the hindmargins between them and the isolated white middle spots, the belly is shining black with a large whitish spot on the middle of the second segment and a narrow white streak along the middle third of the hindmargin of the third segment, and (2) a female from Llanbedr in which the abdominal sidemargins extend only to the end of the fourth segment, and there are only three small obscure pale dorsal spots, while the belly has only a moderate-sized orange spot on the two basal segments. Several European species are closely allied, but in Britain *N. notatus* may be known by its rather larger size, its short snout (except in a specimen from Kenmare which I have noted under *N. pantherinus*), and in addition to that the male may be distinguished from *N. pantherinus* by its distinct dorsal and ventral abdominal white markings, by its small frontal spots, and by its much larger humeral and wing-base spots, while the female is distinguished by those same spots, by the presence of a whitish spot on each side of the frons, and by the peculiar way in which the yellow sidemargins extend (even if interruptedly) along the hindmargins of the segments; from *N. uliginosus* the male is distinguished by the distinct dorsal and ventral white markings and the shorter pale frontal spots, while the female has the yellow sidemargins of the abdomen much more extended along the hindmargins of the second, third, and fourth segments.

N. notatus is not at all uncommon on our coasts, as I have records from Devonshire (Westward Ho and Plymouth), Hampshire (Bournemouth and Fawley), Kent (Gravesend), Essex (Leigh), Suffolk (Aldeburgh), Lincolnshire (Saltfleet), Lancashire (Coniston), Merioneth (Dyffryn and Llanbedr), Glamorgan (Porthcawl); and Arran, Aberlady, and Brodie in Scotland; and from Wexford in Ireland; Coniston is not strictly speaking a coast locality, but I have found many coast species about that lake. The dates extend from June 10 to September 16. It is common over Northern and Central Europe down to Southern Germany and Austria.

Synonymy.—There can be no doubt about Walker's (Ins. Brit. Dipt., i., 26)

N. brevirostris being referred to the female of this species, as his character of "Abdomen with three rows of tawny spots which are connected along each side" is applicable to no other species and certainly does not apply to the species now recognised as *N. brevirostris* Meig.

4. *N. nigrinus* Fallén. Black. Frons without any white spots. Cubital vein not forked.

A small species, well distinguished by its entirely black abdomen in both sexes and by the absence of any fork to the cubital vein.

♂. Face, frons, and vertex all shining bluish black and quite bare; face moderately produced for a *Nemotelus* (fig. 123), conical but not sharply pointed; jowls and back of the head also black and with a slight pale pubescence on the slightly inflated lower part of the latter; ocelli conspicuously yellow. Eyes apparently touching for about one-third the distance between the occiput and the antennæ; facets on nearly the upper two-thirds larger, lighter brown, and sharply contrasted against the smaller darker facets on the

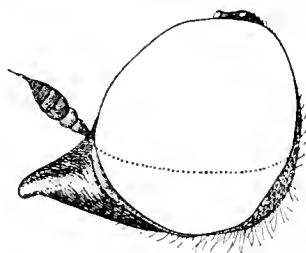


FIG. 123.—*Nemotelus nigrinus* ♂. × 30.

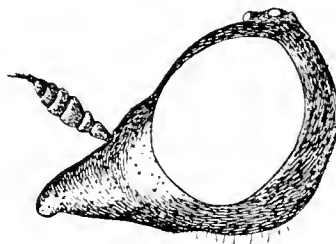


FIG. 124.—*Nemotelus nigrinus* ♀. × 30.

lower part; in life the eyes are probably banded as in the female. Antennæ brownish black, with the tip of the second joint often more yellowish brown, moderately short, and placed high up, as the frons itself is not in the slightest degree produced and consequently the antennæ appear (in profile) to be placed at the extreme upper base of the snout-like face; basal joints short and almost bare; third joint annulated, longer than the two basal joints together, and with a terminal arista which is only about as long as the last annulation of the third joint, while the tip third of the arista consists of only a very fine hair.

Thorax and scutellum shining black and punctate, but there are two rather dull impunctate stripes between the middle and the sides; there is a yellow spot on the humeri which is continued as a narrow line to the wing-base, and then descends (more or less indistinctly brownish yellow) between the mesopleuræ and the pteropleuræ. Pubescence entirely absent on the disc, but there are some very short and inconspicuous pale hairs about the sides and on parts of the pleuræ. Scutellum and metanotum roughened or even almost shagreened.

Abdomen shining black, sparsely punctate, and apparently bare as the brownish yellow pubescence about the basal corners is very minute. Belly shining black, but just the hindmargins of the third and fourth segments obscurely brownish yellow. Genitalia with two pairs of tiny brownish yellow lamellæ, and between them a pair of darker brown style-like processes.

Legs black, but orange on the tip of all the femora, on almost all the anterior tibiæ (as only the lower half or so of the upper side is a little darkened), on the base and the extreme tip of the hind tibiæ, and on the basal two or three joints of all the tarsi. Pubescence practically absent, but a little can be traced behind the middle femora.

Wings (fig. 120) glassy hyaline with the veins very faint, but the anterior

veins up to the end of the cubital vein are yellow; cubital vein without any trace of the fork which exists in all other European species of the genus. Thoracal squamæ blackish, rather larger than the alar pair and forming a longer lobe, with short grey fringes. Halteres whitish yellow to dull orange, with the stem and sometimes the front part of the knob darkish.

- ♀. Similar to the male, but with the eyes much smaller and consequently the snout apparently much more produced. Frons very wide between the eyes, being considerably more than one-third the width of the head, while the snout appears to include the lower part of the frons because the part just above the antennæ and below the transverse depression is slightly elevated; frons shining black, with a longitudinal depression below the middle which runs into the transverse depression which crosses a little above the antennæ; back of the head widely inflated and shining black (fig. 124). Eyes small; in life dark bronze colored with a conspicuous purple band across the middle; facets all small and equal. Antennæ with the third joint rather longer and more conspicuously annulated.

Thorax with even less pubescence on the sides and on the pleuræ than in the male.

Abdomen with only very slight pubescence about the basal corners; segments after the fifth very small and black, ending in a pair of closely adpressed short brownish lamellæ. Belly with a tendency to paleness on the middle part of the basal segments.

Legs with the yellow markings on the hind legs and on all the tarsi rather more sharply defined.

Wings as in the male. Squamæ rather paler. Halteres clear yellow, but with the stem darkened.

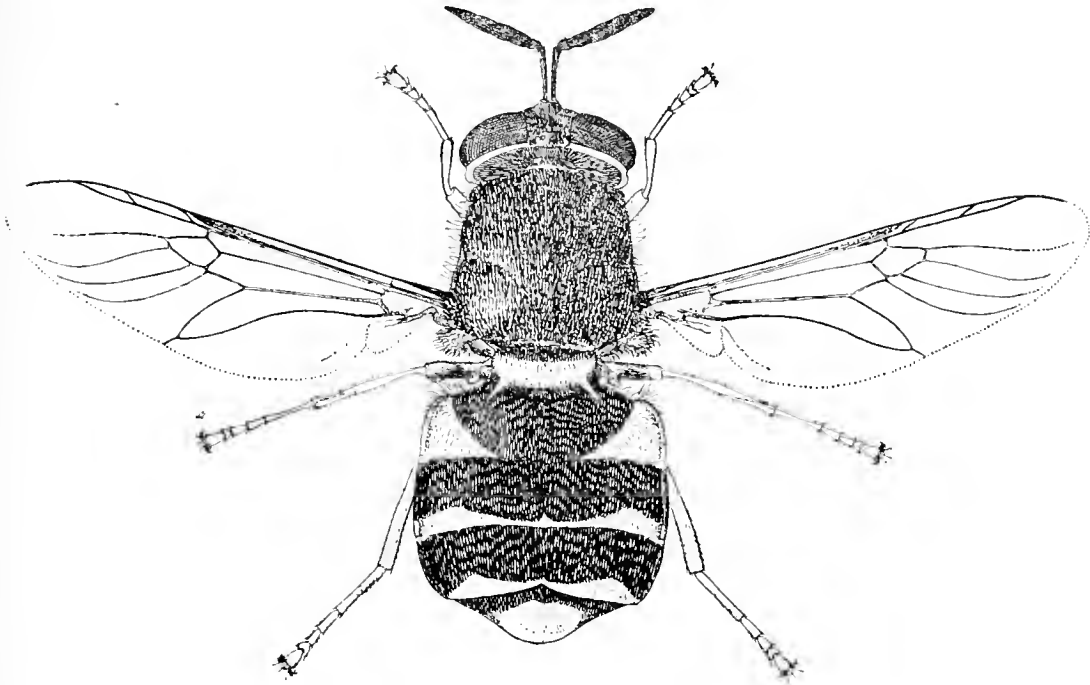
Length about 4 mm.

This species requires no comparison with any other European species as its entirely black colour in both sexes, its smaller size, and its simple cubital vein at once distinguish it, but *N. niger* Bigot from Chili is very closely allied.

N. nigrinus is not uncommon in fenny or marshy districts, and I have taken it in numerous localities in Cambridgeshire and Suffolk, but an examination of my other records only gives Cornwall (fairly common according to Mr C. G. Lamb at Padstow), Lincolnshire (Freshney Bogs), Herefordshire (numerous localities), Glamorgan (Porthcawl, Colonel Yerbury), and Haddington (according to Mr P. H. Grimshaw at Aberlady), while Haliday took it in Ireland. My records extend from June 1 to July 15. It is fairly common over Northern and Middle Europe, from the extreme north down to Southern Germany, and Van der Wulp has stated that he has seen it from North America, but the American entomologists consider his reference to apply to *N. unicolor*; I am however of opinion that *N. unicolor* is only a synonym of *N. nigrinus*.

Synonymy.—I think it more probable that *Nemotelus frontalis* Olivier (1811) is this species than *Pachygaster orbitalis* as was suggested by Loew, but the description is not good enough to identify it with certainty.

STRATIOMYINÆ.

FIG. 125.—*Stratiomys potamida* ♀. × 4.

Abdomen with only five or six obvious segments. Lower cross-vein present; discal cell emitting (normally) three faint, more or less incomplete, veinlets, and not emitting the upper branch of the postical vein; cubital fork short or absent. Antennæ with no long thin arista. Scutellum with two spines in the European species. Thoracal squamæ large and clothed with woolly pubescence.

Antennæ without any long apical or subapical bristle, but in British species with the third joint linear and annulated or club-shaped.

Thorax squarely built; metapleuræ beset with dense shelter hairs. Scutellum with two marginal spines in all the European species.

Abdomen usually short and broad, often flattened, and with only five or six apparent segments.

Legs stout, moderate in length; tibiæ without any spurs.

Wings with three veinlets issuing from the discal cell towards the wingmargin and with five posterior cells, but the veinlets are often so faint or imperfect that they can hardly be traced; lower cross-vein distinct, so that the postical vein is quite clear of the discal cell and is only connected with it by the small cross-vein; cubital fork ending long before the tip of the wing and with the upper branch short or even absent; anal cell closed near the wingmargin; alula rather well developed. Wing-membrane conspicuously ribbed or rippled radiatingly to the wingmargin; wings in repose incumbent and parallel on the broad flattened disc of the abdomen but not covering the side-margins. Squamæ distinct; alar pair comparatively small, and with a thick margin on which there is usually only a short inconspicuous fringe; thoracal pair large and conspicuous, semilunate or subtriangular (*O. viridula*), and clothed all over (on both the upper and under surfaces and on a marginal fringe) with dense almost woolly, sometimes fuzzy, pubescence.

The metamorphoses of many species are well known, and the larvæ are some of the "rat-tailed maggots" which occur in stagnant water.

The essential characters of the *Stratiomyinæ* lie in the small number of segments of the rounded abdomen, in the presence of the small (or lower) cross-vein whereby they are distinguished from the *Clitellarinæ* and *Pachygastrinæ*, and in the absence of any long thin terminal arista whereby they are separated from the *Sarginæ*. The peculiar crowding of the stronger wing-veins towards the costa affords a distinct character pertaining to this and the preceding subfamilies, and it is possible that their separation is undesirable.

The *Stratiomyinæ* comprise about a dozen genera and occur in almost all parts of the world. Six genera and about seventy species are included in Kertész's "Katalog der Paläarktischen Dipteren," but probably only the two genera *Stratiomys* and *Odontomyia* need be retained, as the others may be considered subgenera; about thirty of these species are Asiatic. I have included only nine species in this work as undoubtedly British, but other species of *Odontomyia* have been recorded and possibly two or three of these may occur with us.

Table of the European Genera of STRATIOMYINÆ.

- 1 (2) Basal joint of the antennæ short, usually about as long as the second joint but sometimes twice as long. 5. ODONTOMYIA.

Subgenera :—

- 1 (4) Subcostal and radial veins distinct; discal cell with two or three issuing veinlets (fig. 126).

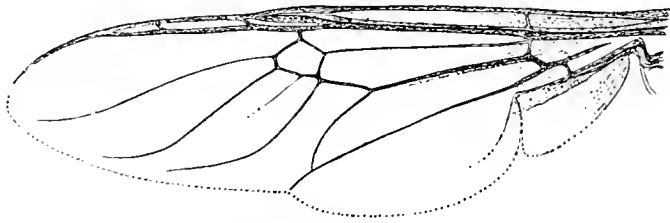


FIG. 126.—*Odontomyia ornata* ♂. × 7.

- | | |
|--|--------------|
| 2 (3) Eyes hairy. | PSELLIDOTUS. |
| 3 (2) Eyes bare. | ODONTOMYIA. |
| 4 (1) Subcostal vein apparently anastomosed with the radial; discal cell with scarcely more than one issuing veinlet (fig. 127). | HOPLODONTA. |

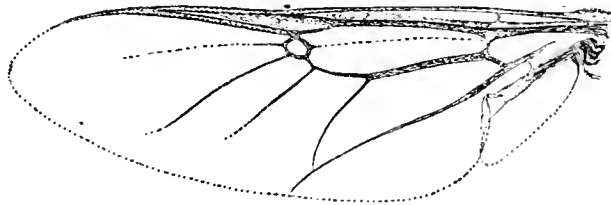


FIG. 127.—*Odontomyia viridula* ♂. × 10.

N.B.—*Erochostoma* Macq. was probably founded upon some injured specimens of *Odontomyia argentata*.

- 2 (1) Basal joint of the antennæ three or four times as long as the second.

6. STRATIOMYS.

Subgenera:—

- | | | |
|---|---|--------------|
| 1 | (2) Flagellum ending in a broad heart-shaped knob (fig. 128). | ALLIOCERA. |
| 2 | (1) Flagellum peg-shaped, pointed at the tip (fig. 125). | |
| 3 | (4) Eyes bare in both sexes. | STRATIOMYS. |
| 4 | (3) Eyes hairy in at least the male. | |
| 5 | (6) Eyes banded. | HIRTEA. |
| 6 | (5) Eyes not banded. | THYREODONTA. |

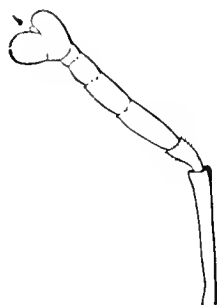


FIG. 128.—*Alliocera grava* ♂.
× 10.

5. ODONTOMYIA.

Odontomyia Meigen, Illig. Mag., ii., 265 (1803).

Rather large to rather small slightly pubescent flies of blackish colour, though usually adorned with orange, yellow, or greenish markings, or with the abdomen sometimes yellowish green, or even pale green, with black spots and markings.

Face arched, slightly retreating or perpendicular, usually strongly bulged out and conspicuously pubescent; back of the head hollowed out on the upper part; proboscis rather long, with moderately long sucker-flaps; palpi jointed, small, and cylindrical. Eyes bare or hairy, practically touching in the male and with the lower facets distinctly smaller than the upper ones, but in the female separated by the broad frons. Antennæ rather long, placed at or just below the middle of the head; the two basal joints almost equally long (fig. 130) or the basal joint at the utmost twice as long as the second (fig. 129); third joint elongate and with from four to six annulations of which the last two may form a terminal style, and this style may have a microscopical apical arista; antennæ closely approximated at the base and extended forward in almost one continuous divergence, at any rate after the basal joint.

Thorax broad. Scutellum with two subapical spines.

Abdomen with five obvious segments in the male and six or even seven in the female, usually scarcely broader than the thorax but sometimes much broader, flattish but with a slight arch down the middle which leaves depressed flat spaces before the actual sidemargins. Genitalia inconspicuous.

Legs simple.

Wings with the anterior veins very much crowded, so that sometimes (*Hoplostonta*) the subcostal and radial veins seem to anastomose (fig. 127); cubital vein usually forked, but sometimes quite simple; discal cell emitting three very vague veinlets towards the wingmargin, of which the third and also sometimes the first may be very incomplete or absolutely missing, and none of which reach the wingmargin; the upper branch of the postical vein does not reach the wingmargin, and the lower branch joins the anal vein a little before the wingmargin; wing-membrane bare but conspicuously ribbed. Squamæ well developed; thoracal pair bearing conspicuous woolly pubescence all over. Halteres with a rather large knob.

This genus is most allied to *Stratiomys*, but can always be distinguished by the shorter inconspicuous basal antennal joint, the less diverging antennæ, and usually by the smaller size.

Odontomyia is a large genus of a rather heterogeneous character, but no satisfactory division has been established; the hairiness or bareness of the eyes is sometimes only a sexual character, the longer basal antennal

joint of some species is of very trivial importance, and the anastomosing of the anterior wing-veins does not seem to provide any clear character. More than 150 species are known from all parts of the world and about twenty are recorded from Europe, of which five undoubtedly occur in Britain, while three or four more have been reputed of which *O. microleon* and *O. hydroleon* are likely to occur. They frequent the neighborhood of water, and may be found on *Umbelliferae* and other flowers, and when the sky is darkened they hide on the under side of broad-leaved water plants, and are said to be often found in astonishing numbers, but I have never observed this; some continental species are said to occur in woods and hilly places far away from water. The larvæ, like those of *Stratiomys*, live in mud or damp earth or among decaying leaves or in puddles under *Lemna*.

Synonymy.—I am of opinion that *Opseogymnus* Costa, *Psellidotus* Rond., and *Hoplodonta* Rond. have no generic value, even though Brauer has adopted *Hoplodonta* for an individual species. I have also under my synonymical note of *O. argentata* expressed my belief that Macquart's genus *Exochostoma* was founded only upon some imperfect specimens of that species.

Table of Species.

- 1 (14) Subcostal and radial veins separate (fig. 126) (*Odontomyia* Brauer).
Discal cell with at least two issuing veinlets.
- 2 (5) Basal joint of the antennæ twice as long as the second (fig. 129).
Cubital vein not forked. Eyes bare.
- 3 (4) Abdomen dorsally with narrow yellow transverse side-stripes and tip, and without shimmering pubescence. *microleon*.

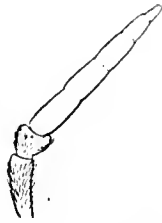


FIG. 129.—*Odontomyia argentata* ♀. × 20.

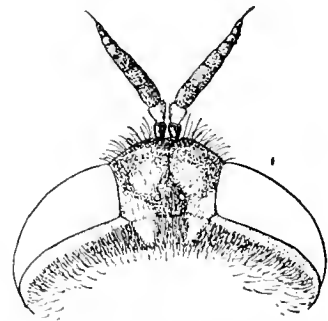


FIG. 130.—*Odontomyia ornata* ♀. × 8.

- 4 (3) Abdomen dorsally with inconspicuous yellow side-spots, and with conspicuous silvery (♂) or golden (♀) shimmering pubescence.
1 *argentata*.
- 5 (2) Basal joint of the antennæ barely longer than the second (fig. 130).
Cubital vein forked.
- 6 (7) Abdomen all black. Eyes of the male hairy. 2 *tigrina*.
- 7 (6) Abdomen black with green or orange side-markings. Eyes bare.
- 8 (13) Abdomen black with a greenish margin. Medium-sized species.
- 9 (10) Abdomen black with only a narrow unequal greenish margin.
felina.

- 10 (9) Abdomen with an unequal black dorsal stripe which leaves a broad greenish margin.
- 11 (12) Abdomen with the black dorsal stripe widened band-like on the foremargin of the segments. Antennæ blackish. *hydroleon*.
- 12 (11) Abdomen with the black dorsal stripe unequal but not widened band-like (fig. 131). Antennæ considerably tawny. 3 *angulata*.
- 13 (8) Abdomen black with three pairs of large orange side-spots. Large species. 4 *ornata*.
- 14 (1) Subcostal and radial veins anastomosed (fig. 127) (*Hoplodonta* Brauer). Discal cell ordinarily with only one issuing veinlet; cubital vein not forked. Small species with a dentate greenish abdominal margin. Eyes bare. 5 *viridula*.

I have included *O. microleon*, *O. felina*, and *O. hydroleon* in this table, because they have been recorded as British under circumstances given in the list of Reputed Species at the end of this volume, and they might well occur in Britain.

Schiner says that the eyes of the male of *O. hydroleon* are hairy, but they are bare in the specimens in Kowarz's collection, and Lundbeck specially describes them as bare.

1. ***O. argentata*** Fabricius. Basal joint of the antennæ quite twice as long as the second (fig. 129). Abdomen with remarkable silvery or golden shimmer, and with obscure orange side-spots. Cubital vein not forked.

A medium-sized black species, with a silver (δ) or golden (φ) sheen on the abdomen caused by very short depressed pale pubescence.

δ . Frons and face very much puffed out and bearing dense long porrected brownish grey pubescence which is very conspicuous from all points of view; the face is also very much widened and arched so that opposite the lower corners of the eyes it occupies about three-quarters the width of the head; it is shining black and sometimes has a ferruginous middle line, and close against each eye there is a line of much shorter glistening white hairs; the lower part of the jowls bears little pubescence but all about the large broad sides and back of the mouth there is similar pubescence to that on the face but hanging straight down and more brownish yellow; close against the lower front angle of the eyes is a narrow whitish shimmering band and on it is a number of short glistening whitish yellow hairs, but this band does not extend to the hind lower corner of the eye, because just before this corner a moderately broad brownish orange eye-collar commences which extends up about one-third the back of the eyes and then narrows down to nothing; the lower part of the back of the head is a little inflated beyond this collar, but the pubescence on and near the collar is reduced to minute brownish yellow scaly hairs pointed forwards and with a silvery sheen close against the eyes; the flat back of the head bears rather long straggly greyish pubescence; vertex shining black and bearing long brownish yellow pubescence, steadily narrowing almost to the frons and the eyes never quite touching, though the inconspicuous upturned brownish yellow pubescence which occurs on the narrowing part of the vertex ceases on the short space where only the two rims separate the eyes; frons black, rapidly widening out to the face, and bearing glistening whitish yellow forwards flattened pubescence, and with a middle furrow; proboscis long, with large shining black sucker-flaps. Eyes bare; facets on the upper two-thirds (or three-quarters when measured round the eyes) much larger than those on the lower part, and with a sharply marked dividing line almost all across the disc of the eye, but on the back part the small facets extend considerably upwards

and they merge gradually into the larger facets: in life they are said to be greenish with a purplish band on the dividing line. Antennæ dull black; basal joint long, thin and cylindrical but rather dilated at its tip, more than twice as long as the second; second joint cup-shaped, rather longer than its widest part; third joint strap-shaped, nearly twice as long as the two basal joints together, and with three very indistinct nearly equal annulations to basal vein, which are punctulate and of which the third is slightly attenuated at its tip, while after these is a short transverse annulation followed by a longer but still short being only a little longer than broad, fifth annulation which ends in a microscopic dark thick terminal arista.

Thorax black only moderately shining because the punctation though not coarse is so dense as to be almost confluent; pubescence long, dense, erect, greyish and equal all over, except that it is rather longer and more shaggy on the pleura. Scutellum similar, the two sides short and obscure, brownish orange to almost blackish, and joined rather near together.

Abdomen ovate almost circular, dull black with indistinct orange spots, and with a slight gloss about the sides and on the two last segments, but all exceedingly densely covered with flat downy silvery pubescence which gives a silvery sheen, conspicuous in certain lights, on part of the basal segment, on the middle two-thirds of the second segment, and on very nearly all the third, fourth and fifth segments, though on the disc of the fourth segment the pubescence is much longer and much more erect, while on the fifth segment it is longer and less dense but is depressed; the ordinary pubescence is moderate on the basal segment, but rather conspicuously long, more erect, and greyish white about the basal corners of the second segment; the sidemargins bear similar pubescence, but slightly longer and more erect and becoming distinctly longer on the fourth and fifth segments; the hind corners of the second and third segments bear fairly large though not conspicuous rather transverse dull obscure orange spots, which extend along the hindmargins about one-fifth to rarely one-third of the segment but are not half the depth of the segment and which are narrowly joined together along the sidemargins; fourth segment with smaller more obscure brownish orange spots at the hind corners which are considerably extended up narrowly along the sidemargins; fifth segment with all the sides and the tip with a rather narrow brownish orange margin. Belly brownish yellow or darker, rather shining, third and fourth segments each with a pair of small (sometimes obscure) black spots close together on the middle of the disc, and the sidemargins narrowly blackish all round; pubescence all pale, very short, except on the second segment where it is erect and much longer. Genitalia protruded from the end of the abdomen, about half as broad as the end of the fifth abdominal segment, all black, rather broad and flat.

Legs black and dull orange, coxae, trochanters, and femora (except at their tips) black and rather shining; tips of the femora and all the tibiae dark orange, except for an obscure inconspicuous dark ring on the tibiae about the middle, which is widest and blackest on the hind pair but on all pairs is more conspicuous on the hinder side and occupies there about one-fifth of the hind pair; tarsi with the basal joint except its tip, and most of the second joint on the posterior pair dark orange, and the other joints brownish black. Pubescence long, greyish white and rather abundant behind the femora but least so on the hind femora.

Wings with a rather conspicuous dark brown blotch about the middle caused by all the veins being rounded dark brown all round the discal cell, on the stigma above, on the tip of the discal vein just before the discal cell, on the lower cross-vein, and on the portion of the upper branch of the postical vein before the small cross-vein; the stem of the postical vein is brownish orange, while the usual strong anterior veins and just the base of the anal vein are orange; the stem of the discal vein is thin and rather faint until its swelling just before the discal cell; the stigma is only a kernel in the marginal cell; the discal cell emits only the two upper veinlets towards the wingmargin, the third one being quite obsolete, and even the two veinlets are faint especially the upper one, and do not nearly reach the wingmargin; upper branch of the postical vein very faint after the lower cross-vein and not nearly reaching the wingmargin; sometimes the ends of the costal and cubital

veins before their junction are both blackish even as far back as the end of the radial vein, and sometimes this blackness extends round the basal cell and back through the lower cross-vein to the base of the postcostal cell, or the blackness may show itself by merely a dot at the junction of the basal and cubital veins; cubital vein without any trace of a fork; wing-membrane conspicuously rippled. Thoracic squame rather large and ranging from dull pale brownish to yellowish, and with a moderate pale fringe. Thoracic squame comparatively small though still rather large. Hall glassy whitish, denser though not very conspicuously so, all over with dull whitish moderately long woolly pubescence. Halteres ranging from brownish through dull pale orange to yellowish white.

3. Rather similar to the male, but with short dense pale felt-like pubescence on the thorax and with broad pale bands of felt-like pubescence across the abdomen. Frons very broad, being at its narrowest part more than two-thirds the width of the head, and the space between the eyes nearly equal for about half-way down the frons but thence rapidly widening out to three-fifths of the head at the lower level of the eyes. Frons flat and practically flush with the eyes, but the face exceedingly bulged out until it protrudes almost half the head in profile, and this bulging arch descends distinctly below the eye-level and leaves the jaws very wide though flattened. Mouth-opening not specially large but with long side-lips, which are pale brownish orange against the jaws but which become blackish round their lowest edge. Middle of the face all brownish orange but the margin about the mouth and the sides broadly shining lustrous black. Pubescence all over the face dull brownish orange to pale grey, and slightly longer on the lower part and hanging down all round the mouth and on the jaws. Frons with dense felt-like golden orange or pale grey adherent pubescence all over down to the level of the antennae; back of the head unaltered, especially on the lower part, and with a moderately broad dull orange eye-collar all round from under the eyes to half-way up the head, or even all the way up to the top corner of the eye, and this collar bears dense adherent short golden orange or silvery grey on the upper part pubescence which is directed forwards on the middle part but more upwards on the upper part. The broad shining lustrous black space behind the jaws and along towards the back of the head bears long pubescence similar to that on the jaws. Eyes small in proportion to the size of the head. Antennae dull black, sometimes the tip of the basal joint and all the second joint with minute brown pubescence, third joint with more distinct annulations, and then the fourth annulation longer than broad and slightly narrower than the three basal annulations but longer and broader than the fifth.

Thorax densely covered all over the disc with short felt-like golden orange or pale grey pubescence out of which arise some moderately long erect but inconspicuous yellow hairs. Sides of the disc rather broadly with longer dense rather shaggy brownish orange or pale grey pubescence right away from the humeri to the scutellum. Pleurae with shorter but similar pale pubescence.

Abdomen very densely covered all over the disc with minute felt-like pubescence, which becomes conspicuous across the hind half of each segment because of its golden orange or pale grey colour. On the fourth segment the pubescence is, as in the male, longer and more erect, while on the fifth segment the pale pubescence occurs over all the segment except the extreme base. The margin of the abdomen is all, or almost all, narrowly brownish orange, and this colour extends on to the disc as small transverse spots near the hind corners of the second and third segments. Belly as in the male, but with a less distinct blackish marginal line.

Legs more orange than in the male, as all the femora are orange or more than the basal third and even sometimes on the basal two-thirds. Tibiae with no darkening about the middle, but the front tibiae darkened in front about the tip and the hind tibiae darkened behind about the tip, pubescence as in the male.

Wings as in the male. Thoracic squame rather less densely pubescent.

Length about 8.5 mm.

This species is easily distinguished from any other European one by the glancing silvery, or golden, felt-like clothing of the abdomen; the elongate basal joint of the antennæ also distinguishes it from most species. It may vary a little in the size of the abdominal spots, as a Bavarian male in Kowarz's collection has them larger and more triangular so that they become fairly conspicuous; the orange red postocular collar may apparently be limited to the lower half of the head or may extend right up to the upper corner of the eye.

O. argentata is either very uncommon in England now or it has been remarkably overlooked, possibly because it is only a May species; Walker says "South of England; not common," and Brunetti says "Not uncommon. On willows. Generally distributed." I have never met with it myself, and only know of one or two recent specimens, one of which was taken by Colonel Yerbury at Fordingbridge in Hampshire on May 6, 1897, and the other was I think taken by Dr D. Sharp at probably Mildenhall in Suffolk about 1901. I have seen a specimen which was taken by Mr Unwin at Seaford in Sussex prior to 1860, and the British Museum possesses the species from Dorset through Mr Dale; Duncan (1837) quotes "Cambridge, 1832.—Charles C. Babington, Esq." It does not appear to be uncommon in old British collections, and one old specimen in my collection bears a label "Kirby." It is recorded from North and Middle Europe, and Lundbeck states that it was once found (May 6, 1843) in Denmark in great numbers, the females sitting upon flowers of *Salix* while the males sat on dead rushes looking like silver spots, and the males were extremely quick and were seen hovering in the air in small swarms.

Synonymy.—Of four males in the Hope Museum at Oxford two were labelled "*atrata*." It may appear remarkable that I suggest Macquart's *Erochostoma nitida* as a probable synonym of this species, but I am led to that opinion by the fact of Bigot's *Exochostoma caliceps* (Ann. Soc. Ent. France, 1879, p. 217) from Colorado being in my opinion a true *Odontomyia* in spite of its unarmed scutellum, and then a re-examination of Macquart's description and figure brings his *E. nitida*, if an *Odontomyia*, to the neighborhood of *O. argentata* because of its elongated basal antennal joint and its bare eyes; if once reduced to this, the remarkable coloration of the legs agrees very closely with *O. argentata*, and the fact remains that in more than sixty years no further record of the capture of so accessible a species exists; I am therefore of opinion that Macquart had before him only some specimens of the female of *O. argentata* in very bad condition, and that he drew very much upon his imagination in describing details and in drawing his figures. I only make the suggestion that this may account for the non-reappearance of *Exochostoma nitida*, as I have had no opportunity of examining the original specimens.

2. *O. tigrina* Fabricius. All black, except the tibiæ and tarsi. Eyes of the male hairy. Cubital vein forked.

The blackest of all the medium-sized *Stratiomyidæ*.

♂. Head broad and depressed when viewed from in front; face and frons considerably bulged out, shining black, and forming an equilateral triangle with slightly arched sides; face at its widest part little more than one-third the width of the head; jowls broad but flat and consequently hardly visible except from below; mouth side-lips not so large as in *O. argentata*; all the frons and face clothed with long porrected dense black pubescence, but the pubescence on the jowls and round the mouth is rather longer, more straggly and hanging down, and includes numerous grey hairs and also black hairs with grey tips; lower half of the back of the head puffed out and black, with

dense black pubescence, the upper half dull deep black, only slightly inflated, and with shorter black pubescence, of which a slight postocular fringe can be seen; vertex elongate, black, moderately shining, with rather long grey pubescence on the back part but with shorter and black pubescence between the ocelli, and all the vertical pubescence slopes slightly forward; down the narrow interval which just separates the eyes there is a line of shorter slightly upturned black pubescence which does not quite extend to the frons; frons with a slight middle furrow which widens out to an ovate depression on the middle; proboscis blackish with large light brown sucker-flaps on which are numerous brownish yellow hairs. Eyes clothed with comparatively sparse greyish pubescence; facets on the upper half of the disc larger than those on the lower half, but with no conspicuous distinctive boundary between them; in life they are said to be greenish with a bluish band on the dividing line. Antennæ dull black, but slightly shining on the basal joint, not quite so long as the head, diverging after the basal joint; basal joint slightly longer than the elongate cup-shaped second joint, and both these joints with fairly obvious black bristly pubescence which is rather the longer on the basal joint; third joint nearly twice as long as the two basal joints together but rather thinner, especially after the first three annulations, bare and with indistinct annulations, of which the first is the longest and the next two a little shorter, and after these there appear to be three more annulations of which the fourth and sixth are about equal in length, but the fifth short (being only about as long as wide); last joint not pointed.

Thorax and scutellum all black, moderately shining, and with dense but not absolutely crowded fine punctuation; pubescence all over the disc and on the scutellum dark brownish orange, fairly long and dense, almost erect, and composed of thin hairs; on the sides of the disc from the humeri to the wing-bases there is a fairly broad stripe of black pubescence, and all the upper parts of the pleuræ and prothorax bear black pubescence, but the lower parts of both bear more straggly greyish white hairs. Scutellum with a pair of short obscure tawny spines which are rather close together.

Abdomen all black, quite as shining as the thorax and more so in the hollows before the sidemargins; the middle three-fifths of the second, third, and fourth segments are raised but flat, and outside this is a hollowed space between this raised portion of the disc and the conspicuously elevated sidemargins (which is probably the space in which the wings lie when at rest); the abdomen is very densely but finely punctuated on the raised part, but not so densely punctate on the depressed part; pubescence inconspicuous, consisting of scattered, erect, black mixed with brownish yellow hairs on all the middle part of the disc but more extensively black towards the sides; pubescence on the middle of the hind part of the fourth segment and on all the fifth segment rather more dense and all brownish orange; margin with outstanding distinct though rather short rather sloping black pubescence, and even the longer tufts at the shoulders black; fifth segment with an obscure but fairly broad yellowish hindmargin, and a black sixth segment just visible. Belly orange, with a more or less distinct broad blackish margin except about the base and where the hindmargins run out as orange lines a little way into these blackish sidemargins; on the middle of the disc of the third and fourth segments there are traces of pairs of small black spots, and the fifth segment is nearly all black except on the orange hindmargin; pubescence erect, rather dense though the hairs are thin, all greyish yellow on the four basal segments, rather depressed on the disc of the fourth segment. Genitalia distinct, brown.

Legs black and orange; coxæ, trochanters, and femora (except at their extreme tip) black, but the basal half of the femora usually brownish; tibiæ orange with a badly defined brownish ring on the anterior pairs and a blackish ring on the hind pair occupying nearly the middle third (at any rate behind); tarsi orange with the last two or three joints or some of them blackened above; tips of the claws black. Pubescence on the femora moderate, obscure greyish, or more obviously pale on the hind pair, but blackish behind the anterior femora about their tips.

Wings hyaline with the base and the anterior and the strong veins blackish brown, but with no sign of any cloud about the discal cell; cubital vein with

a short fork at about two-thirds the submarginal cell ; discal cell pentagonal, and its two issuing veinlets (especially the second) with an undulation, and neither of them nor the upper branch of the postical vein reaching the wing-margin ; anal cell closed well before the wingmargin ; discal vein rather and almost equally thin up to its fork. Alar squamæ fairly large, dark brown with a short pale fringe ; thoracal squamæ rather large, conspicuously white and bearing white woolly pubescence all over including a long neat marginal fringe. Halteres canary yellow with the stem brown.

- ♀. Very similar to the male. Frons at the vertex occupying fully one-third the width of the head and the space between the eyes very gradually widening until at its lowest part it is half the width of the head ; face in profile produced more than half the width of the eye ; frons and face all black ; frons only moderately shining as it is roughly punctate on the two large shallowly depressed spaces about the middle, but more shining on the upper and lower thirds, the upper third being sparsely punctate and with a roughened surface, but the lower third more shining (especially over the antennæ) and not punctate ; frons with a distinct middle furrow all the way down from the ocelli to the antennæ, and with short greyish black and inconspicuous pubescence except for a shimmering greyish white patch on each side against the eyes a little above the antennæ, and for a few greyish hairs about the depressed spaces ; about the antennæ and out to the end of the facial hump there are longer stiffer black hairs, though the pubescence on the shining black face is mainly long, greyish, and rather drooping, and again on the eyemargins there are shimmering whitish patches ; on the jowls and round the mouth the greyish pubescence is longer and hangs down ; back of the head all puffed out and only slightly more so on the lower than on the upper part, dull black with a fairly broad and conspicuous shimmering whitish eyemargin composed of adpressed pubescence which mainly points forwards, and which extends all round from the lowest part of the eye to the upper eye-angle against the vertex. Eyes quite bare, rather large for a female. Antennæ with the basal joint distinctly longer than the second, and with the short fifth annulation of the flagellum fairly distinct.

Thorax and scutellum shining black, with conspicuous short adpressed greyish or greyish orange scaly pubescence all over the disc, and also with rather inconspicuous but moderately long erect greyish pubescence which becomes longer denser and darker about the sides of the disc, and still longer paler and more straggly on the pleuræ. Scutellum with the spines varying from almost black to yellowish.

Abdomen shining black with just the tip sharply yellowish, this tip being the arched hindmargin of the fifth segment and that portion of the sixth segment which is not concealed under the fifth ; pubescence on the disc very slight, dark, and very inconspicuous, but more evident and all greyish on the depressed sides, and longer and whitish grey on the actual margins with a small tuft at the shoulders, and more conspicuous and more erect on the fifth and on the adjoining middle part of the fourth segment. Belly varying on the greater part of the disc from dull pale orange to dark reddish orange or even obscure brownish, with usually a broad black margin and sometimes a broad black band (narrowed at the middle) across the fourth segment, but sometimes on at any rate the second segment the yellowish colour may extend quite out to the sidemargins ; the fifth segment is black with a triangular yellowish spot on its hindmargin, and a small sixth segment can be seen which is yellow with its base black ; pubescence rather abundant, depressed and rather shimmering greyish.

Legs as in the male, but the hind trochanters may be dull orange ; tibiæ with blacker and better defined rings. Pubescence on the femora slighter and very nearly all greyish white.

Wings sometimes with the anterior strong veins more darkish orange, but often quite as blackish as in the male. Halteres varying from dark orange to greenish white.

Length about 9 mm.

This species varies but little, though occasionally the female has small orange spots near the hind corners of the second and third abdominal

segments. It has no close ally in Europe, though *O. argentata* is about the same size and shape but is easily distinguished by its glistening abdomen, longer basal antennal joint, unforked cubital vein, and bare eyes of the male.

O. tigrina is not very uncommon in Britain though I have very seldom seen it alive. It occurs about ponds and in marshes, and I have records from Hampshire (Fawley and Fordingbridge), Sussex (Lewes and Bognor), Kent (Lewisham, Gravesend), Suffolk (Tostock and Drinkstone), and Hereford (Ledbury), while Colonel Yerbury has taken it at Aviemore in Inverness. The dates extend from May 14 to July 12. It is recorded from all Europe north of the Alps except in the extreme North.

Synonymy.—In the Hope Museum at Oxford a pair of this species and a male of *O. argentata* bore a printed label "*O. atrata*," but I cannot trace where the name came from.

3. *O. angulata* Panzer. Abdomen with a broad dentate greenish margin which leaves trapezoid black markings on the disc; the two basal trapezoid markings equal in size, and widest against the foremargins of the segments but not band-like there. Antennæ tawny except at the tip. Legs all orange.

A medium-sized species, distinguished by the shape of the abdominal markings.

♂. Head large, distinctly broader than the thorax. Face black, rather shining but obscured by abundant yellow pubescence, and with an orange brown middle line which extends from the small facial knob down to the mouth, and with all the mouthmargin rather widely orange brown; jowls orange; the mouth-opening extends in front fully half-way up the face leaving the black sides of the face on the upper part a little puffed out, and when viewed sideways the face just below the antennæ projects a little into a slight knob which in conjunction with the puffed-out black sides of the face slopes downwards from the sides of the upper mouthmargin; the mouthmargin is bare, but the pubescence of the face is continued as a conspicuous rather long fringe all round the inner and lower margin of the eyes, extending outwards again on to the jowls; back of the head shallow below but deeply hollowed out above, and apparently bare; vertex slightly raised, shining black, extending forwards to a very long narrow point on all of which there is short brownish orange pubescence; frons very small, moderately shining black, with two small tufts of short yellow pubescence on the upper part. Eyes bare, touching for only a short space near the frons; small facets on the lower part sharply distinguished from the larger facets on more than the upper half. Antennæ obliquely porrect, practically touching at the base, little more than half the length of the head, and deep orange from the base up to the blackish last annulation of the flagellum; two basal joints thin and about equal in length; third joint thin, nearly three times as long as the second and composed of four nearly equal annulations, besides the brownish red style, which is scarcely more than a third the length of the flagellum and which has a short orbicular basal joint.

Thorax black with a slight æneous tinge and with universal greyish yellow pubescence, which is shortish on the disc but longer and conspicuous about the sides and on the pleuræ; pubescence all composed of soft fairly erect hairs. Scutellum black with a broad orange margin and with two brownish orange marginal spines of which the tips are blackish; pubescence short and inconspicuous, greyish yellow, and not specially marginal.

Abdomen shining black, slightly dulled by minute but coarse punctuation

on the disc of the second and third segments, and with a broad dentate greenish yellow margin; this greenish yellow margin leaves the basal segment black except at the extreme hind corners, the second segment with a broad black trapezoid occupying nearly all the front margin but sloping down on the sides to the middle third of the hindmargin; the third segment with a very similar but more regular black trapezoid occupying only the middle three-fifths of the front margin; the fourth segment with a very similar but larger black trapezoid which is less contracted on the hindmargin and occupies there only half the segment, and this trapezoid on the fourth segment is less sharply defined than the one on the third segment; the fifth segment has a broad shallow black diamond, leaving all the margin equally greenish yellow; abdomen with a narrow raised margin. Pubescence on the disc very inconspicuous as it is composed of very short depressed black bristles, but there are a few longer yellow hairs about the basal corners. Belly greenish black, but not easily visible in the specimen described.

Legs entirely orange from the base of the coxæ to the tip of the tarsi and pulvilli, but the claws black at the tip. Pubescence pale yellow, inconspicuous, but forming a moderate fringe on the anterior femora.

Wings with a slight yellowish tinge; all the veins near the costa, the stem of the postical vein and its upper branch as far as the small cross-vein, the veins round the discal cell, and just the base of the anal vein strong and orange; discal vein up to the discal cell and the other veins faint; the veinlets issuing from the discal cell do not quite reach the wingmargin and the upper one vanishes on its basal half, while a faint indication of a veinlet existing between the second and third veinlets causes a slight bend in that side of the discal cell; radial vein short but distinct; cubital vein forked at about half the length of the submarginal cell; anal cell closed well before the wingmargin through the lower fork of the postical vein being bent down rather sharply. Thoracal squamæ large, whitish yellow with no obvious margin but bearing all over the disc rather long whitish yellow pubescence and a similar rather long marginal fringe. Halteres with rather large greenish yellow knobs, stem brownish at the base.

- ♀. Not much like the male though similar in size and general appearance. Frons and face almost equally wide from occiput to mouth, though the face is slightly the broader, both mainly luteous but the upper part more orange with a large blackish space on the ocellar triangle and its neighborhood; frons shining luteous, practically bare though some tiny black hairs occur about the middle and also some short tiny yellow hairs at the middle of the sides, while a small but conspicuous tuft of short yellow hairs occurs on each side just above the antennæ; the lower margin of the blackened ocellar space may be very much blurred and may emit two vague darkened lines out towards the tufts of yellow pubescence; there is also a narrow blackish middle furrow running from the lowest ocellus to the antennæ, and the furrow extends below them but is no longer blackish; the lower margin of the frons is marked off by a shallowly arched furrow rather above the antennæ, and the sides of this furrow (on which stand the tufts of pale pubescence) are blackened; another furrow extends on each side from the middle of the previous arched furrow down in an arch to each eyemargin, and the space enclosed near the eyes by these furrows is slightly puffed and is quite bare, while the face (which here has no bandlike eyemargin) may be a little obscured in colour except on the bare yellow middle line, and bears silky yellow pubescence which is conspicuous but not dense and which forms a slight patch at the eyemargins; the absolute upper mouthmargin is blackish; jowls rather small, and bearing short yellow pubescence; all round the eyes there is a yellow bandlike margin narrowly interrupted at the middle of the vertex, which is bare except for a microscopical shining golden recumbent pubescence; proboscis large and dilated, black; palpi small, yellow, knobbed, and bearing scattered short yellow pubescence. Eyes comparatively small. Antennæ as in the male.

Thorax æneous black, rather dull from dense punctuation, and closely covered on the disc (though not quite closely enough to obscure the ground colour) with short almost adherent golden pubescence; about the sides and

on the pleuræ the pubescence is longer and more erect; humeri, postalar calli, back part of mesopleuræ, broad spaces round the front coxæ, and an oblique stripe on the hypopleuræ, luteous. Scutellum more shining and with more sparse less adherent pubescence, and the pubescence on the under side longer; the luteous margin is so wide as to leave only a shallow arched black base.

Abdomen (fig. 131) more shining black because the punctuation is less coarse though just as dense; the broad green margin is so broad from the base to the end of the fourth segment that the black dorsal spots on the second, third, and fourth segments are almost exactly equal, each occupying just half the foremargin and more than a third of the hindmargin with the sides not absolutely straight; the fifth segment is more extensively black but has the hind part irregularly and rather obscurely green, and has the middle of its hindmargin orange, which unites with the orange of almost all the sixth segment. Belly all yellowish green with universal very short pale pubescence. Ovipositor with the basal plate blackish, followed by four orange lamellæ.

Wings with the cubital fork just beyond the middle of the submarginal cell. Squamæ yellow, with the margin faint but just obvious. Halteres with an apple green knob.

Length about 9 mm.

This species probably varies considerably, but the description is given in detail from one male (probably British) in the Hope Museum at Oxford and from one female taken by myself at Tuddenham near Barton Mills in Suffolk. I have not ventured to give any details from continental specimens, as it is very desirable to know first the limits of our British form. Of the recognised allied species, *O. hydroleon* has the antennæ usually all blackish, and the face of the male all black and of the female marked with black, while Schiner especially notes the band-like widening of the front part of the abdominal black dorsal spots, but as he says the eyes of the male are hairy I am compelled to doubt his identification of the species; *O. hydrogota* has the second abdominal black dorsal spot smaller than the first and widest at the middle of the segment instead of at the foremargin; *O. hydrophila* only occurs in extreme South-east Europe and Sicily, so is not likely to occur with us; *O. felina* has the green abdominal margin very narrow.

O. angulata became known to me as British from a female which I caught at Tuddenham near here on July 20, 1880, and I think I have since seen (but missed) a specimen at Chippenham Fen. Mr H. W. Andrews took three females at Sutton Broad in Norfolk on July 14, 1905, which are very similar to the specimen I have described, but all the green markings have become very orange and the specimens are slightly smaller. I expect that under favorable circumstances it is not uncommon in the Fens or Broads in July or August; there are a few specimens in the Dalean collection at Oxford under the names of *O. hydroleon* and *O. hydrogota*, and in the old British collection of the British Museum under the name of *O. felina*, and in the Entomological Club collection. A male in the Dalean collection (with an undecipherable label beginning apparently "Cosm") has rather small green spots on the sides of the

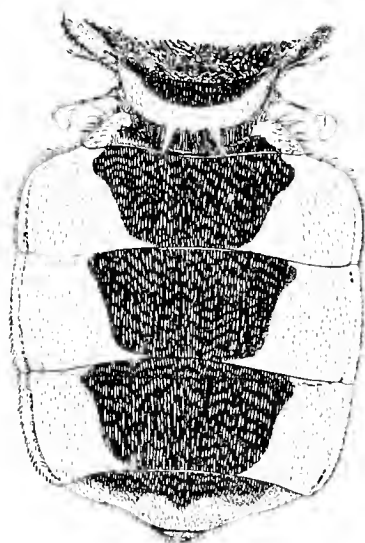


FIG. 131.—*Odontomyia angulata* ♀.
× 8.

second and third abdominal segments, which occupy all the sidemargins of those segments and which are widest along the hindmargins but not produced angularly, and the fourth segment has a narrow orange margin; the antennæ have only the two basal joints left and they seem to be blackish. It is recorded from North and Middle Europe, but not from the extreme North.

Synonymy.—I have no doubt about this being the species for which Loew adopted Panzer's name of *angulata*, and Panzer's description and figure fairly well represent it. It is also obviously Zetterstedt's *O. ruficornis*. If Walker had it before him in his *Inſ. Brit. Dipt.* it must be his *S. hydroleon*, but it is not the *O. hydroleon* of Zetterstedt or Loew; and I am inclined to think that it is the *O. hydrogota* of Duncan because of his description of the antennæ. Loew suggested that Macquart's *O. latifasciata* must be allied, but if a specimen so named in Bigot's collection represents Macquart's species it must be a synonym of *O. hydrogota*, which was a species unknown to Loew when he made the suggestion.

4. **O. ornata** Meigen. Basal joint of the antennæ only a little longer than the second. Abdomen flattened, black with three pairs of large side-spots of almost equal size and the tip orange. Wings almost unicolorous.

A large handsome *Stratiomys*-like fly.

♂. Face and frons black, bulging out when seen in profile, and forming when seen from in front a sharply retreating equilateral triangle of which the sides are very slightly arched; face all covered with long yellowish or greyish white rather drooping pubescence which is often rubbed off the middle and then leaves a shining black middle line extending from the antennæ to the mouth, and the pubescence elsewhere is not quite dense enough to hide the black ground colour; jowls broad and flat but drooping at the mouth-edge, bearing similar pubescence to that on the face, but the actual margin against the eyes on the lower half of the face and round under the eyes is shimmering white; back of head hardly perceptibly inflated, dull black and bearing obscure brownish or greyish orange pubescence, but the postocular marginal rim has only a minute adherent brownish orange pubescence which is directed forwards, and even this rim disappears on the upper part of the back of the head and the moderately long pubescence extends up to the hindmargin of the eyes, but as the eyes at this part are somewhat dilated there is no sign of any postocular fringe when viewed from in front; vertex shining black, at its widest part less than one-twelfth the width of the head and narrowing forwards almost to the frons, but for about six facets the eyes may be considered touching, as the coarse black line of upturned pubescence extending down between the eyes from the lower ocellus ceases for about that distance just before the frons; ocellar space with very little black pubescence; frons with depressed greyish white pubescence and with a distinct middle channel. Proboscis rather long and with moderate sucker-flaps; palpi very much withdrawn, cylindrical, brownish orange at their tips and bearing long pale pubescence there. Eyes bare; facets on the larger upper part distinctly larger than those on the smaller lower part, and the line of distinction fairly well marked but not strongly so on either the front or back part; the eyes are more shining on the area of the small facets. Antennæ black, ferruginous at the junction of the joints and to a greater or less extent from the base of the third joint onwards; basal joint rather longer than the cup-shaped second joint, and both these joints rather shining and bearing tiny bristly pubescence; third joint porrected and widely diverging, dull brownish black where not ferruginous, quite bare, about three times as long as the basal two together, and with indistinct annulations of which the first four are about equal in length while the short fifth and the sixth together are about as long as each preceding one, the three basal annulations are about equal in thickness and are distinctly punctulate, the fourth is contracted and not at all punctulate, while the fifth and sixth jointly form an awl-shaped end which has a rather blunt point from which a microscopical thin whitish arista proceeds.

Thorax shining brownish black, densely clothed all over with erect brownish orange or almost brownish red pubescence, which but little obscures the ground colour; this pubescence is rather longer, shaggier, and paler on the pleuræ, and is even fuzzy on the metapleuræ. Scutellum shining black, with all the margin broadly brownish orange; spines stout, sharply black at the tip.

Abdomen shining black, with large conspicuous orange spots and tip, broad and flat, even the disc being hardly arched; basal segment with a small orange spot at each extreme hindmarginal corner; second segment with a pair of large triangular reddish orange spots, occupying the basal corners and each extending along more than a quarter of the hindmargin and then sloping back across the disc so as to include the point of the shoulder; third segment with a pair of larger trapezoidal reddish orange spots which occupy the hind third (to half) of the sidemargins but extend inwards as far as the previous spots and have an irregularly perpendicular inner margin which reaches fully three-quarters up the segment and then slope back on their own upper margins to the sides, the irregularity of their inner margin being often caused by the portion against the hindmargin of the segment being produced rather more inward than the middle and upper portions of the spot; fourth segment with a pair of similar large orange spots having their inner margins more distinctly extended inwards near the hindmargin of the segment; fifth segment with a broad reddish orange (paler orange about the middle) margin except at the basal corners; small sixth segment all orange. Pubescence almost erect and rather abundant on the discal portion of the second, third, and fourth segments, but inconspicuous dark greyish yellow and longer in front of the shoulders; round the sidemargins there is a rather shorter stiff sloping pubescence which is black where the margin is black but yellow where the margin is yellow; on the flattened margins between the disc and the sidemargins on the second, third, and fourth segments there is only short depressed black pubescence, on all the fifth segment the pubescence is pale and similar to that on the disc of the preceding segments. Belly obscurely shining reddish orange with a small black transverse spot (often resolved into two spots) on the middle of the third and fourth segments; pubescence consisting of long erect whitish hairs, except on the flattened sides of the third and fourth and part of the fifth segments where it is short black and depressed. Genitalia when seen from above with a pair of broad soft orange side lamellæ which overlap the broad but pointed middle piece.

Legs shining black and orange; coxæ and trochanters black with conspicuous orange joints; femora, after the joint, shining black for more than the basal half, but the rest and almost all the tibiæ and tarsi orange; all the tibiæ however have a darkened incomplete ring about their middle, which is usually blackish behind the anterior and in front of the hind pairs, and the tarsi are obscurely blackish above the last two joints, and sometimes so on the third, or even on the second, joint. Pubescence all pale yellow, abundant and conspicuous on the middle femora especially behind the tip, and fairly abundant behind and beneath the front femora, and beneath and about the base of the hind femora; the tibiæ and tarsi bear only very tiny adpressed yellow pubescence all over; claws black at the tips.

Wings (fig. 126) hyaline, with the base and foremargin brownish orange, the usual strong veins being dark orange but the rest faint and almost colourless; eubital vein distinctly forked rather beyond the middle of the submarginal cell; discal cell apparently pentagonal, because the lower side which slopes from the lower cross-vein to the base of the second veinlet issuing from the discal cell is almost straight; discal vein not at all faint, and its fork branching at almost right angles to the stem; third veinlet from the discal cell sometimes absent, and sometimes not extended half-way to the wingmargin and consequently not looped upwards like the others, while none of the veinlets quite reach the wingmargin. Alar squamæ rather large, brownish orange, with rather short orange marginal fringes on the basal part, but the fringe becoming longer and more abundant towards the angle; thoracal squamæ much larger, and with no distinct margin, but all whitish yellow with whitish yellow almost woolly pubescence all over and forming a long elegant marginal fringe. Halteres yellow.

♀. Rather similar to the male. Frons at the vertex nearly one-third the width of the head (fig. 130) and the space between the eyes gradually widening down to the mouth, where it is about two-fifths the width of the head; frons shining black with orange markings which in their simplest form are composed of three pairs of orange spots, but frequently the second and third pairs of spots more or less coalesce; the upper pair of orange spots placed at the top corners of the eyes are always present, and then a pair of long spots at the sides of the furrow which runs down the middle of the frons, and lastly a pair of larger transverse spots a little before the antennæ which are only narrowly separated, the middle pair of spots almost reach the upturned inner ends of the third pair, and the third pair extend only about half-way to the eyes; but frequently the second and third pairs of spots are much larger and connect by a broad neck, thereby leaving an equal narrow black bordered furrow extending from the front ocellus all down the frons; face shining black but an obscure yellow spot on each side runs across it from the eye to the mouth, and about half-way down the face the margins against the eyes begin narrowly dull pale yellow, and expand into a conspicuous fairly broad dull pale yellow collar right round the eyes up to the shining orange spots on the vertex; this collar is slightly widest near the lower hind corner of the eye until about one-third up the back of the head; all the mouth borders are broadly yellow except at the front point and are almost connected with the broad yellow collar under the eyes; pubescence on the frons erect and blackish from the upper ocelli to the third pair of orange spots, but there is a pale yellow patch on each side about the middle of the frons; the third pair of orange spots are bare, and outside each of them against the eyemargin is a bare shining black space, and just below them is another pale yellow patch in a line with the antennæ, followed by another smaller shining black bare space against each eye, but otherwise all the face and jowls bear long drooping pale yellow pubescence, unless (as frequently happens) it is rubbed off down the middle of the shining black face; the yellow eye-collar bears no distinct pubescence but has minute glistening yellow adherent scaly hairs pointing forwards; the hollowed back of the head bears some long straggling greyish pubescence; the vertical pair of orange spots extend a little down the back of the head, but there is no raised rim between the vertex and the occiput. Eyes with their facets all equal. Antennæ (fig. 130) inclined to be more extensively ferruginous than in the male.

Thorax with shorter erect pubescence, and in addition with some very short depressed golden pubescence; postalar calli brownish orange and almost connected with the basal corners of the scutellum; pleuræ with the upper and front margins of the mesopleuræ broadly orange as well as usually the lower part of the metapleuræ and the upper part of the sternopleuræ. Scutellum more ferruginous, so that there is only a large semicircular black basal spot.

Abdomen with smaller orange spots, the pair on the second segment forming small triangles (missing the extreme outer hind corners because the hindmargin of the segment turns up there) which do not quite include the shoulder points; third segment with long transverse orange red spots at the hind corners (though upturned at their own actual hind corners) usually occupying less than one-third the depth of the segment; fourth segment with similar but slightly larger spots; all the spots extend barely a quarter of the way across each segment unless occasionally the basal pair extend to a point along the hindmargin for a third of the segment on each side; fifth segment with the orange colour more confined to the tip, though a narrow line exists up the sidemargins. Pubescence shorter, depressed, and dark (almost blackish) grey, rather long and more erect about the base, more obvious on all the fifth segment and the hinder half of the fourth, and long and yellowish above the shoulders. Belly with shorter pubescence and without any black spots.

Legs after the coxæ and trochanters entirely orange except at the end of the tarsi, though sometimes the front femora are more or less darkened behind on the basal half or more; pubescence on the femora shorter.

Wings, squamæ, and halteres as in the male.

Length about 13 mm.

This species varies a little in the shape and colour of the abdominal spots, especially in the form of their inner margins, and also in their size, as they are sometimes rather more extensive than in the descriptions given above; on the other hand they are occasionally smaller and narrower, while the colour varies from orange up to obscure reddish, though probably the darker and obscurer colours are caused by discoloration in drying, especially in immature specimens, and in such specimens the orange markings on the frons and face of the female may become very obscure; the antennæ also vary a little in the amount of ferruginous coloring. I possess a male from Bigot's collection, which as usual bears no locality label, in which the abdominal spots are exceedingly extended so that they all widely connect and form a broad orange band which extends all round the margin, leaving only small black spots at the extreme front angles of the segments. The large size and large conspicuous orange spots on the abdomen readily distinguish it from any other species likely to occur in Britain.

O. ornata appears to be uncommon. I met with a few specimens in Abbots Wood in Sussex on June 25, 1876, but that is the only occasion upon which I have seen it alive; Mr J. H. A. Jenner has bred it from larvæ found in the Lewes marshes, and Rev. E. N. Bloomfield has taken it at Guestling, but these two localities are not very far from Abbots Wood. I know of it from Kent (Wickham and Gravesend), Essex (Colchester), and Middlesex (Acton). Duncan (1837) recorded it from Roxburghshire and near Edinburgh, "near London," *Stephens's Catal.*, "*Dalmeny*," *Rev. William Little*. I have records from May 10 to June 25. It is recorded from all Europe except the extreme north, and is known to extend to Italy and Sicily, but I do not know of any record from Spain or Greece.

Synonymy.—A male in the Hope Museum at Oxford is labelled "*felina*."

5. *O. viridula* Fabricius. Black. Abdomen transparent pale green, with a broad unequal black dorsal line which is widest on the fourth segment. Wings (fig. 127) with the subcostal and radial veins apparently anastomosed; discal cell small and with only one well-defined issuing veinlet.

♂. Head large, being both broad and long, slightly broader than the thorax and nearly as long from back to front as from top to bottom. Face and frons shining black and forming a rather small almost equilateral triangle; the frons is flat and flush with the eyes, but the face is distinctly produced and rises to a knob on the upper part just below the antennæ; pubescence whitish yellow, rather coarse and rather short, most conspicuous on the frons and down the sides of the face near the eyes, but occurring more sparsely on the rest of the face except on the bare middle line and knob; in specimens in perfect condition the frons and a pair of side face patches are (as in the female) conspicuously glistening white; after a short polished gap the lateral pubescence is continued on the lower part of the eyemargins in a line to the jowls; jowls black, not small but flat and flush with the lower eyemargin; head behind the eyes somewhat hollowed and bearing some scarce pale pubescence which is not visible against the eyes because the eyes arch over; vertex very slightly elevated, shining black, and rather long as it extends to a long point between the eyes, and bearing short whitish pubescence behind and at the sides right down to the lowest point; proboscis black, concealed in the mouth-opening. Eyes large, touching from the point of the vertex (which is nearly half-way between the occiput and the antennæ) for about two-thirds of the

remaining distance, quite bare; facets on more than the upper half brown and conspicuously larger than the black facets on the lower part, the two sizes being contrastedly separated by a line which allows the small facets to extend higher up against the back of the head; bottom of the eye when seen from in front but little arched as compared with the sides; eyes in life probably as in the female. Antennæ scarcely as long as the head; two basal joints brown, almost equal in length, but the basal joint may be slightly the longer; third joint forming a darker elongate flagellum nearly three times as long as the two basal joints together, and indistinctly annulated into five rings besides being obviously pitted; the last of these rings is narrower than the others and ends in a rounded blunt tip; none of the antennal joints bear any bristles or pubescence.

Thorax and scutellum all black, moderately shining, but the brightness obscured by the dense coarse punctuation; thorax, including the pleuræ, clothed all over with moderate dull yellow fairly dense pubescence, which is however not dense enough to obscure the ground colour; this pubescence is about equally dense on all parts, but is rather longer and more erect on the pleuræ. Scutellum semicircular, with all the pubescence short, and with a pair of short yellow subapical spines.

Abdomen broad and squat, being less than one and a half times as long as broad, short-oblong with rounded corners, all shining, and the sides broadly pellucid pale green, while all down the middle is an irregular broad black dorsal stripe; this black dorsal stripe occupies the middle two-thirds of the basal segment, though it is rather narrower against the hindmargin, while on each of the second and third segments it begins about one-third the width of the segment and contracts by oblique lines to about one-fifth the segment just before the hindmargin, on the fourth segment the black marking is much wider as it occupies fully two-thirds of the base and when contracted to the hindmargin still occupies more than half the width; against this large black spot and apparently forming part of it is the shallow triangular spot on the foremargin of the fifth segment which extends down the segment for about one-third of the segment's length, and then protrudes from its point a narrow black dorsal line which extends down another third of the segment; the three middle segments are about equal in length, the basal and fifth segments being shorter; pubescence very inconspicuous and sparse, all pale except the tiny black bristles on the dorsal stripe. Belly greenish white, but a little orange about the tip; pubescence almost absent. Genitalia showing a pair of short blunt yellow lamellæ.

Legs pale orange; coxæ black, trochanters brown, and the femora on the basal three-quarters slightly obscured; the orange colour extends even to the tips of the tarsi and to the pulvilli, though the claws are black except at the base. Pubescence all pale and very slight, but there is a moderate fringe behind the anterior femora.

Wings (fig. 127) whitish hyaline, blackish about the root and distinctly yellowish on the foremargin down to the end of the subcostal and cubital veins; other veins very faint and difficult to trace except on the stem and upper fork of the postical vein up to the cross-vein connecting it with the discal cell and all round the very small discal cell; subcostal and radial veins anastomosed; cubital vein not forked; only one veinlet from the discal cell is at all lengthy and even that does not reach the wingmargin, and this veinlet would be the second one out of the discal cell, the upper one being indicated by a very short stump, while the third is entirely absent unless as a fold; one veinlet from the second basal cell (the continuation of the upper branch of the postical vein) is traceable though faint, and the whole discal vein is very faint from its origin to its end except when enclosing the discal cell. Squamæ (alar) fairly large, chalky white or slightly yellowish, triangular, with a delicate fairly long white fringe all round the margin and on the surface. Halteres pale greenish yellow, stem brownish.

- ♀. Not much like the male, because of the glistening scaly yellow or bronze pubescence on the thorax and scutellum and the more extended black abdominal markings. Frons flat, fully one-third the width of the head, slightly widening when nearing the antennæ, black and shining but for the

dullness caused by dense coarse punctuation; there is a narrow middle channel from the point of the vertical triangle to just before the base of the antennæ, and the frons bears a conspicuous short scaly orange pubescence, which though scattered all over tends to form two patches on each side against the eyes, one about the middle and the other at the lower outer corner; just below this last spot a channel crosses from the eyes towards the antennæ which is smooth, bare, and shining on its upper side and sometimes leaves the sides of the face below it polished and bare, and before reaching the antennæ this channel spreads out above and below them and is less defined; the frons is about three times as long as the face; face produced as in the male, with a pubescence similar in texture to (though much scarcer than that on the frons), and forming a patch on each eyemargin just below the smooth part, and below this patch is a smaller smooth part; there is usually a dark ferruginous space at each side of the front of the mouth-opening; jowls with the pubescence less scaly close against the eyes, but continued densely all over the black flat collar behind the eyes, and conspicuously glistening pale yellow; all the back of the head well puffed out from the eyes, and more so on the upper half than on the lower, but there are no black hairs and no fringe; the actual back of the head is black and hollowed out. Eyes with the facets all equal, but there is an inconspicuous slight dark band across the eyes about their middle; in life they are (according to Dr Sharp) greenish bronze with a narrow transverse dark line and with numerous irregular small dark dots, but Colonel Yerbury informs me that these latter characters are often absent. Antennæ reddish brown, but the last two annulations of the flagellum blackish brown.

Thorax, scutellum, and pleuræ all densely covered with glistening scaly short yellow or bronze pubescence which is, however, not quite dense enough to obscure the black ground colour; usually a pair of rather broad black stripes can be traced on the front part succeeded by a middle stripe down the hinder part, but sometimes only a narrow middle line runs down the disc with a cross-line along the suture, but the cross-line does not extend inwards enough to touch the middle line, and none of the lines extend to any margin. Scutellum with a pair of inconspicuous dull yellow spines.

Abdomen somewhat like that of the male, but the black marking on the basal segment is narrower than that on the second segment, while that on the second segment is wider than in the male and is very slightly narrowed downwards, the marking on the third segment is as wide as that on the fourth segment, and the combined markings of these two segments make the end half of the abdomen black with a broad reddish orange (in death) margin of almost equal width, as the black colour only just extends on to the fifth segment at the middle.

Legs darker orange.

Wings, squamæ, and halteres as in the male.

Length about 7 mm.

This species varies very considerably, and many of the varieties have been given specific names. I have not met with any of the extreme forms in Britain, but yet our specimens vary quite enough to cause uncertainty among those who do not know the species well. The black dorsal abdominal markings vary in width, being sometimes broader on the second and third segments to almost half the width of the abdomen and bearing outward prongs at the sides near the foremargins; the five-sided spot on the fourth and fifth segments may be larger and less regular in outline or may extend almost to the hindmargin of the fifth segment; the pale abdominal sides may be orange or dark green; the middle femora may be considerably blackish on about the basal two-thirds; and the halteres may be dark green. Two females taken by Colonel Yerbury at Waterville, Co. Kerry, on July 27 and 30, 1901, appear very distinct (but a normal female also occurred there on July 30); they are slightly larger, and the abdomen has only a narrow green margin

which becomes yellowish towards the end and widens out only at the shoulders, and this distinction is mainly caused by the black coloring on the second segment being wider and widening still more towards the hind corners, thereby entirely doing away with the rectangular inner hind angles, while on the third and fourth segments the pale side-band is narrower and does not extend inwards near the hind corners of each segment, and the pale margin round the end of the abdomen is narrower; in these two specimens the antennæ are entirely dark brown, and the femora are obscured on about the basal half, the pubescence is bronzy golden and is especially dense and conspicuous on the whole of the collar behind the eyes; the upper veinlet from the discal cell is distinctly visible and, in certain lights, as much developed as the next one, and I think the bare polished spaces on the face are larger and more conspicuous. On the Continent a very similar variety has been described as *O. Heydenii* by Jaennicke, and other remarkable varieties are recorded; in one well-known variety (*jejuna*) the abdomen is entirely green or yellowish green, or with only a black basal spot, in another (*interrupta*) there is the black basal spot and also a large subanal spot, in others (*subvittata* and *bimaculata*) there may be another black spot between the two previously mentioned spots. Colonel Yerbury has informed me that the extreme variations between green and yellow markings have no correlation with the presence or absence of black dots on the eyes in life.

O. viridula is by far the commonest species of the small *Stratiomys*-like flies in Britain, and occurs in most marshy places. I have numerous records from Devon, Sussex, Kent, Essex, Middlesex, Suffolk, Cambridgeshire, Herts, Hereford, Warwick, and Northampton in England; Glamorgan and Merioneth in Wales; and various localities in Cork and Kerry in Ireland, but the only northern records are from Scotston Moor near Aberdeen and from Barr in Ayrshire. The dates range from June 2 to August 17. It seems to like the flowers of *Cnicus palustris*. It is recorded from Middle and North Europe and from Asia Minor, but not from the extreme North.

Synonymy.—The only addition I can make to the accepted synonymy is the inclusion of *O. Heydenii* Jaennicke; I possess a male and a female from Bigot's collection which probably came from Jaennicke, and though they represent a large form I cannot consider them distinct, as they are almost identical with the variety I have mentioned from Waterville. I have no doubt that several reputed British species of *Odontomyia* have been introduced from varieties of *H. viridula*, as I found a female in the British Museum from Berkshire and a male in the Hope Museum at Oxford labelled "*hydroleon*," and a female in the Hope Museum labelled "*angulata* P.," while another female in that collection is labelled "*felina*," and yet another female "*atrata*," which makes the third species in that collection labelled "*atrata*."

6. STRATIOMYS.

Stratiomys Geoffroy, Hist. des. Ins., ii., 475 (1764).

Large, though not very large, flies of blackish colour usually broken up on the abdomen by yellow spots or bands, or by patches of pale pubescence.

Head semicircular when seen from above, wider than high; face slightly or distinctly arched, retreating, not much produced just below the antennæ; jowls fairly broad; back of the head in the male slightly inflated on the lower part, but almost flush with the eyes on the upper part; in the female considerably more inflated, and forming a rim or broad collar against the eyes which is often conspicuously yellow; frons moderately produced. Proboscis not prominent, comparatively small, but with large sucker-flaps; palpi small, jointed, with the end joint thickened; mouth-opening small, ovate but produced in front. Eyes bare or hairy, and sometimes differing in this respect in the sexes; always widely separated in the female, but always closely approximated on the frons in the male, though with a line of dividing pubescence, and usually with the lower facets smaller than the upper ones and sometimes sharply and conspicuously contrasted. Antennæ conspicuously elongate, twice as long as the head, and placed at about the middle of the head in profile; basal joint cylindrical, four or more times as long as the short second, and the basal joint of both antennæ very contiguous from the base to the tip, but the other joints widely diverging (fig. 132); the third joint very long and thin, and with five or six annulations,* much longer than the basal joint, and without any terminal style or bristle unless the last annulation represents one; the two basal joints of the antennæ bear some tiny adpressed bristles, but the annulated third joint is bare.

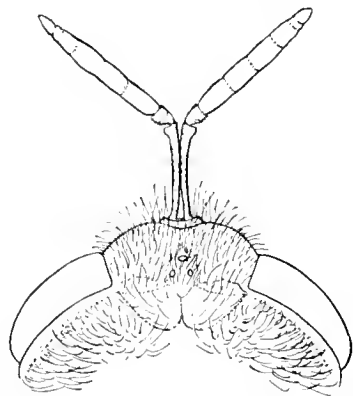


FIG. 132.—*Stratiomys furcata* ♀.
× 8.

Thorax rather longer than broad, and with moderately or conspicuously dense equal pubescence in which there is no trace of any bristles or long bristly hairs, suture distinct. Scutellum semicircular, with one pair of marginal spines set well apart.

Abdomen distinctly broader than the thorax, almost quadrate and with the fore angles so little rounded as to leave pronounced shoulders, slightly arched over the middle of the disc but leaving broad flattened margins within which the wings lie when at rest; sides parallel from the middle of the second segment to near the end of the fourth segment, and bearing a more or less dense suberect pubescence on the arched part, while that on the flattened sides is more sparse and depressed. Genitalia of the male small, but obvious.

Legs rather thick, simple in structure, and bearing only moderate inconspicuous pubescence.

Wings (fig. 125) with the venation of the *Stratiomyinæ*, in which the anterior veins are strong and crowded together, the radial vein being extremely close to the subcostal, but the exterior and posterior veins are faint. Cubital vein obviously forked; veinlets from the discal cell strongly bent and not quite extended to the wingmargin; anal cell closed well before the wingmargin; discal vein very thin though not faint until near the discal cell, when it becomes blackish and continues so until the fork which forms the two diverging basal sides of the pentagonal discal cell, and this blackish portion is densely though minutely downy before the fork and still downy though in a still more minute form on the branches of the fork; wing-membrane bare. Squamæ (alar) comparatively small but with a thick margin and a short slight fringe; thoracal pair large and rather upraised, with no obvious margin but bearing dense woolly pubescence all over.

Metamorphoses well known; the rat-tailed larvæ live in water, mud, and moist sand. Walker has given a rather full account of the larva of *S. chamaeleon* (*S. potamida*?) in *Insecta Britannica* Diptera, vol. i., p. 14. Dr D. Sharp confirms the opinion that their larvæ live on minute life, and considers that they congregate in the neighborhood of drowned creatures in search of the minute organisms which abound there.

This genus is well circumscribed and easily distinguished in this sub-family by the basal joint of the antennæ being four or more times as long

* Lundbeck calls special attention to the annulations of the flagellum, and I find (as he states) that *S. potamida* and *S. chamaeleon* have the ordinary fourth annulation subdivided so that a short fifth annulation precedes the last one; I cannot trace this annulation at all in *S. longicornis*, but it occasionally occurs in *S. furcata* as in fig. 132.

as the short second joint and by the still longer outspread third joint, which is usually simply strap-shaped, but which has a broad heart-shaped terminal knob in the subgenus *Alliocera* (fig. 128). The species frequent Umbelliferae and other flowers in the neighborhood of large marshes or fens, and are not at all shy, and are so quiet that they can even be taken by the fingers off flowers.

Stratiomys is composed of a considerable number of species which are said to occur over most parts of the world. When Schiner published his *Fauna Austriaca Diptera* (1862) only about nine species were satisfactorily known as European, but since then several new species have been detected and others have been distinguished, while one may safely say that a large number of species have been manufactured upon the most slender distinctions, until forty-six or (including *Hirtea*) forty-nine so-called species are enumerated in Bezzi's *Katalog der palæarktischen Dipteren* (1903); most of these new species were described from various parts of Asia even to China and Japan and many of them may be good species, but I believe that a large number of them are founded on very trivial variations.

Synonymy.—The genus *Stratiomys* (mouche armée) was founded by Geoffroy in 1764, and for seventy-four years was accepted without any demur except for the dismemberment of *Odontomyia*. In 1838 Macquart emended the spelling to *Stratiomyia* because of its obvious derivation, and in 1842 Zeller suggested the new name of *Hoplomyia*. I have not accepted any change of the original spelling, as I consider such classic words as *Stratiomys*, *Nemotelus*, *Bibio*, *Scatopse*, *Nemocera*, etc., exempt from emendation because of their antiquity and long-continued use; further than that, if emendation is to commence with such a word as *Stratiomys* I fail to see any finality until *Stratiotomyia* (as proposed by Rye in 1879 and by Lynch Arribalzaga in 1883) is adopted, and finally the quibblers can contend that none of Geoffroy's generic names were properly founded because he did not use them in accordance with the binomial system. Strict priority-mongers have found another bugbear in *Hirtea*, which Scopoli (1763) founded upon *S. longicornis*, and they would have contended that that name should supplant *Stratiomys* but have salved their consciences by forcibly and quite unnecessarily making a separate genus for *S. longicornis*. For my part I decline to accept any suppression of the time-honored name of *Stratiomys* in favour of *Stratiomyia*, *Stratiotomyia*, *Hoplomyia*, or *Hirtea*.

Again, as to *Hirtea*, if anybody can recognise a genus founded upon the following characters it is more than I can do :

"HIRTEA. Os armatum rostro unisetis: seta canaliculata obtusa: vagina retractili, apice labiata, basi palpigera." These words are meaningless to me, and it is only by a very great exercise of faith that I can accept Scopoli's specific description as applying to our well-known *S. longicornis*, and I have almost felt it my duty to continue the name of *S. strigata* which was used uninterruptedly for seventy years before Walker's unfortunate resurrection; the patriotic zeal of Schiner accepted Walker's identification just at the time when he was dealing systematically with the Diptera of Europe, and consequently his successors have been influenced, though I observe that Brauer in 1882 still retained the name *strigata*, and therefore refused to accept the identification of the genus *Hirtea*.

Rondani's attempt to form two genera, distinguished by hairy eyes (*Thyreodontia*) or bare eyes (*Stratiomys*), must fail when such species as *S. furcata* occur in which the eyes of the male are hairy but those of the female quite bare. I also consider *Alliocera* only a subgenus, as I believe the terminal joints of the antennæ will not give good generic characters, and in some cases not even specific as is instanced in *S. unguicornis* Becker and in the varying subdivision of the fourth joint of the flagellum in *S. furcata*.

For the characters of suggested subgenera see page 129.

Table of Species.

- 1 (4) Eyes of both sexes bare, and those of the female with a conspicuous yellow postocular collar.
Tibiæ and belly mainly yellow, the latter with small black bands or transverse spots.
- 2 (3) Abdominal yellow markings composed of a pair of large basal spots followed by pairs of almost similar but less triangular spots. 1 *chamæleon*.
- 3 (2) Abdominal yellow markings composed of a pair of large basal spots followed by entire narrow bands or pairs of linear spots. 2 *potamida*.
- 4 (1) Eyes (of at least the male) hairy, and those of the female without any yellow postocular collar.
Tibiæ and belly mainly black, the latter with pale bands.
- 5 (6) Abdominal pale spots rather small but distinct. Eyes of the female bare. 3 *furcata*.
- 6 (5) Abdomen practically without pale spots. Eyes of the female hairy. 4 *longicornis*.
Unusually pubescent species.

1. **S. chamæleon** Linné. Eyes bare, in the female with an encircling yellow band. Abdomen with three pairs of spots and the tip yellow; belly yellow, with small black spots and lines.

A large well-marked handsome fly.

♂. Head moderately large. Face and frons forming an equilateral triangle, all black except for two obscurely whitish yellow stripes low down on the sides of the face close against the eyes; face rather densely clothed with moderately long greyish pubescence which is equal all over, and which extends on the under part and on to all the back part of the head against the mouth, but not on to the distinctly inflated lower half of the back of the head; this lower part of the back of the head is dull blackish and bears on its lower part a short pale brown very decumbent pubescence which slopes forwards, and just higher up there is a rather longer glistening white pubescence which mainly slopes downwards, while quite at the back of the head right away from the eyes there is some long greyish white pubescence; the upper half of the postocular margin has only a very narrow blackish rim on which there is a very minute black pubescence; vertex black, shining, bare and corrugated about the ocelli, but bearing a number of moderately short black hairs behind the ocelli; the vertex at its widest part is less than one-twelfth the width of the head but narrows forwards soon after the ocelli, and thence forward the eyes are only slightly separated for nearly a third the distance between the occiput and the antennæ, and all along this space there is a line of moderately long rather dense greyish black pubescence which ceases at the commencement of the frontal triangle; the frontal triangle has a middle furrow which diverges a little before the antennæ, and the furrow and this enclosed space are bare and shining black, but the corrugated sides are rather dull and bear a similar blackish grey (or at the top angle and the sides grey) pubescence which extends slightly round the base of the antennæ. Proboscis blackish brown, with scattered brownish yellow hairs; palpi inconspicuous, blackish. Eyes occupying almost all the head, shining black and bare; facets all about equal. Antennæ black, but the tip of the second joint rather chestnut; the shining basal joint of each antenna stands out straight

forwards from the frontal prominence, and is slightly longer than half the third joint; second joint short, being hardly longer than deep, and commencing a sharp divergence, which is carried on by the long and thin third joint, so that at their tips the antennæ are separated by rather more than their own length; the third joint is long and thin, being about eight times as long as deep, with its tip slightly attenuated but blunt and with no sign of any style; the two basal joints bear inconspicuous very short decumbent black bristly pubescence, but the third joint is quite bare.

Thorax black, rather shining but with dense though not coarse punctuation; pubescence dense and downy, nearly erect, but not so dense as to obscure the ground colour, not long, mainly light brownish grey, but when viewed from in front there appears to be a fair-sized patch of blackish sheen in the pubescence on each side between the postalar calli and the suture, but this is only caused by darker grey and less dense pubescence; pleuræ with lighter grey, longer, and quite as dense pubescence, which is rather tangled and shaggy on the metapleuræ. Scutellum bright yellow with a small middle basal transverse black spot and just the basal corners black, and the two spines (which are wide apart) becoming rather obscure orange towards the tip; pubescence yellow, long, thin, and sparse, but inconspicuous.

Abdomen black, with three pairs of large conspicuous spots and the tip orange; rather dull because of the exceedingly dense though exceedingly minute punctuation; basal segment black; second segment with a large pale orange spot on each side which occupies all the sidemargin and which leaves the middle half of the hindmargin black, and this black part widens out upwards in a sloping line to the middle three-quarters of the foremargin and thus leaves all the shoulders of the segment broadly orange, and the inner angle of each orange spot is rather rounded; third segment with less than the hind fifth of the sidemargins yellow, and the yellow colour extending along the hindmargin of the segment for quite as far as on the second segment but gradually widening until at the irregularly rounded inner ends the yellow spots occupy about half the depth of the segment; fourth segment contracting in width on its hinder half and therefore the similar yellow spots more approximated at the middle, but beginning narrower at the sidemargins than in the third segment and curving up on the front margin of the spots to more than half the depth of the segment at their inner ends and with a straighter inner margin; fifth segment rapidly contracting in width, with all its hindmargin orange and forming the base of an equilateral orange triangle with a rounded top which extends fully two-thirds up the segment; after the fifth segment there is a trace of a yellow sixth segment. Pubescence on the dorsum rather dense, almost erect, brownish orange but inconspicuous on all the dorsal dark part, but the broad flat outer part of the abdomen appears to be bare but actually bears very short, but coarse depressed, pubescence, which is black on the black parts and yellow on the yellow parts, and this short coarse black pubescence exists on all the raised dorsal part but is not noticeable under the long brownish orange hairs, and even round the front of the shoulders of the abdomen the pale pubescence is only moderately long. Belly dull yellow, rather orange down the middle, and with black transverse spots; basal segment black; second segment with a pair of narrow transverse black lines near the foremargin, but not near each other nor even nearly reaching the sides; third segment with a pair of broader but still very transverse black spots near the middle of the foremargin, with very narrow black lines running out from them along the foremargin though not nearly to the sides; fourth segment with similar but larger black spots which practically unite at the middle but leave the actual foremargin there yellowish orange, and these spots are continued out narrowly along the foremargin but not nearly to the sides; fifth segment with a long very narrow black foremarginal line which is almost extended to the sides; the actual marginal line of the abdomen is yellow and black, being yellow on all the second segment but only at just the hind corners of the next three segments; pubescence of the belly abundant and rather long, whitish yellow, and slightly sloping backwards. Genitalia slightly protruding, the middle plate shining blackish brown, with a pair of almost equally long rather orange brown side lamellæ, and slightly beyond and

beneath these are a pair of short broad orange brown blunt lamellæ and a short transverse blunt middle piece.

Legs orange-yellow with the femora black; coxæ and trochanters black; femora with just the tip orange; tibiæ and tarsi orange, but all the tibiæ have a faint blackish ring (most conspicuous beneath) about their middle; claws black, but orange at the base. Pubescence very slight, but there are some weak short pale hairs behind the anterior femora, and antero-ventrally on the hind femora and quite beneath about the base; on the tibiæ and tarsi the pubescence is all yellow, short, and adpressed.

Wings brownish hyaline, but strongly brownish on the forepart because of the strong tawny veins there, and blackish about the base because of the strong blackish bases of the veins there; costal, subcostal, radial, and cubital veins strong and tawny, and also the stem of the postical vein, and its upper branch up to the discal cell, and the veins continued round the outer part of the discal cell; discal vein thin and black as well as its fork which forms the two basal sides of the discal cell; the lower branch of the postical vein is coarse and a little darkened, but all the other veins on the outer and hinder part of the wing are very thin and faint; fork of the cubital vein well away from the tip of the submarginal cell. Alar squamæ smoky glassy, with a thick dark lower margin and a short pale fringe; thoracal squamæ large and pale brownish yellow with the margin concolorous, and bearing over all both upper and lower discs, as well as on the margin, dense shaggy long and whitish pubescence. Halteres brownish orange, with the stem blackish.

♀. Similar in general appearance to the male, but easily distinguished by the face, frons, and conspicuous yellow eye-collar.

Frons at the vertex more than a third the width of the head, and the space between the eyes very gradually widening right down to the lower angle of the eyes; all the upper two-thirds of the frons shining black, but on the lower third the black is reduced to the middle fifth though slightly widening out again on the antennal prominence and continued as an equal black line down the middle third (or more) of the face to the mouth; outside this black line the frons and face are widely yellow; black part of the frons with very sparse very inconspicuous greyish black pubescence; upper part of the shining yellow part of the frons bare and polished, but when level with the upper part of the base of the antennal prominence shallowly punctate and beginning to bear whitish pubescence, which becomes more abundant and conspicuous all down the sides of the face and in fact all over the face except on a narrow black middle line; these sides of the face are less shining yellow because they bear minute whitish dust; antennal prominence above and below bare and polished; a rather broad black stripe runs across from the lower angle of the eye to the hind corner of the mouth; back of the head with an unusually broad conspicuous yellow marginal band against the eyes, which is equal in width from top to bottom except that it is distinctly though slightly widened about the middle; this band has a sharp edge and is quite as conspicuous on the upper part of the flat of the back of the head, so that it is only the middle of the back of the head that is black, and this is connected with the black vertex by rather more than half the width of the vertex; at the lowest part of the yellow band (and not on the black part of the back of the head) are some long greyish white hairs, which become on the upper part obscurer darker grey, but on the rest of the band there is only some inconspicuous minute glistening yellow adpressed pubescence. Eyes rather small. Antennæ exactly as in the male.

Thorax almost dull black; scutellum just as in the male, but both with shorter pubescence.

Abdomen above almost exactly as in the male, but with shorter pubescence. Belly with similar but much larger black markings; second segment with a pair of large transverse black spots which are not near each other nor near the sides, but which just touch the foremargin at their middles; third segment with a pair of very much larger transverse black spots which extend along the foremargin almost to the sides, but which are still well separated; fourth segment with a pair of similar spots but more pointed towards the sides and

practically united at the middle; fifth segment with a narrow black line, which is still more narrowed at the sides and at the middle, and which does not quite reach the sides; pubescence similar to that of the male but a little shorter and rather more sloping. Ovipositor composed of a small transverse brown plate which is hidden under the hindmargin of the fifth dorsal segment, and with a middle pair of small brown lamellæ which project just beyond the hindmargin of that segment.

Legs rather similar to those of the male, but the base of the front femora and nearly all the posterior femora tawny; the middle femora have a rather long and broad irregular dull black ring just after the middle, which is considerably extended beneath and towards the front, even sometimes to nearly the whole length, leaving at the same time a comparatively narrow dorsal band between the middle and the tip, but even that may be rather obscurely extended to the middle; on the hind femora the shining black band is better defined but still is considerably extended beneath.

Wings as in the male. Squamæ with rather shorter pubescence.

Length about 14.5 mm.

This species has only one close ally in England, *S. potamida*, and I have specially contrasted that with it.

S. chamæleon is rather rare in Britain, as the records of so large and conspicuous a fly are sure to be noted in most cases. I know it has occurred in Devonshire (Bovey Tracey), Dorset (Bloxworth Heath), Hampshire (Lyndhurst), Cambridgeshire (Chippenham Fen), Norfolk (West Runton), Oxfordshire (Ogley Bog near Shotover), and Leicestershire (Owston Wood) from the end of June to September 9; most of the old records may refer to *S. potamida*, except those of Duncan in 1837, as he fully recognised the distinctions between the two species, and he wrote of it as occurring in most parts of England and Scotland, giving specially some localities near Edinburgh. My own experience of it is mainly limited to Chippenham Fen, where I have taken it as early as July 6 and as late as August 23; it occurred on large *Umbelliferae*, upon which it could be seen a long way off, and though sluggish and easy to catch from the flowers it created a great disturbance when in the net. The metamorphoses are well known, and the larva, which is one of the "rat-tailed maggots," lives in muddy water, in which it can float or sink at will; it is believed to feed on minute *Infusoria*; the eggs are said to be laid on the under side of the leaves of *Alisma plantago*, and to be arranged like tiles on a roof, one being laid partly over another. It is recorded from Sweden to the Alps.

Synonymy.—Linne's and De Geer's descriptions seem to point more to *S. potamida* than to this species, but as it is impossible to be certain upon this point it is sufficient to accept Meigen's apportionment of the names. Walker clearly described *S. potamida* under the name of *S. chamæleon* and openly gave *S. potamida* Meigen as a synonym, but he did not seem to have recognised the true *S. chamæleon* at all.

2. *S. potamida* Meigen. Very much like *S. chamæleon*; but the yellow markings on the third abdominal segment are linear and pointed at their inner ends (♂) or form an entire band (♀), and on the fourth segment form an entire band in both sexes.

A large conspicuous fly (fig. 125), which is almost as handsome as *S. chamæleon*.

♂. Compared with *S. chamæleon* the head is large (being comparatively the largest of our four species), the sides of the face and frons are more rounded

and do not form so true a triangle; the yellowish spot at each side of the face is more extended triangularly towards the mouth; the pubescence of the face, jowls, and back of the head is yellower, and on the frons sometimes all black down to the antennæ; back of the head below only slightly inflated and with a narrow pale brownish yellow postocular rim, on which towards the middle is a minute shimmering brownish yellow or even almost silvery tomentum. Eye-facets sharply divided by a straight line into large ones above and smaller ones below, and this division extends across the eye a little below its middle almost but not quite to the back of the eye where the smaller facets trend upwards.

Thorax, pleuræ, and scutellum with rather denser, longer, and darker pubescence, which sometimes has a tendency to form a tawny patch just above the middle of the disc of the thorax. Scutellum yellow or reddish orange with a black line all across its base which becomes rather narrow at the sides.

Abdomen not so much flattened towards the margins, and duller deeper black; the basal pair of yellow spots form sharply defined triangles which have one side on the sidemargin (so that the shoulders are hardly at all orange) and one on the hindmargin; on the third segment the long narrow yellow side-spots run along the hindmargin and end pointed and separated from each other by more than the length of each spot, but rather nearer each other than the basal pair of spots; the fourth segment has an entire dull orange band all along the hindmargin which, at its widest part, occupies about one-fifth the length of the segment, but is narrowed slightly on each side of the middle and near the sides; fifth segment with a semicircular or sub-triangular yellow spot on the whole of the hindmargin and arching up to about the middle of the segment, and then abruptly and rather narrowly extended upwards at its middle towards and sometimes quite up to the foremargin; pubescence of the second and third segments on the disc shorter and less abundant and more blackish. Belly yellow; basal segment black; second segment with a pair of long narrow black spots against the foremargin which are well separated at the middle but nearly reach the sides; third segment with a pair of much larger black spots (about one-third the length of the segment) on the foremargin which are near together at the middle and which almost reach the sides; fourth segment with a slightly narrower entire black band against the foremargin which is rather widened at the middle and at just the ends but which is hardly connected with the sidemargins; fifth segment with a rather similar entire black band on the foremargin, which is however more pointed at the sides and is hardly extended to the sides; sometimes all these belly-bands extend to the sidemargins for their full width; actual sidemargins less yellow than in *S. chamæleon* at the hind corners of the third, fourth, and fifth segments; pubescence glistening and depressed but very short and inconspicuous, very distinct from the long pubescence of *S. chamæleon*.

Legs very similar to those of *S. chamæleon*, but the whole of the pubescence is more orange.

Wings very similar, but perhaps slightly paler on the foremargin and the base. Thoracal squamæ dark brown with still more dense long tangled pale brown conspicuous pubescence all over.

♀. Mainly agreeing with the male, but differing from the female of *S. chamæleon* by having the frons all shining black down to the level of the top of the antennal prominence; frons punctate and bearing inconspicuous tiny black bristles and also some inconspicuous grey pubescence, or even blackish grey pubescence about the middle; black middle line of the face rather narrower and the sides reddish orange; the reddish orange or yellow postocular collar is rather narrower and is not obviously widened about the middle, and only extends upwards far enough to allow the black back of the head to connect at full width with the black frons; the collar is wider at the back than on its upper side (fig. 133).

Thorax shining black, with very short coarse mainly blackish grey pubescence on all the disc mixed with longer (though still short) fine pale yellow hairs, especially about the suture and the sides, and forming a pair of

pale brownish yellow stripes on the forepart of the thorax which are set well apart and which do not extend half-way to the suture. Scutellum with the long narrow black base as in the male and not with the small middle basal spot of *S. chamaeleon*.

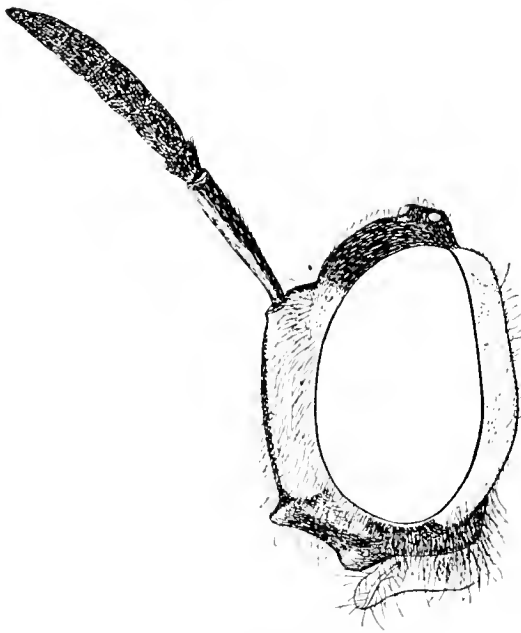


FIG. 133.—*Stratiomys potamida* ♀. × 11.

Abdomen duller rustier black than in *S. chamaeleon*, because of the minute rusty black pubescence; yellow or reddish orange markings more like the male than like *S. chamaeleon*, but the third segment with an entire band on the hindmargin, and this band is narrow all about the middle because the true hindmargin of the segment arches slightly upward, though an impressed line runs straight across near the foremargin of the fourth segment in such a way as to give a false impression of what is the real hindmargin; fourth segment with an entire band on the hindmargin, which is widened by an arch upwards at the middle and at the sides; fifth segment with a semicircular spot on the whole hindmargin, which is sometimes a little produced forward at its middle; pubescence very short and brownish orange on the disc of the third, fourth, and fifth segments.

Belly very similar to that of the male, but the basal pair of black spots may extend less towards the sides, and the black bands are sometimes a little narrower, more equal in depth, not pointed at the ends, and not reaching the sides, but in all these points they vary; pubescence practically none, which is quite different from *S. chamaeleon*.

Legs almost as in the male, and as black in the female as in the male instead of being extensively tawny as in *S. chamaeleon*; pubescence shorter, finer, and all whitish.

Wings and squamæ very much as in the male, but slightly paler.

Length about 14.5 mm.

This species is very distinct from all the other British species except *S. chamaeleon*, with which I have compared it; the narrow second and third pairs of spots or bands and the short ventral pubescence at once distinguish it.

S. potamida is uncommon in England, but is rather commoner than *S. chamaeleon*. It occurs in extensive marshy or fenny districts, and I have records from Hampshire (New Forest), Sussex (Guestling), Surrey (Guildford), Huntingdonshire (Monk's Wood), Cambridgeshire (Chippenham Fen), Suffolk (various localities), Herefordshire (Tarrington, etc.), Hertfordshire (Felden), Gloucestershire (Painswick), Warwickshire (Sutton Park, Rugby). Colonel Yerbury informs me that he has found it common in the New Forest and at Tarrington in Herefordshire, about the end of June and in July. My dates extend from June 13 to August 22. It is recorded from South Sweden and Denmark through Central Europe.

Synonymy.—It is most probable that all references to *S. potamida* are correct, but it is very probable that many references to *S. chamaeleon* also refer to this species; Walker's description of *S. chamaeleon* undoubtedly refers to this species. Two female specimens in the Hope Museum at Oxford were labelled "*splendens*," and it is very probable that there is some connection between these and Westwood's fig. 127.1 in his Introduction to the Modern Classification of Insects, vol. ii., 531.

3. *S. furcata* Fabricius. Eyes of the male hairy, of the female bare and with no encircling yellow band. Abdomen of both sexes with three pairs of small spots and the tip whitish yellow or orange. Legs and belly mainly black.

A much duller looking species than *S. chamæleon* or *S. potamida*, and with more extensive black coloring.

♂. Head comparatively small. Face and frons forming a moderately shining black equilateral triangle; face considerably retreating, rather roughened, slightly dusted with white at the sides, and clothed with conspicuous greyish white pubescence which often gets rubbed off on the middle part; jowls black, shallow, and with some minute glistening whitish yellow adpressed pubescence; lower part of the back of the head only slightly inflated, black and bearing similar glistening adpressed pubescence which lies pointing forward; upper part of the back of the head practically flush with the eyes but with a rim of glistening white minute adpressed pubescence, black behind and bearing some rather long obscure grey hairs which become whitish grey on the upper part; vertex black, roughened but rather shining, continued forwards to the frons by two narrow rims between the eyes, and the middle portion of this narrow part bears a line of rather coarse black pubescence, which is not extended back to the rather shorter more scattered black pubescence on the vertex and scarcely to the frontal pubescence; frons moderately shining black with either blackish pubescence on its middle and some brown hairs at the sides or with greyish black pubescence which extends right up the antennal prominence to the base of the antennæ; proboscis brown. Eyes rather densely clothed with long brownish pubescence; facets very sharply divided just below the middle by a slightly curved line, into decidedly large ones above and much smaller ones below; the large facets are rather dull dark brown in dry specimens and the smaller ones conspicuously shining black; but in life they are dark greenish, with the lower part and a band below the middle and the upper hindpart dark bluish; the sharp division of the facets extends from the front part of the eye only about three-quarters of the way across so that on the back part the facets are not contrasted in size. Antennæ blackish brown; basal joint about four times as long as the second and about two-thirds as long as the third joint; extreme base of the third joint slightly chestnut.

Thorax black, only moderately shining because the punctuation is very dense and rather coarse; pubescence dense and rather long, almost erect, light brownish grey on all the disc or light grey when viewed from in front, light grey on the pleuræ and scutellum, but sparse and pale yellow on the sternopleuræ, and usually with a few inconspicuous black hairs on the upper part of the mesopleuræ. Scutellum black with its spines and the rather straight broad hindmargin between them dark orange, but the tips of the spines blackish.

Abdomen black, almost dull except on the hind part of the fourth, and all the fifth, segments, with transverse dull pale yellow or almost orange spots at the hind corners of the second, third, and fourth segments, and with the hindmargin of the fifth segment and its middle extension upwards almost to the foremargin also orange; the spots on the second segment are in the absolute hind corners, and are more than twice as wide as high, and are occasionally rather ovate, and they extend along the sidemargins a little on to the third segment and sometimes widen out a little there; the spots at the hind corners of the third segment are very similar, but are rather more directed upwards about their discal ends, and are considerably extended downwards on to the fourth segment along the actual sidemargins, occasionally spreading a little on to the disc near there; the fourth segment has similar spots at the hind corners but the discal ends are slightly widened and distinctly directed upwards so that their inmost part leaves the hindmargin and slopes out rather towards the middle of the disc of the segment, and these spots are narrow at the sidemargins and do not extend at all on to the side-

margins of the next segment ; the middle line on the fifth segment does not extend upwards to the true foremargin, though it does extend to an impressed line across the segment which appears like a margin ; there is a small sixth segment usually visible which has a narrow orange hindmargin and middle line. Pubescence on all the second, third, and fourth segments (except on the flattened margin) when viewed from behind abundant, erect, long greyish brown but not very conspicuous, on the fifth segment more depressed and more yellowish ; on the flattened sidemargins it is much scarcer than on the disc and rather more yellowish, but everywhere on the whole upper surface there is very inconspicuous but dense short black coarse pubescence beneath all the longer greyish hairs. Belly black, more shining ; hindmargins of the second to fifth segments bone white, and there is a trace of a band at the middle of the base of the second segment ; these bands sometimes become pointed towards their ends and do not reach the sidemargins except on the fifth segment ; but more usually the band on the second segment is hardly pointed at its ends and does not nearly reach the sidemargins, while the bands on the third and fourth segments have long points which do reach the sidemargins ; pubescence fairly abundant, long, erect, brownish yellow on all the segments except the fifth but more blackish on that. Genitalia with five short brown lamellæ just projecting from the fifth abdominal segment, the middle one and the two outer ones rather narrow, the three middle ones with some moderate pale hairs.

Legs shining black and orange, the black parts sometimes with a brownish tinge ; coxæ and trochanters black, but a little brownish at their bases ; femora black and roughened, with just the tip orange, as well as the basal third of the tibiæ (or rather more on the hind pair) and the three or four basal joints of the tarsi, though the fifth joint, and usually the fourth, are obscurely blackish ; all the tibiæ a little flattened just below the middle ; pulvilli and base of the claws orange. Pubescence forming a moderate pale yellow fringe behind the front femora, though quite beneath these there are some sparse black hairs ; behind and beneath the middle femora it is more abundant and conspicuous and is all pale yellow, while beneath the hind femora and more sparsely on their front it is pale and fairly conspicuous ; the minute pubescence of the tibiæ is longer and more conspicuous than usual, and is all pale yellow, as it is also on the tarsi.

Wings with a strong brownish tinge, which becomes diluted towards the tip and hindmargin ; costal, subcostal, radial, and cubital veins coarse and rufous orange, stem of the postical vein coarse and orange, upper branch of the postical up to the discal cell and the veins enclosing the outer end of the discal cell strong and brownish orange ; discal vein not thin but pale until near the discal cell when it becomes rather blackish, and this colour extends to its two forks which enclose the basal end of the discal cell, and to the discal cross-vein ; anal vein at just its base strong for a short distance, and even the extreme basal portion of the axillary vein strong and orange ; lower branch of the postical vein moderately strong but pale, and all the other outward veins thin and faint. Squamæ brownish black ; alar pair with thick margins, but with only very short brownish fringes ; thoracal pair with long dense shaggy yellowish brown or pale grey pubescence all over, but especially about the margin. Halteres yellow, but the base of the stem brownish.

- ♀. Larger than the male. Head (fig. 132) flattened down so that it appears broad ; face and frons so broad as to occupy nearly half the width of the head, almost parallel-sided, shining black except for the orange spots ; frons when viewed from in front appearing to have but little pubescence, because its pubescence is darker grey and pointing rather upwards though it is rather long and rather abundant, but the face has conspicuous almost dense rather drooping long pale grey or almost white pubescence all over, beginning above with rather conspicuous large whitish tufts near the eyes and almost parallel with the antennæ ; frons with numerous convolutions and ridges, and with a small middle channel between two raised edges extending from the front ocellus to the orange spots, and with coarse but not dense punctuation ; just before the antennal prominence there is a pair of transverse orange spots placed close together at the middle but reaching more or less than half-way towards the eyes,

and when these spots are long they slope outside the antennal prominence; jowls decidedly broad and bearing similar pubescence to that on the face, and similar pubescence extends on to the lower part of the back of the head away from the broad eye-marginal collar; back of the head considerably inflated behind the eyes on the lower half but not so much on the upper half, but still on this upper part forming a black collar; this front part of the back of the head close against the eyes bears a minute adherent glistening pubescence which is yellowish white on the lower part and white on the upper part, and this glistening pubescence points forwards about the middle and upwards on the upper part; right at the back of the head behind the vertex there are numerous long thin pale grey hairs; vertex with a pair of large orange spots on a thin rim between the vertex and the occiput but usually rising from the flat part of the vertex just before the raised rim, and these spots are rather near together at the middle and almost extend to the hind corners of the eyes, and they are bare in front, while behind they extend a long way down the back of the head and form two large triangles almost united but separated by a darker orange (or very rarely blackish) stripe, and bear some of the long thin pale grey hairs of the back of the head. Eyes quite bare, shining blackish, in life colored as in the male but with the band a little above the middle and the dark bluish lower part larger; facets all equal. Antennæ as in the male.

Thorax, scutellum, and pleuræ with more conspicuous denser shorter woolly whitish grey or pale brownish grey pubescence. Scutellum with more than the tip half reddish orange, leaving a broad arched black basal band.

Abdomen rather more shining black than in the male, because the pubescence is much shorter and less conspicuous on the disc; this short pubescence is almost blackish on the disc, but is more conspicuous because more pale grey on the fifth segment, and the pubescence is longer and yellowish all round the margin and especially about the shoulder corners. The orange spots are rather larger, and sometimes the basal pair are so large as to extend right up to the shoulder points, and not at all uncommonly each extreme basal corner of the second segment bears a small isolated inconspicuous orange spot; at other times the basal pair of spots are more triangular, while the second and third pairs are always more conspicuous than in the male and are more lunate, *i.e.* their inner ends are more widened upwards; the extension of the first and second pairs of spots on to the sidemargins of the next segment is larger and extends more on to the disc at the extreme fore corners of the segments. Belly with much shorter and less conspicuous pale grey pubescence, and consequently the yellowish white cross-bands more sharply defined, and the one on the hindmargin of the fifth segment usually broader.

Legs as in the male, but the tarsi less obscured about the tip.

Wings as in the male. Thoracal squamæ and their pubescence more dull pale yellowish. Halteres sometimes rather darker.

Length about 13.5 mm.

This species varies considerably in the colour of the pale markings and spots, which range from bright yellow to reddish orange, probably from the varying maturity of living specimens and from the effects of time in museum specimens; it also varies a little in the size and shape of the dorsal abdominal spots and the ventral bands, but not enough to cause any doubt as to the specific identity of specimens. Continental specimens in Kowarz's collection are clearly the same species, but the pubescence is rather browner and the abdominal spots darker orange, while the pubescence on the frons is rather conspicuously whitish grey; the line of pubescence between the eyes is greyer, and the pubescence on the vertex and occiput has a tendency towards tawinness.

S. furcata is the commonest species of the genus in Britain, but yet is rather local; I met with it in considerable numbers near Felixstowe on July 7, 1894, when it occurred on large Umbelliferous blossoms which

extended all round the edge of a field near the Bawdsey Ferry, and Colonel Yerbury has found it rather common in the Thames Valley. I have other records from Hampshire (St Helens in Isle of Wight), Sussex (Eastbourne, Seaford, Littlehampton), Suffolk (several localities) and Norfolk (Horning); all these localities appear to be in the neighborhood of large salt, or at any rate brackish, marshes, and Duncan (1837) quoted Haliday for its occurrence in Ireland at Holywood, Co. Down, and at Killarney, while he gave Duddingston, near Edinburgh, as a locality for *S. riparia*. Colonel Yerbury records a specimen from Caragh Lake, Co. Kerry, on August 20, 1901. My dates extend from July 5 to August 28. It is recorded from Finland through all Central Europe.

Synonymy.—A considerable amount of confusion has occurred through Walker's attempt to record *S. riparia* as a British species distinct from *S. furcata*; his *S. riparia* is evidently founded on a specimen or specimens which had "narrow whitish" abdominal spots instead of what he calls "more or less triangular tawny spots"; the two are evidently varieties of one species, and it is most probable that Meigen's *S. riparia* was founded upon the same variety; it is hardly worth while calling attention to Walker's using the word "*apice*" when he meant *basi*! Duncan had previously (1837) attempted to distinguish *S. furcata* and *S. riparia*, but Walker does not appear to have seen Duncan's paper. It may be taken as quite certain that our species is the same as the *S. furcata* which Zetterstedt and van der Wulp (who suppressed *S. riparia* as a synonym) found commonly in Scandinavia and The Netherlands.

4. ***S. longicornis*** Scopoli. Eyes bearing obvious black hairs in both sexes, and with no encircling yellow band in the female. Abdomen without pale spots, though bands of pale pubescence are visible. Legs and belly mainly black.

A conspicuously pubescent species, which has no pale markings on the ground colour of the abdomen.

♂. Head comparatively small. Face and frons forming an equilateral space, which can hardly be called a triangle because each of the three sides is rather curved, about two-fifths the width of the head at the mouth level, and all covered with dense long tawny or yellow or almost whitish pubescence, which is not quite dense enough to conceal the black ground colour; this pubescence is slightly drooping on the face, but is erect on the frons and about the antennæ; face bulging; jowls broad, with similar but much less dense pubescence which consequently leaves the shining black ground colour quite obvious; back of the head slightly inflated up to the middle, but above that almost flush with the eyes; at the point where the inflation ceases there is a slight angle in the outline of the back of the head, and on the widest part there is close against the eye a brownish red margin, below which the eyemargin is shimmering white down to the jowls, and above which it is shimmering brownish orange on the narrow line against the eye; behind all this on the flat back of the head is a long straggly brownish yellow pubescence which forms a ciliation of rather shorter straight yellow hairs behind the narrow rim against the upper part of the eye; vertex shining black, with indistinct brownish tawny or almost black pubescence; the very narrow space between the eyes has two very narrow rims, and between them is a line of coarse brownish tawny to blackish brown rather upturned hairs, which continue to the more blackish tawny to pale greyish yellow pubescence on the small rather dull black frons. Eyes clothed with rather dense long black pubescence, which is brownish in some lights; facets not abruptly contrasted in size though they are smaller on the lower part than on the upper; eyes generally dark brown, but sometimes even in dry specimens a broad purplish band can be traced across the eyes

just below the middle with a greenish shimmering on each side of it, and at such times the eyes appear to be dark blue with a greenish shimmer visible from any point of view. Antennæ dull black; second joint slightly rufous because of a little obscurely rufous pubescence; basal joint about six times as long as the second, but hardly more than half as long as the third.

Thorax, pleuræ, and scutellum with universal very dense moderately long pubescence, which is usually foxy red, but varies to brownish or pale tawny or brownish greyish yellow or even simply light grey, but when at all dark colored there is a paler tuft behind the postalar calli which harmonises with the thoracal squamæ; the pleuræ also bear paler pubescence than the disc of the thorax when that of the latter is foxy red; rather conspicuous in this dense pubescence are the practically bare spaces on the pleuræ for the reception of the front femora, and on the hollows near the base of the wings. Scutellum black with two orange to whitish yellow spines, and the under side of the straight margin between the spines obscurely fulvous.

Abdomen black with a brownish tinge caused by the apparently depressed pubescence, rather more arched transversely than usual, and with the flattened margins hardly so conspicuous as in the other species; there is often no trace of any pale spots, but usually close examination shows very small ones at the extreme hindmarginal corners of the second, third, and fourth segments; abdomen rather shining because of the punctuation though abundant is not confluent. Pubescence abundant on the disc, usually tawny but ranging to greyish, nearly erect when viewed sideways, not quite dense enough to obscure the ground colour, and almost absent on the basal segment and about the sides of the disc on the third segment, and rather scarce on about the same part of the fourth segment; shorter, more sloping, and paler on the fifth segment; the discal pubescence when viewed from above appears much more sloping; on the whole of the sidemargins the pubescence is hardly longer, but is more outstanding and is paler, while on the straight foremargin before the shoulders it is longer and stands up tuft-like. Belly rather shining black with three orange or bone-white arched bands on the hindmargins of the second, third, and fourth segments; the band on the second segment is very broad, and usually even reaches the foremargin at the middle but slopes outwards until it dies out on the hindmargin rather before or at the sides; the band on the third segment is much less broad as it hardly reaches half-way up the segment, while the band on the fourth segment forms only a shallow arch extending about a quarter up the segment, these two bands also die out before or at the sidemargins; hindmargins of the fourth and subsequent segments (when visible) brownish orange to bone-white; pubescence rather abundant and long, slightly sloping towards the anus and slightly interrupted at the hindmargins of the three basal segments.

Legs shining black on the femora except at the exact orange tip; basal fifth or less of the anterior tibiæ sharply yellow, but the rest of them shining black; hind tibiæ yellow with obscure dark markings especially beneath just before the middle and all about the apical sixth, but sometimes these obscure markings become black bands; tarsi varying from being dorsally blackish with the basal joint of the posterior tarsi yellow, and the second and third joints on the hind tarsi obscured, to being darkened above all the front tarsi until the last two or three joints are almost blackish, and darkened at the tips of the joints of the middle tarsi with the last two joints almost blackened, and the hind tarsi not much darkened until the blackish last joint, and on to the tarsi being orange, with the basal joint of the posterior tarsi yellow, and the last joint of the anterior tarsi obscured; claws black at the tip. Pubescence orange, long and dense behind the anterior femora, and long but less dense beneath on their basal half; on the hind femora less abundant but quite as long on the front part and beneath; on the tibiæ the pubescence is yellow and is unusually long, especially on the anterior pairs, and is but little depressed.

Wings with a strong brownish tinge which is very noticeable all about the middle part, and which in fact leaves only the tip and the hind angle region hyaline; costal vein at the base and the subcostal up to the origin of the radial vein, blackish and after these the usual strong veins are dull orange or dull reddish orange; discal vein thin and brown but becoming blackish a

little before the discal cell and on its fork which forms the base of that cell; costal vein at its basal black dilatation bearing golden adherent pubescence. Alar squamæ glassy whitish with thick blackish brown margins and short inconspicuous brownish yellow or pale yellow fringes; thoracal squamæ large, yellow or whitish yellow, with dense long almost woolly yellow pubescence all over. Halteres yellow or whitish yellow.

- ♀. Resembling the male. Face and frons fully half the width of the head when viewed from in front, and the inner margin of the eyes slightly convex; frons shining black until near the antennæ, coarsely but sparingly punctate and convoluted, *i.e.* there are three ridges running out from the rimmed ocellar space, one to each eye and one forward to the antennæ; at the front part of the frons a pair of large orange spots begin which dip a little just above the antennæ and end there in points rather near each other, but outside drop round the slight antennal prominence widely until about half-way down the sides of the face, and these spots touch the eyes for their whole length, but the shining black middle part of the face steadily grows wider from the antennæ to the end of these spots, while after them the face is all black; pubescence all long and dense, pale brownish grey and slightly upturned on all the black part of the frons, yellowish white and erect all about the antennæ, and yellowish white and rather drooping on the face; middle part of the face bulging and very liable to have the pubescence rubbed off; between the lower part of the eyes and the mouth-edge there is very little pubescence but a narrow line of whitish dust encircles that part of the eyes and extends to a long narrow orange spot which runs along the border of the eye past the abruptly widened middle part of the postocular collar; this collar is black and is almost equally broad except at this abruptly widened middle part, while it bears some of the long straggly greyish yellow pubescence on its lower part, which extends all over the flat part of the back of the head, but the orange spot bears minute adherent shimmering yellow pubescence pointing forwards, and the projected widened part of the collar is shining black; the postocular collar all above the orange spot bears rather conspicuous minute adherent shimmering whitish pubescence pointing upwards; right out on the back of the head behind the vertex there is a pair of large orange spots. Eyes with still long but more sparse black hairs; the purple band and the greenish sheen can just be traced in certain lights; facets blackish brown and all small. Antennæ as in the male.

Thorax, pleuræ, and scutellum almost as in the male, but the scutellum has usually a rather narrow orange margin between its spines.

Abdomen very different from that of the male, being more shining black because of the absence of long tawny or grey pubescence; all the disc on the third and fourth and the middle of the second segments is covered with very short dense black pubescence, but a longer almost white pubescence exists all round the margin and is long and conspicuous above the shoulders, from which it descends in a large triangular patch on the sides of the second segment until at the hindmargin it occupies a third or more of the segment on each side; on the third and fourth segments a small spot of similar whitish pubescence occurs at each front basal corner, and more such pubescence occurs along each outer hindmarginal third of the third segment, but rather less on the fourth segment, and these last two patches of whitish pubescence sometimes extend considerably on to the disc; fifth segment with some short tawny depressed hairs scattered about all over the disc; the small transverse whitish yellow spot at each hind corner of the second and third segments may be sometimes reduced to a dot, but more commonly is quite as large or larger than in the male, and occasionally the pair on the third segment extend all down the extreme sidemargins of the fourth segment so as to join a small spot at each hind corner of the fourth segment. Belly similar to that of the male but the bone-white hindmarginal bands are rather smaller, the one on the third segment being at its widest part only about one-sixth the depth of the segment, while the one on the fourth segment is only a very narrow line; pubescence rather shorter and rather more depressed, more whitish grey.

Legs as in the male, but the pubescence is whitish grey and consequently

more conspicuous on the tibiæ; tarsi rather more extensively orange, as the posterior tarsi are all orange except on the last joint of the hind tarsi.

Wings and halteres as in the male. Thoracal squamæ and their pubescence more whitish.

Length about 12.5 mm.

This species varies a little in the extent of the white belly-bands and considerably in the colour of the pubescence, but both sexes are distinguished from the other British species of the genus by the practical absence of abdominal spots or markings except those caused by bands of whitish pubescence, and by the dense pubescence on the thorax. The female is the only British species which has hairy eyes, and is also distinguished from *S. furcata* by the larger facial and smaller occipital orange spots; it is known at once from *S. chamaeleon* and *S. potamida* by the absence of the conspicuous yellow eye-collar.

S. longicornis is hardly common, but may occur in company with the other species. I believe it is not uncommon in the Thames Valley as Colonel Yerbury has taken it at Shoeburyness, Belvedere, Gravesend, etc., but my only other localities are in Sussex (Lewes and Littlehampton), Hampshire (Lyminster), Cambridgeshire (Wicken Fen), and Suffolk (Felixstowe); Duncan recorded it as occurring in Scotland. It is apparently an earlier species than the others, as my records extend from May 24 to July 11 and are mainly in June. It is recorded from almost all Europe, extending from Southern Sweden to Italy.

Synonymy.—A female in the Hope Museum at Oxford was labelled "*strigata*." The identity of *S. strigata* Fabr. with *S. longicornis* Scop. is now generally accepted, but I have made some remarks upon that and upon the genus *Hirtea* in my synonymical notes on the genus *Stratiomys*.

SARGINÆ.

Colour brilliant metallic green in all the European species.

Abdomen with only five or six obvious segments (fig. 134.) Discal cross-vein connecting the discal cell with the præfurca; discal cell emitting three veinlets and not emitting the upper branch of the postical vein, because the lower cross-vein is present; thoracal squamæ developed. Scutellum unarmed in all European genera. Antennæ with a long arista in all European genera.

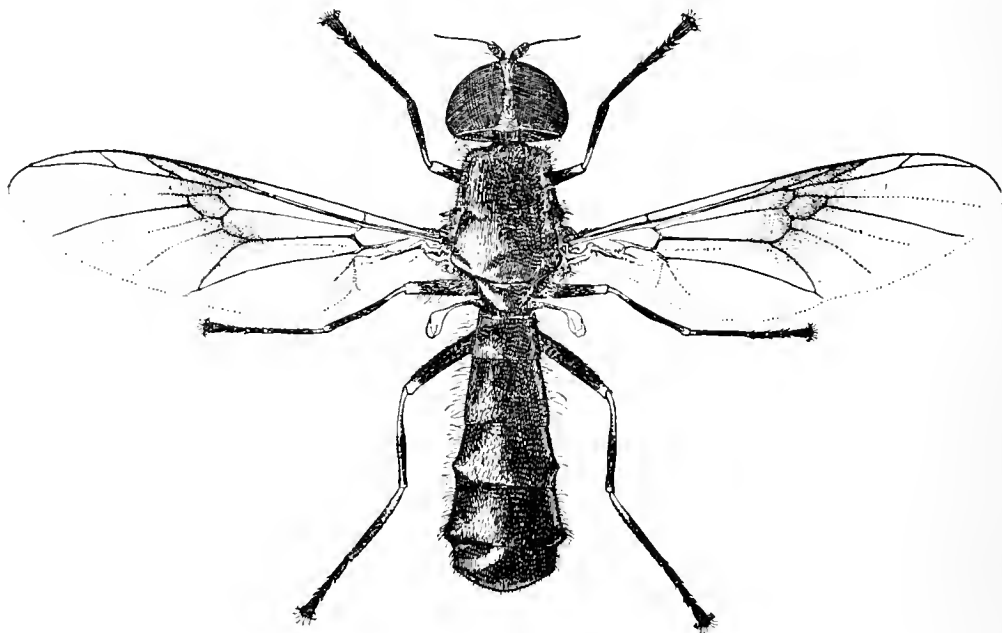


FIG. 134.—*Sargus cuprarius* ♂. × 5½.

Head semicircular; neck elongated and very fragile in dry specimens (especially in *Sargus*). Eyes large, sometimes not touching in the male. Antennæ in European genera with a long thin arista, which is inserted at the extreme base of the apical annulation of the flagellum and which consequently appears to be subapical.

Thorax unarmed, but with moderately dense though inconspicuous pubescence; metapleuræ with rather long shelter hairs. Scutellum without any marginal spines in the European genera.

Abdomen with only five or six obvious segments, long and parallel-sided in *Sargus*, but short and rounded in *Microchrysa*.

Legs simple in European genera; tibiæ without any spurs.

Wings (fig. 134) with the costal vein extended obviously beyond the end of the lower branch of the cubital fork, but not reaching to the wing-tip; radial vein rather short, slightly curved upwards, and ending near the subcostal, and its divergence from the cubital vein occurring some distance after the discal cross-vein, so that the discal cross-vein connects the discal cell with the præfurca and the radial vein seems to emit two short forks to the costal vein; cubital vein forked, the upper branch being short and only about a quarter as long as the lower branch, and both branches ending in the wingmargin before the tip of the wing; discal cell commencing opposite to or only just after the origin of the præfurca and connected

with that before the middle of the cell by the discal cross-vein, and it is hexagonal and emits three veinlets towards the wingmargin, all of which belong entirely to the discal vein, as the small cross-vein is present and connects the discal cell with the upper branch of the postical vein; postical vein with its fork simple except that the lower branch runs into the anal vein just before the wingmargin, and consequently the anal cell is long and pointed and closed just before the wingmargin; posterior cells five, but the middle ones rather imperfect; alula small but obvious, pointed, triangular; wing-membrane strongly ribbed. Alar squamæ evidently present and with short fringes; thoracal squamæ sometimes tongue-shaped, resting close to the squamal angle of the frenum, pubescent on the upper and under surfaces and with long straight fringes, in *Sargus* the tongue-shaped membrane is longer and smaller than in *Chrysomyia*, while *Microchrysa* has the thoracal squamæ almost circular.

The essential characters of the *Sarginæ* lie in the small number of abdominal segments, whereby they are distinguished from the *Berinae* and *Xylomyinae*, the presence of the small cross-vein which connects the discal cell with the upper branch of the postical vein whereby they are distinguished from the *Pachygastrinae* and *Clitellarinae*, and the long thin arista whereby they are distinguished from the *Stratiomyinae* and in fact all the other European forms except the *Pachygastrinae*, but the peculiar feature of the *Sarginæ* which distinguishes them from in fact almost all the BRACHYCERA, lies in the discal cross-vein connecting the discal cell with the præfurca and not with the cubital vein, whereby the radial vein appears to emit two short forks to the costa. The brilliant metallic blue or green coloration of all the European species at once distinguishes them from any others in the *Stratiomyidae*, though many *Berinae* have a metallic æneous-black coloration; the elongate parallel-sided abdomen of *Sargus* and its allies is also only equalled in the *Berinae*; the apparently doubly forked cubital vein caused by the radial vein diverging from the cubital so far after the discal cross-vein, and the remarkable thoracal squamæ of *Sargus* are peculiar to the subfamily.

The *Sarginæ*, when restricted to the species with a long thin apical or subapical arista and an unarmed scutellum, comprise about nine genera from all Europe, Asia, Africa, and North, Central, and South America, but I cannot trace any record from Australasia; five genera are recorded from the Palæarctic region, of which one (*Ptecticus*) has not been observed in Europe, and in the remaining four genera (one of which I fail to distinguish) about twenty species are recorded, but of these only ten or eleven are well recognised of which at least eight are British, while I have also included five of the less satisfactorily distinguished species.

The metamorphoses of a few species have been recorded, and as three or four species occur commonly in gardens they should be well known, but their habits do not seem to be known with full accuracy, for it seems strange that *Sargus cuprarius* should breed in cow dung or heaps of rotting weeds and also in ulcers in Elm (*Ulmus*).

Table of the Palearctic Genera of SARGINÆ.

- 1 (2) Second antennal joint lengthened on the inner side like a thumb inserted into the third joint (fig. 135). PTECTICUS.

Eyes of the male not touching.

- 2 (1) Second antennal joint normal.

- 3 (6) Eyes bare or almost so.

- 4 (5) Elongate narrow species.

Eyes of the male not touching. Veinlets issuing from the discal cell distinct.

7. SARGUS.

- 5 (4) Short and stout species.

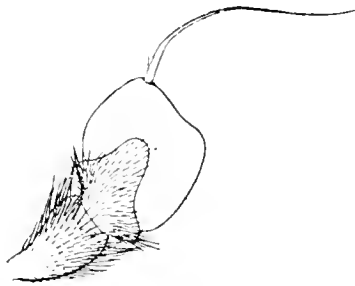
Eyes of the male touching. Veinlets issuing from the discal cell very faint.

9. MICROCHRYSA.

- 6 (3) Eyes densely and conspicuously hairy.

Eyes of the male touching. Oblong species. Veinlets issuing from the discal cell rather indistinct.

8. CHLOROMYIA.



* FIG. 135.—*Plecticus tenebrifer* ♀.
× 22.

An attempt was made by Loew in 1855 to divide *Sargus* into two genera, one with equidistant ocelli (*Chrysonotus*) and one with the front ocellus remote from the other two (*Sargus sensu stricto*), and many authors appear to have recognised the distinction but I have found myself unable to do so.

7. SARGUS.

Sargus Fabricius, Entom. Syst. Suppl., 549, 566 (1798).

Figure long and narrow. Middle-sized species of brilliant metallic green colour.

Head semiglobular, wider than the front part of the thorax and (when viewed from in front) wider than deep, considerably excavated behind and attached to the prothorax by a slender neck; frons (in profile) occupying four-fifths of the distance from the occiput to the upper mouth edge; face rounded and slightly projecting from the eyes though short and retreating, densely pubescent; ocellar space always and the part of the frons above it usually distinctly elevated, ocelli placed well forward from the vertex, so that the foremost one is placed at nearly a quarter of the length of the frons (*Chrysonotus*) or as much as two-fifths of the length (*Sargus*, s. str.), and the front ocellus is slightly more remote from the other two than they are from each other (*Chrysonotus*) or considerably so (*Sargus*). Eyes quite bare, distinctly separated by the frons in the male (fig. 136), and still more widely separated in the female; facets inconspicuously enlarged on the front part in the male. Antennæ short, placed (in profile) well below the middle of the head, and consequently not so prominent at their base as the most prominent part of the frons; second joint cup-shaped, and the two basal joints bristly; third joint transverse and but little longer than the others, composed of four annulations of which the fourth is less bulky than the others, and from the extreme dorsal base of which the long thin arista arises; this arista is therefore distinctly not apical and is two or more times longer than the antennæ, and bears a few slight plumes about its base.

Thorax rather long and narrow being rather contracted anteriorly, brilliantly shining green, and bearing considerable though rather inconspicuous pubescence; in the male this pubescence is often of two very different lengths, there being a short

* The faint annulations of the third joint are not shown in the drawing.

rather dense pubescence all over the disc with much scarcer long thin hairs intermixed, and these long hairs are from two to four times as long as the short dense pubescence; pleuræ with longer pubescence, but the middle part of the mesopleuræ bare, polished, and depressed so as to admit the front femora. Scutellum unarmed, and similar to the thorax in colour and pubescence; metanotum large, conspicuous, and polished, pubescent on its lower part.

Abdomen rather club-shaped, quite twice as long as the thorax, brilliantly shining, and bearing obvious though not very conspicuous pubescence. Genitalia small.

Legs practically simple, rather long and thin; basal joint of all tarsi, and especially the hindmost, long. Osten Sacken (Biol. Centr. Amer. Dipt., i., 24), speaks of the tibiæ of the male "showing the usual sexual characters," but I do not know what they are.

Wings long, with the normal venation of the subfamily; costal vein extended beyond the end of the cubital vein but not so far as the wing-tip; præfurca with the discal cross-vein close to its base, and the radial vein subsequently diverging from the cubital vein like a fork to the costa, so that the normal short fork of the cubital vein looks like a second fork from the same vein, and this normal upper branch of the cubital fork ends in the costa about half-way between the lower branch and the radial vein; discal cell emitting three long almost straight veinlets towards the wingmargin, of which the third does not extend to the margin, while the upper branch of the postical vein only reaches the wingmargin faintly; wing-membrane strongly ribbed. Alar squamæ moderately developed; thoracal squamæ of a very remarkable shape being long narrow tongue-shaped, very pubescent, and placed close to the angle.

This genus is easily distinguished from *Chloromyia* by its bare eyes, and from *Microchrysa* by its much more elongate shape and the separated eyes of the male. Loew formed a genus *Chrysonotus*, for *S. bipunctatus* and some exotic allies, which was supposed to be distinguished by the equidistant ocelli, but I am unable to realise its generic distinction, especially as I do not consider the ocelli of *S. bipunctatus* to be absolutely equidistant; it is possible that a distinction might be found in the ocelli being placed nearer the vertex in *Chrysonotus* than in *Sargus*, but I have not been able to estimate that distinction as sufficient (figs. 136, 137). I have made some remarks about the use of the word *Chrysonotus* under the synonymy of the genus.

Sargus is composed of a very uncertain number of European species, as so many supposed species have been described from single specimens or from insufficient material. Only four species can be considered well recognised, although seventeen names appear in Kertész's "Katalog," and these four are not at all uncommon in Britain, while four or five other unsatisfactory species occur with us. The metamorphoses of several species are known, and Westwood (Introd. Mod. Classif. Ins., ii., p. 533) says that he found many of the larvæ of *S. cuprarius* in garden mould, though Léon Dufour records them from Elm (*Ulmus*) sores. Réaumur says that he found the larvæ of a species which has been considered to be *S. bipunctatus* (= *Réaumurii*) in cow dung, and in confirmation of this habit Colonel Yerbury has seen the females of *S. flavipes* sitting on cow dung while the males were on the leaves of shrubs near, which makes it probable that Réaumur may have had *S. flavipes* before him. The genus is recorded from all Europe; North, Central, and South America; Asia, even to its southern parts; and South Africa. The flies often occur in gardens, and are very quick in their movements during hot sunshine; they fly quickly about shrubs and settle upon the leaves but are very easily alarmed.

Synonymy.—The genus *Sargus*, as established by Fabricius in 1798, was formed for five species of which *S. cuprarius* was the first (and the only one left in the now restricted genus), though the next three belong to closely allied genera of the *Sargince*. The first dismemberment was made by Macquart, who formed a genus *Chrysonomyia* in 1834 for our present *Chloromyia* and *Microchrysa*, though Macquart had full knowledge of a prior Dipterous genus *Chrysonomyia* of his fellow-countryman Desvoidy (1830), and in 1837 Duncan, in probable ignorance of what Macquart had done, proposed for identically the same group the name *Chloromyia*; the remaining species allied to *S. cuprarius* and *S. bipunctatus* were again divided by Loew in 1854 (*Verh. zool. bot. Wien.*, v., 146) into genera, of which one was proposed for *S. bipunctatus* under the name of *Chrysonotus*, which was supposed to be distinguished by the equidistant ocelli, as contrasted with true *Sargus* in which the front ocellus was remote from the other two; I have found myself unable to recognise this distinction, and to me *Sargus flavipes* and its allies seem to be much closer to *S. bipunctatus* than to *S. cuprarius* and its allies; other writers seem however to have recognised a distinction, and finding a supposed prior generic name of *Chrysonotus* (Swainson, *Aves*, 1837) have proposed a substituted name of *Chrysochroma* (Williston, 1896) or *Chrysonotomyia* (Hunter, 1900); perhaps it would have been better if they had first tested the validity of Loew's genus, and then, if convinced that it was worth retaining, an examination might have been made into the validity of Swainson's genus, as the mere record of a name in a "Nomenclator" is not evidence of its having been properly founded; for my part I fail to recognise the validity of Loew's genus and therefore have not troubled about its name. In 1907 Bezzi (*Wien. Ent. Zeit.*, xxvi., 53), upon the mere statement of an *Index Animalium* that a genus *Sargus* had been described in 1792, imposed the name *Geosargus* in substitution of Fabricius' genus; in the absence of any proof that a valid genus *Sargus* was established in 1792 I positively decline to accept this change.

Table of Species.

MALES.

- | | | |
|---|--|--|
| 1 | (6) Legs nearly all orange. No outstanding postocular fringe present (fig. 136). | |
| 2 | (5) Large species. | |
| | | *3 (4) Abdomen with some golden orange pubescence on the disc.
1 <i>bipunctatus</i> . |
| | | *4 (3) Abdomen with only greyish brown pubescence on the disc.
2 <i>albibarbus</i> . |
| | | 5 (2) Small species. 5 <i>minimus</i> . |
| | | 6 (1) Legs nearly all black. |
| | | 7 (12) No outstanding postocular fringe present (fig. 136). |
| | | *8 (11) Thorax mainly orange haired down the disc. Legs orange from the knees for some distance down the tibiæ, and at the base of the tarsi. |
| | | *9 (10) Abdomen with the short red-orange pubescence (as distinguished from the long yellow pubescence) almost confined to the sidemargins. Thorax usually black haired on the hind part of the disc.
3 <i>flavipes</i> . |

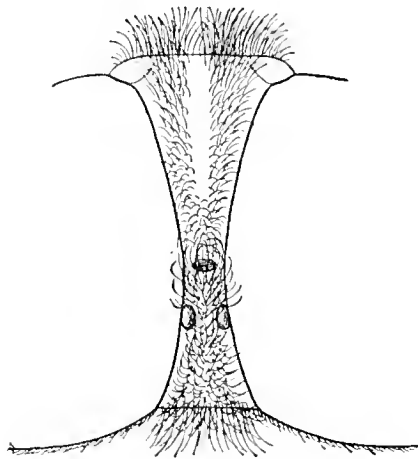
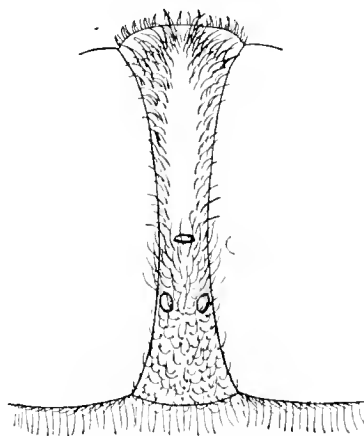


FIG. 136.—*Sargus bipunctatus* ♂. × 22.

* Unsatisfactory distinctions.

- *10 (9) Abdomen with the short red-orange pubescence extending widely on to the disc so that only a middle line is left clear. Thorax entirely orange haired on the disc. *4 rufipes.*
- *11 (8) Thorax all black haired down the broad middle part of the disc. Abdomen without any short red-orange pubescence. Legs orange at the knees only. *6 nitidus.*
- 12 (7) A conspicuous outstanding postocular fringe present (fig. 137).
- *13 (14) Postocular fringe mainly black. Wings with a conspicuous cloud about the middle. Small species. *7 nubeculosus.*
- *14 (13) Postocular fringe all white. Largish species.
- 15 (16) Wings with a conspicuous cloud about the middle. *8 cuprarius.*
- 16 (15) Wings infuscated but without a conspicuous cloud about the middle. *9 iridatus.*

FIG. 137.—*Sargus cuprarius* ♂. × 22.

FEMALES.

- 1 (8) Legs nearly all orange. No outstanding postocular fringe present.
- 2 (3) Coxæ orange. Base of the abdomen beautifully red-orange. Thorax with the humeri and a narrow side line yellowish; front femora immaculate. *1 bipunctatus.*
- 3 (2) Coxæ black. Abdomen at the base, humeri, and sides of the thorax concolorous with the rest.
- *4 (5) Front femora immaculate. *4 rufipes.*
- *5 (4) Front femora with at least a dark splash or ring about the middle.
- *6 (7) Medium-sized species. Front femora with moderate dark marking. *3 flavipes.*
- *7 (6) Small species. Front femora with extensive dark marking. *5 minimus.*
- 8 (1) Legs nearly all black (*S. nitidus* is doubtful).
- *9 (10) No outstanding postocular fringe present. Wings without a conspicuous cloud about the middle. *6 nitidus.*
- 10 (9) A conspicuous outstanding white postocular fringe present.
- *11 (12) Small species. Wings with a conspicuous cloud about the middle. *7 nubeculosus.*
- *12 (11) Largish species.
- 13 (14) Wings with a conspicuous cloud about the middle. *8 cuprarius.*
- 14 (13) Wings without a conspicuous cloud about the middle. *9 iridatus.*

* Unsatisfactory distinctions.

Four well-distinguished fairly common species occur in Britain, viz., *S. bipunctatus flavipes*, *cuprarius*, and *iridatus*, but other forms occur which will not satisfactorily agree with any of these. *S. albibarbus?* is certainly distinct from any other British species (unless it should prove to be the true male of *S. rufipes*) but is only known from one or two certain European specimens. *S. rufipes* is very close to *S. flavipes*, and may not be the species distinguished by Wahlberg, or I may have incorrectly recognised the male. *S. nitidus* must belong to the same group because of the absence of the characteristic outstanding postocular fringe, but it may be a very black form of *S. flavipes* unless the female prove to be black legged. *S. minimus* is an eminently unsatisfactory species of which very few specimens are known, but at present it cannot possibly be allocated to any of the others. *S. nubeculosus* has been generally considered a small dark variety of *S. cuprarius*, but if the character of the black postocular fringe of the male prove constant it is probably a good species. The five doubtful species have never been adequately described by previous writers, and have apparently never been taken in numbers in both sexes.

1. ***S. bipunctatus* Scopoli.** Legs all orange in both sexes. Abdomen of the male with some short golden orange pubescence on the disc, and of the female with extensive orange markings about the base.

A handsome green species of which the female is one of our most beautiful British flies.

♂. Frons (figs. 136, 138) shining blue-black or green, but blackish all about the ocelli, narrow at the top and gradually narrowing to below the ocelli, after which it gradually widens down to the antennæ where it is about twice as wide as at the top; front ocellus not quite so near the upper two as they are to each other; the raised vertex and ocellar space are practically at the top of the head, and when seen in profile they occupy about the top quarter of the frons; lower

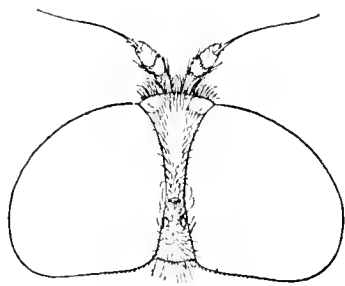


FIG. 138.—*S. bipunctatus* ♂.
× 12.

half of the frons only very slightly raised above the level of the eyes, sparsely punctate at the sides and bearing there upturned blackish pubescence, but impunctate and bare on a middle line which begins narrowly some distance after the ocelli and thence widens as the frons widens; the actual occiput between the eyes bears long rather dense brownish yellow pubescence, but as soon as the space between the eyes begins to contract the pubescence is less long and is darker brownish and all pointing forwards, becoming black towards the end of the ocellar space and separated by a short interval from the upturned frontal pubescence; there is a pair of conspicuous white spots on the forepart of the frons a little above the antennæ and close against the eyes. Face rounded and a little produced, greenish blue, and bearing a rather long and moderately dense pubescence which is black near the antennæ and brownish below, and this pubescence is upturned on the disc of the face but is drooping downwards on the upper part of the sides against the eyes and is continued (but brownish yellow) down the sides of the mouth; jowls narrow, with greyish yellow pendent pubescence continued in a narrow line under the eyes to the shorter pale pubescence on the lower quarter of the back of the head; the rest of the back of the head is hollowed and shows only microscopical pubescence; proboscis orange, with rather large sucker-flaps. Eyes bare, distinctly separated all down the frons; facets large on the prominent front part even up to the inner sides, but gradually diminishing in size behind and especially on all the lower part. Antennæ dull black; basal joint rather cylindrical though short; second joint rather shorter and cup-shaped, and both the basal joints bearing rather dense short black bristly hairs; third joint bare, rather longer than the basal joint, and with four annulations of which the last one is the smallest in bulk and bears at its extreme dorsal base the long

thin arista, which is consequently by no means apical; this arista is about twice as long as the antennæ and bears one or two very small plumes near its base.

Thorax shining green or purplish green, finely punctate, and bearing a moderately dense sloping rather inconspicuous short yellowish pubescence all over the disc intermingled with which are comparatively scarce suberect thin yellow hairs which are four or five times as long as the dense short pubescence; humeri and a line from them along the top margin of the mesopleuræ to the wing-base orange or obscurely yellowish, and the postalar calli inconspicuously brownish orange; pleuræ with a dull yellow pubescence which is mostly rather long, but is rather short and depressed on the sternopleuræ, and which leaves most of the disc of the mesopleuræ (against which the front femora usually lie) bare and depressed. Scutellum resembling the thorax in colour and pubescence, but with an inclination towards a narrow inconspicuous orange margin beneath; metanotum brilliant green, bare on the disc but with thin (but not short) orange hairs round the margin.

Abdomen shining coppery green, considerably more than twice as long as the thorax, rather club-shaped as the straight sides gradually diverge from the base to almost the end of the fifth segment; sixth segment less than half as wide as the fifth, and brilliant purple; the abdomen is not quite so brilliant as the thorax because it is more densely and coarsely punctate, and is tinged in colour by depressed golden orange pubescence; the ordinary pubescence is orange, long, outstanding, and fairly conspicuous on about the side quarters of the three basal segments, but on this part of the fourth and fifth segments it is shorter and denser, and where the fifth segment slopes round to its hind-margin it is sometimes more reddish orange, and it may be reddish orange on the sides of the sixth segment; the middle space all down the disc appears to be bare and blackish in some lights, but has very short dense depressed blackish bristly pubescence, and between this and the longer pubescence on the sides there is on the second to fifth segments a broad stripe of short depressed reddish orange pubescence, which widens out on to the disc at each side of the incisures, and which on the fourth and fifth segments tends to amalgamate with the side pubescence. Belly brilliant green, with universal short adpressed yellow pubescence. Genitalia not small, blackish, with two short projecting lamellæ; the genitalia and often the sixth abdominal segment are bent downwards.

Legs orange; front and hind coxæ blackish, and the middle pair obscurely orange, with the base black; trochanters with a broad blackish ring; tarsi with the last three or four (or even end of basal) joints obscurely blackish; anterior tibiæ a little thickened on the apical half, and the hind tibiæ with a slight kink just after the middle; basal joint of all the tarsi long, being almost as long as the tibiæ, and much longer than in the other species. Pubescence behind the anterior femora slight and all yellow.

Wings rather smoky, with the stigma and its neighborhood slightly brownish. Alar squamæ small, glassy whitish yellow with a minute inconspicuous pale yellow fringe; thoracal squamæ long and rather narrow tongue-shaped, placed close against the squamal angle, orange and bearing rather long conspicuous yellow pubescence all over.

- ♀. Usually very distinct from the male because of the beautiful extensive orange markings about the base of the abdomen. Frons rather wide, being about one-quarter the width of the head, and the eyes almost equally separated from the vertex to the mouth; ocelli equidistant and placed at almost the top of the head, with a channel round them which diverges below them into two channels running towards the large sharply defined conspicuous white spots against the eyes; the part of the frons between these two channels is brilliant green and is all pubescent and punctate except on the middle, and this middle part (which does not extend to top, bottom, or sides) is bare and polished; the space between the two channels and the eyes is duller purple and is also pubescent and punctate; frons slightly prominent at its lower part so that the white spots show up when viewed in profile; pubescence of the frons fairly abundant, long and greyish against the occiput but black and all pointed forwards down to the lower ocellus, when after a slight gap the lower

frontal pubescence extending down to the antennæ is black and sloped rather upwards, becoming shorter and denser near the antennæ. Face dark green, very slightly rounded, and clothed with rather long greyish or blackish pubescence; jowls very small but bearing a pale yellow ciliation which is extended round under the eyes to the lower part of the back of the head; back of the head practically flush with the eyes for the lower three-fourths, but shining black and slightly inflated as it approaches the vertex; behind the eyes on the lower half of the head there is a very short whitish ciliation, but on the upper half when viewed from the side there is only a microscopical black pubescence or when viewed from behind a short greyish pubescence which slopes forwards; on the occiput the pubescence is greyish white, and behind the vertex it is rather long; proboscis large and conspicuously orange. Antennæ rather larger than in the male, all dull blackish or sometimes dark brown.

Thorax and scutellum more brilliant than in the male, because the pubescence is short and depressed, and there are practically none of the long hairs which occur in the male; pubescence brownish orange on the disc but greyish white at the sides; humeri and the upper margin of the mesopleuræ for their whole length yellowish. Scutellum obscurely yellowish at the basal corners and beneath the margin.

Abdomen quite as brilliant as the thorax but usually purplish with more or less extensive conspicuous orange markings on most of the first and second segments and on the sidemargins of the third and fourth segments; it is club-shaped, as it steadily widens from the base to the middle of the fourth segment and then slightly narrows to the still brilliant sixth segment, and when the ovipositor is protruded there is a black remarkably bristly transverse oblong seventh segment which is produced on the ventral hindmargin; a black bristly eighth segment may follow, and the abdomen terminates in a pair of long three-jointed hairy lamellæ which bear a long hair at the tip. Pubescence less conspicuous than in the male.

Legs orange, even to the coxæ, but the last three joints of the anterior, and more than the last four joints of the hind tarsi darkened; pubescence very slight.

Wings as in the male. Thoracal squamæ perhaps narrower.

Length about 12.5 mm. ♂, or 11 mm. ♀.

This species is closely allied to those of the *S. flavipes* group, and like them has no outstanding hairs on the back of the head standing at a right angle to the eye, and has not even the very short postocular ciliation which occurs in *S. flavipes* and its allies; it is, moreover, distinguished from them by the ocelli being placed higher up on the frons; the male may be known by its large size and its entirely orange legs from all except *S. albibarbus*?, and the golden orange pubescence which almost obscures the disc of the abdomen will distinguish it from that species, while the female also has even the coxæ orange (which distinguishes it from the *S. flavipes* group), and has beautiful orange-red markings about the base of the abdomen and along the sidemargins of the third and fourth segments, and also has the humeri and the upper margin of the mesopleuræ yellowish; the extent of the bare polished middle part of the frons is less than in *S. flavipes* and its allies (including *S. albibarbus*?).

S. bipunctatus is a species which I have never seen alive, though Colonel Yerbury has taken it in numerous localities in Britain, from Tor Cross in Devonshire to Nethy Bridge in Inverness, and has also taken it in Phoenix Park, Dublin. Altogether I have records from Devonshire (several localities), Somerset (Shepton Montague), Hampshire (New Forest), Sussex (Iford), Suffolk (several localities), Herts (Felden), Hereford (Tarrington), Shropshire (Neach Hall), and Durham (Hesleden), while in Scotland I have records from Jedburgh, Aberlady, and Nethy

Bridge, and in Ireland from Phoenix Park, Dublin, where Colonel Yerbury caught a male sitting on wet mud in a stream. It is obviously an autumn species, as my dates extend only from August 8 to September 27. The larvæ are said to live in cow-dung, but Réaumur's reference may belong to *S. flavipes*. It is recorded from Central and Southern Europe, though its occurrence at Nethy Bridge seems to show that it may occur in Northern Europe.

Synonymy.—This species was for a long period known as *Sargus Réaumurii* Meig. (1804), and was named in commemoration of Réaumur, who described the metamorphoses of what was supposed to be this species in 1741, but Walker in 1851 resurrected Scopoli's (1763) name of "*bipunctata*." This revival is not entirely to be regretted, because Réaumur's association of his species with cow-dung makes it most probable that he had *S. flavipes* before him.

2. *S. albibarbus* Loew? Legs all orange in both sexes. Abdomen brilliant green with the short pubescence on the disc all greyish brown.

A handsome species very much like *S. bipunctatus*.

♂. Very much like *S. bipunctatus* but rather smaller, and on the other hand rather larger than *S. flavipes*, and with the wings more darkened than in either. Frons less arched in profile and more produced near the white spots, broadly bare and brilliant green on the middle part (as in *S. flavipes*) from the ocelli almost to the white spots, and with the side pubescence shorter, black, almost erect, and more sparse than in *S. bipunctatus*; pubescence on the vertex and the top of the occiput shorter, and all the pubescence on the ocellar knob black, but the tuft behind the vertex tawny; ocellar knob slightly more forward than in *S. bipunctatus* but the ocelli in about the same relation to each other; the white spots on the frons are rather large and are very conspicuous; frons below these white spots brownish black; face blackish with only short black or greyish black pubescence, but in the single British specimen the face is not in good condition for describing; pubescence on the sides of the mouth, jowls, and back of head very short, inconspicuous, and yellowish. Eyes with the front facets not distinctly enlarged. Antennæ with the basal joint shining black, the second joint with some long black dorsal hairs, and the third joint brown.

Thorax brilliant green, much more finely punctate than in *S. bipunctatus*, and with the longer pale hairs much less numerous and not extended to the front part. Humeri and top margin of the mesopleuræ hardly orange. Scutellum not at all orange beneath.

Abdomen brilliant green, not so long as in *S. bipunctatus* nor so constricted at the base, and consequently hardly at all club-shaped even though the fifth segment is the widest; sixth segment rather purple, and the end part of the fifth segment rather coppery; the abdomen is more thickly punctate than the thorax but not enough to dull it, nor is there any trace of depressed golden orange pubescence, but the whole of the upper side (except for the long pubescence at the sides and on the basal segment) bears short (not very short) depressed inconspicuous brownish pubescence, instead of the coarse stubby black pubescence which occurs in *S. flavipes*, or the shorter inconspicuous pubescence of *S. bipunctatus*; the longer dull yellow pubescence about the sides and on the basal segment is rather inconspicuous, and becomes shorter and more orange about the sides of the fourth segment, but the pubescence on the sides of the fifth and sixth segments is black and more bristly.

Legs with the anterior tarsi all orange, but the last three joints (and the second joint indistinctly dorsally) darkened.

Wings with a much more conspicuous blackish tinge about the discal cell, which diffuses itself all round over nearly all the wing except the base; basal third of the costal and subcostal veins orange. Thoracal squamæ more orange.

- ♀. In the present state of knowledge of the yellow-legged species of *Sargus* it is impossible to allocate a female with certainty to the male just described. There is, however, a female in the old collection of the British Museum which is without history but obviously British, and which possesses some slight characters which may distinguish it from *S. flavipes* and *S. rufipes*. It has the front femora without any dark marking, which would distinguish it from *S. flavipes*, while it has the frons slightly wider than in *S. rufipes* and the wings more infuscated especially about the discal cell and stigma; it is also rather larger than any specimen I have seen of those two species.

Length about 10.5 mm.

This species is a most unsatisfactory one, but the male specimen described is widely different from any British species except *S. bipunctatus*, and it is with that I have mainly compared it. As to any European allies I have given copious notes under the synonymy of *S. flavipes*.

S. albibarbus? was taken by Colonel Yerbury in the Avon Valley in extreme South Devon on July 7, 1896, when a single male was captured, which is now in the British Museum.

Synonymy.—*S. albibarbus* was described in 1855 from a single specimen of uncertain sex taken in Dalmatia; *S. angustifrons* (a possible synonym) was described at the same time from a single female taken near Vienna, and in the same paper a single doubtful female was noted which was subsequently (1866) called *S. ceriferus* by Jaenicke. Since that time not one of these species has been recorded, but I have dealt with them in some detail in the synonymical notes under *S. flavipes*. Furthermore, it is of course possible that the male now described may be the true male of *S. rufipes* Wahlberg, which has not been recorded since its capture in 1843 until in the present work.

3. ***S. flavipes* Meigen.** Male with the legs black but broadly orange at the knees and at the base of the hind tibiæ and tarsi; abdomen with the short pubescence on the disc mainly black. Female with the legs orange except for a blackish marking about the middle of the front femora.

- ♂. Face shining blackish green, rounded and a little bulging, with almost parallel sides, and bearing abundant upturned black pubescence; mouth extending half-way up the face, and the consequently narrow space between this part of the mouth and the eyes dullish black and bearing short black pubescence; jowls shining black, very narrow, but with some moderately long brownish grey pubescence which extends a short distance up the very slightly inflated lower quarter of the back of the head, but then dies out and leaves the rest of the back of the head hollowed out and with only a very short close blackish or (on the lower part) greyish ciliation immediately against the eyes, which becomes shorter still and black and stubby on the upper part; vertex blackish green until after the ocelli, but below them the frons is shining green or blue and widens rapidly down to the antennæ, where it is more than four times as wide as its narrowest part and about twice as wide as at its widest part on the vertex; a little before the antennæ there is a small but conspicuous white spot on each side against the eye, and above these spots the frons is blue and punctate on all the sides, but the frons is polished and bare down a broad middle space from the ocelli to near the white spots; the lower third of the frons distinctly bulges out beyond the eyes when seen in profile; front ocellus considerably separated from the other two and placed at rather more than one-third down the frons; pubescence on the vertical portion of the frons rather long and abundant about the ocelli and pointed forwards, brownish yellow on the upper part, but blackish on all the frons below the front ocellus and pointed upwards; proboscis bright orange. Eyes bare; facets very gradually decreasing in size towards the lower part; in life (according to Lundbeck) the eyes are greenish and unicolorous. Antennæ

dull blackish ; basal joint with rather dense black pubescence ; second joint about as long as the first but broader, and with the pubescence on the upper side less dense but longer ; third joint slightly longer than either of the others and with four indistinct annulations, of which the last one is the smallest in bulk and bears at its extreme dorsal base the long arista, which is therefore by no means apical ; arista about as long as the antennæ, and with two or three short plumes near its base.

Thorax and scutellum brilliant green, sometimes with purplish reflections on the back part and on the scutellum, and all finely punctate ; pubescence composed of two sets of hairs, as there is a rather dense short brownish orange pubescence which becomes black or almost black on at least the hinder half of the disc, and intermingled with it there is (except on the front part) a sparse long blackish or brownish pubescence which is about three times as long as the short dense pubescence ; the short pubescence forms a slight crest at quite the front part, except that the absolute front part of the disc is polished and bare so as to allow free action for the head ; when viewed from in front all the pubescence on the sides of the disc is long and broadly and conspicuously brownish orange ; pleuræ bluish black, with obvious long dull yellow pubescence near the humeri (twelve to twenty hairs), on the back part of the mesopleuræ, on the sternopleuræ, and on the metapleuræ, but polished and bare on most of the mesopleuræ right up to the dorso-pleural suture, and with a depressed space there for the reception of the front femora. Scutellum with shorter and mainly black pubescence ; metanotum large and bright green, with upturned rather long pale pubescence on the lower part.

Abdomen brilliant green, but slightly more blackish than the thorax because of its denser coarser punctuation ; it is club-shaped as it gradually increases in width from the base to near the end of the fifth segment, but the sixth segment is very much narrower and is bright coppery æneous. Pubescence on about the lateral quarters of the three basal segments long, thin, erect, and orange-yellow, but not appearing dense unless viewed from behind, while on the sides of the fourth and fifth segments it is shorter, more sloping, and mostly black unless almost over the sides, and it is black all round the hindmargin of the fifth segment and all over the sixth segment ; all over the disc there is a very short, but dense and coarse, suberect black almost bristly pubescence which is sometimes slightly encroached upon by the brownish orange pubescence at the hind corners of the segments. Belly brightly shining æneous, very finely punctate, and bearing universal recumbent yellow pubescence. Genitalia small, dull blackish, curved under the sixth abdominal segment, and ending in a pair of hairy lamellæ which are shorter than those of *S. iridatus*.

Legs mainly black ; coxæ shining black with light grey pubescence ; trochanters shining black but orange at the base and tip ; femora conspicuously orange at the tip ; anterior tibiæ broadly but indefinitely orange at the base (about one-third) and narrowly at the tip, while the hind tibiæ have about the basal half more or less reddish orange and even all the rest tinged with reddish orange ; hind femora with the orange tip extended beneath ; anterior tarsi brownish on the basal joints, and the middle pair often yellowish brown for more than the basal joint ; hind tarsi bright reddish orange for at least the basal half of the basal joint on its upper side and on all its under side ; anterior tibiæ a little dilated on the apical half, and the hind tibiæ with a slight kink just after the middle, before which they are slightly dilated ; basal joint of the tarsi much shorter than in *S. bipunctatus* but longer than in *S. cuprarius*. Pubescence very slight and inconspicuous, moderately long, but thin behind the anterior femora, and pale everywhere except on the upper side of the darkened tarsal joints, where it is much more extensively black than in *S. rufipes*.

Wings suffused with a slight blackish brown tinge, which becomes more intense about the stigma and the space below so that sometimes there is a rather blackened cloud on all the middle part of the wing ; veins blackish. Alar squamæ rather small, obscurely blackish brown with brownish yellow fringes ; thoracal squamæ forming a short thick blackish brown club, which bears long yellowish brown pubescence all over. Halteres bright orange.

♀. Varying much in size, and very distinct from the male in the colour of the legs. Frons shining purplish black, coarsely punctate, but with a brilliant green impunctate polished middle space right away from the lowest ocellus to the white spots against the eyes; these white spots are larger and more conspicuous than in the male; frons and face with almost parallel sides, and at their narrowest part more than one-fifth the width of the head; front ocellus slightly remote from the others, and placed at about two-fifths down the frons, so that the raised vertical space behind the ocelli is long; pubescence of the frons whitish about the vertex and more or less so down to the lower ocellus and all long and bent forward, though sometimes mixed with blackish soon after the vertex; after the lowest ocellus it is rather shorter, dark brownish, and curved upwards; the lower part of the frons and the middle of the face bulge out a little; face with longer more dense brownish grey upturned pubescence, but the minute pubescence along the lower margin of the eyes and the longer pubescence on the jowls is greyish white, and the very short pubescence on the lower part of the back of the head is also greyish white but dies away about the middle of the head, though becoming again more obvious on the upper part, and there is no stubby black postocular fringe and no outstanding white hairs on the back part as in *S. cuprarius* and its allies. Eyes in life (according to Lundbeck) greenish, with an iridescent band lying above the middle. Antennæ with the third joint larger than in the male.

Thorax and scutellum clothed with short whitish pubescence, amongst which are no longer erect hairs; pleuræ with rather long whitish pubescence.

Abdomen brilliant burnished copper or green often tending to purplish after the middle, widest near the end of the fourth segment. Pubescence about the sides of the basal segments rather long and whitish, but short, obscure, and dark greyish on the disc; on the fifth segment it is all greyish black, and on the small sixth segment all black. Ovipositor with long narrow jointed terminal lamellæ.

Legs nearly all orange; coxæ shining black with a tinge of brown; front femora on about the middle half with a badly defined brownish black ring, which is sometimes incomplete, and which is sometimes absent posterodorsally; front tibiæ slightly darkened; tarsi with the last three or four joints, and just the upper side of the tip of the basal joint of the hind pair, blackish. Pubescence on the femora shorter and very slight.

Wings with an indistinct middle cloud, which leaves the basal third of the wing rather conspicuously pale; veins blackish, and the indistinct cloud formed by the stigma (which includes the whole end part of the subcostal cell and the submarginal cell) brown, while the space below is darkened down to the postical vein. Squamæ paler than in the male.

Length about 8 to 10 mm.

This species is easily distinguished in the female from most of the others by the orange legs which always have a darkened space about the middle of the front femora, while the black coxæ distinguish it at once from *S. bipunctatus*; *S. minimus* (if distinct), besides being smaller (though *S. flavipes* varies very much in size) has the legs of the female more extensively black. Both sexes are distinguished very easily from *S. iridatus*, *cuprarius*, and *nubeculosus*, by the absence of any outstanding postocular fringe, as well as by the paler legs; the male has much blacker legs than *S. minimus*, but the distinctions from the male of the species which I describe as *S. rufipes* and *S. nitidus* require very close examination. *S. nitidus* has the whole middle part of the thorax from front to back clothed with black pubescence, while *S. rufipes* has rufous orange pubescence more extended on to the disc of at least the fourth and fifth abdominal segments; for more minute distinctions the descriptions of these (so-called) species must be examined. The relative position of the ocelli seems to me to agree with *S. bipunctatus*, though it was upon this

character that Loew separated off his genus *Chrysonotus*, but the ocelli altogether are placed further down the frons than in *S. bipunctatus*, so that there is in *S. flavipes* and its allies a longer elevated vertical space than in *S. bipunctatus*, and it appears to me that it is upon this very faint character that the existence of the genus *Chrysonotus* exists, unless *S. flavipes* and its allies are united generically with *S. bipunctatus* and separated from *S. cuprarius* and its allies by the absence of any outstanding postocular fringe. The male is easily distinguished from *S. bipunctatus* and *S. albibarbus*? by its considerably black legs.

S. flavipes is not so common as *S. iridatus* and *S. cuprarius*, but I have records from numerous localities extending from Cornwall (Boscastle) up to Sutherland and across England from Barmouth to Beccles, while Colonel Yerbury has found it very common in Ireland at Caragh Lake, and at Kenmare and Valentia Island. My dates show it to be a rather late species as they extend from July 6 to September 22. I have generally taken it in or near large woods, but Colonel Yerbury noticed the females congregating on cow-dung (in which the larvæ probably feed), while the males sat near on the leaves of lime, sycamore, aspen, etc. It is recorded from Northern and Middle Europe.

Synonymy.—There can be no doubt about this being the species described by Zetterstedt as *S. flavipes* of Meigen (although Meigen's description is insufficient to distinguish it) and consequently I follow Loew (1855) in continuing to use that name. Meigen (1822) wrote "pedibus flavis" and "Beine gelb, die Schenkel bisweilen etwas bräunlich," and in 1830, when adding to his description from apparently plenty of material, he said nothing about the legs; it is, however, almost certain that he must have known so common a species, and the one female left in his collection in Paris belongs to it.

Fallén's description is of no distinctive value so far as the male is concerned, but Zetterstedt in 1842 wrote "femoribus tibiaramque apice in ♂ nigricantibus" and "pedibus nigris, geniculis omnibus late, tarsisque posterioribus basi, tibiisque posticis, flavis," and he hinted at *S. cœruleicollis* Meig. being a synonym, but he said nothing about any dark smudge behind the front femora of the female until 1849. Walker probably had the true species before him, though he said of the female, "pedibus fulvis, tibiis anticis fusco-cinctis" and "*Legs tawny: a black band on each femur*," which are characters that apply to no known species. As there is so much uncertainty about the yellow-legged European species I add a few notes on them.

S. albibarbus Loew was described from one (probable) female, which has quite yellow legs except for a dark "wisch" or band about the middle of the hind femora, and which has the frons brown between the antennæ and the white spots, and the two basal joints of the antennæ yellowish brown; I possess a specimen which was in Kowarz's collection (with no locality but with a tiny pink label attached), and it agrees so exactly with Loew's description even to the uncertainty of the sex that I cannot help suspecting it to be the original specimen from which Loew described his species; it has the frons at the vertex, about one-tenth the width of the head and narrowed to less than one-third as much at the front ocellus and onwards for a long way, and hardly wider at the antennæ than at the vertex; the pubescence on the frons is all orange and comparatively short from the occiput to the front ocellus, but thence on the very narrow part of the frons there is only a single line of black hairs on each side for about half-way to the antennæ, after which the pubescence is in more than a single line and is brown and hardly upturned; the pubescence on the face is pale brown and not upturned except for some black hairs close under the antennæ, and the pubescence on the back of the head is pale brown; the specimen has any genitalia withdrawn, but I think I can trace some lamellæ which look like those of a female; the frons is narrower about the middle than I have seen in any other *Sargus*, and there is a slight dark patch about the middle of the front of the front femora.

The other specimen in Kowarz's collection under the name of *S. flavipes* may be

the true male of *S. albibarbus*; it is labelled "St Moritz, Becker," and is therefore probably the species mentioned by Becker in Berl. ent. Zeitschr., xxxi., p. 97 (1897); it has the frons at the vertex about one-fifteenth the width of the head and running down almost equal to the front ocellus, after which it widens to the antennæ where it is about one-quarter the width of the head; the bare middle part below the front ocellus extends widely up to the front ocellus (very differently from *S. bipunctatus*); the white spots are small; the front ocellus is placed at two-fifths down the frons; vertex black haired but with a few tawny hairs behind it on the occiput; no outstanding postocular fringe (as in *S. cuprarius*, etc.), but there is the usual fringe close against the back of the eyes, which is all black, fairly long on the lower part and obvious though short and stubby on the upper part; pubescence on the face black but rather rusty and short, rusty black on the narrow sides of the mouth, and brownish grey on the jowls near the front lower corner of the eyes; antennæ dull black. Thorax brilliant green with pubescence entirely black on the disc, but rusty black on the upper margin of the mesopleuræ, while the long erect pubescence on the prothorax and the shorter pubescence on the metapleuræ are darkish tawny; humeri with a small yellowish spot. Abdomen duller green because of the coarse dense punctuation, and with a coppery tinge partly caused by the abundant long tawny pubescence which broadly clothes the sides of the three basal segments, while a shorter tawny pubescence extends down the sidemargins of the fourth and fifth segments and round on to the hindmargin of the fifth segment; sixth segment small and shining green, curved downwards along with the large black genitalia; belly blue, with rather abundant depressed pale grey pubescence. Legs red orange, coxæ blackish, but the posterior pairs with brownish tints; front coxæ with mainly black pubescence, but with a patch of pale pubescence on the lower part in front; last four joints of the hind tarsi blackened above, and the same joints of the front tarsi obscured above, while those joints of the middle tarsi are only very slightly obscured. Wings conspicuously infuscated all over, but most strongly about the middle and more orange about the basal third; stigma and the space above inconspicuously brown. Squamæ pale orange, with orange fringes. I have also described in this work an English male under the name of *S. albibarbus* which does not accurately agree with this specimen, but which must remain doubtful until more material can be obtained.

S. angustifrons Loew is known from one female only which was taken near Vienna before 1855, and which only differs from *S. flavipes* by the narrower frons; Schiner declined to acknowledge it as distinct from *S. flavipes*, and the fact of no more specimens having been found in such a well-worked locality in the subsequent fifty years seems to make its distinctness very doubtful, and I expect it is the same as *S. albibarbus*. *S. ceriferus* Jaennicke was described from a single female taken at Genoa, to which individual specimen Loew eleven years previously had refused to give a name on the ground that it required more confirmation and that it was very near *S. albibarbus*, of which I now think it must be a synonym or variety; it is said to have the front fifth of the frons waxy white and (according to Loew) the sides of the thorax with a fine dirty whitish line, and altogether short whitish pubescence; legs pale yellow, but with a peculiar brown streak (Loew) or ring (Jaennicke) on the upper side of the hind femora; antennæ yellow on the two basal joints. *S. tuberculatus* Loew is known from a single female from Nubia which has a complete white cross-band on the frons instead of the usual pair of spots, and which has conspicuous white side-spots at the abdominal incisures. *S. chrysis* Loew was described from two females and perhaps one male, from Nubia, and they also have an entire white frontal band, the side lines of the thorax brownish yellow, and the pubescence of the abdomen yellowish, and the abdomen carmine red on the four middle segments, and Bezzi has since recorded this species as occurring in Eritrea.

If *S. angustifrons*, *S. albibarbus*, and *S. ceriferus* are synonyms, strict priority would require the use of the name *S. angustifrons*, but as *S. angustifrons* in this case would be incorrectly as well as insufficiently described and *S. albibarbus* is well described on the same page I adopt the latter name.

It may be noted that Loew on page 136 of his paper on *Sargus* in Verh. zool.-bot. Wien, v. (1855) persistently referred to *S. flavipes* under the appellation of *S. pallipes*.

From the association of this species with cow-dung it is more likely to be the species noticed by Réaumur in Ins., iv., p. 59, Table 22, figs. 5-8, than *S. bipunctatus* (*Réaumurii* Meig.) and Réaumur's figure of the natural size also agrees better with it.

4. *S. rufipes* Wahlberg. Abdomen of the male mainly clothed with brownish orange pubescence. Legs of the male black, with the knees broadly and the base of the tarsi extensively orange; of the female almost entirely orange, even the front femora being immaculate.

A rather doubtful and unsatisfactory species.

♂. The following is the description of what I believe to be the male belonging to the female subsequently described, but if *S. rufipes* has the legs, as described by Wahlberg, "in utroque sexu totis rufo-testaceis," it may be only the description of a variation of the male of *S. flavipes*.

Rather larger than ordinary *S. flavipes*, though some specimens of *S. flavipes* may equal it. Frons bearing pale brownish yellow pubescence from the vertex to near the upper ocelli.

Thorax almost wholly pale haired, the short dense pubescence being all pale brownish tawny except that in some lights some obscurely blackish hairs may with difficulty be detected on the middle hind part of the disc, while all the longer hairs are of the same colour as the short pubescence even though in some lights a few of them may appear to be black; the short dense pubescence seems to be rather more sloping than in *S. flavipes*. Scutellum with most of its pubescence brownish tawny and with very few distinct longer hairs, but certainly a few black hairs exist on the basal part of the disc.

Abdomen rather paler green, and when viewed from in front with the short rich brownish-orange pubescence much more extensively spread over the sides of the disc than in *S. flavipes*, so that only the middle quarter of the second and third segments remains indefinitely green, while on the fourth segment the brownish-orange pubescence occupies quite each side third and vaguely extends along the incisures so that only about the middle third remains somewhat circularly green; the fifth and sixth segments have all the sidemarginal pubescence pale brownish yellow.

Legs with the tiny pubescence on the tarsi black on only the blackened part of the hind tarsi; coxæ blackish.

Wings with a rather more definite cloud about the stigma than in *S. flavipes*.

♀. Extremely like *S. flavipes*, but the front femora have no dark marking about the middle. Pubescence shorter on the vertex (notably), frons, thorax, and abdomen.

Abdomen more deep purple, and the short whitish pubescence less conspicuous. Belly usually with a pale spot on the middle of the base of the second segment.

Legs less rufous, being almost pale orange; front femora without any trace of darkening about the middle; tip of the anterior tarsi very slightly, if at all, darkened.

Wings more clouded than usual about the middle.

Length about 8.5 to 10.5 mm.

This species (if distinct) is *very* closely allied to *S. flavipes*, and it was only the capture of four females in one day (July 27, 1897) which all differed from *S. flavipes* by the immaculate front femora that attracted my attention to it; these four females were taken in the Forest of Dean on July 27, 1897, and three days previously one very small female was also caught there which confirmed their distinctness from *S. flavipes*. If I have properly associated the male it has no doubt been always overlooked as *S. flavipes*, but I was led to distinguish it first by noting it as a remarkable variety of *S. flavipes*, and subsequently by suspecting that the male of the Forest of Dean females would be *very* similar to the male of *S. flavipes*; I then found that the peculiar male had been taken by Dr J. H. Wood at Cusop Dingle, which is in Herefordshire, on September 7, 1898,

and that he had also taken a female there with the immaculate femora on the previous July 27. I have made further notes on Wahlberg's *S. rufipes* in the synonymy below.

S. rufipes has occurred (as mentioned above) in the Forest of Dean in Gloucestershire and at Cusop Dingle in Herefordshire, while I consider a male as belonging to this species which was taken by Dr J. H. Wood at Swillgrove in Herefordshire on September 17, 1897, and also a male taken by Colonel Yerbury at The Mound in Sutherland on August 4, 1900, and probably a male taken by myself at Coniston in Lancashire on July 19, 1876, a female taken by Mr C. J. Wainwright at Boscastle in Cornwall, a female taken by Colonel Yerbury at Valentia Island, Co. Kerry, on August 10, 1901, a small male taken at Boat o' Garten in Inverness (possibly *S. nitidus* as it has the anterior tibiæ obscurely tinged with orange on the basal third), and a female in C. W. Dale's collection (now at Oxford) labelled "Glanville's Wootton, 8/8/91," besides stray specimens without history in the British Museum and in the old Babington collection of the Cambridge Museum.

Synonymy.—The only record of *S. rufipes* is that of Wahlberg, who caught it on the leaves of shrubs at Quickjock in Lapland on July 13, 1843 (he described it in 1854); he professed to know both sexes, but if my recognition of it is correct he could only have taken the female as he says "pedibus in utroque sexu totis rufo-testaceis—nec pedibus maris femoribus tibiærumque apice nigris"; the sexes in *Sargus* are not conspicuously distinct, and I think Wahlberg may have made a mistake in thinking that he had both sexes, especially as in the species which he described at the same time (*Pachygaster orbitalis*) he probably had both sexes while he thought he had only the female. I am led to this conclusion by the fact that Wahlberg's species has remained unrecognised ever since, and it is curious that Meigen in his original description made a similar mistake over *Sargus flavipes*, which however was quickly recognised when the species was found in numbers. Zetterstedt's diagnosis in Dipt. Scand., xii., 4558 (1855) is not an exact equivalent of Wahlberg's either in words or meaning, and it is almost certain that his Var. b. of *S. flavipes* in Dipt. Scand., viii., 2964 (1849) refers to this species. It is however possible that the species I have described as *S. albibarbus?* may be the true male of *S. rufipes*.

5. **S. minimus** Zetterstedt. Small species. Legs mainly orange in both sexes. Wings without any definite cloud.

An unsatisfactory but possibly distinct small species.

♂. Frons purplish, similar in shape and pubescence to that of *S. flavipes*, but the whitish spots are large and obscure (immature?); vertex more brownish-yellow haired; back of the head as in *S. flavipes*.

Thorax purplish, with greenish reflections on the back part and on the scutellum; pubescence all pale brownish yellow unless there are some indistinct blackish hairs on the middle hind part and on the middle basal part of the scutellum; the short pubescence on the front part of the thorax appears to be more sloping than usual.

Abdomen (immature) brownish purple; pubescence resembling that of *S. flavipes*.

Legs all yellow with a slight brownish tinge; last four joints of the front and the last three of the middle tarsi obscured, and the last four joints of the hind tarsi almost blackish above; coxæ, and front and hind trochanters, brownish black, middle trochanters yellowish; front femora slightly obscured postero-ventrally; middle tibiæ slightly obscured about the tip.

Wings (immature) a little smoky; membrane waved rather than ribbed. Halteres with yellowish-white knobs.

♀. Very much resembling the male. Frons broad, being fully a quarter the width of the head; ocelli equidistant, with the front one more than a third down the frons; white spots small but sharply defined, and when viewed in profile this part of the frons is not much inflated but sufficiently for the white spots to be conspicuous; pubescence of frons whitish at the occiput, but thence to the front ocellus rather long, black, and bent forwards, after which, as far as the antennæ, it is much shorter brown and upturned; face with dark brown upturned pubescence, but the narrow sides of the mouth with short whitish-grey pubescence, which becomes longer on the jowls; pubescence on the lower part of the back of the head pale but soon dying out and succeeded by a shorter blackish ciliation, and the pubescence on the slightly inflated shining black upper part by no means in a single line but rather dense and fairly conspicuous, and at first glance appearing to be blackish, but when seen from in front with a downward sloping view in a good light appearing to be pale grey on at least the back part.

Thorax and scutellum brilliant green, with depressed whitish inconspicuous pubescence.

Abdomen burnished coppery; pubescence when seen from behind long and broadly whitish at the sides of the three basal segments, but short and brownish black on the last three segments except for a few whitish hairs at the corners of the fourth segment. Lamellæ of the ovipositor thin, three-jointed, and black, with pale hairs.

Legs orange; anterior femora with more than the middle half brownish black to a rather undefined extent, and with the upper side of the middle femora remaining indefinitely orange for nearly the basal half; anterior tibiæ indefinitely blackish brown on the slightly dilated apical half except at the extreme tip; front tarsi obscurely blackish except at just the base, middle tarsi similar but with all the basal joint orange; hind femora with a less defined brown middle darkening which leaves the basal third obscurely, and the apical third more distinctly, orange; hind tibiæ all brownish though the basal half is more orange than the apical half; hind tarsi brownish, but orange just about the base. Pubescence behind the front femora very slight and pale.

Wings with a slight brownish tinge all about the middle which is diffused outwards but which leaves the basal third of the wing more hyaline; stigma and all the end of the subcostal cell faintly blackish brown. Squamæ obscurely blackish. Halteres yellow.

Length about 6.5 mm.

This species is described from a male taken at Dolgelley on July 26, and a female on July 24, 1888. I have seen a very similar female which was taken by Miss M. A. Sharp at Milford-on-Sea in June 1904, which however has the front femora black with only just the base and tip orange, while the posterior femora and all the tibiæ are only very slightly obscured, though all the orange coloring of the legs is more obscure than usual; it also has the wings less generally infuscated, though the stigma and the tip of the subcostal cell are rather conspicuously blackish. If these specimens belong to the true *S. minimus* of Zetterstedt (of which he knew only one male and two females) the species may have the legs brown with all the knees and the basal joint of the posterior tarsi (especially in the female), obscurely yellowish.

The absence of the postocular ciliation, which occurs in *S. iridatus*, *cuprarius*, and *nubeculosus*, at once disposes of its being a small pale variety of any one of them; the size, besides other details, at once disposes of *S. bipunctatus* and *S. albibarbus*, and therefore it must belong to the *S. flavipes* group; from all the males of that group (as I understand them) the much paler legs of *S. minimus* at once distinguish it, while the female of *S. minimus* has more darkened legs than any of the other females. The doubtful points about *S. minimus* are the small size and the possible

immaturity of the specimens, or else there would be no doubt about its absolute specific distinctness.

S. minimus must remain at present a very unsatisfactory species, but it is a coincidence which may have a meaning, that I caught one of each sex on almost the same day at Dolgelly, and many years afterwards saw one female from a different locality, while Zetterstedt apparently caught one of each sex in the same locality in his early days, and saw one female afterwards from a different locality; the fact of our each catching a pair to begin with tends to indicate that it is a good species which may be very rare or very local.

Synonymy.—*S. minimus* was described very insufficiently by Zetterstedt from (probably) only three specimens (1 ♂ 2 ♀), but I am obliged to refer my specimens to it as they agree in so many peculiarities, of which the small size is a striking one. It appears to be doubtful whether any two of the described specimens have the legs quite similarly colored, but they all agree in having the legs of the male much paler than in any allied species except *S. flavipes* and *S. rufipes*, and on the other hand the legs of the female are much darker than in either of those species. On the whole I am disposed to consider it a good species.

6. ***S. nitidus*** Meigen. Small species. Legs black, with only the knees orange. Wings not at all clouded about the middle. Pubescence on the middle of the disc of the thorax all black in the male. No outstanding postocular ciliation.

A very unsatisfactory species, resembling, but quite distinct from, a small *S. iridatus*.

♂. Frons three to four times as wide at the antennæ as at its narrowest part, with a broad middle part bare and polished almost down to the unusually small white spots; vertex not much wider than the narrowest part of the frons, and all black haired except for a suspicion of pale hairs just against the occiput; ocelli rather high up, and the front one not much remote from the other two; lower part of the frons bulging; pubescence on the frons sloped as in *S. iridatus*, and on the face all black; *pubescence behind the eyes* long and greyish white on only the lower eighth, and on the rest with only a short (very short on upper part) stubby black postocular ciliation almost as in *S. flavipes*, but entirely *without the outstanding whitish ciliation of S. iridatus*. Eye-facets inappreciably differing in size. Arista but little longer than the antennæ.

Thorax and scutellum brilliant green, rather densely punctate, clothed all down the middle of the disc (except on the bare front part) with entirely black (in some lights brownish-black) pubescence of two different lengths, the long hairs being rather sparse and three or four times as long as the dense short pubescence, but the sides for about a quarter of the disc on each side bear brownish-yellow rather long pubescence for the whole length which is best seen when viewed from in front; pleuræ with the usual large bare polished space but otherwise with rather drooping brownish-yellow pubescence, and with the usual more erect pale hairs near the humeri. Scutellum with all black pubescence; metanotum with brownish-yellow pubescence on its lower part.

Abdomen brilliant green, but roughened and rather dulled down the broad middle of the disc from the coarse dense punctuation; pubescence on the sides long and pale to the end of the third segment, but black, short, stubby, and dense on all the disc, though longer and more conspicuous than usual and more erect on especially the sides of the disc well away from the middle, while a few pale hairs show on the basal corners of the fourth segment; sixth segment purplish and not much shining, curved under along

with the genitalia. Belly with short inconspicuous rather scarce pale brownish-yellow pubescence on the three basal segments, but black and denser elsewhere though very inconspicuous because so minute. Genitalia black and large, the lateral plates being very large and nearly quadrate and covering all the sides, but with small lamellæ projecting from the end upper corners.

Legs black; knees rather conspicuously brownish orange and that colour extending down about an eighth of the anterior, and a third (though obscurely) of the hind, tibiæ; the usual dilatation of the apical half of the anterior tibiæ and the kink on the hind tibiæ very slight. Pubescence behind the anterior femora pale but slight, and very slight in front of the hind femora.

Wings smoky, but without any sign of a cloud, though the stigma and the costal space near are inconspicuously brownish. Squamæ blackish with pale brownish fringes, the thoracal pair being narrow club-shaped. Halteres pale orange.

♀. Unknown or unrecognised.

Length about 7 mm.

This species is easily distinguished from *S. iridatus* and *S. euprarius* by the absence of any outstanding long whitish postocular ciliation, as well from *S. nubeculosus* which also has that ciliation but has it black in the male; the black legs distinguish it from *S. bipunctatus*, *S. albibarbus*, and *S. minimus*, while the absence of any trace of golden pubescence on the disc of the abdomen distinguishes it from *S. rufipes* and to a certain extent from *S. flavipes*. *S. albibarbus*, *flavipes*, *rufipes*, *minimus*, and *nitidus* have a common type of frons, which is broader than in the other species, and has a broad bare shining middle part extending from the front ocellus to near the white frontal spots, and as all these species also do not have the outstanding postocular pubescence of *S. euprarius*, etc., they form a natural group. If *S. nitidus* (as interpreted by me) is not a good species it must fall under *S. flavipes*, and a specimen taken by Mr C. G. Lamb at Whittlesford in Cambridgeshire in July 1903 exhibits a tendency that way, as it has the sides of the abdomen with pale pubescence to the end of the fourth segment extending rather obscurely on to the disc about the hind corners of the segments and even a little on to the disc of the basal segments but not showing any reddish-orange colour, while the stubby black pubescence on the disc is not so apparent but is very dense on the disc of the fourth and fifth segments; this specimen also has the basal third of the anterior tibiæ orange and the tip faintly so, nearly the basal half of the hind tibiæ and the base of the hind and middle tarsi brownish orange, and the brownish stigma and space near more blackish.

S. nitidus is a very little known species, or may represent only small dark specimens of other species. My main description has been made from a very distinct-looking specimen which was taken by Dr J. H. Wood at Tram Inn in Herefordshire on July 15, 1903, while I have referred to a rather similar male which was taken about the same time by Mr C. G. Lamb at Whittlesford in Cambridgeshire. I have also seen a very well-marked male which was taken by Rev. W. J. Wingate at Hesleden in Durham on August 13, 1900, but a small male taken at Boat o' Garten in Inverness is in my opinion a specimen of *S. rufipes*.

Synonymy.—It is just possible that *S. nitidus* is only a small dark variation of *S. flavipes*, but it seems to have occurred in localities where *S. flavipes* is unknown. It is also possible that the original *S. nitidus* of Meigen is quite distinct and founded

on small female specimens of *S. iridatus*, and the types in Meigen's collection at Paris confirm that view, which is also the view taken by Lundbeck. Time and more specimens may clear up the doubts.

7. *S. nubeculosus* Zetterstedt. Small. Legs mainly black, but with the knees orange. Wings distinctly clouded about the middle. Postocular outstanding ciliation of the male black on all the lower part.

A very unsatisfactory species, which may possibly be only a small dark variety of *S. cuprarius*.

♂. Small, but otherwise very similar to *S. cuprarius*. Frons with the two white spots small but rather sharply defined; pubescence greyish white from the vertex to the upper ocelli; *back of the head with an outstanding ciliation* as in *S. cuprarius*, but *all black* except just behind the vertex; this ciliation is quite distinct from the short stubby black postocular ciliation which occurs in most of the species of *Sargus*, and proves its relationship to *S. cuprarius* and *S. iridatus* which have a similar but all-white outstanding ciliation; the short stubby black postocular ciliation is not so dense as in *S. cuprarius*.

Thorax with entirely pale greyish-white pubescence as in *S. cuprarius*.

Abdomen with the pubescence on the sides of the fourth and fifth segments all black except on the extreme basal corners of the fourth segment.

Legs black, with the knees narrowly but obviously orange; in one specimen (Cambridge) the hind knees are not more extensively orange than the anterior, but in another (Musselburgh) the base of the hind tibiæ is obscurely orange for a short distance; hind tarsi not at all orange at their base.

Wings slightly smoky, with a distinct blackish cloud about the middle as in *S. cuprarius*. Squamæ very much blackened; thoracal pair very narrow, club-shaped.

♀. Very similar to the male, and scarcely differing from the female of *S. cuprarius* except in size. It is supposed to differ from *S. cuprarius* by the hind tarsi being black to the very base, but I possess several very small individuals in which the hind tarsi are as orange about the base as any *S. cuprarius*, and on the other hand some undoubted specimens of *S. cuprarius* in which the hind tarsi are entirely black.

Length about 7 mm.

This species needs comparison with only *S. cuprarius*, of which it may be a small dark variety.

S. nubeculosus is apparently very little known in the male sex; a pair were sent to me by Mr W. Evans which were taken by him at Levenhall quarry, Musselburgh, on July 29, 1901, and Mr F. Jenkinson took a male in his garden at Cambridge on July 7, 1904; I have seen probable females from Sussex, Surrey, Suffolk (a few specimens in my own garden, including two on one day), and Monmouth. My dates extend from July 2 to August 14. It is recorded from Scandinavia to Austria.

Since writing the foregoing I found some *Sargi* in numbers at Newnham, Cambridge, on August 3, 1906, and seeing them with infuscated wings and apparently of various sizes I thought I should clear up all doubts, but to my surprise a subsequent examination showed that I had taken a male and female of true *S. cuprarius*, and four smaller males, which all had the outstanding ciliation behind the eyes black except on the upper part and which also had the hind tarsi hardly pale at the base; these specimens therefore tend towards proving the distinctness of the species.

Synonymy.—All authors who have mentioned this species agree in its close relationship (except in size) to *S. cuprarius*, and it is therefore most probable that all references to it are correct. The representatives of *S. nubeculosus* in Bigot's collection were ordinary *S. cuprarius*, and it was evident that he had failed to distinguish even *S. cuprarius* and *S. iridatus*.

8. ***S. cuprarius*** Linné. Legs black, with the knees distinctly orange. Wings with a conspicuous dark cloud about the middle extending across the discal cell. Postocular outstanding ciliation all whitish.

Very closely allied to *S. iridatus*, but distinguished at once by the dark cloud on the wings, and by the more conspicuously pale knees and base of hind tarsi.

♂. Resembling *S. iridatus*, but slightly smaller; frons (fig. 137) more extensively greyish, white haired down to the front ocellus, and the white side-spots just above the antennæ usually but not invariably less sharply defined and even indistinctly united across the frons when they are not sharply defined; middle part of the frons more bare and polished. Eyes in life bright bronze on the upper two-fifths and bright green on the lower three-fifths with a dark blue intermediate band which shades off through violet and purple to the bronze part and through light blue to the green part; the dark blue band starts in front just above the white frontal spot and continues right through to the back (Lundbeck says this band is placed lower down than in *S. iridatus*); facets all almost equal in size.

Thorax with inconspicuous lighter (almost whitish), grey pubescence which is less distinctly divided into two lengths.

Abdomen less dulled by dense punctuation; pubescence down the hinder half of the sides of the fourth and fifth segments more black, or even all the sides of the fifth segment black haired. Genitalia smaller and less protruded, and the upper elongate lamellæ less hairy.

Legs with the knees more broadly orange, extending sometimes indistinctly to the basal third of the anterior and the basal half (or even more) of the hind tibiæ, but sometimes only to the basal sixth of the anterior tibiæ and even less of the hind tibiæ except for the extension on the upper side; and with usually the basal half of the basal joint of the hind tarsi orange, though sometimes this is imperceptible, while occasionally just the base of the middle tarsi is orange.

Wings with a conspicuous dark cloud about the middle, which extends from the blackened stigma and its costal neighborhood across both ends of the discal cell to the fork of the postical vein, and down the stem and along the lower branch of the postical vein, while both basal cells are faintly clouded on their apical quarter. Thoracal squamæ perhaps longer, thinner, and darker. Halteres much more whitish.

♀. Frons slightly broader than in *S. iridatus*, and the two white spots less sharply defined and more extended (though sometimes vaguely) across the frons so that in some lights they almost meet; front ocellus placed at more than half-way from the vertex to the white spots; pubescence on the upper part of the frons distinctly white down to the front ocellus; pubescence on the upper mouth-edge whiter; postocular black fringe absent.

Thorax with the point of the humeri yellowish, and sometimes the upper margin of the mesopleuræ indistinctly and narrowly pale.

Legs as in the male.

Wings with the cloud about the middle browner than in the male but more accentuated, because the rest of the wing is more hyaline and the cloud extends vaguely right across the wing; subcostal vein rather more yellowish. Halteres whitish yellow.

Length about 8.5 to 10.5 mm.

This species is closely allied to *S. iridatus*, but is at once distinguished by the obvious cloud about the middle of the wing which envelops the discal cell; it is curious that some females taken by Colonel Yerbury at Porthcawl in June 1906 have the dark blotch on the wings enlarged and intensified in a similar manner to the blackening noticed on the wings of three species of *Beris* taken at the same time. If *S. nubeculosus* is a good species it is still more closely allied, and *S. cuprarius* is apparently only distinguished by its larger size and in the male by the white postocular fringe; it is however possible that *S. nubeculosus* is only a small dark form of *S. cuprarius*.

S. cuprarius is said to be the most widely spread European species and is recorded from Scandinavia to Italy and from North America; but I have not found it so common as *S. iridatus*, and my records only include Hampshire, Sussex, Kent, Surrey, Suffolk, Cambridgeshire, Lincolnshire, Warwickshire, Lancashire, Cumberland, Durham, and Glamorgan, though old records included Somerset, Dumfries, and Edinburgh, and Duncan quoted from Haliday "common in Ireland." It is a garden species like its two close allies, but also occurs in shrubby lanes and small woods, where it is fond of sitting on large leaves in the hot sunshine. My dates extend from June 6 to September 29. Westwood bred this species from garden mould, and Beling from decomposing heaps of rotting weeds, but Bremi said he bred it from cow-dung and Dufour from ulcers in elms.

Synonymy.—No real doubt has ever been attached to Linné's *Musca cupraria*, though many old writers failed to thoroughly recognise the distinctness of *S. iridatus*. Loew's two varieties, *robustus* and *gracilis*, noted in his *Bemerkungen*—Posener (1840) are probably both *S. iridatus*, or at any rate his *robustus* is perfectly normal *S. iridatus*, while his *gracilis* with "Augen mit Binde" and "2¼" and "Flügel glasartig mit dunkeltem Randmale, darunter nur wenig gebräunt" may apply to a small form of *S. iridatus* or to the male of *S. flavipes*; it is quite certain that they are unimportant varieties or else Loew would have mentioned them in his paper on *Sargus* in 1855. I possess a copy of Loew's *Bemerkungen* with numerous MS. notes which I believe were made by Loew himself, especially as "*adde pallipes*" occurs in black ink against the list of species of *Sargus*, and no *Sargus* was called *pallipes* except by Loew himself in mistake for *S. flavipes* in his paper on *Sargus* in 1855, while alongside of the notes on *S. cuprarius* is added in red ink (which proves that it was written at a different time) a further note that *S. flavipes* had been mixed up by him with *S. cuprarius* in probably his smaller variety.

9. ***S. iridatus* Scopoli.** Legs black, with only just the knees ferruginous. Wings without any special dark cloud about the middle.

A brilliantly shining blue-green fly of elongate shape.

♂. Head considerably wider than the thorax, and when viewed from in front rather wider than deep, and when viewed in profile very little deeper than long. Face small, blackish, and its abundant pubescence mainly blackish but pale on the lower part, and this pubescence is slightly upturned except close against the eyes; the mouth-opening reaches more than half-way up the face and the facial pubescence is very slight and short along the narrow margins until almost round the lower margin of the eye, but all the way up the back of the head (which is hollowed out) there is a long outstanding yellowish-white rather conspicuous ciliation (and by outstanding it is meant that this ciliation points directly backward at a right angle to the head) and in front of this whitish ciliation is an inconspicuous short black ciliation close against the hindmargin of the eye. Frons shining green, gradually diminishing in width from the vertex to the middle, where it is about half as wide as at the vertex, and then gradually increasing in width

down to the antennæ, where it is rather wider than at the vertex; there is a small but conspicuous white spot against each eye a little above the antennæ, and the space between these spots is obscurely brownish; the frons has no bare polished space down its middle, but bears all over rather abundant moderately long pubescence, which is brownish about the vertex but blackish below, or is all brown, and which slopes forward on the upper part until after the ocelli, but is almost erect but slightly sloping upwards on the lower half; ocelli placed at some distance from the vertex and the front one, which is remote from the other two, placed at nearly half-way between the vertex and the white spots; frons a little elevated above the level of the eyes on the lower quarter; proboscis orange. Eyes bare; facets only gradually and inconspicuously diminishing in size towards the back and lower parts; in life the iridescent band lies (according to Lundbeck) above the middle of the eye with its end thus reaching the frons somewhat above the white spot. Antennæ short, dull blackish; basal joint with short black bristly hairs; second joint similar, but with longer hairs on its upper side; third joint as deep as long, bare and only indistinctly annulated, with the last annulation longer than the others and bearing at its dorsal base a long thin arista, which is twice as long as the antennæ and which bears two or three plumose hairs close to its base.

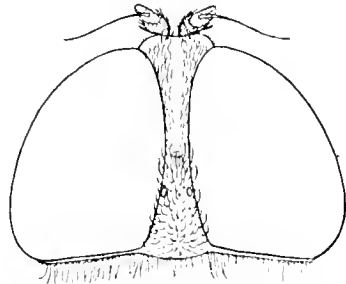


FIG. 139.—*Sargus iridatus*
♂. × 14.

Thorax and scutellum brilliant green or blue green, rather sparsely though not very finely punctate, clothed on the disc with inconspicuous though fairly abundant almost erect pale brownish-yellow pubescence, which forms a slight crest near the front of the thorax, and which is formed of hairs of inconspicuously different lengths, the short rather denser pubescence being about half the length of the longer pubescence; pleuræ more bluish black, polished and bare on all the middle and upper parts of the mesopleuræ, but bearing rather long sloping whitish-yellow pubescence on the rest, and with a few rather long pale hairs near the humeri.

Abdomen shining purplish or purplish green, but ranging (in immature specimens) to greenish brown, rather dulled by dense punctuation, somewhat club-shaped, as it gradually increases in width from the base to beyond the middle of the fourth segment, after which it gradually decreases to near the end of the fifth segment and then curves round sharply to the end of the fifth segment; sixth segment scarcely half so wide as the end of the fifth,

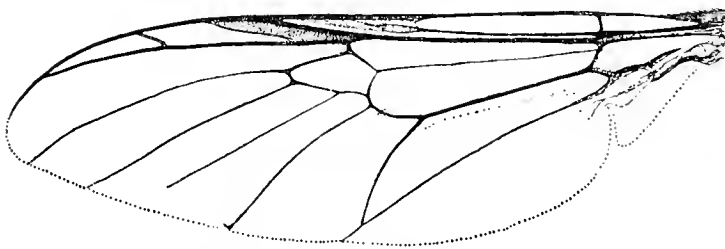


FIG. 140.—*Sargus iridatus* ♂. × 8.

bluish black. Pubescence pale, erect, and not scarce about the sides, longer about the basal corners, but very short, very dense, rather depressed, and black on all the disc. Belly shining black, with universal not short but rather sloping whitish pubescence. Genitalia black, rather conspicuously protruded from the small sixth segment, and showing a pair of elongate fringed black dorso-lateral lamellæ and several lateral plates.

Legs dull black, with the extreme knees inconspicuously ferruginous; dilatation of the apical half of the front tibiæ and the kink just below the middle of the hind tibiæ slight. Pubescence slight, but there is little pale fringe behind the anterior, and in front of the hind, femora.

Wings (fig. 140) suffused all over with a brownish tinge, and with the stigma and the subcostal space above and near it distinctly pale brown; second

veinlet from the discal cell rather strong, the first one being faint and the third one obsolete or incomplete. Alar squamæ small, brown, with moderately long pale fringes; thoracal squamæ almost concealed, club-shaped, rather yellowish brown, and with long pale brownish-yellow pubescence all over. Halteres dull yellowish brown.

- ♀. Very much like the male. Frons shining blue green, at the vertex about one-fifth the width of the head but narrowing from there to the ocelli, and then it is almost parallel-sided down to the pair of conspicuous white spots, after which it gradually widens until it is about as wide at the antennæ as at the vertex; pubescence greyish from the vertex to the upper ocelli, but black and nearly erect after them, and absent on and below the white spots; below the ocelli the rather narrow middle part is bare and polished down to the white spots but the sides are widely pubescent; in profile the frons begins to be elevated much before the white spots and thence to the antennæ, and the face bulges out a little; face slightly wider than the frons and with parallel sides, and bearing longer and denser pubescence which is outstanding and not upturned; back of the head very shallow and scarcely visible in profile, but with a rim behind the eyes on the lower part of which is a short black ciliation pointed forwards, and behind this a long conspicuous outstanding whitish fringe all the way down. Antennæ slightly longer than in the male.

Thorax and scutellum brilliant green, bearing short whitish pubescence composed of moderately sparse nearly erect hairs and dense shorter sloping pubescence; pleuræ with longer and more conspicuous whitish pubescence except on the bare polished part of the mesopleuræ; metanotum with upturned hairs on its lower part.

Abdomen purplish; ovipositor with a pair of protruded jointed terminal lamellæ which very much resemble those of the male except that they are longer and thinner; pubescence on the disc very inconspicuous, being composed of very short dense adherent rusty black bristles, but all about on the sides sloping, whitish, and short except at the sides of the two or three basal segments.

Legs as in the male.

Wings very similar to those of the male, but paler about the basal third.

Length about 8 to 10 mm.; Becker gives ♂ as 7 to 11 mm., ♀ 6 to 11 mm.

This species is distinguished from all the European species except *S. cuprarius* and *S. nubeculosus* by the remarkable outstanding white postocular fringe, while it is distinguished from those two by the absence of the conspicuous cloud on the middle of the wings and by the more narrowly ferruginous knees. It is very easily distinguished with the naked eye, but not so easily by the lens, though the more darkened pubescence on the upper part of the frons is a good character. These species may probably be distinguished from the *S. flavipes* group by the banding of the eyes in life, but I have not been able to test this character.

S. iridatus is rather common though seldom abundant, and appears to be very widely spread over Britain as I have numerous records from Penzance to Golspie, and also from several Irish localities. My dates extend from May 15 to August 15. It is recorded from all Europe.

Synonymy.—This species has been commonly known as *S. infuscatus* Meig., but Walker in 1851 resurrected Scopoli's name of *S. iridatus*, which is probably correct and of course has priority, though why Schiner after adopting *iridatus* in 1855 reverted to *infuscatus* in 1862 is unintelligible. It is perhaps as well that Scopoli's name was revived, as otherwise the obvious synonym of *Musca indicus* of Moses Harris (1782) might have claimed priority. In the synonymical notes under *S. cuprarius* I have called attention to Loew's var. *robustus* being obviously, and his var. *gracilis* probably, varieties of *S. iridatus*, which was evidently a species which he had not recognised in 1840.

8. CHLOROMYIA.

Chloromyia Duncan, Mag. Zool. Bot., i., 146, 164 (1837).

Moderate-sized brilliantly shining green flies, stouter than *Sargus* but more elongate than *Microchrysa*, and differing from both by the densely hairy eyes.

Head wide, being slightly wider than the thorax and also much wider than deep; face small but inflated and conspicuously hairy; jowls small; back of the head hardly hollowed out; vertex raised and rather conspicuously pubescent. Eyes densely hairy, touching for a considerable distance in the male and with enlarged facets in that sex on the upper part, but widely separated and with equal facets in the female. Antennæ (fig. 141) rather long; third joint with four distinct annulations, of which the three basal ones form nearly equal rings, but the fourth one is very much smaller and emits from its extreme dorsal base the long thin arista, which is therefore not quite apical and which is slightly plumose about its thickened base.

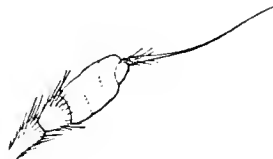


FIG. 141.—
Chloromyia formosa ♀. × 20.

Thorax subquadrate, rather longer than broad, and very slightly widening from the front to the back, rather densely pubescent, but not enough to obscure the brilliant ground colour.

Abdomen rather broad, being about twice as long as broad in the male, but broader and shorter in the female.

Legs simple, just as in *Sargus*.

Wings with a *Sargus*-like venation, but the apparent two upper branches of the cubital vein much fainter, the cubital cell shorter because the cubital vein is less arched, the third veinlet from the discal cell fainter and less complete, the discal cell less produced at the emission of the upper veinlet, and the lower cross-vein shorter. Thoracal squamæ forming an almost circular disc.

This genus is easily distinguished from any other of the *Sarginae* in Europe by its densely pubescent eyes; it is also distinguished from *Sargus* by the eyes of the male touching on the frons, by the broader shape, and by the more elongate antennæ (fig. 142) which have the third joint by no means globular and with three distinct almost equal annulations which are followed by the small terminal one; from *Microchrysa* it is distinguished by the larger size, densely hairy eyes, more elongate shape, and differently formed third antennal joint on which the arista is more apical.

Chloromyia is limited to the two closely allied European species and one from the Cape of Good Hope, as I believe the North American *S. viridis* to be a true *Sargus* of which *S. frontalis* Lw. (which was described subsequently from Europe), is a probable synonym, while Walker's *S. sapphirinus* from "East Indies" requires confirmation. The larva of *C. formosa* lives in garden mould and has been bred from *Brassica rapa*, while the perfect insect is common in gardens and is fond of sunning itself on leaves.

Synonymy.—The first attempt at dividing the genus *Sargus* as restricted by Meigen was made by Macquart, who in 1834 formed a genus *Chrysomyia* for the combined genera *Chloromyia* and *Microchrysa*; in 1837 Duncan, in ignorance of Macquart's genus, formed a precisely equivalent genus *Chloromyia*, but Macquart's name was inadmissible because Desvoidy had in 1830 already proposed a genus *Chrysomyia* in the *Muscidae* and consequently Duncan's name must stand. It is fortunate that Osten Sacken rescued Duncan's name from oblivion, as his little-

known paper on British Diptera contained really excellent work, and it was most unfortunate that it came to such a premature end; Duncan founded his genus upon the character of the ovate third antennal joint, but as his figure and the first species of his genus refer to *C. formosa* that species may well be considered to be his type. In 1854 Loew separated off *Microchrysa* for the small almost bare-eyed species, but still retained Macquart's name of *Chrysomyia* for *C. formosa*, and very soon after (1856) Rondani suggested the name of *Clorisoma* for the same as Loew's *Microchrysa* and distinguished the hairy-eyed ones again as *Chrysomyia*, but in 1861 he proposed the name of *Myochrysa* in substitution of the preoccupied *Chrysomyia*. We have therefore *Chrysomyia* Macquart and *Myochrysa* Rend. as exact synonyms of *Chloromyia*, and *Clorisoma* (subsequently altered in 1861 to *Chlorosia*) as an exact synonym of *Microchrysa*. Rondani's name *Myiochrysa* is retained in Aldrich's Catalogue of North American Diptera (1905) for *M. cœrulea* Bigot, but the original type of Bigot's species seems to me to be only a small *Sargus viridis*.

1. **C. formosa** Scopoli. Brilliant green. Face with yellowish pubescence on at any rate the lower part. Tarsi altogether blackish.

A moderate-sized handsome pubescent green fly.

♂. Head kidney-shaped when seen from above, because the large eyes curve back from the vertex and the neck is long; when seen from in front the head is about one and a half times broader than deep, and when seen in profile it is very little deeper than long. Frons and face shining blue-black; frons small and bearing long and rather dense black, or grey-black, or sometimes on the front part pale, pubescence; face considerably bulging, gradually widening to fully one-third of the head at the lower level of the eyes and curving round to the small jowls, bearing long and rather dense pubescence which is usually all pale dull yellowish or is sometimes black on the upper part (when the frons is wholly black haired), and this pale pubescence extends along under the eyes but hardly to the back of the head; back of the head distinctly puffed out on the lower part but practically flush with the eyes on the upper part, bearing a short dense blackish pubescence which on the upper part forms only a very short but very close ciliation; vertex raised, black, and bearing a rather long dense yellowish pubescence. Eyes large, touching for more than a third of the space between the occiput and the antennæ; facets large on the upper part, and though the distinction from the smaller facets on the lower part is rather sudden it is not very sharply defined; the eyes bear a long dense blackish-brown pubescence all over except quite close to the upper and hind margins, and in life are colored almost as in the female but with the cross-band nearer the middle. Antennæ (fig. 141) long; two basal joints black and bearing rather conspicuous black bristly hairs; basal joint almost cylindrical, thinner but longer than the second; third joint bare, dull dark orange to blackish brown, and with three distinct fairly equal annulations and one small terminal one, and from the dorsal base of this small terminal one arises the apparently almost apical arista; arista about as long as the antennæ, slightly and shortly plumose on its thickened basal quarter, and then tapering to a fine point.

Thorax and scutellum shining blue-green, thickly and finely punctate, and bearing a rather dense nearly erect dull pale brownish-yellow pubescence, or to speak more correctly there is a very dense short pubescence and a sparser long pubescence which is about four times as long (especially noticeable on the scutellum), and the result is that the shining ground colour is but little obscured; pubescence on the pleuræ rather long and pale yellow, or sometimes blackish on the upper part of the mesopleuræ, while very little of the middle part of the mesopleuræ is bare and polished though there is a space for the reception of the front femora.

Abdomen brightly shining green, nearly twice as long as the thorax but broader and flatter, almost equally wide from the hind part of the second to the end of the fourth segment, but the fifth segment is short and forms a flattish semicircle, and the sixth segment is very small being only about a third as wide as the base of the fifth segment. Pubescence dense, short, equal, and orange

all over, and appearing conspicuous when viewed sideways; sloping but hardly adpressed unless on the middle of the disc. Belly black, and bearing obvious though not at all dense decumbent orange pubescence. Genitalia blackish, conspicuous though small, exerted from about the middle third of the sixth abdominal segment and ending in a pair of small lamellæ.

Legs dull brownish black, with nearly the apical fourth of the femora and the basal third of the tibiæ reddish orange. Pubescence slight and all pale yellow except for the longer black hairs at the end of the tarsi near the claws. Pulvilli dull orange; claws black, but orange at the base.

Wings greyish hyaline but strongly tinged with brownish orange; stigma indistinct, but the discal cross-vein and the cross-veins ending the discal cell slightly darkened; extreme base of the wing blackened. Alar squamæ inconspicuous, obscure glassy brown with very short whitish marginal fringes; thoracal squamæ brownish, forming an almost circular disc, and with long brownish-yellow pubescence all over. Halteres reddish orange, but the stem sometimes pale yellow.

- ♀. Rather broader, barer, and greener than the male. Frons shining black and occupying fully one-third the width of the head, very finely and rather sparsely punctate; the triangular depression which contains the equidistant ocelli is continued as a narrow channel down the frons to another triangular depression just above the antennæ; sides of the frons almost parallel down to the antennæ, and all the frons with inconspicuous but not scarce rather short pale greyish pubescence. Face rather short, but continued by moderately broad eye-margins under the eyes round to the jowls and back of the head, and on these lower sidemargins of the face there is a longer pale pubescence which contrasts with the rather shorter and mainly black pubescence on the somewhat bulging disc of the face; jowls small and bearing similar pale pubescence to that on the sides of the mouth; back of the head shining black and almost impunctate, broad all the way up and decidedly broad above the middle until it is (at the top corners of the eyes) nearly a quarter the length of the head, and with short pale pubescence behind the polished part. Eyes with slightly shorter pubescence than in the male; in life brownish purple on the upper third and dull coppery green on the lower part with a peacock-hued (dark blue, light blue, and green) intermediate band, which becomes widened and less defined towards the back of the eye. Antennæ as in the male, or with the third joint more dull blackish.

Thorax with the pubescence all pale and all short, but less dense and consequently leaving the thorax rather more brilliant; the bare part of the mesopleuræ is more distinct.

Abdomen broader and shorter than in the male, being only about one and a quarter times longer than broad, brilliant purplish on the disc but green at the sides, densely punctate, and bearing a minute inconspicuous pubescence. Ovipositor ending in a pair of small black lamellæ almost as in the male.

Legs very similar to those of the male.

Wings perhaps slightly paler than in the male. Squamæ and halteres as in the male.

Length about 9 mm.

This species has no close ally in Britain as the densely hairy eyes distinguish it at once from all our *Sarginae*, but there is a widely distributed continental species, *C. speciosa* Macq. (= *melampogon* Zell.) which is very closely allied, but which has the pubescence black on the whole of the face, and which also has the wings more blackish tinged and the posterior tarsi yellowish.

C. formosa is very common in Britain, and I have innumerable records from Penzance to Golspie and the Orkneys, while I have records from several Irish localities. My dates extend only from May 13 to July 31, and it is mainly a June species. It is common in gardens where it suns itself on the leaves of plants, and it has been bred from the common

cabbage (*Brassica rapa*). It is recorded from almost all Europe, while *C. speciosa* seems to be confined to Central Europe.

Synonymy.—Scopoli's description (1763) is quite distinct enough, the only point which could raise a doubt being "Alæ hyalinæ," and ever since 1817 his name has been universally accepted, except that Loew described a *Sargus azureus*, which he himself suspected of being a mere variation in 1840 and which he suppressed altogether in 1855. There can be no doubt but that *Musca cicur* of Moses Harris is a synonym.

9. MICROCHRYSA.

Microchrysa Loew, Verh. zool.-bot., Wien, v., 146 (1855).

Small broad brilliantly shining green flies.

Head broader than the thorax; face small and not bulging, inconspicuously pubescent; jowls very small; back of the head hollowed out in the male but with an eye-collar in the female; vertex rather elevated; ocelli equidistant. Eyes practically bare, touching for a long distance in the male, and in that sex with the facets on the upper part conspicuously enlarged, but widely separated and the facets all equal in the female. Antennæ (fig. 143) moderate in length; basal joint small; second joint cup-shaped, much broader than the basal joint; third joint large, and with four distinct annulations, and bearing the long thin arista just above its tip.

Thorax longer than broad, but very slightly increasing in width towards the hind part; pubescence dense but short and inconspicuous; mesopleuræ with a bare polished space on the front part.

Abdomen short broad ovate, very little longer than broad.

Legs simple, or with the tibiæ slightly dilated on the apical half.

Wings (fig. 142) with the true *Sargus* venation, in which the radial vein appears

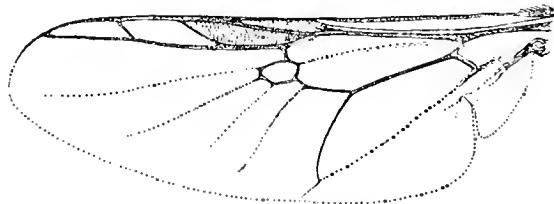


FIG. 142.—*Microchrysa flavicornis* ♂. × 12.

to be the first of two forks from the cubital vein; stigma distinct though pale and sharply margined by the radial and subcostal veins; cubital vein not in the least arched and consequently the cubital cell short; discal vein very faint before the discal cell; veinlets from the discal cell more widely rayed out than in *Sargus*, fainter and less complete, the middle one being the strongest; the wings being altogether broader than in *Sargus* cause all the three basal cells (especially the anal cell) to be much broader in comparison. Squamæ (alar) with a short marginal fringe; thoracal pair forming an ovate disc which has a long conspicuous fringe and is pubescent all over.

This genus may easily be known by its small size, short broad abdomen, and bare eyes which touch in the male for a considerable space.

Microchrysa is composed of a few closely allied species which occur in Europe, South Asia, Africa (Caffraria), and both North and South America, while our common *M. polita* has a very wide distribution in Europe and North America. The larvæ are related to those of *Sargus* and live in cow-dung or decaying vegetable matter, and the perfect insects frequent gardens.

Synonymy.—I have dealt with the generic names of *Chrysomyia* Macq. and *Chloromyia* Dunc. in the synonymical notes under *Chloromyia*, and have there proved that Rondani's genus *Clorisoma* (which he subsequently changed to

Chlorosia) is exactly synonymous with *Microchrysa* Loew, though I might have added that *M. polita* is the type of *Microchrysa* and *M. pallipes* (= *flavicornis*) is the type of *Chlorosia*, but I do not think that these two species will ever be generically separated.

Table of Species.

- | | |
|---|--------------------------|
| 1 (2) Antennæ and legs mainly blackish. | 1 <i>polita</i> . |
| 2 (1) Antennæ and legs mainly yellowish; smaller species. | |
| 3 (4) Abdomen in both sexes and frons of female brilliant greenish. | 2 <i>flavicornis</i> . |
| 4 (3) Abdomen in both sexes and frons of female shining blackish. | 3 <i>cyaneiventris</i> . |

1. *M. polita* Linné. Antennæ not at all yellowish at the base. Legs mainly blackish.

A common small bright green fly.

♂. Frons triangular, rather small, shining black, and bearing short rather dense decumbent pale pubescence except on the depressed middle channel. Face small, almost flat, shining green, and bearing fairly abundant but inconspicuous slightly upturned pale pubescence; the narrow sides of the mouth and the very small jowls with a very short pale ciliation; back of the head so much hollowed out that it is not visible at all in profile; vertex rather raised, shining blackish green, and bearing very short blackish pubescence; proboscis brownish orange to blackish; palpi small but just visible, blackish. Eyes large, appearing to touch for a long distance but actually the vertical triangle extends down a long way in a narrow point as is usually evidenced by its short blackish pubescence; the eyes are bare, but the facets on the larger upper part are considerably larger than those on the smaller lower part, and the contrast is so abrupt and conspicuous across the eye as to leave the upper part slightly bulging. Antennæ small, dull dark brownish; two basal joints with short brown bristly hairs; third joint with four indistinct annulations; arista not quite apical, thin, and longer than the antennæ.

Thorax and scutellum all brilliant green, with usually a shade of blue, thickly but finely punctate, and clothed all over the disc with extremely dense but very short erect black pubescence, but towards the sides the pubescence becomes rather longer, softer, and greyish; the pubescence in spite of its density does not affect the brilliancy of the ground colour; pubescence on the pleuræ slightly longer and pale brownish yellow, but there is a large bare depressed polished space on the front part of the mesopleuræ for the reception of the front femora.

Abdomen brilliant green but not quite so bright as the thorax and usually with a less bluish tint, slightly wider than the thorax and about as long, being rather longer than broad; disc of the second, third, and fourth segments densely and coarsely punctate and bearing an extremely dense very short black (in side-lights greyish) pubescence, and consequently the brightness on this part is diminished, but on the basal segments there is a longer pale brownish inconspicuous pubescence; the bright sides and the fifth segment are less punctate and bear a rather sparse tiny pubescence which is more or less obviously pale. Belly bright blackish green, all punctate, and bearing very short inconspicuous pale pubescence. Genitalia dull orange, protruding from about the middle sixth of the end of the fifth abdominal segment, and bearing a pair of short orange upper lamellæ.

Legs mainly blackish; coxæ and trochanters tipped with brownish orange; all femora orange at the tip (front pair broadly), and the anterior tibiæ all orange except usually for a large obscurely darkened splash on most of the apical three-fifths (least distinct on the front tibiæ); hind tibiæ orange about the basal quarter and at the extreme tip; all tarsi orange, with the last four

joints obscurely darkened above; all tibiæ slightly dilated on the apical half. Pubescence all very inconspicuous and nearly all pale yellow. Pulvilli dirty pale yellow; claws blackish.

Wings very slightly smoky, with the stigma sharply defined though only yellowish; veins about the base brownish orange, and the outer veins not so faint as in the other species of the genus; discal vein exceedingly faint up to the discal cell. Squamæ (alar) rather small, obscure glassy, with darkened margins which bear a short dark fringe; thoracal squamæ forming an ovate disc which is blackish with a slight tinge of orange, and which bears blackish or greyish-black pubescence all over though most conspicuously so on the marginal fringe. Halteres large, orange.

- ♀. Similar to the male in general appearance. Frons fully two-fifths the width of the head, brilliant green and practically bare but moderately punctate; frons and face very slightly narrowing from the vertex to the mouth, and while the pubescence on the frons is very sparse that on the face is distinct and pale though short and inconspicuous; near the vertex there is a depressed elongate triangular space extending from the ocelli about half-way down the frons and continued as a narrow middle furrow as far as the antennæ; back of the head all puffed out, rather narrowly on the lower part but becoming wide on the upper part, and forming a brilliant green eye-collar which rounds off on to the frons. Eyes smaller and the facets all equal. Antennæ (fig. 143) with the third joint larger and more distinctly annulated.

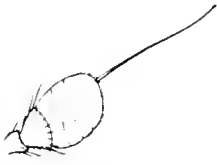


FIG. 143.—*Microchrysa polita* ♀. × 30.

Thorax and scutellum sometimes more purplish, and bearing all over a very short pale inconspicuous though

dense pubescence.

Abdomen sometimes brilliant purple, shorter than the thorax and as broad as long, not so distinctly punctate as in the male, and bearing only very short inconspicuous grey pubescence and consequently more brilliantly shining. Ovipositor with a pair of rather long thin jointed blackish-orange lamellæ.

Legs usually darker than in the male, even to the basal joints of the tarsi and the more restricted orange tips of the front femora, but the front tibiæ are often almost entirely orange.

Wings slightly more hyaline than in the male, and the stigma only pale greyish yellow. Thoracal squamæ almost as black as in the male, but with rather greyer fringes.

Length about 5 mm.

This species varies but very little; the antennæ may be more or less dark brown, but are never so yellow on the basal joints as in the other European species; the legs may vary a little in the amount and more so in the intensity of the dark markings; and the whole coloring may vary between brilliant green, bluish green, and even purplish. It is always distinctly larger and has blacker markings than the other two species.

M. polita is very common on the leaves of shrubs in gardens, and occurs in any shrubby district. I have innumerable records from Penzance to Golspie between March 26 and August 16. Colonel Yerbury took (along with normal specimens) a very large (5½ mm.) female at Glengariff in Co. Cork on June 15, 1901, and Haliday has stated that it is common in hedges in Ireland. It is recorded from almost all Europe and from North America, though Bezzi states that it is rare in Italy. It has been bred in abundance from cow-dung and from decaying vegetable matter.

Synonymy.—No doubt need be raised against Linné's description which (according to Haliday) is confirmed by the type in his collection. *Musca vitreus* of Moses Harris is an obvious synonym.

2. *M. flavicornis* Meigen. Antennæ yellowish on at least the two basal joints. Legs mainly yellow. Abdomen brilliant green. Frons of the female brilliant green. Thorax with a pale stripe between the humeri and the wing-base.

An exceedingly brilliant little fly.

♂. Very much like *M. polita* but smaller and paler. Frons dull greenish black, with less obvious pale pubescence; face with shorter pubescence. Eyes touching for a longer space, and the distinction of the large and small facets even more conspicuous. Antennæ with the two basal joints yellowish orange; third joint smaller than in *M. polita* and usually brownish orange, though it varies a little in colour.

Thorax with still shorter pubescence than in *M. polita*, and with the pale pubescence more extended; humeri and a narrow line along the dorso-pleural suture to the wing-base obviously yellowish; postalar calli brownish.

Abdomen apparently even more brilliant than in *M. polita* and often with a more coppery tint. Genitalia brownish orange, not small.

Legs mainly yellow, but the middle femora have a broad blackish indefinite ring which occupies nearly the middle half, and the hind femora have a still blacker ring which occupies fully the middle two-thirds; posterior tibiæ slightly obscured after the middle, and all the tibiæ less distinctly dilated on the apical half; tarsi with only just the tip darkened.

Wings slightly more hyaline and the veins much paler than in *M. polita*. Squamæ pale brownish yellow with yellow fringes; fringe on the alar pair apparently not quite so short, and the fringe on the thoracal pair not quite so long, as in *M. polita*. Halteres bright orange.

♀. Frons vivid bluish green, with (in certain lights) a slight narrow pale line running out from each eye part-way across the frons just above the antennæ, slightly less punctate than in *M. polita*, and the depression below the ocelli less obvious; eye-collar still more brilliant green. Antennæ brownish yellow on the two basal joints; third joint broader and yellowish brown or brown; arista more dorsal than in the male.

Thorax with the humeri and the narrow line to the wing-base more conspicuously pale.

Abdomen intense bright purplish green. Ovipositor with long thin jointed yellow lamellæ.

Legs mainly yellow, but with rather more black on the femora than in the male, as even the front femora often bear a small splash, while the middle femora bear a very wide black ring, and the hind femora are all black except on the obscurely orange base and at the narrow orange tip.

Wings almost hyaline, except for the pale yellow stigma and the yellow veins. Squamæ yellowish white, with similarly colored margins and fringes.

Length about 4 mm.

This species varies a little in the amount and in the intensity of the yellow on the antennæ and legs, but never enough to confound it with *M. polita*; it also varies in the hue of its brilliant coloring from absolute green to beautiful purplish with green reflections, but never towards the blackish hue of *M. cyaneiventris*. My description has mainly contrasted it with *M. polita*, but *M. cyaneiventris* is distinguished at once by the blackish colour of its abdomen in both sexes and by the blackish frons of its female. An extremely small female from Chippenham Fen, taken on July 10, 1905, has the legs most unusually black and the antennæ only obscurely brownish yellow about the base, but the pale line from the humeri to the wing-base is distinct and that combined with its size seem to prove that it belongs to this species.

M. flavicornis is not uncommon and has similar habits to *M. polita*, with which it sometimes occurs but is by no means so common. I have

records from Cornwall, Devon, Hampshire, Sussex, Kent, Surrey, Middlesex, Cambridgeshire, Suffolk, Norfolk, Worcestershire, Herefordshire, Lancashire, Yorkshire, Durham, and Glamorgan, while from Scotland I have notes of having seen it from Arran, Whauphill, Kinghorn, Rannoch, Forres, and Golspie, and Duncan quotes from Haliday "common in Ireland along with *C. polita*," but I think my records from at least Rannoch and Forres may belong to the next species. My dates extend from June 9 to September 1. If correctly identified it is recorded from Scandinavia to Italy, though Bezzi excludes South Europe.

Synonymy.—Meigen originally described this species from a female sent to him by Dr Leach from England, and his words "antennis flavis" and "Stirne breit, "glänzend goldgrün ;—Hinterleib goldfarbig, mit blaulichem Schiller" conclusively identify it. In 1830, however, Meigen described a *Sargus pallipes* with very similar characters, which Zetterstedt and Walker professed to recognise as distinct from *M. flavicornis*; I am bound to agree with Loew (1855) that I cannot trace any trustworthy distinctive character, and in fact I think Meigen's words "Brustseiten "glänzend schwarz, vor der Flügelwurzel mit gelbweisser wagerechter Strieme" are conclusive as to its identity. At the same time Loew came to the opinion that Zetterstedt's *Chrysonomyia cyaneiventris* was only another synonym, and that opinion has been generally accepted ever since; I have, however, proved it in my next description to be a perfectly distinct species. Walker's *C. pallipes*, *C. flavicornis*, and *C. cyaneiventris* form a complete tangle, but I think his *C. pallipes* may well be *M. flavicornis*, and his *C. cyaneiventris* the female of *M. cyaneiventris*, and his *C. flavicornis* a mixture of *C. cyaneiventris* and *C. flavicornis*, and a number of specimens in the Entomological Club collection tend to prove this, as both species exist there though mixed up, and there are several specimens of *M. cyaneiventris* under the label of *flavicornis*. It is most probable that *Musca parvulus* of Moses Harris (1782) is the oldest name, but his description and figure of the female only are not sufficient for positive identification.

3. ***M. cyaneiventris*** Zetterstedt. Antennæ yellowish. Legs mainly yellow. Abdomen in both sexes and the frons of the female shining blackish.

Very much like *M. flavicornis*, but easily distinguished by its blacker colour.

♂. Agreeing with *M. flavicornis*, but the frons dull black with more distinct depressed greyish pubescence and narrow middle furrow.

Thorax and scutellum with slightly longer pubescence; the pale humeri and the narrow line along the dorso-pleural suture absent or very narrow and indistinct.

Abdomen shining black with a slight tinge of blue, and bearing longer and much darker pubescence.

Legs with the blackish markings on the posterior femora more restricted, especially on the middle pair, and sometimes limited to an obscure middle sixth of the hind pair.

Wing-veins darker. Squamæ dark brown with brownish fringes. Halteres rather paler.

♀. Occiput, vertex, and frons dark bluish black; frons more sparsely punctate, and often with a pair of narrow curved yellow lunules which almost meet just above the antennæ, but these lunules are usually obscure or even absent, though when distinctly present the dorso-pleural suture is also yellowish. Eyes in life brownish green with a faint trace of a broad dark band just above the middle. Antennæ larger than in the male.

Abdomen shining bluish black, and consequently the pale pubescence more obvious.

Legs with comparatively small brown rings on the posterior, or only hind, femora ; tibiæ as in the male.

Wings and squamæ as in the male. Halteres pale yellow.

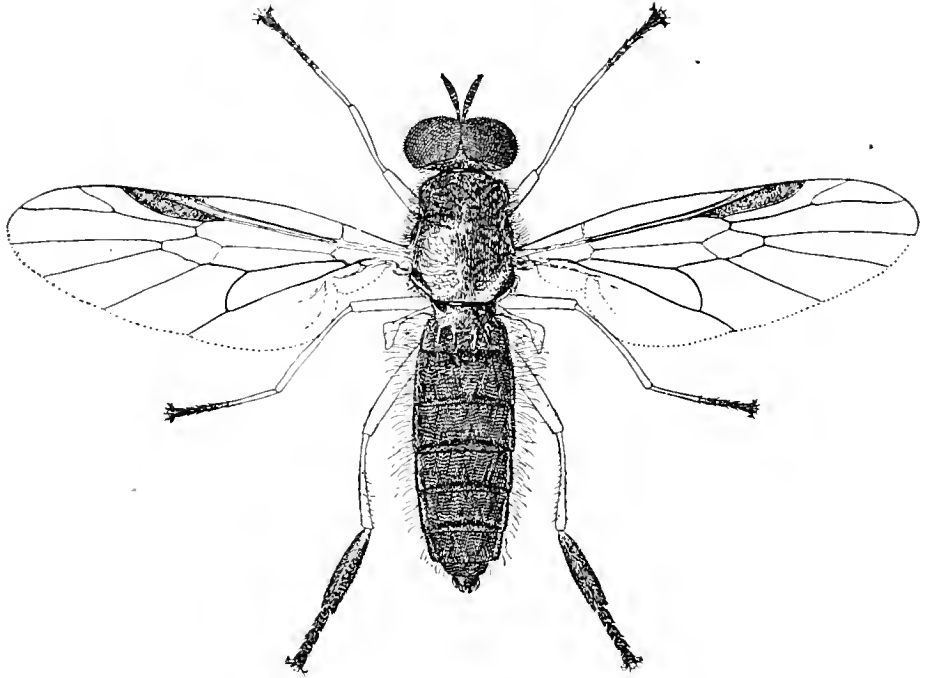
Length about 4 mm.

This species is very closely allied to *M. flavicornis*, but is as Zetterstedt said "certe distincta," and it may easily be known by the blackish abdomen in both sexes and the blackish frons of the female. The slight pale lunules on the frons of the female obviously represent the white spots which occur there in *Sargus* and *Nemotelus*.

M. cyaneiventris is probably not uncommon in at any rate the northern part of England and in Scotland, while probably Haliday caught it in Ireland, but although Colonel Yerbury and I have often taken it we have always mistaken it for *M. flavicornis* at the time of capture; it must however be borne in mind that it was not until 1901 that we knew there was such a species, because it had been sunk by Loew as a mere synonym of the rather common *M. flavicornis*. I have records from Devonshire (Tor Cross and Lynton), Norfolk (Mundesley), Oxfordshire (Shotover), Herefordshire (Cusop, Stoke Wood), Worcestershire (Bewdley), Lancashire (Coniston), Yorkshire (Burley-in-Wharfedale), Glamorgan (Porthcawl), Merioneth (Dolgelly), Fife (Aberdour), Perthshire (Rannoch), Inverness (Netly Bridge), Nairn (Nairn), Elgin (Forres), Sutherland (Golspie), and the Orkneys, from June 6 to September 1. I first took it at Coniston on July 19, 1876, but did not distinguish it until describing for this work early in 1901. It is at present recorded from only Scandinavia and Britain.

Synonymy.—When Zetterstedt first described this species in 1842 he said "Similis *pallipedi*, sed—certe distincta," and therefore Loew in 1855 was not justified in hastily suppressing it as a mere variation, and in fact Loew did harm in his suggestion, because from that day to this there has been a fixed idea that there were only two species of *Microchrysa* in Europe; it is possible that Loew was led into error through Walker's hopeless jumble in 1851 of *C. flavicornis*, *C. pallipes*, and *C. cyaneiventris* in which he must have partly mixed up *M. cyaneiventris* with his *C. flavicornis* when he said "Abdomen—cupreous-black," though it is probable that his *C. cyaneiventris* was the female of the true species as identified by Haliday.

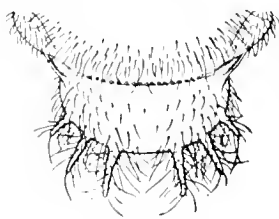
BERINÆ.

FIG. 144.—*Beris Morrissi* ♂. $\times 7\frac{1}{2}$.

Abdomen with seven obvious segments. Antennæ with 8-annulated flagellum. Wings with the lower cross-vein absent; discal cell emitting only two veinlets irrespective of the upper branch of the postical vein, or occasionally emitting a third incomplete veinlet (fig. 150). Scutellum usually armed with four or more marginal spines.

Antennæ with the third joint (= flagellum) long and normally 8-annulated, but without any trace of a terminal style or arista.

Thorax but little arched. Metapleuræ with short shelter hairs over the stigma.

FIG. 145.—
Beris chalybeata ♂.

Scutellum with normally four or six marginal spines (except in *Allognosta*) which are part of the integument of the scutellum, as is proved by the pubescence extending on them up to the tip (fig. 145), but these spines vary in individuals of the same species from four up to eight or nine and are not necessarily symmetrical.

Abdomen with at least seven obviously distinct segments, plump and flat but with almost parallel sides (broad ovate in *Acanthomyia*).

Legs simple, rather stout in all the European genera; basal joint of the hind tarsi usually dilated in the male; tibiæ without spurs in the European species, except on the middle tibiæ in *Acanthomyia*.

Wings with the radial vein very short and ending near the tip of the subcostal and curved upwards so as to include the conspicuous dark stigma which lies between the ends of the subcostal and radial veins and includes the whole of the marginal cell, and this stigma is placed soon after the middle of the costa; cubital vein forked, with its upper branch about half as long as the lower one, and both branches ending in the wingmargin well before the tip of the wing; discal cell hexagonal (unless the two veinlets issuing from it touch each other at their bases), with its base opposite

to or just before the origin of the præfurca, and emitting from its end two veinlets to the wingmargin (and sometimes an abortive third veinlet) besides the upper branch of the postical vein which appears to issue from the discal cell because the small cross-vein is absent, so that the upper branch of the postical vein forms the lower margin of the discal cell for a short distance or even to nearly one-third of the length of the cell; discal cross-vein placed only a little before or at the middle of the discal cell; postical vein with part of its upper branch forming the lower margin of the discal cell and otherwise running simple to the wingmargin, but with its lower branch rapidly curved downwards so that it joins the anal vein a considerable distance before the wingmargin, and consequently the portion of the anal vein after the anal cell is about half as long as the anal cell; hindmarginal cells including the subapical and postical cells four more or less complete, or if the discal cell emits an imperfect veinlet five, of which two are incomplete; alula evidently developed though small. Wing-membrane minutely pubescent, but not ribbed or rippled. Alar squamæ present though rather small, distinctly fringed on their margins; thoracal squamæ undeveloped, though traceable as a raised line near the squamal angle.

The *Berinae* are most allied in their venation to the *Pachygastrinae*, from which the elongate seven-segmented abdomen and the very distinct antennæ in European species at once distinguish them; the *Xylomyiinae*, which are the only species with a similar abdomen and an 8-annulated flagellum are really the most allied, but are easily distinguished by having the præfurca (= common base of the radial and cubital veins) originating far before the base of the discal cell, by the elongate hexagonal discal cell, longer anal cell, unarmed scutellum, and spurred posterior tibiae. Important characters for the *Berinae* may lie in the peculiar sharply defined darkened stigma which fills the whole of the marginal cell, and in the shortened anal cell caused through the peculiarly downturned lower branch of the postical fork.

The *Berinae* are composed of about ten genera, which are known to occur all over Europe, North, Central, and South America, Australia, and New Zealand. Five genera and about ten species are palæartic, and two genera and seven species are now described as British.

The metamorphoses of very few species are known, but the larva of *Chorisops tibialis* was described and figured by Handlirsch in 1883 (Verh. zool.-bot., Wien, xxxiii., 243).

Considering the uncertain etymology of *Beris*, I prefer to use the term *Berinae* for the subfamily, just as *Canis* makes *Caninae*, etc. Agassiz derived *Beris* from "*βῆρος*, vestis," but I cannot trace any such Greek word, and I am inclined to derive it from *βήρυλλος*, the beryl, because of the brilliant green coloring of the thorax.

Table of the Palæartic Genera of BERINÆ.

- | | |
|--|-------------|
| 1 (2) Scutellum unarmed, smooth margined. | ALLOGNOSTA. |
| 2 (1) Scutellum armed with four or more marginal spines. | |
| 3 (8) All tibiae without spurs. Abdomen rather narrow, with almost parallel sides. | |
| 4 (5) Palpi obsolete or minute. Eyes hairy, touching in the male. | |

10. BERIS.

- 5 (4) Palpi distinct and rather long. Eyes not touching in either sex.
 6 (7) Eyes hairy. ACTINA.
 7 (6) Eyes bare. 11. CHORISOPS.
 8 (3) Middle tibiæ with two small unequal spurs. Abdomen broad and stout. Eyes hairy. ACANTHOMYIA.*

Actina and *Acanthomyia* with only one species each might occur in Britain.

10. BERIS.

Beris Latreille, Hist. Nat. Crust. et Ins., iii., 447 (1802).

Rather small flies which are easily recognised by their shape and their peculiarly spined scutellum, as well as by their numerous abdominal segments.

Head rather semicircular; face short, pubescent, arched, but little produced. Proboscis prominent and with large sucker-flaps; palpi rudimentary in the European species (but visible in *B. Morrisii*). Eyes large and touching (though hardly so in *B. Morrisii*) for a long space in the male so that in that sex only a small triangular frons and a small elevated vertical space exist, but in the female they are smaller and well separated by an almost parallel-sided frons; densely hairy in the male (but only sparsely in *B. Morrisii*), and in that sex the upper and front facets are usually enlarged, but in the female they are less hairy and have no enlarged facets. Antennæ porrect, at least almost as long as the head; two basal joints short, almost equal in length and bearing short bristles; third joint (=flagellum) elongate and annulated into eight rings (fig. 148) of which the first and last are longer than the others.

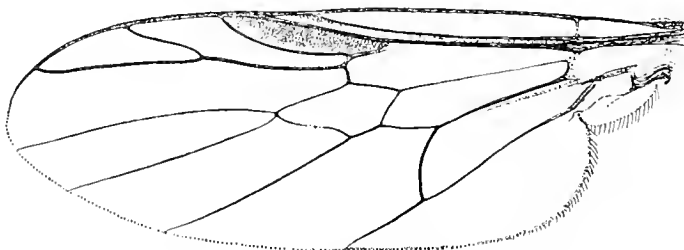


FIG. 146.—*Beris vallata* ♀. × 12.

Thorax rather arched, clothed in the male with rather dense erect pubescence but in the female with shorter more depressed and less conspicuous pubescence, without any trace of bristles or spines. Scutellum (fig. 145) with strong marginal spines which are actual projections of the scutellum itself, as they bear to their tips similar pubescence to that on the disc of the scutellum; these spines are normally six in number, but vary very much in strength and development, so that there may be any number from four to eight or even nine, as the less developed outer spines may not be symmetrical on both sides.

Abdomen hardly broader than the thorax, flattened, rather narrow and almost parallel-sided, and consisting of at least seven segments. Genitalia of the male with a pair of elongate dorsal lamellæ near together, and a pair of upcurved pickaxe-shaped under lamellæ set wide apart with a rather large middle piece between them; of the female composed of a pair of projecting two-jointed lamellæ.

Legs simple, except that the basal joint of the hind tarsi is dilated in the male and elongate in both sexes.

Wings (fig. 146) rather long, being longer than the abdomen; radial vein short and curved upwards so that it ends rather near the subcostal and encloses the

* The name *Hexodonta* Rond. cannot claim priority over *Acanthomyia* Schin. because (1) it was never founded with a known or described species attached to it; (2) one of its express characters lay in the absence of spurs on any of the tibiæ; and (3) the atrocious malformation of the word *Exodontha*.

conspicuous dark stigma which lies between these two veins; cubital vein practically straight and emitting its fork at about half its length, and ending distinctly before the tip of the wing; discal cross-vein close to the origin of the cubital vein and placed near the middle of the discal cell; discal cell emitting two veinlets from its end which are rather approximated at their origin and which extend to the wing-margin, and sometimes an abortive third veinlet (fig. 150) or a trace of one may occur (not necessarily alike in the two wings), and as there is no small cross-vein the last part of the upper branch of the postical fork appears to issue from the lower part of the discal cell; the upper branch of the fork of the postical vein forms the lowest side of the discal cell for a short distance, and the lower branch bends down rather abruptly and joins the anal vein considerably before the wing-margin; wing-membrane minutely pubescent all over but not at all ribbed or rippled. Alar squamæ moderate in size and with a delicate moderate fringe; thoracal squamæ only represented by the frenum. Halteres normal.

The metamorphoses of the restricted genus *Beris* are very little known, and I can only record that *B. chalybeata* has been bred from moss, but those of *Chorisops tibialis* have been described in detail. The perfect insects usually occur on shrubs in the vicinity of water, and Colonel Yerbury has seen the males dancing with a rather wild flight.

This genus is allied to *Actina* and *Chorisops*, but is distinguished from both of them by its obsolete palpi and by the touching eyes of the male, while *Chorisops* is further distinguished by its bare eyes. *B. Morrisii* is however very near to *Chorisops*.

Beris (including *Actina* and *Chorisops*) is a genus which has a very wide range, as species are known from South-west Asia, North, Central, and South America, Australia, and probably New Zealand. The European species are few in number, there being only five or six species of *Beris*, one of *Actina*, and one of *Chorisops*, all of which occur in Britain with the possible exception of the *Actina*; Bonsdorff was unable to record any of them from Finland.

Synonymy.—*Beris* was intelligibly founded by Latreille in 1803, with *Stratiomys sexdentata* F. given as the type, and with a remark that the genus was probably the same as "Les potamides" of Meigen. There was a genus *Potamida* suggested by Meigen in 1800 in his "Nouvelle classification des mouches à deux ailes," but that work was always treated by Meigen himself as a mere undeveloped suggestive paper and not as a scientific work. *Beris sexdentata* F. is a synonym of *B. chalybeata* Forster, and therefore that species must be accepted as the type of any restricted genus *Beris*. In 1804 Meigen well founded a genus *Actina* which was equivalent to *Beris (sensu lato)*, and as his first species, *A. chalybea*, was a synonym of *A. nitens* that fact may constitute *A. nitens* as the type of *Actina*, more especially as all the other species then known had been previously included under Latreille's name *Beris*. In 1820 Meigen sank his genus *Actina* under *Beris*, and Loew supported this action in 1846 even though Curtis in 1830 had expressly applied Meigen's name of *Actina* to *B. tibialis* on the grounds of the generic value of its long palpi, eyes not contiguous in the male, wings with an additional nervure, and posterior tibiæ incassated; Curtis was wrong in applying the name *Actina* to *B. tibialis* because the genus *Actina* was founded in 1804, while the species *tibialis* was not even described until 1820, but his distinctive characters were good; next Haliday in Westwood's Introduction to the Modern Classification of Insects, vol. ii., Syn. 130 (1840) separated the two genera as follows:

"*Beris* Latr. Scutellum 6- or 8-spined; antennæ 10-jointed; eyes contiguous ♂; palpi obsolete.

"*Actina* Meig. Scutellum 4-spined; palpi long; eyes apart in ♂."

It is now known that the number of spines on the scutellum is not even of specific, much less generic, value. Schiner in 1862 reaffirmed the genus *Actina* for *A. tibialis* and *A. nitens*, but previous to this Rondani had in 1856 suggested a genus *Chorisops* for *Beris tibialis* Mgn. on very insufficient characters, though the name *Chorisops* showed that he had appreciated the character of the separated eyes of the

male, and also shows that Brauer was guilty of carelessness in calling the genus *Chlorisops*. In 1863 Rondani (Arch. p. Zool. Modena, iii., 86) returned to the defence of his genus *Chorisops*, and distinguished *Actina* Meig., *Beris* Latr., *Oplachantha* (sic) Rond., and *Chorisops* Rond., and then laid stress upon the hairy eyes of *Actina* and *Beris* as against the bare or almost bare eyes of the others. In 1882 Brauer placed too much stress upon the frequently incomplete veinlet from the discal cell, but clearly distinguished *Actina* with its hairy eyes from the bare-eyed genus *Chorisops*, and ever since then the two dismemberments (*Actina* and *Chorisops*) of the old genus *Beris* may be considered definite; I have however more to say about *Exaireta* Schin. in my synonymical notes under the genus *Chorisops*.

Table of Species.

- 1 (4) Abdomen reddish orange.
- 2 (3) Abdominal pubescence of the male black. Wings of the female light brownish with a conspicuous stigma. 1 *vallata*.
- 3 (2) Abdominal pubescence of both sexes yellow. Wings of both sexes dark brownish black. 2 *clavipes*.
- 4 (1) Abdomen all blackish.
- 5 (10) Thoracic pubescence of the male black. Antennæ placed just below the middle of the head. Legs mainly black or dark brown, or brownish yellow, but never pale yellow.
- 6 (7) Antennæ with the third joint less than twice as long as the other two joints together. Tarsi with the basal joint of the hind pair in the male as in *B. geniculata*, but the legs in both sexes rather paler than in *B. geniculata*. 4 *fuscipes*.
- 7 (6) Antennæ with the third joint more than twice as long as the other two joints together.
- 8 (9) Legs black with the knees orange; basal joint of the hind tarsi in the male moderately and equally dilated, longer than the other four joints together. 3 *geniculata*.
- 9 (8) Legs brownish orange, or lighter in the female, but unicolorous from the coxæ to the tarsi; basal joint of the hind tarsi considerably and unequally dilated in the male, not longer than the other four joints together. 5 *chalybeata*.
- 10 (5) Thoracic pubescence of the male yellow. Antennæ placed on the lower quarter of the head. Legs pale yellow. Frons of the female narrow. 6 *Morrisii*.

1. **B. vallata** Forster. Abdomen reddish orange without any narrow black cross-bands; abdominal pubescence of the male black. Hind tibiæ black on the apical half or more. Wings of the male dark brownish, but of the female light brownish with a yellowish base and a conspicuous dark brown stigma.

A rather small fly which appears to mimic certain *Tenthredinidæ* in its bright orange abdomen.

♂. Head black; face subquadrate and a little arched, about one-third the width of the head, bearing rather dense moderately short black pubescence, while

similar pubescence becomes greyish on the jowls and on the moderately inflated lower part of the back of the head; frons rather small, and bearing similar black pubescence; upper part of the back of the head very shallow but hardly hollowed out, and bearing only a very short black ciliation; vertex very much elevated, and bearing black pubescence similar to that on the frons and face. Proboscis short, but the sucker-flaps large and dull orange; palpi imperceptible. Eyes touching for a long distance, rather densely clothed with brownish-black pubescence which is slightly longest on the front part of the large facets; facets on rather more than the upper half of the eyes distinctly larger than those on the lower part, and the line of distinction fairly well defined. Antennæ longer than the head, dull black with occasionally the tip of the second joint yellowish orange, first joint hardly longer than the second, and both bearing short black bristles; third joint almost strap-shaped, slightly attenuated, almost three times as long as the two basal joints together, annulated, and minutely pubescent at the tip.

Thorax and scutellum shining black, coarsely punctate, and clothed with dense blackish pubescence; outer points of the humeri orange; pleuræ clothed with considerable greyish-yellow pubescence, especially on the lower part, but the middle of the mesopleuræ bare and polished. Scutellum usually with six black thick spines, but there may be four, five, seven, or eight such spines of which one or two may be imperfect, and these spines bear blackish pubescence.

Abdomen conspicuously brownish orange; basal segment black except on the hindmarginal two-fifths, and usually the hindmargin of the sixth and the upper part of the small seventh segment are blackish, but as a rule there is no trace of any narrow black cross-bands near the hindmargins of the segments; pubescence black and not scarce, fairly long down the sides. Belly all orange, and bearing minute pale pubescence. Genitalia orange with the upper pair of lamellæ and usually the extreme base blackish.

Legs dull orange or sometimes rather bright orange, with about the apical two-thirds of all the tibiæ (except the extreme tip) and the tarsi blackish brown; coxæ blackish, but rather orange at the tip and on the trochanters, and bearing pale pubescence; basal joint of the hind tarsi obviously dilated, as long as or slightly longer than the other four joints together. Pubescence on the femora pale and inconspicuous; hind tibiæ with a moderately long fine dark ciliation inside (=behind) on the apical two-thirds.

Wings blackish brown to brown, but more yellowish brown about the base; stigma moderately conspicuous. Alar squamæ moderate in size, obscurely blackish or brownish, with moderate pale brown fringes; thoracal pair almost absent. Halteres dull orange.

- ♀. Rather similar to the male, but with much lighter wings. Frons broad, more than one-third the width of the head (in one specimen less), shining black and sparingly punctate, and with rather sparse minute greyish pubescence; face slightly wider than the frons, and bearing sparse pale pubescence; jowls and back of the head with similar pubescence, and the back of the head slightly puffed out with all the upper part on the inflated part against the eyes greyish and bearing more obvious grey pubescence. Eyes with much shorter and sparser pubescence.

Thorax, pleuræ, and scutellum with less coarse yellowish-grey pubescence.

Abdomen not blackened at the base and usually with only the apical prongs blackened, but sometimes the fifth and sixth segments are slightly blackened on the disc, or a dark dorsal line may occur on the basal segments, or the belly may be slightly blackened on about the middle of its disc. Pubescence all pale yellow, inconspicuous but not scarce.

Legs with the ciliation inside the hind tibiæ present but pale; basal joint of the hind tarsi hardly dilated, perceptibly longer than the other four joints together.

Wings only pale brownish, and consequently the dark brown stigma very conspicuous; wings more yellowish about the base. Squamæ more yellowish, with pale yellow fringes.

Length about 6 mm.

This species varies a little in the coloring of the legs, but never in such a manner as to be confounded with *B. clavipes*; a male caught in company with normal specimens at Aberlady has the tibiæ all black except the basal third of the anterior pairs and just the base of the hind pair, while the hindmargins are slightly darkened until on the fifth and sixth segments narrow blackish bands occur almost as in *B. clavipes*; males taken at Porthcawl in Glamorgan in 1906 have (like males of *B. geniculata* taken there at the same time) a much more blackish hue to the wings without any trace of brownish. The only allied European species is *B. clavipes*, which in the female has dark wings and the male has a pale-haired abdomen, while both sexes have much paler hind tibiæ and also have black cross-bands on the abdomen just before the hindmargins of the segments.

B. vallata is fairly common in Britain as I have numerous localities from Penzance to Golspie, including Porthcawl and Llangollen in Wales, and Colonel Yerbury took it in Co. Kerry. Colonel Yerbury has noted that he caught a male "hovering" at Porthcawl on July 7, 1906. My dates range from June 6 to August 26. It is recorded from North and Middle Europe.

Synonymy.—Forster apparently described his *Musca vallata* from the female only, and probably what he called *M. clavipes* from the male only, but ever since Meigen accepted Forster's distinctions in 1820 there has been no doubt about the two species, and no proof can now be brought forward to disturb the nomenclature. Jaenicke's contention (Berl. Ent. Zeitschr., x., 234, 1866) that *B. clavipes* is a variety of *B. vallata* is proved to be a fallacy, and he also seems to have had an idea that Forster (1771) had a priority over Linné (1767).

2. ***B. clavipes*** Linné. Abdomen reddish orange with narrow black cross-bands near the hindmargins of the segments; abdominal pubescence of the male all yellow. Hind tibiæ hardly darkened at the tip in either sex. Wings dark brownish black in both sexes.

Very much like the preceding species.

- ♂. Distinguished from *B. vallata* by being slightly larger, and having narrow black cross-bands on the depressed lines near the hindmargins of the abdominal segments in both sexes; basal segment in the male more narrowly orange on the hindmargin; the black cross-bands do not touch the hindmargins and do not extend out to the sidemargins; hindmargin of sixth segment and all the seventh segment not blackened; pubescence on the abdomen all yellowish.

Legs in both sexes with the hind tibiæ hardly darkened at all about the tip, or only slightly so, and with the ciliation on their inner side pale; basal joint of the hind tarsi considerably dilated, and distinctly longer than the next four together.

Wings more blackish, especially about the base, and consequently the stigma less distinct.

- ♀. Distinguished from *B. vallata* by many of the characters mentioned under the male as applying to both sexes, and by the strongly blackish tinged wings which consequently have the stigma inconspicuous. Frons rather broader. Antennæ rather longer. Basal joint of the hind tarsi not much dilated, but still longer than the next four joints together.

Length about 5.5 to 7 mm.

This species varies a little in the amount of darkening about the tip of the hind tibiæ, as it often has no darkening whatever or at other times the tip is decidedly darkened but never to the extent that it is in *B. vallata*. There is no other allied species known in Europe.

B. clavipes is far less common than *B. vallata*, and I have records from only Dorset (Sherborne), Sussex (Three Bridges), Kent (Darent), Suffolk (common according to Mr C. Morley), Oxford (Hope Museum), Leicester (Blaby), Hereford (several localities), Glamorgan (Porthcawl), Merioneth (Dolgelly), and Brecknock (Hay), and then after a very long interval at Tongue, on the North Sea; Haliday recorded it from Holywood in Co. Down. My dates extend from May 12 to June 18, which indicate that it is a rather earlier species than *B. vallata*. It is recorded from middle Sweden down to Italy.

Synonymy.—The nomenclature of these two species (*B. vallata* and *B. clavipes*) may be considered as settled, because no proof is possible that it is wrong; it is obvious that Forster described his *Musca vallata* from the female of *B. vallata*, but it must remain uncertain what species Linné had before him when he described his *M. clavipes*. Haliday (Stett. Ent. Zeit., xii., 138) stated that a specimen named *M. clavipes* in the Linnean collection in the British Museum was "*Beris clavipes*, "Mg. ♂," and another specimen with a printed label "*3 clavipes*" was a fragment of the same species.

3. ***B. geniculata* Curtis.** Abdomen all blackish. Legs black with the knees yellowish. Antennæ moderately long.

The blackest and largest species in the genus *Beris*, though *Actina nitens* is still more black.

- ♂. Head black; frons rather large, shining black with a depressed middle channel down the upper part, and bearing a long and rather dense black (or in some lights brownish) pubescence similar to that on the face; face more than half the height of the head, slightly produced and arched, barely more than one-third the width of the head at its lowest and widest part, and bearing long rather dense black or brownish-black pubescence; jowls (including the lower part of the back of the head) rather large and bearing long black and greyish pubescence; upper part of the back of the head slightly hollowed behind the eyes and showing a row of short dense black bristles against the eyes on the top part, while the pubescence on the actual back of the head (as seen from above) is dense, black, and long, being longer than in *B. chalybeata*; vertex elevated and bearing long black pubescence. Proboscis black at the base, but the large sucker-flaps orange; palpi minute, black. Eyes touching for a rather long space (about fifteen facets) and densely clothed on all the front part with long brownish-black pubescence, but on the upper, lower, and hind margins with only very short sparse hairs; facets on the upper half conspicuously larger than those on the lower part but the change is only gradual. Antennæ dull black, nearly as long as the head and placed a little more than half-way down the head; two basal joints nearly equal in length and bearing short black bristles; third joint nearly twice as long as the two basal joints together, grey on the inside about the middle, and tapering after about the third annulation rather sharply to a point or almost so, and the point itself bearing two or three tiny bristles.

Thorax and scutellum bright shining green, not in the least blackish, rather abundantly punctate on the front part, and the punctuation does not diminish much until quite on the hindmargin of the thorax, though the scutellum is practically impunctate; disc of the thorax clothed with rather dense black or rusty black pubescence, which is composed of numerous short hairs and almost as many long hairs, but the long hairs do not extend quite to the front part; pleuræ with dull brownish-yellow pubescence, which is long and conspicuous on the hind part of the mesopleuræ, but the middle part of the mesopleuræ is bare and polished as usual. Scutellum mainly with only a few long black or rusty hairs (similar to the long hairs on the thorax), but these hairs extend rather more numerously right up the spines to their tips; spines usually six (though Loew says sometimes eight), perhaps rather

blackier green than the scutellum, and the two middle pairs longer than the outer pair.

Abdomen deep dull black, slightly shining on the sides and about the tip; pubescence on the disc very minute and inconspicuous but long and obviously pale yellowish grey or brownish yellow all down the sidemargins, including the sixth and even seventh segments (and thereby distinguished from *B. chalybeata*). Belly glittering brownish black, with short depressed greyish-yellow pubescence all over. Genitalia small, beginning above with a shining black basal plate from which a pair of blackish-brown elongate ovate lamellæ (which bear pale pubescence) project, while a pair of longer brownish-orange lamellæ curve up from the base beneath, and between these on the under side is a simple shining blackish-brown triangular middle piece.

Legs shining black, with the knees usually obviously but sometimes narrowly, and the anterior ankles narrowly, yellowish; the knees include just the tip of the femora and the base of the tibiæ for a rather indeterminate amount, but ordinarily for about half the front tibiæ, two-fifths or less of the middle tibiæ, and sometimes only just the base or at most a quarter of the hind tibiæ; trochanters rather brownish; hind tarsi with the basal joint extra long and quite equally dilated (except at just the base and tip), very distinctly longer than the other four joints together, but hardly twice as deep. Pubescence on all the femora all yellowish and not scarce, but the ciliation on the inner side of the hind tibiæ may be a little darker.

Wings with a very strong smoky blackish-brown tinge but with the costal cell lighter, light brownish but not at all yellowish at the base, and sometimes the wings blackish with no brownish tinge and the pale base more contrasted. Alar squamæ smoky yellowish brown with greyish-yellow fringes; thoracal squamæ existing only as a brown line. Halteres with the stem brown, but the knob distinctly orange or dark orange.

♀. Rather similar to the male. Frons (fig. 147) not one-quarter the width of the head at the vertex, and thence very gradually but distinctly widening down

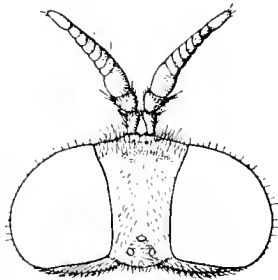


FIG. 147.—*Beris geniculata* ♀. × 20.

to the antennæ, after which the face gradually widens down to the mouth where it is less than half but more than one-third the width of the head; frons shining black with a purplish tinge, and bearing fairly dense though inconspicuous short pale pubescence; face also shining black and bearing all over a similar though slightly longer pubescence; back of the head behind the eyes very little inflated on the upper part, and bearing rather abundant depressed short grey pubescence which colours the upper part close to the eyes. Eyes with very short but not very scarce pubescence. Antennæ (fig. 147) longer than the head, and sometimes rather ferruginous up to the end of the basal segment of the flagellum; flagellum quite two and a half times as

long as the two basal joints together and tapering to almost a point.

Thorax and scutellum bright dark green, with the front points of the humeri orange and the ridge of the postalar calli often brownish orange. Pubescence short, pale, and rather decumbent on the thorax, but sparse and erect on the scutellum.

Abdomen shining dark brownish black, with very short inconspicuous pale grey depressed pubescence on the disc, but longer more conspicuous erect almost whitish pubescence on the sidemargins and basal corners; tip usually brownish orange with an extending pair of two-jointed lamellæ, of which the stouter basal joint is usually orange and the elongate second joint dark brown and pubescent.

Legs more orange at the knees and base of the tibiæ, there being usually about two-fifths of the anterior tibiæ and one-fifth of the hind tibiæ orange, while the trochanters, ankles, and basal half of the posterior femora may be inconspicuously brownish; basal joint of the hind tarsi not dilated but still longer than the other four joints together. Pubescence very short and inconspicuous except for the yellowish ciliation down the inside of the hind tibiæ

Wings much paler than in the male, and rather yellow about the base but not so much so as in *B. chalybeata*; stigma much more conspicuous. Squamæ paler, being more brownish yellow. Halteres yellow.

Length about 6 mm.

This species varies but little (unless the specimens I have described as *B. fuscipes* are only varieties) though a considerable number of specimens taken by Colonel Yerbury at Porthcawl in June and July 1906 have more intensely black wings and legs, the pale base of the wings becoming thereby more conspicuous, while the pale knees and ankles almost disappear; it is remarkable that other species of *Beris* taken at that time at Porthcawl also possess more intensely blackened wings. It may be easily distinguished from *B. chalybeata* by the more brilliant green thorax, the less produced longer and narrower face, the more pointed antennæ, the yellower knob of the halteres, the pale pubescence down the sides of the abdomen of the male, the much blacker legs in both sexes, the more equally dilated basal joint of the hind tarsi in the male, the blacker basal joint of the hind tarsi, the longer abdomen, the larger size, and the narrower frons of the female. From *B. fuscipes* (as I interpret that species) it is distinguished by the longer third joint of the antennæ, blacker legs, and less parallel-sided frons of the female, but more details of distinction are given under *B. fuscipes*.

B. geniculata is not at all common in Britain and I possess recent records from only Warwickshire, (Sutton), Herefordshire (Tarrington), Glamorgan (Porthcawl), Denbigh (Llangollen), Durham (Bishop Auckland and Hesleden), Edinburgh (Inveresk), Perth (Rannoch), and Sutherland (Golspie), though old records include Yorkshire (Hebden Bridge) and Ireland. My dates extend from June 20 to August 1. Mr A. E. J. Carter has taken both this and *B. chalybeata* at Inveresk and found *B. chalybeata* fairly common in May and June, while *B. geniculata* occurred more rarely in August and September, so that it appears to be a later species than *B. chalybeata*; Colonel Yerbury has noted that the males (at Porthcawl) dance in the shade, and have a wild flight like a *Rhamphomyia*.

Synonymy.—I accept the name given by Haliday for this species in Curtis' British Entomology, Pl. 337 (1830) because I consider it the earliest certain name, but the utmost confusion has arisen between this species and *B. fuscipes* Meig. (if they are distinct). Haliday appears to have known his species well in both sexes and to have taken numerous specimens, as Curtis recorded it as being in his own and other cabinets, while the description and figure given are unmistakable. At that time *B. fuscipes* was comparatively ignored because its eight-spined scutellum was considered a good specific distinction. Meigen (1820) described *B. fuscipes* from an English male sent him by Dr Leach, and used the words "pedibus fuscis: tibiis basi flavis" which clearly distinguish it from *B. chalybeata*, and "Fühler...nicht ganz so lang als der Kopf" which along with "pedibus fuscis" applies better to *B. fuscipes* (as I interpret it) than to *B. geniculata*. Macquart's descriptions of *B. fuscipes* are evidently compiled from Meigen's and are valueless. Next Loew in 1846 when describing *B. fuscipes* said of the male "Fühler erheblich kürzer als der Kopf...die Behaarung des Hinterleibes ist schwarz" (which does not apply to the longer and more conspicuous pubescence on the sides of *B. geniculata*)... "Die Beine sind schwarzbraun, die äusserste Spitze aller Schenkel und Schienen, so wie die Wurzel der letzteren in etwas grösserer Ausdehnung gelblich gefärbt; an den Vorder—und Mittelbeinen zeigt die Wurzelhälfte der Metatarsen dieselbe, oder doch eine nur wenig dunklere Färbung; die Metatarsen der Hinterbeine sind merklich länger als die 4 folgenden Glieder zusammen, ziemlich stark verdickt, von bräunlicher Farbe, die aber auf der Oberseite, wegen der dort befindlichen ganz kurzen schwarzen Behaarung ein schwarzbraunes Ansehen bekommt;... Die Schwinger sind schwärzlich," (this colour of the halteres is wrong); and of the

female (of which he had apparently only one specimen) he says "die hintersten Schenkel haben vor der Spitze ein braunes Bändchen, welches nach letzterer hin ziemlich scharf begrenzt, nach der Wurzel hin aber sanft verwaschen ist; Vorder— und Mittelschenkel zeigen die verwaschenere Anlage einer ähnlichen Zeichnung; auch sind alle Schienen gegen das Ende hin gebräunt, doch so dass dieser Bräunung nur an den Hinterschienen mehr bemerkbar ist, auch überall die alleräusserste Spitze freilässt und sich auf der Aussenseite weiter nach der Wurzel hin erstreckt, als dies auf der Innenseite der Fall ist; die 4 letzten Glieder aller Füsse sind dunkelbraun; dass erste ist kaum an der alleräussersten Spitze etwas gebräunt": again later on when comparing *B. fuscipes* with *B. chalybeata* he says "die Fühler kürzer, der Metatarsus der hintersten Beine länger, ausserdem bei dem Männchen weniger verdickt," thus not recognising any distinction in the colour of the basal joint of the hind tarsi in the two species; also at the close Loew stated that "Hr. v. Heyden theilte mir diese Art unter dem ebenfalls sehr passenden Namen *Ber. brevicornis* mit; in der That hat sie unter allen bekannten Arten die kürzesten Fühler." This description of Loew's therefore almost exactly agrees with my present description of *B. fuscipes*, and it may be concluded that Loew at that time did not know any specimens like true *B. geniculata*; on the same page he also wrote "Trügt mich das Gedächtniss nicht, so gehört auch *Beris geniculata* Curtis Brit. Ent. hierher"; that is "Unless my memory deceives me!" thereby showing that he had no specimen before him at that time which professed to be *B. geniculata* Curtis, and very likely no description as he gave no reference to it in his synonymy. It is probable that the difficulty has arisen between *B. fuscipes* and *B. geniculata* through this trivial remark of Loew's. Zetterstedt's *B. fuscipes* (1849) is probably the true species, because he said of the male (the only sex he knew) "pedibus brunneis" and "Femora brunnea...Tibiæ brunnescentes" when I think he would have said "nigri" or "nigrescentes" for *B. geniculata*; as however he said nothing about the antennæ except that they were as in *B. 6-dentata* (= *chalybeata*) his description is rather uncertain, though he detected Loew's error about the colour of the halteres. Walker in 1851 and in 1854 deliberately kept both the species separate and in his *Ins. Brit. Dipt.* described them so well that English collectors have recognised his *B. geniculata* ever since; I can feel but little doubt that Haliday encouraged Walker to this action, and that he sent a genuine *B. geniculata* to Loew which has since been found in his collection. Wahlberg in 1854 also claimed to have caught a female *B. geniculata* (as distinct from *B. fuscipes* in spite of Loew's doubt) in Lapland, and gave such distinctive characters as to make it probable that he was right; though I cannot quite agree with all the details of his description. Zetterstedt (1855) quoted from Wahlberg but added "Vix ad *Ber. fuscipedem* referenda, ut opinavit Löw (Ent. Zeit, 1846, p. 284); nam ab hac pluribus notis differt *B. geniculata*, utpote luculenter monstravit Prof. Wahlberg, l. c." Schiner also kept the two species separate in 1855 though he had only one specimen of each, and he said that his *B. geniculata* agreed entirely with the specimen in Loew's collection which had been received from Haliday himself; and it may be noted that Schiner was at this period in close communication with Loew and that therefore Loew had apparently by this time separated the two species in his collection, but unfortunately in 1862 Schiner sank *B. geniculata* without a word of comment as a synonym of *B. fuscipes*, and as his *Faun. Austr. Dipt.* has been the dipterological guide for all European writers ever since it appeared no further attempt has been made to distinguish the two species. The next writer was Becker in 1887, who took it for granted that a number of specimens he had caught at St Moritz in Switzerland were *B. fuscipes* because they agreed with some of Loew's distinctions of that species from *B. chalybeata*, and so after stating that Loew and Schiner had pointed out that *B. geniculata* Curt. was a synonym of *B. fuscipes* (which was a considerable exaggeration of Loew's and Schiner's statements), he, as his specimens did not well answer to Loew's description of 1846, gave a full and amended description, but unfortunately his description is a very good one of *B. geniculata* and not of *B. fuscipes*!

Subsequent descriptions appear to refer to the true *B. fuscipes*. Meigen in 1820 described *B. nigra* from a female sent him from England by Dr Leach, and his description might apply to the female of *B. fuscipes* as described above; it is probable that Leach sent him what he thought was a pair of his species, though the probable type of *B. nigra* in the Paris Museum appears to me to be a female of *B. chalybeata* while the true *B. geniculata* seems to have been entirely unknown to Meigen. *Musca similis* Forster (1771) remains an unintelligible species; it appears

to have been a true Berid female, but with entirely black legs, and no known species will answer to that; the male of *Actina nitens* has entirely black legs, but is not known to occur in England, while after *A. nitens* the most black-legged species is *B. geniculata* which usually, though not always, has conspicuously yellow knees; Forster's description being unrecognisable must sink as a doubtful synonym of *A. nitens* or *B. geniculata*, but with no certainty that it refers to either of those species, as the genus *Musca* of those days was a very comprehensive one.

I should give the synonymy and references of the two species as follows:

B. FUSCIPES Meig., S.B., ii., 8, 11 (1820); Macq., Soc. Sci. Lille, 1826, 139, 7 (1826), et Suit. à Buff., i., 237, 8 (1834); Lw., Stettin. ent. Zeitg., vii., 282, 4 (1846); Zett., Dipt. Scand., viii., 2949, 2-3 (1849); Walk., Ins. Brit., i., 12, 4 (1851), et List. Dipt. Brit. Mus., v., 9, 4 (1855); Schin., Verh. zool.-bot. Ver. Wien, v., 655, 4 et 674 (1855), et F.A., i., 24 (1862); Brun., Entom., xxii., 134, 4 (1889); Schoch., Dipt. helv., 26 (1890); E. L. Coucke, Annal. soc. ent. Belg., xxxvii., 435 (1893); Kertész, Természettud. Közl. Pótfüz., lv., 131 (1900); Verr., Brit. Fl. Strat., 207 (1908).

brevicornis v. Heyd. in litt. ad Lw.

B. GENICULATA Curt., Brit. Ent., 337 (1830); Walk., Ins. Brit., i., 12, 6 (1851), et List Dipt. Brit. Mus., v., 10, 7 (1854); Wahlbg., Of. Vet. Akad. Förhandl., xi., 212 (1854); Zett., Dipt. Scand., xii., 4552, 2-3 (1855); Schin., Verh. zool.-bot. Ver. Wien, v., 656, 6 et 674 (1855); Verr., Brit. Fl. Strat., 203 (1908).

fuscipes Beck., Berlin. ent. Zeitschr., xxxi., 100, 9 (1887).

4. **B. fuscipes** Meigen. Very similar to *B. geniculata*, but with the antennæ shorter and the legs paler. Thorax partly pale haired.

A still insufficiently known species, but if distinct more closely allied to *B. geniculata* than to any other.

♂. Rather like both *B. geniculata* and *B. chalybeata* but structurally nearest to *B. geniculata*. Face very small being scarcely one-third the height of the head nor a quarter its width at its widest part, scarcely at all produced. Eyes with shorter pubescence than in *B. geniculata*. Antennæ short and inserted on the lower third of the head, the third joint being only about one and a quarter times the length of the two basal joints together; third joint rather wide on its large basal annulation but thence rapidly tapering and the remaining annulations not one and a half times so long as the basal one; antennæ greyish on the inside but not very conspicuously so.

Thorax narrower than in *B. geniculata* and with more short yellowish but inconspicuous pubescence intermixed all over (including the scutellum) under the longer black pubescence, though the black pubescence is less abundant than in *B. geniculata*.

Abdomen much more shining than in *B. geniculata* and with the long pubescence about the sides more brownish white but yet more like that of *B. geniculata* than that of *B. chalybeata*, and on the fifth and sixth segments the pubescence becomes blackish. Genitalia large, with the orange lamellæ shorter than in *B. geniculata*.

Legs black with the knees broadly but sharply orange, the basal two-fifths of the anterior and the basal quarter of the hind tibiæ being orange, and all the ankle joints narrowly so; the hind femora are luteous at the base and posteriorly to nearly one-third of the femora, while the anterior femora show traces of being luteous at the base; basal joint of the hind tarsi shaped as in *B. geniculata* but rather shorter, though still longer than the other four joints.

Wings very much less darkened, so that the stigma stands out long, black, and conspicuous. Squamæ yellow, with yellow fringes. Halteres orange.

♀. Frons (fig. 149) narrow, being barely more than one-fifth the width of the head, and with its sides quite parallel until the cross-furrow a little above the antennæ; face at the mouth only one-third the width of the head; upper part of the back of the head (I think) a little more inflated behind the eyes.

Antennæ (fig. 148) slightly shorter than the head; third joint barely one and a half times as long as the two basal joints together, rather incrassate about its base but after that conical and almost pointed.

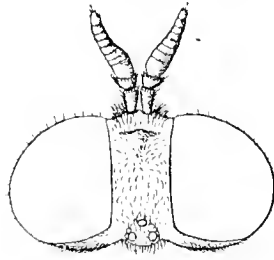


FIG. 148.—*Beris fuscipes* ♀. × 20.*

Thorax brighter green; humeri with only very small orange points; postalar calli not at all pale. Scutellum rather more pubescent.

Legs with the base of all the femora yellow, and this colour extends indeterminately along the upper and hinder sides almost to the tip but more obscurely after about the middle, so that when seen from above the pale base of all the femora and the conspicuously blackened large præapical part become notable. Trochanters and tip of the coxæ yellow; anterior tibiæ yellow on the basal two-fifths, and the hind pair on the basal fifth, while the rest of the tibiæ is only brown (not black); ankles and the basal joint of the anterior tarsi until near the tip yellowish; basal joint of hind tarsi brownish yellow with the tip rather darkened.

Wings clearer, more yellow about the base. Halteres yellow.
Length about 6 mm.

This species is extremely closely allied to *B. geniculata*, and with the unsatisfactory material before me I should have hesitated to separate it, but Haliday seems to have never acquiesced in the union of the two species though he has said but little about it, and Wahlberg (who was a most careful worker) deliberately distinguished the two even after Loew had united them. I therefore keep the two species separate and call attention in my synonymical notes to the confusion which has arisen between them; I only hope that further studies will distinguish them as thoroughly as *B. chalybeata* is now distinguished, though quite recently that perfectly distinct species had been confounded with them.

B. fuscipes is known to me from very few specimens. I have made my description of the male from a specimen in perfect condition which was taken by Colonel Yerbury at Porthcawl in Glamorgan on July 12, 1906, and he also took a female at Kenmare, Co. Kerry, on June 30, 1901; Mr C. G. Lamb took a female at Padstow in Cornwall in July 1904, and Mr W. Holland took one at Kingswear near Oxford on June 27, 1902; besides these specimens I possess an old female without history, and a doubtful male taken by me at Aberlady on June 27, 1873. According to descriptions *B. fuscipes* occurs in North and Middle Europe.

Synonymy.—*B. fuscipes* was originally described by Meigen from a male sent to him from England by Dr Leach, and his very imperfect description seems to apply to the species now described better than to any other as "Fühler...nicht ganz so lang als der Kopf" and "pedibus fuscis: tibiis basi flavis" hardly apply to *B. geniculata*; I have seen the probable original type in Meigen's collection at Paris, and can state that in general appearance it resembles *B. geniculata* but has the legs more brownish, the hind tibiæ and tarsi being dark brown, the basal joint of the hind tarsi long and equally rather thin, the thorax rather bright green with the postalar calli slightly brown, the genitalia large, but unfortunately the antennæ have both lost the last joint so that that character cannot be utilised; on the whole I should consider it a male of the species now described. A female in Kowarz's collection (labelled *B. fuscipes*) from "Bärtfa" in Hungary has also unfortunately lost the third joint of both antennæ, but is a larger specimen with the hind tibiæ darker (but far from black) and the middle femora paler. I have dealt with the synonymy in further detail under *B. geniculata*, but until the species has been taken in larger numbers its distinctness must remain an open question, but its acceptance by such entomologists as Haliday and Wahlberg after its attempted suppression by

* In this figure the position of the head apparently reduces the comparative length of the basal joints.

Loew tells strongly in its favour. It is possible that *B. nigra* Meig., also described from a female sent from England by Dr Leach, may represent the female of *B. fuscipes*, but I think the probable original type in the Paris Museum is only *B. chalybeata*, though it is hardly in perfect enough condition to decide.

5. **B. chalybeata** Forster. Abdomen all blackish. Legs dull orange to pale brown, unicolorous except for the tarsi. Frons of the female fully one-third the width of the head. Thorax of the male black haired.

♂. Head black; frons shining black, rather large and broad, with a broad depressed channel down the middle of its upper part, and bearing fairly long rather upturned black pubescence; face broad (half the width of the head) and arched, clothed with a rather long slightly upturned brownish black pubescence, which becomes rather dark greyish on the jowls; lower part of the back of the head inflated and bearing dense blackish pubescence, but the upper part shallow; the back of the head when seen from above bears dense black rather long pubescence (very different from *B. Morrisii*), which does not reach beyond the level of the eyes when seen from in front; vertex considerably elevated and bearing moderate black pubescence; proboscis black at the base but with obscure orange moderately large sucker-flaps; palpi not evident. Eyes touching for a fairly long space, densely clothed with rather long brownish black pubescence; facets on the upper half larger than those on the lower half but with no abrupt division. Antennæ dull black, hardly as long as the head and placed only a little more than half-way down the head; two basal joints almost equal in length and bearing minute bristles; flagellum hardly twice as long as the two basal joints together, grey inside about the middle, and bearing minute hairs on the blunt tip; the flagellum is but little attenuated and ends bluntly.

Thorax and scutellum shining blackish æneous, in fact almost black, moderately but rather coarsely punctate on the front part but with the punctuation growing finer and scarcer until the back part and scutellum are almost impunctate, and bearing a double blackish pubescence of which the short hairs are rather dense while the longer hairs are less abundant and not extended to quite the front part; pleuræ with brownish or rusty black pubescence except on the bare polished middle part of the mesopleuræ. Scutellum (fig. 145) usually with six shining dark green or almost black spines of which the outer pair are small, but sometimes there are eight spines or (according to Loew) sometimes only four; the pubescence is similar to that on the back part of the thorax and extends up the spines to their tips.

Abdomen dull black with a slight purplish tinge; pubescence blackish, rather long down the sides and not scarce. Belly with minute depressed pale grey pubescence, but with one or two black bristly hairs at the hind corners of the last two segments. Genitalia large, protruded from the seventh segment, with a large rounded end plate, above which are small brownish black lamellæ, while underneath they are usually conspicuously keeled.

Legs ranging in colour from dull brownish yellow to brownish orange or almost or quite darkish brown, but never anywhere at all approaching to black except on the coxæ and tarsi; basal joint of the hind tarsi obviously longer than the other four joints together, brownish yellow and sometimes that joint of the middle tarsi slightly brownish; basal joint of the hind tarsi considerably incrassated and arched above so that the crown of the arch (as seen in profile) is beyond the middle of the joint, and the joint there is quite as high as the other tarsal joints. Pubescence fairly long, blackish and obvious behind the front and hind femora; on the hind tibiæ there is a pale ciliation inside (=behind) except at the base.

Wings with a very strong blackish tinge, but with the costal and sub-costal cells a little clearer and with the large stigma distinctly blackened. Alar squamæ small, blackish brown with brownish fringes; thoracal squamæ absent. Halteres dark brown, knob elongate.

♀. Rather similar to the male, but the wings are much lighter, though still decidedly brownish, and the stigma is consequently much more conspicuous.

Frons shining black with a slight bluish tinge, broad as it is fully one-third the width of the head, minutely and sparsely punctate and hardly widened at all until the obliquely striate eyemargins which are level with a slight undulating furrow crossing the frons a little above the antennæ are reached, but thence the space between the eyes very gradually widens down to the mouth where it is less than half the width of the head; both frons and face bear soft pale inconspicuous rather upturned pubescence; upper part of the back of the head puffed out behind the eyes so as to form a distinct eye-collar, but the lower part considerably more inflated. Eyes with much shorter and rather sparser pubescence. Antennæ hardly so long as the head; third joint slightly tapering.

Thorax and scutellum bright greenish or bluish æneous and bearing short brownish yellow pubescence, which is depressed and rather abundant anteriorly but which becomes rather longer and more erect on the back part and on the scutellum and the scutellar spines; front part of the disc rather densely punctate but the punctuation gradually growing sparser until the hind part is almost impunctate, while the disc of the scutellum is only sparsely punctate; the hind points of the humeri are yellowish, as is also a very indistinct narrow line along the suture to the wing-base.

Abdomen shining dark brownish black with a slight purplish hue, and bearing pale grey pubescence which is moderately long at the sides and which extends widely on to the disc about the basal corners.

Legs orange, being one colour from the trochanters to the base of the tarsi, rather paler than in the male but not yellow as in *B. Morrisii*; femora with only short pubescence; basal joint of the hind tarsi hardly dilated, as long as the other four joints together, and rather brownish orange but darkening towards its tip.

Wings pale brownish or with almost a blackish tinge, but yellowish at the base; stigma conspicuously dark brown. Alar squamæ dull brownish yellow. Halteres orange to yellow.

Length about 5.5 mm.

This species varies considerably in the tint of the colour of the legs, which are however almost one colour from the trochanters to the tarsi (both excluded) and that colour is not so blackish as in *B. geniculata* or *B. fuscipes* nor so yellow as in *B. Morrisii*. *B. geniculata* has very much blacker legs in both sexes, the basal joint of the hind tarsi longer and in the male more equally dilated, the sidemarginal pubescence on the abdomen of the male almost whitish instead of blackish, the halteres yellower, and the frons of the female much narrower. *B. fuscipes* differs in most respects as in *B. geniculata*, but has the antennæ shorter and the legs (especially in the male) more similar to those of *B. chalybeata*. *B. Morrisii* cannot be confounded as the pale yellow legs in both sexes, the pale haired thorax of the male, and the the narrow frons of the female at once distinguish it. The shape of the flagellum of the antennæ in *B. chalybeata* is distinct from that in any of the allied species.

B. chalybeata is one of the commonest and most widely distributed of the British species of this genus, as I have very numerous localities from Cornwall (Penzance) to Sutherland (Golspie, etc.), while Haliday recorded it from near Belfast. The dates range from May 14 to June 26, so that it appears to be an earlier species than its allies. It is recorded from North and Middle Europe. Curtis stated that it had been bred from moss.

Synonymy.—Forster described this species as British in 1771 (not 1781 as Loew said) as *Musca chalybata*, obviously from a male, and consequently his name has priority over *Stratiomys sexdentata* of Fabricius, which was also described from England and obviously from a female. Meigen amended Forster's name in 1820 to *chalybeata*, and a whole host of synonyms were sunk by Loew in 1846, with which I agree except that *B. flavipes* Macq. and possibly *B. obscura* Meig. may be

synonyms of *B. Morrisii*, which was a species at that time little known to Loew; as, however, that cannot be proved, they can remain where Loew put them. Jaenicke in 1866 (*Berl. Ent. Zeitschr.*, x., 234) considered *B. fuscipes* Meig. as only a synonym of *B. chalybeata* and stated that Loew himself had named some of his *B. chalybeata* as *B. fuscipes* Meig.; if Loew did so, either he made a mistake or Jaenicke unaccountably failed to distinguish the two species, just as he had done with the males of *B. clavipes* and *B. vallata*. A male in the Hope collection at Oxford was labelled "*obscura*." In Bigot's collection the only exponent of *B. sexdentata* was a female *Actina nitens*, and the two males representing *B. nigripes* were also *A. nitens*. *Beris nigra* of Meigen was described from a British female specimen sent by Dr Leach, and according to the probable type specimen at Paris is almost certainly only *B. chalybeata*, but its head is too much injured to make certain; its legs are too much obscured (especially the femora and hind tibiae) for it to be *B. Morrisii*, even though the thorax is pale haired.

6. **B. Morrisii** Dale. Abdomen shining blackish. Thorax and head of the male with wholly yellow pubescence. Legs in both sexes almost wholly pale yellow. Eyes sparsely hairy in the male, almost bare in the female. Frons of the female one-fifth the width of the head. Antennæ in both sexes on the lower quarter of the head (fig. 144).

A very distinct species through its brilliant colour and pale legs.

♂. Head black; face and frons small, the face being only one-quarter the width of the head, not produced (fig. 149), and bearing long whitish yellow pubescence which ceases on the very small jowls but reappears on the moderately inflated lower part of the back of the head; upper part of the back of the head rather flattened but not hollowed and bearing only a short inconspicuous brownish pubescence; pubescence on the absolute back of the head (best seen from above) short and inconspicuous; vertex small and long, distinctly elevated at the ocellar space, and bearing moderately long yellowish pubescence; frons small and narrow, but elongate, shining black and comparatively bare; proboscis black at the base, but with large orange sucker-flaps; palpi small, but I think distinct and black (as shown in fig. 149 lying on the sucker-flaps). Eyes large, almost but not actually touching for a long space from the vertex because a minute pale pubescence exists between them for a long distance, bearing a short rather sparse dark pubescence; facets large on all except the upper and back parts.

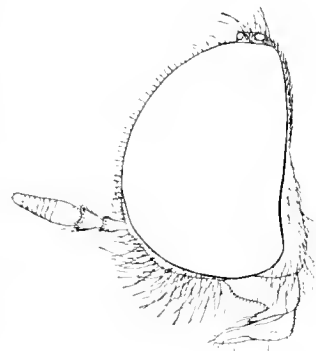


FIG. 149.—*Beris Morrisii* ♂.
× 18.

Antennæ dull black, with a slight luteous tip to the second joint and with an obscurely greyish luteous patch about the middle of the underside of the third joint, not so long as the head because the third joint (=flagellum) is only a little longer than the two basal joints together; third joint inconspicuously annulated and bearing some minute projecting hairs at its tip; the eyes are so large that the antennæ are placed on the lower fifth of the head (in perpendicular height), or a little after the middle in the rounded measurement.

Thorax brilliantly shining bluish green or blue, moderately but by no means densely punctate, and bearing moderately long pale brownish yellow or sometimes light greyish fine pubescence, which is not at all dense but bears underneath it a short inconspicuous more dense pale pubescence; pleuræ with longer more conspicuous pale pubescence on the back part of the mesopleuræ, and with shorter darker pubescence on the metapleuræ, but the middle part of the mesopleuræ bare and polished. Scutellum of the same colour as the thorax, but impunctate and with tangled yellowish pubescence

on the spines; spines shining green, thick and long, usually six in number, but the outer pair may be short or even practically absent, leaving sometimes five spines, or when the spines are extra strong there may be a seventh spine.

Abdomen purplish or brownish black, moderately shining, and bearing inconspicuous not scarce short yellowish pubescence on the disc but longer and more conspicuous yellow pubescence on the sides; belly shining brownish black, with abundant minute depressed pale pubescence. Genitalia small, with two apical and two lateral brownish orange lamellæ, and beneath with all the middle part brownish yellow.

Legs pale yellow; front and hind coxæ partly blackish; hind tibiae occasionally slightly darkened at the tip; anterior tarsi with the tip of the basal joint obscured and the other four joints blackish or brownish with the extreme tips of the second to fourth joints yellowish; hind tarsi all brownish or brownish black, with the basal joint dilated and elongated so that it is slightly longer than the other four joints together. Pubescence moderate, pale yellow, and inconspicuous behind the femora and in a ciliation inside the hind tibiae. Pulvilli soft brown; claws orange at the base, but black at the tip.

Wings moderately tinged with brown and with a conspicuous blackish brown stigma; veins yellowish for some distance about the base; discal cell not unfrequently emitting an abortive third veinlet (fig. 150) as in *Chorisops*.

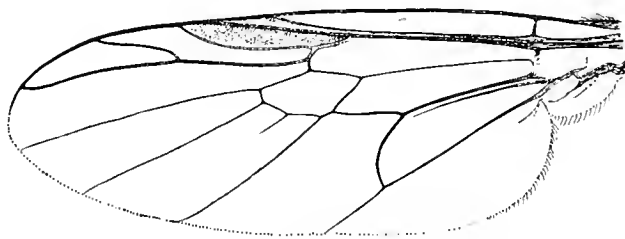


FIG. 150.—*Beris Morrissi* ♂, var. × 10.

Alar squamæ yellow with pale yellow fringes; thoracal squamæ only indicated by a raised yellow line. Halteres pale orange.

- ♀. Very similar to the male, but altogether rather paler. Frons very narrow for this genus, being barely one-fifth the width of the head, moderately shining bluish black, indistinctly striate and punctate, very gradually widening down to the face, and the face very gradually widening down to the mouth; the frons bears very short pale pubescence, and the face rather longer but still inconspicuous pale pubescence; upper part of the back of the head not at all puffed out, dull black but bearing at the top part a patch of minute depressed greyish brown pubescence. Eyes with only very short inconspicuous sparse pubescence. Antennæ quite as long as the head, the third joint being nearly twice as long as the two basal joints together, but still placed on the lower quarter of the head even though the eyes are smaller.

Thorax ranging in colour from brilliant green to purplish; pubescence all short and yellow, comparatively scarce.

Abdomen more shining purplish black or brownish, but blacker at the base and tip; pubescence inconspicuous, all pale yellow. Genitalia showing a pair of projecting two-jointed pubescent lamellæ, of which the basal joint is usually orange and the elongate thin second joint brownish.

Legs even paler than in the male; hind coxæ yellow; basal joint of the hind tarsi hardly dilated but obviously yellowish; four last joints of the anterior tarsi more brownish, and the pale tips of the joints more distinct. Pubescence short and inconspicuous.

Wings nearly clear, except for the conspicuous dark blackish brown (or in immature specimens light brown) stigma.

Length about 6 to 7 mm.

This species does not vary much, but the abortive third veinlet from the discal cell is not uncommon and may occur on one wing of a specimen

but not on the other. I cannot consider it at all closely allied to any European species, but it is very near the North American *B. annulifera* Bigot according to the original specimens which I possess (four females); *B. annulifera* however has a slightly but distinctly wider frons in the female, and has the base of the third antennal joint ferruginous, while the eyes are more pubescent and the legs and wings appear to be slightly darker. In many respects it indicates a tendency towards a relationship with *Chorisops tibialis*.

B. Morrisii cannot be considered at all a common British species though I know of numerous and widely spread localities; these localities are mostly on the south and west as they are in Cornwall (Boscastle), Devon (Lynton), Dorset (Charmouth, the original locality), Somerset (Porlock), Sussex (Guestling), Surrey (Clandon), Hereford (Cusop, Ledbury), Merioneth (Dolgelly, Barmouth), North Wales, but they extend to Aberdeenshire (Ballater), and Elgin (Logie). The dates range from June 17 to August 6. It is known to occur from England and South Sweden to Austria and Italy, and has been recorded by van der Wulp from Quebec.

Synonymy.—I have come to the conclusion that it is not advisable to suggest any alteration to the accepted synonymy, which simply admits *B. Morrisii* Dale (1842) as the only prior name for *B. pallipes* Loew (1846). It is unfortunate that neither Dale nor Loew referred to Macquart's *B. flavipes* (1826), as that name alone is almost a description, but Loew sank Macquart's species as a synonym of *B. chalybeata* and only referred to *B. obscura* Meigen (1820) as possibly representing his *B. pallipes*. I am afraid to revive Macquart's name of *B. flavipes*, even though I believe the present species was intended, because the description is not sufficiently clear, and if a change were begun it would open the door to a possible revival of Meigen's *B. obscura*. Under all the circumstances I prefer to accept the certain name of *B. Morrisii* rather than any uncertain name, even though I do not consider that the Rev. F. O. Morris was a naturalist worthy of such acknowledgment. The solitary exponent of *B. flavipes* in Bigot's collection was a small female *B. Morrisii*, which apparently had been named for him by Rondani; Bigot however had five males of *B. Morrisii* under the label of *B. chalybeata* and one male (apparently from Rondani) under the label of *B. sexdentata*.

11. CHORISOPS.

Chorisops Rondani, Dipt. Ital. Prodr., i., 173 (1856).

Closely allied to *Beris*, but distinguished by the long palpi and the separated eyes of the male. It agrees with *Actina* in these two characters, but is distinguished by its bare eyes.

Head with the eyes bare in both sexes and well separated down the frons (fig. 152); space above the antennæ glistening white. Palpi about as long as the proboscis.

Scutellum with four yellowish marginal spines.

Abdomen usually with yellowish markings on the disc. Genitalia of the male distinct from the abdominal segments, and apparently connected with them by a sort of neck.

Legs with the hind tibiæ incrassated after the base, especially in the male.

Wings (fig. 151) differing in many minor points from *Beris*, though the character of the incomplete third veinlet from the discal cell is not a strong one, as it often occurs in *Beris Morrisii*. Cubital vein rather undulating, with its short upper fork beginning at two-thirds of its length; upper branch of the postical vein forming the lower margin of the discal cell for nearly half the length of the cell.

This genus may be easily recognised amongst British species, even if *Actina nitens* with its hairy eyes should occur, but its relationship to *Beris Morrisii* is very obvious, as that species often has a small incomplete third veinlet from the discal cell, almost bare eyes (scarcely touching in the male), small but evident palpi, and a pale-haired thorax in both sexes. The characters given here for the genus may be too limited, as they are mainly drawn from the European *C. tibialis*.

The metamorphoses are well known, as Handlirsch in 1883 gave a detailed description with figures; he found the larvæ in mouldering wood-earth which contained decaying vegetable matter.

Chorisops (including *Exaireta*) is recorded from Europe (one species only), North and South America, Australia, and New Zealand.

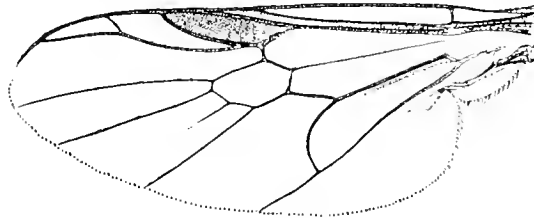


FIG. 151.—*Chorisops tibialis* ♂. × 12.

Synonymy.—I have dealt with the synonymy of the European genera *Beris*, *Actina*, and *Chorisops* in my synonymical note under *Beris*, but I made no reference there to the genus *Exaireta* of Schiner (1867), amended by Osten Sacken in 1878 to *Neoexaireta* on the ground of preoccupation; a close examination of various species of *Exaireta* confirms me in the belief that it cannot be separated from *Chorisops*, and in fact *Exaireta (Beris) luteipennis* Philippi from Chili is extremely closely allied to our European *C. tibialis*. Nowicki's argument upon the synonymy of *Exaireta* Schin. and *Diphysa* Macq. is well grounded, but he is wrong in stating that the veinlet (=upper branch of postical vein) which separates (what ought to be) the fourth posterior cell from the fifth springs from the discal cell in *Beris*, but from the second basal cell in *Exaireta*, as I cannot find any more distinction between *Exaireta* (including the type species *E. spinigera* Wied.) and *Beris* than I can between *Chorisops* and *Beris*. As both the names *Exaireta* and *Diphysa* are pre-occupied, the only change required in the present synonymy is to sink *Neoexaireta* under *Chorisops*. I am aware that Brauer in his paper on the *Notacantha* in 1882 separated these two genera, but I do not think his distinctive characters of generic value, and his cursory work was proved by his erroneous spelling *Chlorisops*. All these writers seem to have overlooked Rondani's paper in 1863 (Archiv. p. Zool. Modena, iii. 87) in defence of his genus *Chorisops*, in which he gives the European *C. tibialis* as the type species but states that the genus includes "exotice nonnullæ, "*Servillei—Javana—Macq.*, etc.," though all knew that *Beris Servillei* Macq. was a synonym of *E. spinigera* Wied. which was the type species of *Exaireta*. Curtis and Haliday were wrong in considering *C. tibialis* to be the type of the genus *Actina* because that species was not described until seventeen years after the genus *Actina* had been founded, but that question is also dealt with in my synonymical note upon the genus *Beris*.

1. *C. tibialis* Meigen. Abdomen more or less yellow on the disc. Scutellum with yellow spines. Eyes bare and well separated in both sexes.

Easily distinguished from the other *Berinae* by the yellowish scutellar spines, and usually by the pale abdominal markings.

♂. Frons (fig. 152) shining bluish black or dark green, about one-eighth the width of the head at the vertex but gradually narrowing until below the ocelli, and thence almost parallel-sided to the glistening white space just

above the antennæ, where it is about half as wide as at the vertex; the vertex bears some moderately long black hairs, but the frons has only a short pale pubescence; face not at all produced, glistening white, slightly widening down to the mouth, and bearing pale hairs on the sides but with a few blackish or even whitish hairs down the middle line and especially on the lower part; jowls very small, but their back part and the lower part of the back of the head with some slight pale pubescence; back of the head deep black but very shallow and with a very short black postocular ciliation on the upper part; ocellar space elevated, and the three ocelli dull reddish and equidistant. Proboscis dull orange; palpi small, dull yellowish, distinctly porrected well above the proboscis. Eyes bare, and in life dark green; facets all equal. Antennæ long and rather thin, being slightly longer than the head and thickest on the second and base of the third joints, usually dull brownish black but brownish orange beneath the second and the base of the third joints, and sometimes dull brownish orange with only the tip half of the third joint blackish, or sometimes all dull blackish; basal joint thin and distinctly longer than the second, and both bearing minute black bristles; third joint nearly twice as long as the two basal joints together, and rather indistinctly 8-annulated with the first and last annulations not conspicuously longer than the others.

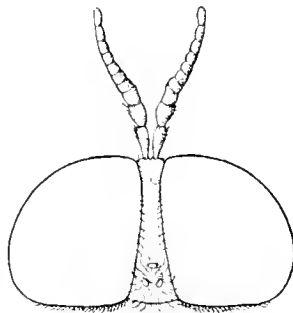


FIG. 152.—*Chorisops tibialis* ♂. × 18.

Thorax and scutellum brilliant shining green, finely and rather sparsely punctate, and bearing a not scarce though not conspicuous fine pale yellow pubescence all over; pleuræ with the middle part of the mesopleuræ bare, but the hind part with rather longer and more conspicuous pale pubescence. Scutellum with four yellowish marginal spines which bear (besides other hairs) a rather long apical hair which is easily broken off.

Abdomen black, moderately shining, with more or less yellow coloring on the disc; sometimes the yellow colour is limited to the middle of the base of the third and fourth segments, but more commonly nearly all the disc of the third and fourth segments and the base of the fifth are yellowish, and sometimes the yellow colour extends over almost all the second to fifth segments and on to part of the sixth. Belly as a rule more extensively yellowish than the dorsum. Pubescence mainly very short and dark colored, but long pale yellow and fairly abundant down the sides from the base to part way down the fourth segment. Genitalia distinct, being much narrower than the last abdominal segment and only connected with it by a sort of neck; genital lamellæ orange.

Legs mainly yellow or dull orange, or sometimes more obscure in dark specimens; tarsi blackish from the tip of the basal joint onwards, and sometimes the front tarsi blackish even to the base; hind femora brownish yellow or even brown about the middle and just before the tip, slightly incrassated; hind tibiæ blackish brown after the basal quarter, and considerably incrassated after the base; hind tarsi rather short, basal joint moderately incrassated and quite as long as the other four joints together. Pubescence very slight and pale yellow on the femora, and even the minute pubescence on the legs pale except on the dark parts of the tarsi and on the incrassated part of the hind tibiæ.

Wings faintly suffused with brown, and with a conspicuous large dark brown stigma. Alar squamæ moderate in size, dull glassy with pale fringes; thoracal squamæ almost absent. Halteres yellow, knob large.

- ♀. Very similar to the male, but the disc of the abdomen usually more yellowish and the dark parts of the legs lighter colored. Frons nearly one-fifth the width of the head and more equal in width from the vertex to the antennæ, shining greenish black down to the white space above the antennæ, and bearing such very short pubescence that it appears to be bare; back of the head slightly but equally puffed out; pubescence on the face very slight, but that on the lower part of the back of the head obvious. Antennæ longer than in the male.

Thorax and scutellum with short depressed pale yellow pubescence; humeri distinctly yellowish.

Abdomen sometimes nearly all yellowish except for dark triangular spots near the hind corners of the segments, and with much shorter pubescence at the sides. Genitalia with a pair of terminal orange lamellæ.

Legs paler than in the male and the hind femora not darkened about the middle, while in pale specimens the hind tibiæ are hardly at all darkened; hind tibiæ less dilated, and basal joint of the hind tarsi only a little dilated; front tarsi occasionally dark to their base.

Wings slightly more hyaline, and sometimes the stigma only pale brown. Alar squamæ yellow with whitish yellow fringes.

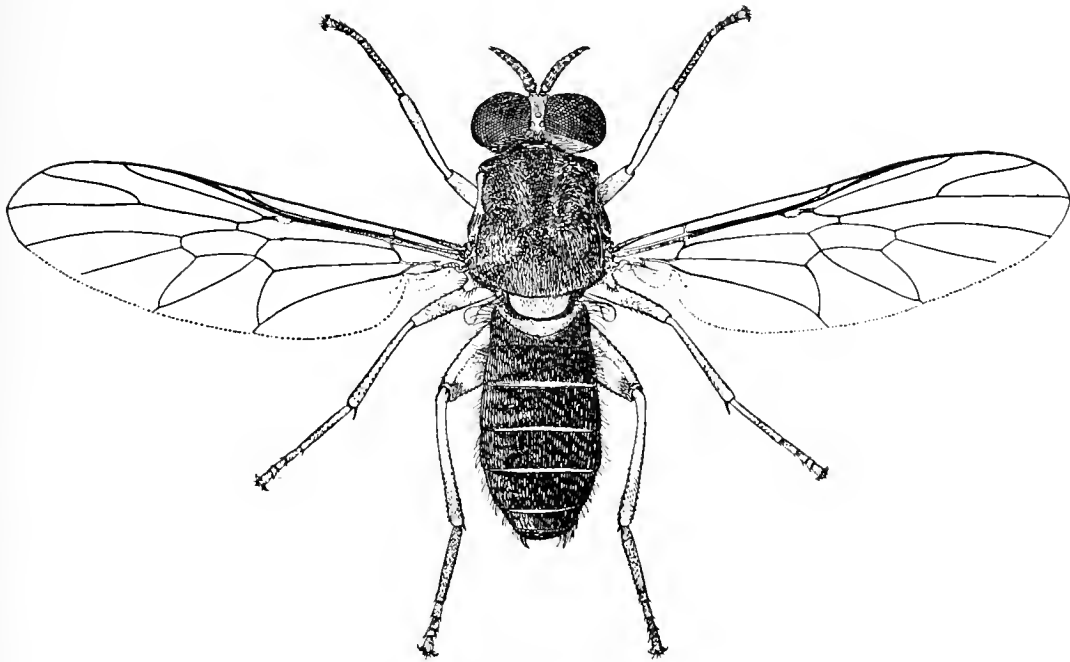
Length about 6 mm.

This species varies so much in the yellow coloring on the disc of the abdomen as to raise the impression that there might be two species under it, but I am unable to find any definite character for distinction; it also varies in the intensity of the dark markings on the legs (especially in the female), and in the colour of the frons and the facial pubescence, and I think also that there are slight variations in the narrowing or expansion of the frons and face. There is no close ally known in Europe, as *Actina nitens* is much blacker and has hairy eyes.

C. tibialis is not uncommon over the south and middle parts of England, as I have numerous localities from Devonshire, Hampshire, Sussex, Kent, Surrey, Cambridgeshire, Norfolk, Suffolk, Lincolnshire, Wiltshire, Gloucestershire, Herefordshire, Yorkshire, and Glamorgan, from July 4 to September 14. The males often congregate in aërial dances. It is recorded from almost all Europe. The metamorphoses are noticed under the generic description.

Synonymy.—Meigen originally described his *Beris tibialis* from a male in Baumhauer's collection and a female sent from England by Dr Leach, and no doubt has ever arisen as to their identity. A. Costa in 1857 described an *Actina hyalini-ventris* of which I have not seen the description, but Bezzi (Bull. Soc. Ent. Ital., xxxii. 77, 1900) wrote of it as a species which has a certain affinity of appearance with *C. tibialis* and as occurring throughout Italy. I know nothing about the species, but the name suggests the paler form of *C. tibialis*, and in Bezzi's Band ii. of Kertész's Katalog it is sunk as a synonym, so that it is to be supposed that Bezzi had become convinced that it had more than a certain affinity of appearance.

XYLOMYINÆ.

FIG. 153.—*Xylomyia marginata* ♂. × 8.

Abdomen with at least seven obvious segments. Antennæ with 8-annulated flagellum. Wings with the discal cell emitting three almost complete veinlets irrespective of the upper branch of the postical vein, with the fourth posterior cell closed, and with the ambient vein extended beyond the tip of the wing. Scutellum without any marginal spines. Posterior tibiæ spurred.

Head with very slight pubescence. Face depressed on all the middle part as in *Leptidæ* but without a socketed tubercle. Palpi elongate and upturned so as to lie on the depressed part of the face. Eyes well separated in both sexes and almost equally separated from the vertex to the mouth, always bare, and the facets all equal. Antennæ (fig. 157) elongate; two basal joints almost equal in length; third joint (= flagellum) bare, long, and whip-shaped, with eight annulations and usually with a small apical bristle.

Thorax almost without pubescence, because any that exists is so tiny; prothorax rather large and rather oblong (fig. 154). Scutellum unarmed.

Abdomen elongate, with almost parallel sides, and with no angled shoulders on the second segment, composed of from seven to nine visible segments, and practically without pubescence. Genitalia of the male usually large, protruding, and very complicated; of the female with a pair of protruding lamellæ.

Legs fairly stout; front femora at their origin only moderately distant from the middle pair; front coxæ rather long; femora simple or with the hind pair incrassate and spinose beneath; front tibiæ unarmed, but the posterior pairs with two almost equal fairly long terminal spurs.

Wings (fig. 153) with an almost Leptid venation. Costal vein extended as an ambient vein to the end of the second veinlet from the discal cell though rather faint after the lower branch of the cubital vein; mediastinal vein rather abruptly upcurved into the costa opposite the discal cross-vein; subcostal vein ending about half-way between the mediastinal and radial; *præfurca* (= common base of radial and cubital veins) starting well before the base of the discal cell and opposite about

two-thirds of the length of the upper basal cell; radial vein extended just beyond the fork of the cubital; cubital vein with a long fork, of which the lower branch ends in or just after the tip of the wing, and the upper branch is fully two-thirds as long as the lower one and ends about half-way between the radial vein and the wing-tip; basal cells all very long as they extend almost or quite to the middle of the wing, and both (or, if including the anal cell, all three) nearly equally long; discal cell distinctly hexagonal with two short basal and two short end sides, remarkably long and distinct from the usual Stratiomyid type, being about four times longer than broad, with the upper and lower cross-veins placed at its basal sixth, and emitting three veinlets of which the upper two, or only the upper one, extend completely to the wingmargin, while the lower one bends sharply down and joins the upper branch of the postical vein just before the wingmargin, and thereby forming a closed fourth posterior cell which is peculiar to this subfamily in the *Stratiomyidæ*; postical vein with a long stem, the stem being nearly twice as long as the whole upper branch, and with its fork simple, but the upper branch is joined by the lowest veinlet from the discal cell just before the wingmargin, while the lower branch is short and bends down rather abruptly into the anal vein distinctly though not far before the wingmargin, and consequently the fourth posterior cell and the anal cell are closed; stem of the postical vein and its lower branch strong; anal vein quite reaching the wingmargin; alula moderately developed. Membrane of the wings minutely pubescent, but not at all ribbed, though there may be slight inequalities or folds. Squamæ very little developed, but the alar pair present and slightly fringed especially at the lower angle; thoracal pair entirely absent.

The *Xylomyinæ* are most allied in their venation to the *Berinae* in the *Stratiomyidæ* or to the *Xylophaginæ* in the *Leptidæ*. They are dis-

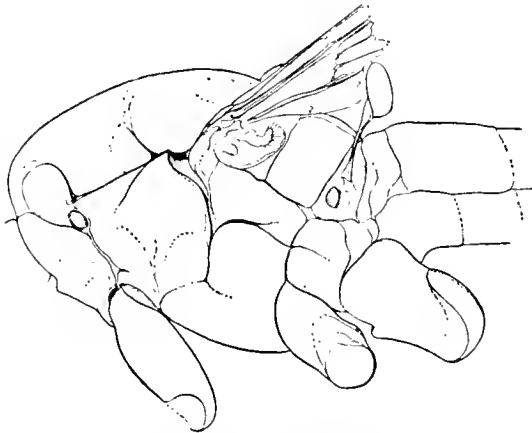


FIG. 154.—*Xylomyia maculata* ♂. × 10.

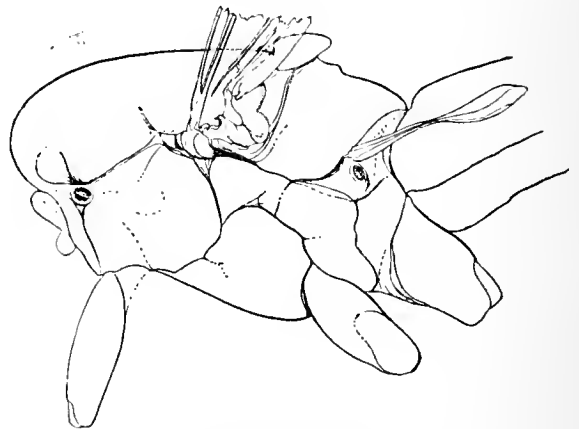


FIG. 155.—*Xylophagus ater* ♂. × 20.

tinguished from the *Xylophaginæ* as was pointed out by Osten Saeken by the large prosternal plate which intervenes between the front coxæ and the anterior thoracic orifice (v. fig. 154), the comparatively short front coxæ, and the but little extensile abdominal segments, as well as by the closed fourth posterior cell. They differ from all the other *Stratiomyidæ* in the præfurea (=common base of the radial and eubital veins) starting far before the base of the discal cell, in the spurred posterior tibiæ (which otherwise only occur on the middle tibiæ of *Acanthomyia*), in the closed fourth posterior cell, and in the more extended ambient vein.

The *Xylomyinæ* comprise but very few species; in fact it is at present uncertain whether they are not limited to the genus *Xylomyia*, although probably one or two other genera which had been placed in the old family *Xylophagidæ* will ultimately be included and most likely *Rhachicerus*

because of its closed fourth posterior cell. The species are recorded from Europe, North America, and South Asia. Their metamorphoses are well known, and they are really far more common in the larval stage than in the imaginal, as the habits of the perfect insects are very little known while the larvæ are easily found and easily reared; I once however saw the females of *Xylomyia marginata* running about the bark of some felled trees in considerable numbers.

Synonymy.—For a very long time this subfamily was included along with *Xylophagus* in the family *Xylophagidae*, but is now considered to belong to the end of the *Stratiomyidae* while the *Xylophaginae* are relegated to the beginning of the *Leptidae*.

For the purposes of this work the subfamily may be considered to consist of only the genera *Xylomyia* and possibly *Rhachicerus*, the latter being easily distinguished by its remarkable antennæ. Before any attempt is made to divide the genus *Xylomyia* into those with simple and those with serrate hind femora a careful examination should be made to find out upon what Walker's genus *Solva* was founded.

Table of the Palearctic Genera of XYLOMYINÆ.

- | | |
|---|--|
| 1 (2) Antennæ with an eight-annulated simple flagellum. | XYLOMYIA. |
| 2 (1) Antennæ with a multi-articulate (22 to 32), often pectinated, flagellum (fig. 166). | RHACHICERUS
(<i>Xylophaginarum</i> ?). |

12. XYLOMYIA.

Xylomyia Rondani, Dipt. Ital. Prodr., iv., 11 (1861).

Middle-sized to rather small almost bare flies, which are mainly of black coloration with more or less yellow markings.

Face and frons flush with the eyes or even slightly depressed; face considerably depressed on all the middle part except close to the antennæ; ocelli three. Proboscis prominent, with small sucker-flaps; palpi two-jointed, cylindrical, rather long, directed upwards and mainly lying upon the face. Eyes bare, well separated in the male and still more widely separated in the female. Antennæ (fig. 157) elongate, as long as or longer than the head; two basal joints almost equal in length; third joint by far the longest, whip-shaped, composed of eight annulations of which the first is the largest, and usually with a tiny apical bristle or style.

Thorax short, oval, little arched; pleuræ with slight downy pubescence. Scutellum without any marginal spines.

Abdomen elongate, flattened, with seven distinct segments, but with no prominent front angles. Genitalia of the male forming a large knob (? *X. varia*) beneath the sixth and seventh dorsal segments; ovipositor not protruded tubularly but with a pair of lamellæ extending beyond the seventh dorsal segment.

Legs rather long, almost bare and without any bristles; front coxæ long, but not so long and cylindrical as in *Xylophagus*; posterior tibiæ with two spurs each; coxæ rather long.

Wings (fig. 156) rather large, lying parallel on the abdomen when at rest, not spotted; costal vein extending after the end of the lower branch of the cubital fork as an ambient vein to the end of the first or second veinlet from the discal cell; præfurca commencing well before the base of the discal cell; cubital fork rather like that of the *Berinae*, being the longest and most wide open of any of the *Stratiomyidae*, but differing from that of the *Berinae* in being placed further out on the wing and just including the wing-tip; discal cell very different in shape from that of any other palearctic *Stratiomyidae*, being long and hexagonal as in the *Leptidae*,

and with the third issuing veinlet bent down sharply and joining the upper branch of the postical fork just before the wingmargin so that the fourth posterior cell is closed; postical fork simple except that each branch of the fork unites with the neighboring vein just before the wingmargin, so that the anal cell is also closed near the wingmargin; small cross-vein usually distinct but sometimes almost absent; wing-membrane minutely but distinctly pubescent, and with indistinct folds.

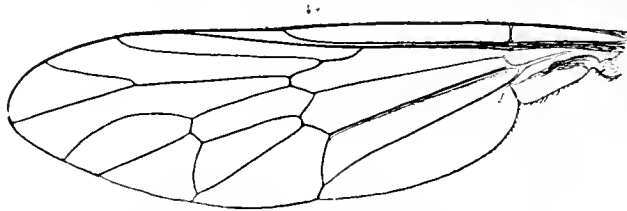


FIG. 156.—*Xylomyia maculata* ♀. × 9.

Alar squamæ small and triangular, with a long but not dense fringe; thoracal squamæ absent. Halteres normal.

The larvæ resemble those of *Sargus*, and live in the pulp or rotten wood débris in hollows in many kinds of trees, or (it is said) on the out-flowing sap, especially of Elms (*Ulmus*), Oaks (*Quercus*), Poplars (*Populus*), and Walnut (*Juglans*). Specimens of *X. maculata* are more easily obtained by breeding than by capture, so much so that in places or even on trees where its larvæ are abundant the perfect insect is scarcely ever seen, and I believe its habits in the imaginal state are very little known; the female of *X. marginata* has occurred on the trunks of felled trees, and though active is not very shy.

This genus is easily known among the *Stratiomyidæ* by its *Ichneumon*-like appearance, its venation, and its spurred posterior tibïæ, but with the Leptid subfamily *Xylophaginæ* (with one of which it was for a long time thought congeneric) the superficial resemblance is very close; so far, however, as we are concerned in Britain the closed fourth posterior cell is peculiar to *Xylomyia*.

Xylomyia is at present composed of very few species, and only three or four have been met with in Europe, though closely allied species occur in Caffraria, Sierra Leone, the Canaries, North America, and South Asia.

Synonymy.—This genus was known from 1820 to 1861 as *Subula* Meig., but as that name had been preoccupied by Schumacher in 1817 for a genus of *Mollusca* Rondani substituted *Xylomyia*; the change was received with very little favour by dipterologists and even in 1886 Osten Sacken declined to adopt it on the ground that "a change in a name of such old standing involves much more inconvenience than its retention;" I have however made close inquiry and I find that Schumacher's genus is well established and in general use in *Mollusca* at the present time, and therefore I fear that the inconvenience of the change must be endured. Williston's substitution of the name *Subulomyia* in 1896 was made hastily without noticing that Rondani had proposed *Xylomyia* thirty-five years previously.

The type of the genus *Subula* would apparently be *S. maculata* Meig. because that is the species that Meigen figured, and is the first species of this section of Meigen's genus *Xylophagus*, and is the only one to which Meigen has actually united Megerle's generic and specific names (though Meigen received all three species from Megerle with suggested names); Rondani however when proposing the name *Xylomyia* in substitution for *Subula* gave *S. varia* as the type, possibly because it may have been the only species known to him. So long as *X. maculata* and *X. varia* remain in one genus it does not matter which is the type species, but in case of any further subdivision of the genus (which is not unlikely) I leave the matter to be adjudicated upon at that time; before however any new name might be proposed it would be well to ascertain further details about *Solva* of Walker which was founded in 1862 and which has been sunk by Osten Sacken as a synonym. The type specimen of *Macroceromys* Bigot (1879) has markings on the thorax very

similar to those of *X. maculata* but has very much longer antennæ; unfortunately it has lost both wings, but it must be very closely allied to *Xylomyia* or even congeneric as Osten Sacken suggested in 1886; the hind femora are not thickened and have no serration beneath.

Table of Species.

- | | |
|---|----------------------|
| 1 (2) Thorax black with conspicuous yellow spots. | 1 <i>maculata</i> . |
| 2 (1) Thorax black without any conspicuous yellow markings. | |
| 3 (4) Coxæ blackish. | 2 <i>marginata</i> . |
| 4 (3) Coxæ all orange. | 3 <i>varia</i> . |

1. **X. maculata** Meigen. Thorax black with conspicuous yellow spots. Abdomen with yellow cross-bands.

A very handsome exotic-looking black and yellow fly.

♂. Ground colour rather shining black. Eyes separated at the vertex by about one-seventh the width of the head and almost equally so down to the mouth, as the widening which begins just above the antennæ is very slight; this space is dull black except on the shining part just outside and in front of the ocellar space, but the vertex, the ocellar space itself, and a considerable part of the frons after the shining portion is rather densely covered with glistening greyish yellow adpressed pubescence which leaves only a dull black unequal cross-band a little above the antennæ on which there is neither dust nor pubescence, and the portion anterior to that just above and all round the antennæ, including the narrow strip of face below the antennæ, is densely covered with greyish dust; the face is very short and only forms a strip just below the antennæ because a wide quadrate clypeus extends far upwards from the mouth and leaves only a very narrow grey line down each eyemargin, the clypeus itself being also densely covered with greyish dust; jowls and back of the head so shallow as to be almost absent, but behind the eyes from their lowest part to nearly one-third up there are some fairly long pale greyish hairs, and on the rest of the back of the head there is a line of short dense inconspicuous black bristles; quite behind the vertex there is a patch of minute pale pubescence on the back of the head. Proboscis large and entirely exerted, being apparently composed of the large pale orange sucker-flaps which look like a lower pair of palpi; palpi large and rather club-shaped, bright orange. Eyes bare; facets all equal. Antennæ (fig. 157) slightly longer than the head when seen from above, more or less extensively dull orange on the inner side, but blackish on the outside and upper side and on the base and tip; basal joint short, being barely so long as broad, second joint slightly shorter but more equally transverse, and these two joints bear tiny black bristles except on their inner side; third joint (flagellum) with seven annulations before the conical end one, first annulation nearly as long as broad, but the next six only about half as long and very gradually diminishing in size, eighth annulation microscopically hairy, quite twice as long as its base is broad, conical, and sending from its point a short sharp apical bristle.

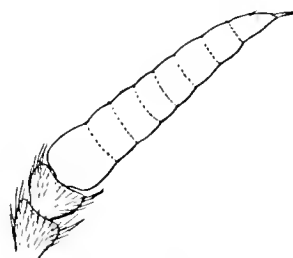


FIG. 157.—*Xylomyia maculata* ♂. × 32.

Thorax shining black, with several conspicuous orange spots; each end of the suture has an orange spot which usually extends rather narrowly along the suture and is widened at its inner end into another (though smaller) spot of irregular shape, but the middle third of the suture remains black; humeral knobs and adjoining front of thorax pale orange, or sometimes with an adjacent orange spot out on the disc; postalar calli with a large irregular

diamond-shaped orange spot, which extends to the margin near the corner of the scutellum; a pale orange line runs along the top of the mesopleuræ from the lower margin of the humeral spot to the wing-base, and forms there a large oblong spot down the upper part of the hinder side of the mesopleuræ; the top part of the pteropleuræ and the top of the sternopleuræ pale orange; lateral plate of the metanotum forming an oblong pale orange spot just in front of the halteres, which is usually large but sometimes more restricted in size. The black parts of the thorax and scutellum are finely and rather thickly punctate and from each punctuation a minute grey adpressed bristle arises, but the yellow parts are less punctate or even impunctate and the minute bristles on them are yellow; these minute bristles constitute the only pubescence on the dorsal part, but the sternopleuræ bear a short sparse downy pale yellow inconspicuous pubescence, and the top of the hypopleuræ is downy, and the metapleuræ have an indistinct pale pubescence; prothorax with some fine pale yellow pubescence. Scutellum pale orange, with a straight black base which is widened at the corners.

Abdomen black and only moderately shining, with the whole side thirds of the second segment orange; hindmargins of the third to the sixth segments orange for about the hind quarter of each segment, but the orange bands slightly narrowed at the sides and slightly bowed in front at the middle; seventh segment orange with a transverse black spot on the middle of the foremargin and smaller ones at the sides; eighth and ninth segments just visible and orange, but the eighth segment has blackish sides; pubescence all so short and depressed as to be almost imperceptible, except for a little pale pubescence about the basal corners of the second segment and the tiny adpressed golden hairs on the hinder part of the segments. Belly dull black with narrow pale yellow hindmargins to the segments; fifth segment with a large quadrate excision for the genitalia which has a fringe of dark hairs on its sides; pubescence very minute, adpressed, and pale. Genitalia all orange, with a large shining dorsal plate, and with two large subquadrate side-plates, but before these a pair of long but broad clavate lamellæ arise from near the sides of the base of the dorsal plate, while beneath them and the lateral plates are other pairs of smaller lamellæ, of which the basal pair are long, thin, and clavate; the basal pair of dorsal lamellæ and the subquadrate lateral plates bear a delicate pretty fringe of orange hairs, and all the lamellæ when seen from above bear depressed glistening golden pubescence all over.

Legs mainly orange, but the apical third of the hind femora and tibiæ conspicuously black; front coxæ shining black, large both in length and in bulk, and bearing tiny adpressed light grey pubescence except on the polished base in front, trochanters black, but tinged with luteous above, and with adpressed tiny whitish pubescence on all the lower part; middle coxæ shorter, shining black, and with scarcer light grey tiny pubescence; hind coxæ as large and long as the front pair but bulkier, trochanters more obviously luteous about their joint with the coxæ and at the tip, and also bearing white almost downy pubescence; last four joints of the front tarsi darkened above and partly so beneath; hind tarsi slightly darkened towards the end. All the femora are apparently transparent beneath, which causes light or dark reflections to show in different lights and also causes the minute pale pubescence to appear downy in some lights, but otherwise all the femora and tibiæ bear very minute dense pale yellow or orange pubescence which however darkens to tawny on the black part of the hind tibiæ; the hind femora may even appear to be extensively whitish beneath, and they are moderately strong and without any trace of serration beneath. Front tibiæ unarmed at the tip, but each of the posterior tibiæ with a pair of dull tawny moderately long spurs. Claws black, small, and almost concealed behind the pulvilli.

Wings (fig. 156) slightly smoky; anterior veins and base with a yellowish tinge when contrasted with the brownish tinge of the posterior veins; subcostal vein with dense minute bristles above on its whole length; cubital vein with its stem nearly twice as long as its upper branch, and its upper branch about two-thirds the length of the lower branch and ending about half-way between the radial vein and the tip of the wing, and with its lower branch

ending immediately after the tip of the wing; discal cell with the discal and lower cross-veins at about its basal sixth, the lower cross-vein being fairly long; the discal cell emits three veinlets of which the upper one is strongly arched so that the first posterior cell is contracted just after its middle and is more widely open at the wingmargin than at any other part, while the second posterior cell is rather contracted at the wingmargin; the second veinlet from the discal cell is entire right up to the wingmargin; basal cells equally long; costal vein continued as an ambient vein to the end of the second veinlet from the discal cell. Squamæ (alar) obscurely whitish yellow with a very slight pale fringe up to the lower angle, where there is a slight tuft. Halteres orange, knob large.

♀. Very much like the male. Head just as in the male, but the antennæ rather less orange on the inside.

Thorax as in the male, but the yellow markings usually smaller, so that the humeral knobs are only partly orange and the spots at the sides of the suture may be smaller; the top of the sternopleuræ and all the metapleuræ have slighter indications of orange, or the metapleuræ may have a round orange spot on their middle. Scutellum with a broader black base.

Abdomen similar to that of the male, but the eighth and ninth segments are quite obvious, while the orange hindmargins of the third to sixth segments are narrower; hindmargin of the seventh segment similar to that of the sixth, but broader as it occupies half the segment at its widest part; eighth segment all orange except on the large transverse black middle basal spot; ninth segment all orange except on a large obscure middle basal spot. Ovipositor with a pair of extended reddish orange lamellæ which are more than half as long as the ninth abdominal segment. Belly with the yellow hindmargins very narrow up to the eighth segment.

Legs with the tarsi and spurs darker, the basal joint of the front tarsi having the apical half darkened like the rest of the joints, while sometimes the middle tarsi are as much blackened as the front pair, and the hind tarsi may have the tip of the two basal joints and the whole of the rest blackish; the spurs (especially the hind pair) may be blackish.

Wings, squamæ, and halteres as in the male.

Length about 9 mm.

This species varies a little in the size and extent of the orange spots and markings, and the dark tip of the hind tibiæ may be brownish rather than black. *X. trinotata* Bigot from the Caucasus Mountains (according to the female type in Bigot's collection) is rather allied and agrees in the venation and the unarmed hind femora, but has the proboscis and palpi blackish orange, the humeri and pleuræ black, the thoracic suture with very faint orange markings, the abdomen with scarcely perceptible bands and even the end segments black, while the legs are reddish with very slight darkening at the tip of the hind femora and tibiæ, and the hind tarsi are all darkened. *X. tenthredinoides* v. d. Wulp, which Osten Sacken considered a dark variety of the North American *X. americana* Wiedemann, is quite congeneric according to a specimen in Bigot's collection.

X. maculata occurs in the New Forest and was bred in considerable numbers by Rev. H. S. Gorham in 1898, and since then on several occasions by Dr D. Sharp, but the perfect insect has been seen by them on only one occasion, when about the end of May 1904 one settled on a tree trunk near Bank where they were collecting the larvæ. It had been bred from the same neighborhood previous to 1840 by Rev. F. W. Hope as recorded in Westwood's Introduction to the Modern Classification of Insects, and Stephens figured it in his Illustrations, vii., Suppl., 28, T. xlvi., fig. 3

(1846). Walker said, "Very rare; inhabits the New Forest, Hampshire. "In Mr Stephens's collection. (E.);" and this may well refer to a female specimen labelled "*scutellata?*" which still remains (*t.* Austen, Ann. Nat. Hist. (7), iii. 182) in the old Stephensian collection in the British Museum with its puparium attached to it. There are four specimens in the Hope Museum at Oxford, which are probably the original specimens referred to by Westwood, especially as a label attached to a male says, "Mr Hope in New Forest. Pupæ found in dry rotten trees." Gorham said (Entom. Month. Mag., 1899, 71), "While searching for *Coleoptera* near "Denny Lodge in the New Forest, on the 29th of June in the summer last "past, I came across a number of Dipterous pupæ, in very rotten wood, in "a hollow stump. The tree was, I believe, oak, and the consistency of the "rotten portion in the crevices of which the pupæ were lying almost "huddled together may be likened to that of rich wedding-cake. I "brought home about a dozen of these pupæ, and from them there "emerged on the 8th of July several flies which were unknown to me "then, but which I made out from Westwood, Introd. ii, pp. 533-534; "and figs. 127, 11 (pupa of *Sargus*), and 12, to be *Subula* (*Xylomyia*) "*maculata*, Fab."—"There were, however, a great number of the pupæ, or "rather pupa cases, for the outside covering is that of the larval skin, "which bursts at the end, just as figured for *Sargus*, the true pupa being "extruded a little way. I bred eleven specimens, being all I believe that "I brought home, simply keeping them in a tin. The flies continued to "emerge for about a week." Austen recorded that there were some forty more pupæ. On June 12, 1905, Dr D. Sharp showed me the pupæ in abundance on similar rotten wood in the New Forest near Bank, and I bred a number of specimens from them. It is apparently common in the New Forest in the larval and pupal stages, though very rarely seen in the imaginal stage, and yet the bred specimens seem to be very active.

Synonymy.—It is curious that Meigen in 1820 should have ascribed this species to Fabricius (just as he did *Xylophagus ater*), when Meigen's first description appeared in 1804 and Fabricius' not until 1805.

2. **X. marginata** Meigen. Thorax without any yellow markings on the disc. Abdomen with narrow yellow cross-bands. Antennæ about as long as the head. Coxæ blackish; hind femora incrassate and serrulate beneath (fig. 153).

A rather inconspicuous fly which is very distinct from any other in Britain except *X. varia*.

♂. Frons separating the eyes by about one-tenth (or more) of the width of the head at the vertex and widening rather abruptly to about one-seventh a little above the antennæ, but if the frons is at the vertex as much as one-seventh the width of the head its sides are parallel until this emargination; sides of the face widening below because of the rounding off of the eyes; frons black but rather densely covered with glistening whitish pubescence which is most conspicuous between the ocelli and the antennæ, and which is not very short but slopes forwards and is dense enough to almost obscure the ground colour; after the emargination and down the sides of the face there are narrow glistening greyish white bare eyemargins, and the face itself is bare; jowls practically none, but the lower third of the back of the head black and

moderately inflated with a narrow light grey eyemargin, and bearing rather long pendulous whitish pubescence; back of the head on its upper third very shallow and with short depressed greyish white pubescence against the eyes and behind the vertex. Proboscis orange, large, exerted, with the sucker-flaps resembling pendulous palpi and bearing a little pale yellow pubescence; palpi pale orange, very long, thin, lying between the sides of the face almost up to the antennæ, and bearing rather abundant short pale yellow pubescence. Eyes large, bare; facets all equal. Antennæ (fig. 158) dull black, but the second joint partly ferruginous; the two basal joints short and transverse, about equal in length, and bearing tiny pale pubescence; third joint practically bare, about three times as long as the two basal joints together, so that the whole antennæ are about as long as (or slightly longer than) the head; third joint a little thicker than the others about its base and slightly tapering, though still thick and blunt at its tip, where a minute sharp apical style can sometimes be traced; the third joint has eight indistinct annulations, of which the basal one is the longest, though the last one is about twice as long as the penultimate one.

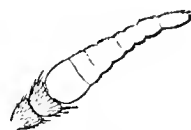


FIG. 158.—*Xylomyia marginata* ♂. × 30.

Thorax black, very crowdedly and coarsely punctate so that it is but little shining, and the ground colour is somewhat obscured by the depressed glistening pale pubescence; humeri with the extreme lower corner reddish (extensively pale yellow in a Bohemian specimen), and a fairly wide orange stripe runs along the upper margin of the mesopleuræ from beneath the humeri to the wing-base, but sometimes this stripe becomes thin and dies out in a point at the hind corner of the mesopleura though even then a reddish spot remains just in front of the wing-base; lower front corner of hypopleuræ obscurely reddish; pubescence all over the disc of the thorax almost adpressed glistening greyish white, but giving an impression of being arranged in broad black and grey stripes because of the differing directions in which the hairs slope, and especially showing (when viewed from above) a broad black middle stripe; pleuræ shining black, but roughened and bearing very short depressed shimmering greyish white pubescence which becomes conspicuous and almost silvery on the sternopleuræ and hindmargin of the mesopleuræ, and rather longer and denser but inconspicuous on the metapleuræ. Scutellum shining reddish orange with the extreme side corners black; pubescence very short and greyish white; nuctanotum black, obscured by greyish dust.

Abdomen black, moderately shining and all rather roughly punctate, with an arched reddish orange spot extending all across the base and with the hindmargins of the second to fifth segments narrowly orange all across the disc but not extended over the sides; the basal four segments have almost parallel sides, but the fifth slightly contracts and the sixth distinctly does so, while the seventh segment is shorter and droops over the genitalia; all the segments have an inconspicuous transverse depression across the disc just after the middle of each segment; pubescence on the disc black but inconspicuous, being very short and dense, but away from the middle of the disc there are some short adpressed greyish white hairs, which become longer and more conspicuous towards the sides and on the sidemargins, and longer still and more erect about the basal corners, while the third to sixth segments have pale hindmarginal fringes. Belly moderately shining black with the basal pale spot shining through from above, and the second to fifth segments with narrow yellow hindmargins and with their sides luteous; pubescence yellowish, very slight. Genitalia forming a large knob beneath the sixth and seventh dorsal segments, the end part forming a large arched plate which is shining black down its middle but shining chestnut at the sides; at the upper basal corners there is a pair of long almost thread-like orange lamellæ which have long pale fringes, and similar fringes extend from these along the hindmargin of the seventh segment; beneath the large plate there is a pair of short stout orange lamellæ against the hind corners of the sixth segment, while the large curved middle part is rather blackish chestnut.

Legs mainly orange; coxæ and trochanters shining black, but the trochanters with chestnut reflections; front coxæ long and stout, trochanters moderate in

size; middle coxæ shorter, but the trochanters long and thin, being longer than the coxæ; hind coxæ large and stout, trochanters moderately large; apical quarter of the front tibiæ and all the front tarsi light brown; apical three-quarters of the middle tibiæ and all the middle tarsi brownish; apical tenth of the hind femora brownish with the part about the knee-joint blackish; apical third of the hind tibiæ brownish, and the hind tarsi blackish brown; front femora slightly incrassate, middle pair stout, but hind pair very much incrassate for their whole length and with about thirty little black spines beneath, and these spines form an irregular row which does not extend to the base but which breaks up into two or three rows near the tip; middle tibiæ with two brownish yellow spurs beneath, of which the one towards the front is rather long but the one towards the back is short; hind tibiæ with a pair of short brownish orange spurs. Pubescence very short, adpressed, and all pale, but there is a short postero-ventral fringe on the anterior femora, and the tiny pubescence is rather conspicuous on the hind femora and tibiæ; coxæ bearing pale down but no sign of bristles. Pulvilli dull orange; claws small.

Wings almost hyaline, but appearing rather yellowish about the base because the veins thereabouts are rather orange but the other veins are brownish black; præfurca starting well before the base of the discal cell but obscured soon after its base by a pale blotch and after that thickened up to the fork; subcostal vein with minute pubescence above on its whole length; radial vein starting from the subcostal opposite about three-quarters of the upper basal cell; cubital vein with a long fork, and its stem only a little longer than its upper branch; -upper branch of the cubital fork about three-quarters the length of the lower branch and ending nearer to the lower branch than to the radial vein because the lower branch ends before the tip of the wing; discal cell hexagonal, about three times as long as broad, the fork of the discal vein which forms the base of the discal cell before the cross-veins has its upper branch usually longer than its lower branch, the discal cross-vein being placed at nearly one-third from the base of the cell; the upper veinlet from the discal cell runs almost straight to the wingmargin, but the second veinlet does not quite reach the margin, and the third one curves down and joins the upper branch of the postical vein just before the wingmargin (so that the fourth posterior cell is closed); the lower branch of the postical vein curves down and joins the anal vein well before the wingmargin; basal cells long, being nearly half the length of the wing, and the upper one slightly longer than the second; small cross-vein either very short, or sometimes even absent so that the upper branch of the postical vein may touch the discal cell, and in all cases there is an abrupt (almost rectangular) angle in the upper branch of the postical vein; ambient vein extended only to the end of the first veinlet from the discal cell. Alar squamæ not small but forming a long triangle or lobe which is dull whitish and has a long but not dense whitish fringe; thoracal squamæ absent, but a very narrow yellow frenum exists. Halteres orange, knob large.

- ♀. Very much like the male. Frons slightly wider and with the widening emargination more conspicuous; face hardly widened below this because the eyes are less rounded off below; lower half of the back of the head rather more inflated and consequently the whitish beard larger and more conspicuous. Eyes in life dark green; facets irregular across the middle line, so that the arcs of facets are broken there. Antennæ rather longer than in the male.

Thorax with the humeri and the mesopleural stripe sometimes more widely and conspicuously orange, so that the humeri may be orange and the mesopleural stripe extended in equal width right up to the wing-base.

Abdomen with the orange basal spot varying from very large to small, and with the hindmargins of the second to sixth abdominal segments obviously yellow, though the band on the sixth segment or sometimes all the bands may be very narrow, but the bands on the fifth and sixth segments nearly extend to the sidemargins and the band on the fourth segment extends beyond the curve of the disc; an all black seventh segment is distinct but only about half as long or broad as the sixth, and even a very short eighth segment may be traced, and at the tip there is a pair of

long reddish orange pubescent lamellæ which are longer than the seventh segment; pubescence of the abdomen greyish white about the sides, short inconspicuous and brownish on the disc, and with short pale fringes on the hindmargins. Belly with the basal spot shining through and with the hindmargins yellowish, almost bare.

Legs with the hind knees rather more conspicuously black.

Wings, squamæ, and halteres as in the male.

Length about 5 to 7½ mm.

This species varies a little in the amount of ferruginous coloring on the inner side of the antennæ which may extend along the base of the flagellum, in the size of the yellowish spot at the base of the abdomen, and in the pale yellow to rufous orange legs and halteres; a male from Herculesbad has the antennæ ferruginous at the base and the apical style distinct though tiny, while the genitalia appear to be smaller. *X. varia* has the hind femora without any tiny black spines beneath and has the coxæ orange and the antennæ much longer. *X. nigritibialis* and *X. varicolor* from the Canaries represent only one species which has the coxæ orange, the hind tibiæ blackish, and the hind femora slightly serrulate beneath. *X. caffra* Bigot from Sierre Leone is very near *X. nigritibialis*, but has the antennæ nearly all reddish brown and perhaps shorter, the hind femora stouter and more strongly spined, and the hind tibiæ less blackish; it is however possibly only a variety of *X. nigritibialis*. *X. rufiventris* Bigot from Natal has the hind femora serrulate beneath on the apical two-fifths; while *X. calopodata* Bigot from Ternate and *X. pallipes* Loew from North America also have serrulate hind femora; but *X. pallipes* has entirely yellow humeral knobs besides other more extensive pale markings on the abdomen.

X. marginata was introduced to our British lists upon two males taken by me, one at Wicken on July 14, 1875, and the other at Exning (about five miles distant) on August 11, 1882. I always believed (after the experience of breeding *X. maculata*) that it would be found common on Poplars (*Populus*) in at anyrate the Fen district, and the capture of another specimen at Cambridge by Mr F. Jenkinson in 1905 confirmed my belief, so that its discovery in considerable abundance at Newnham at the end of July 1906 was not surprising; Dr D. Sharp found the puparia in quantities on some old and decaying Lombardy Poplars (*Populus pyramidalis*), and close by on some felled Walnut (*Juglans*) trees he took about sixty specimens (all females) in about an hour, while a visit on August 3 enabled me to take plenty of females in a very short time; on October 22 Dr Sharp informed me that there were plenty of young larvæ on the felled walnut logs, and from them he bred in 1907 several of both sexes. We evidently still know no more about the habits of the males than we do about those of the imagines of *X. maculata*.

3. **X. varia** Meigen. Thorax without any yellow markings on the disc. Abdomen yellow at the base only. Antennæ more than twice as long as the head. Legs (including coxæ) all orange; hind femora scarcely incrassate and not serrulate beneath.

Resembling *X. marginata* but easily distinguished by its yellow coxæ.

Described from continental specimens.

- ♂. Frons about one-seventh (or less of) the width of the head, and with almost parallel sides down to the slight widening near the antennæ, shining black, bare, and polished on the broad middle part from the front ocellus until quite half-way to the antennæ, but with the sides narrowly but distinctly and equally dull grey; the part of the frons below this polished portion roughened and when seen from above pale greyish, while the eyes have a curious triangular depression against the sides of the slight widening near the antennæ; pubescence on the grey side lines forming a delicate but inconspicuous grey ciliation, and this pubescence extending to the grey part just above the antennæ; ocellar triangle and the vertex behind it rather dulled and bearing short pale pubescence; the grey cross-band above the antennæ extending down outside the antennæ and covering all the small face and the narrow sides of the mouth, the mouth-opening being very large; jowls very small; lower half of the back of the head puffed out and bearing abundant rather long greyish white pubescence on a blackish grey ground with light grey eyemargins; upper part of the back of the head almost flush with the eyes. Proboscis large and protruded, orange; palpi orange with a whitish sheen, very long and upturned, basal joint thinner than the second but almost as long, second joint long-oval or club-shaped and quite three times as long as broad. Antennæ nearly three times as long as the head, dull blackish brown but glistening paler on the inside in some lights and greyish orange on the inner side of the basal part of the flagellum; two basal joints small and short.

Thorax shining black but a little dulled by rather abundant punctuation and by the abundant though not dense and not very short greyish yellow depressed pubescence, which extends all over the disc, the pleuræ, and the scutellum, though when seen from behind the broad middle front part of the thorax seems to show a broad stripe blacker than the rest; pubescence on most of the pleuræ slightly longer and glistening, but short on the metapleuræ; outer part of the humeri and a moderately narrow (but steadily widening) stripe along the upper margin of the mesopleuræ to the wing-base reddish orange and this colour extending slightly down the hindmargin of the pteropleuræ; hypopleuræ with a rather indistinct orange spot near the base of the middle legs. Scutellum conspicuously reddish orange with the sides black.

Abdomen shining black, but with a large semicircular (or broadly arched) orange spot on the basal segment which reaches the hindmargin of the segment but does not quite extend to the sides; pubescence conspicuously greyish white all over, and equal but not dense. Belly shining brownish black, but orange at the base and with the hindmargins of the segments yellowish; almost bare. Genitalia (doubtful whether male or female) in no way clubbed or swollen, but with two long narrow orange lamellæ, at the tip of each of which is a short second joint, and all bearing pale pubescence; when seen from beneath there is also an elongate narrow middle orange basal part. A specimen which may be a true male if the previous description relates to the female, or which may be a specimen with the genitalia crumpled, appears to have the genitalia short and orange, with the side lamellæ forming small rounded clubs without any second joint, and with a middle pair of parallel touching lamellæ beneath, and with another pair of short rounded lamellæ beneath well out at the sides but quite at the base.

Legs all orange (including the coxæ and trochanters) until the darkened last three or four joints of the tarsi; pubescence all over (even to the tips of the tarsi) short, abundant, and whitish, though not very conspicuous except as a silvery sheen on the hind femora, but this pubescence becomes rather longer and downier on the under side of all the femora; spurs on the posterior tibiæ obvious, orange; hind femora but little thickened and with no sign of any bristles or serration beneath. Pulvilli small and broad, dull orange; claws very small, dull orange.

Wings yellowish at quite the base; præfurca blurred soon after its origin; second veinlet from the discal cell hardly complete; fourth posterior cell closed and stalked as much as the anal cell; small cross-vein well present; ambient vein extended to the end of the first veinlet from the discal cell.

Squamæ (alar) whitish yellow, extending out in a rather narrow lobe which bears at its end rather long whitish yellow pubescence. Halteres brownish orange.

♀. I cannot clearly distinguish the sexes, but I believe that one sex has the frons slightly narrower than the other, the lower part of the back of the head less puffed out, the palpi yellower, and the abdomen more pointed.

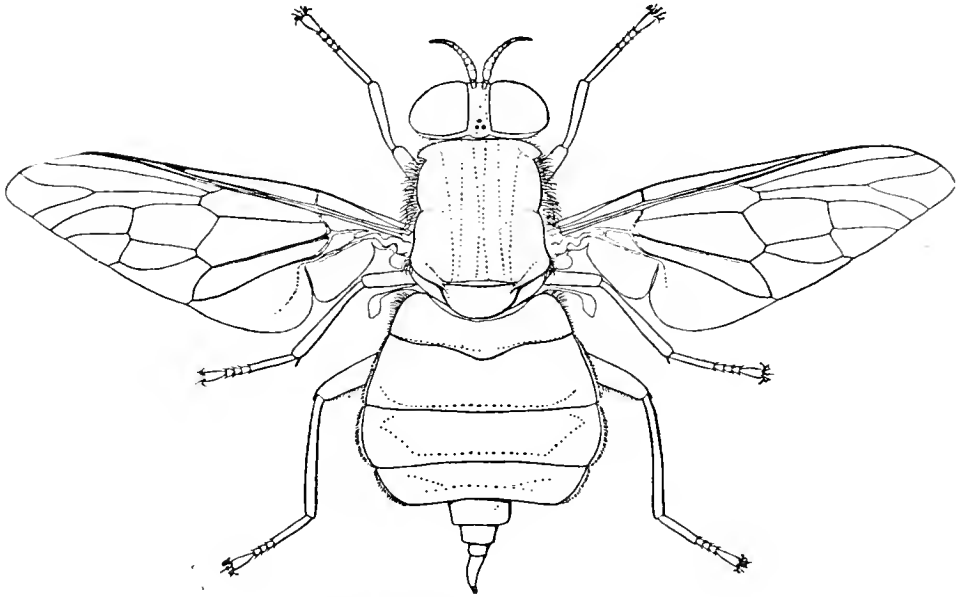
Length about 6 mm.

This species bears a general resemblance to *X. marginata* but is not really closely allied; the yellow coxæ afford an easy distinction, but beyond that the thinner unarmed hind femora show a strong structural character, and I believe the male genitalia of the two species are very distinct. *X. nigriritibialis* and its allies (as mentioned by me under *X. marginata*) all have serrulate hind femora. It has been bred in considerable numbers abroad, and numerous specimens which were bred by Léon Dufour exist in the Museum of the Jardin des Plantes in Paris and in Bigot's collection; the pupa is very similar to that of *X. marginata*, but has one or two long straggly hairs at the sides of each segment of which no trace exists in *X. marginata*.

X. varia at present is only known as British from two specimens in the Stephensian collection in the British Museum, which are probably those upon which Walker founded his description; one of the specimens is immature and in this specimen the front coxæ are discolored and the hind femora are whitish yellow while the antennæ seem to be comparatively short, but in the other specimen (which is larger) the antennæ are almost as long as in the specimens I have described. Walker says, "The larva feeds on the wood of the oak." It is very possible that it will be bred in abundance in England when its larva and pupa are searched for, although it is only recorded from Central and Southern Europe.

Synonymy.—I have seen numerous specimens of *X. citripes* Dufour and have not the slightest doubt about their being the same as *X. varia*.

II. ACANTHOMERIDÆ.

FIG. 159.—*Acanthomera Heydent* ♀. × 1¼.

Orthorrhaphous brachycerous eremochætous flies of very large to gigantic size. Antennæ with an annulated flagellum (almost as in *Xylophagus*) in the female, but with a comparatively short annulated third joint ending a long arista in the male. Tibiæ with only a slight spur on the middle pair. Wings large and broad; præfurca starting only slightly before the base of the discal cell; cubital fork wide open; fourth posterior cell bluntly closed.

Head crammed on to the thorax, large and holoptic in the male as in *Tabanus*, and still rather large and with the eyes not at all widely separated in the female. Face somewhat similar to that of *Leptis*, the middle part being distinct from its surroundings; upper mouth-edge sometimes produced into a short snout; frons of the female slightly depressed as in *Leptis*, not more than one-seventh the width of the head, and the face not much wider at the mouth; frons and occipital collar bare; ocelli conspicuous, on an elevated space. Palpi jointed, long and thin, lying against the lower part of the sides of the face and then projected forwards in the female almost as in *Xylophagus*. Eyes of the male with enlarged facets on the front and upper parts. Antennæ closely approximated at the base; two basal joints unusually short; third joint in the female flagelliform, 8-annulated, elongate, and ending in a point; but in the male (of at any rate some species) short and conical though still annulated, and bearing a long setiform terminal arista which is much longer than the third joint.

Thorax with dense or coarse pubescence at the sides of the disc. Scutellum unarmed; metanotum very small.

Abdomen with the basal five segments broad and flat, similar to that of *Stratiomys*. Genitalia of the male small and inconspicuous, of the female consisting of a many segmented apparently telescopic ovipositor.

Legs only moderately strong or even slender, the tibiæ and tarsi being specially thin; usually with a subfemoral (at about three-quarters the length) and an anterior terminal spine on the hind femora; tibiæ with a small indistinct spur on the middle pair only; touch hairs absent. Pulvilli three, pad-like; claws comparatively small.

Wings large and broad, with curious hyaline spots on a dark ground colour, when at rest lying flat on each other on the flattened abdomen; præfurca usually starting almost opposite the beginning of the last quarter of the upper basal cell, but sometimes almost opposite the base of the discal cell, and there is usually a strong fold in the wing there which runs back a long way and ends in the subcostal vein near the humeral cross-vein; cubital fork wide open, as in the *Tabanidæ* but with its lower branch comparatively longer, beginning far after the end of the discal cell and including the wing-tip, but its wing-marginal space hardly twice as much as that of the adjoining cells; discal cross-vein placed on the basal third or quarter of the discal cell; second veinlet from the discal cell starting very wide from the first veinlet, and even sometimes forming a branch from the down-turned third veinlet; posterior cells five, the fourth one being closed in a more decided manner than in any other EREMOCHÆTA; small cross-vein present though small, placed at about two-fifths from the base of the discal cell; ambient vein entire though thin; alula forming a large lobe; wing-membrane strongly rippled even back to the basal cells and the alula but not ribbed, bare or at least apparently so. Squamæ practically absent, or the alar pair a little developed.

This family shows evident relationships to the *Stratiomyidæ*, *Leptidæ* (especially *Xylophaginæ*), and *Tabanidæ*, but is quite justifiably separated from all of them. The very diverse structure of the antennæ in the two sexes (of at least some species) is very remarkable.

The *Acanthomeridæ* consist of about a dozen species of gigantic flies which inhabit South America, Mexico, and Trinidad. According to Mr Champion they inhabit the forests, alighting on trunks of trees; a habit which tends further to show their relationship to the *Leptidæ*. Fiebrig has recently (*Zeitschr. für Wissenschaftliche Insectenbiologie*, vol. xi., 1906) described the larva of a species from Paraguay which lives in the trunks of very hard-wooded trees.

Synonymy.—The genus *Pantophthalmus* Thunberg (1819) has two years priority over *Acanthomera* Wiedemann (1821), but possibly (as Osten Sacken suggests) the two genera need not be absolutely synonymous.

III. LEPTIDÆ.

Orthorrhaphous brachycerous eremochætous flies of rather small to rather large size and of more or less elongate shape; usually thinly pilose or almost bare, and with the tibiæ (or at least the posterior pairs) always spurred; ambient vein entire, and the squamæ small.

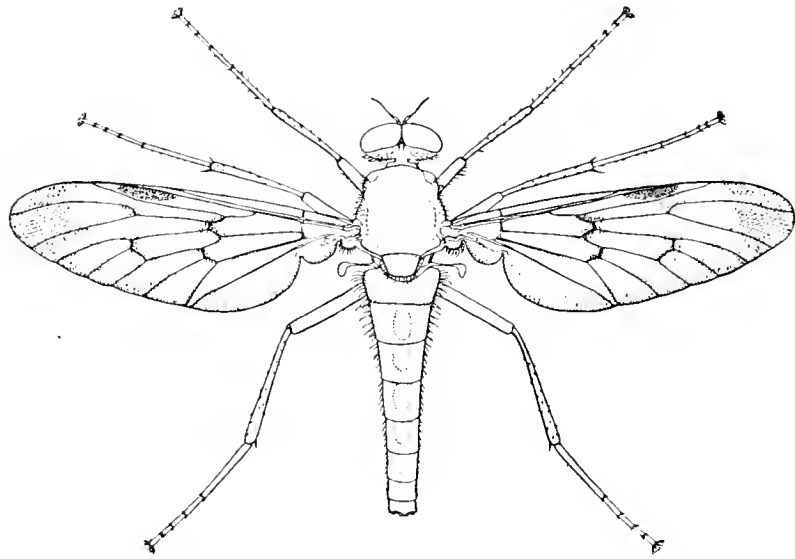


FIG. 160.—*Leptis scolopacea* ♂. × 3.

Head semicircular, usually very short and flattened in front, and consequently with an upturned appearance (though drooped in *Cænomyia*); sometimes as broad as, but often narrower than, the thorax. Frons at the vertex almost flush with the eyes; face usually with a socketed middle part (epistoma) on which there is usually a rounded raised tubercle, and with large side-cheeks or sidemargins which may bear long dense pubescence or which may be quite bare, but sometimes the face has no distinct side-cheeks and no central tubercle; face usually very short, so that the antennæ are placed near the mouth or at least as low as the middle of the head. Proboscis usually rather large and stout, with large sucker-flaps, but in *Lampromyia* (fig. 167) remarkably long; palpi long and slender, jointed. Eyes bare (except in *Cænomyia*), usually approximated or touching in the male but more or less widely separated in the female, and not bulging above the level of the vertex as in *Asilidæ*, but sometimes (*Xylophagus*) the eyes are almost equally separated in both sexes; facets in the male sometimes considerably and conspicuously enlarged on the upper part; eyes in life whole colored, sometimes brilliant green. Antennæ in typical *Leptidæ* with the third joint simple, short conical, round, or reniform, with a terminal bristle or style, and when the joint is reniform the arista may appear to be dorsal (fig. 170); while in the aberrant subfamilies the antennæ may have the third joint flagelliform and annulated (*Cænomyiinae*, *Xylophaginae*).

Thorax normal in shape and almost always bearing moderate or even almost bristly short pile without any trace of strong bristles; metapleuræ ordinarily with a rather dense tuft of pubescence; prothoracic plate forming an elongate triangle or at any rate pointed below. Scutellum usually large and bearing slightly lengthened bristly hairs, unarmed (except in *Cænomyia*) and not elongate; metanotum usually rather concealed beneath the large scutellum, but unusually large and conspicuous in *Fermileoninae* and *Xylophaginae*.

Abdomen with seven obvious segments besides the genitalia, always more or less elongate, and often conical; pubescence moderate, never bristly and never furry, but rarely absent.

Legs usually rather long, without any strong bristles or even distinct small

bristles or spicules but usually with some very tiny bristles placed in rows down the tibiæ or beneath the femora, and with all or at least the posterior tibiæ spurred (hind tibiæ only in *Lampromyia sericea*), there being sometimes one spur on the front tibiæ, always two (except as just mentioned) on the middle pair, and one or two on the hind pair (in *Hilarimorpha* the spurs are stunted); front coxæ elongate. The legs never exhibit any dilatation (hind tibiæ slightly clubbed in *Vermileo*) or structural ornamentation, but very frequently "touch-hairs" exist beneath the front tarsi. Pulvilli three (two in *Lampromyia pallida*, and perhaps in *Hilarimorpha*), the empodium being pad-like.

Wings in typical *Leptidæ* (fig. 160) with a comparatively simple venation, because the discal and small cross-veins are well developed and no veins anastomose or crowd together anteriorly, while all the veins run out separately to the posterior margin except that sometimes the long anal cell is closed just before the wingmargin; cubital vein with a long simple usually bell-mouthed fork of which the lower branch usually ends well after the wing-tip, but hardly so in *Ptiolina* (fig. 161) and *Spania* (fig. 209);

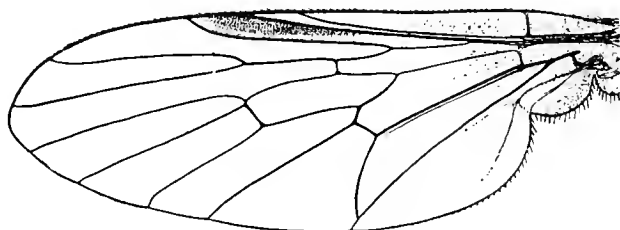


FIG. 161.—*Ptiolina obscura* ♀. × 13.

discal cell long and almost hexagonal and emitting three almost parallel veinlets to the hindmargin, and consequently the five posterior cells are open and simple; discal cross-vein before the middle of the discal cell (usually well before, but in *Spania* at the middle); basal cells long and almost equal in length; ambient vein entire and obvious though sometimes thin all round the hindmargin of the wing. The venation however in some of the subfamilies exhibits considerable modification, as in *Cœnomyia* (fig. 186) the small cross-vein is absent and the upper branch of the postical vein forms for a long distance the undermargin of the discal cell; while in *Xylophagus* (fig. 182) the cubital fork is comparatively short and its lower branch ends in the wing-tip, and the small cross-vein hardly exists because the upper branch of the postical vein often just touches the undermargin of the discal cell; and in *Rhachicerus* (which may belong to the *Xylomyiinae*) and in *Lampromyia* (fig. 183) the third veinlet from the discal cell bends sharply downwards and almost or quite closes the fourth posterior cell; in *Vermileo* (fig. 184) the cubital fork is comparatively short but the lower branch ends far below the wing-tip, and the lower branch of the discal vein runs parallel and rather close to the upper branch of the postical vein, and it would only require the anastomosis of these two latter veins and the absence of the cross-vein at the base of the third posterior cell, which sometimes even occurs in *Vermileo* (fig. 185), to produce the remarkable venation of *Hilarimorpha* (fig. 178) which is the only genus of the *Leptidæ* with four posterior cells and no discal cell. Wing-membrane smooth and often glittering, in no way ribbed or rippled but very minutely pubescent. Alula usually but not always well developed. Alar squamæ fairly even if not strongly developed, and fringed on the margin with numerous hairs (*Leptis*, etc.) or with one row of hairs (*Chrysopilus*, etc.); thoracal pair absent, but the frenum distinct and developing a rather broadened membrane near the angle. Halteres conspicuous, rather large and with a rather long stem.

The *Leptidæ* are usually easily distinguished from the *Stratiomyidæ* by their simple non-annulated third antennal joint, by their spurred tibiæ, and by the præfurca starting long before the base of the discal cell, but the boundary line between the two families is not easily defined and has been discussed by me at some length in the notes under the *Stratiomyidæ*. The only *Leptidæ* with an annulated flagelliform third antennal joint are

the *Xylophaginae* and the *Cænomyiinae*, and the only *Stratiomyidæ* with spurred tibiæ are the *Xylomyiinae* and a few exotic (but one European) *Berinae*; the *Berinae* may be also distinguished from the *Leptidæ* by the short præfurca, and consequently the only difficulty for the British student lies between *Xylomyia* and *Xylophagus*; the complete though faint ambient vein distinguishes *Xylophagus*, while the closed fourth posterior cell conveniently though empirically distinguishes *Xylomyia*. The gigantic exotic *Acanthomeridæ* are distinguished by the entire absence

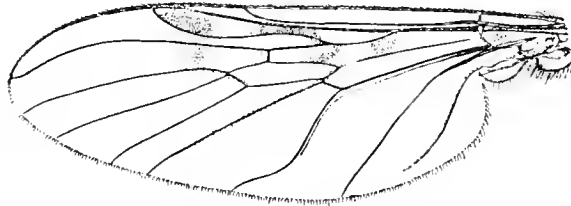


FIG. 162.—*Rhyphus punctatus* ♂. × 10.

of tibial spurs, and by a quite distinct venation in which the fourth posterior cell is bluntly closed in a different manner from any others of the EREMOCHÆTA. The *Tabanidæ* may be distinguished at once by their large thoracal squamæ, though an affinity exists in the presence of “touch-hairs” beneath the front tarsi. An entirely misleading resemblance exists between the venation of *Leptis* (fig. 162) and *Rhyphus* (fig. 163), but the

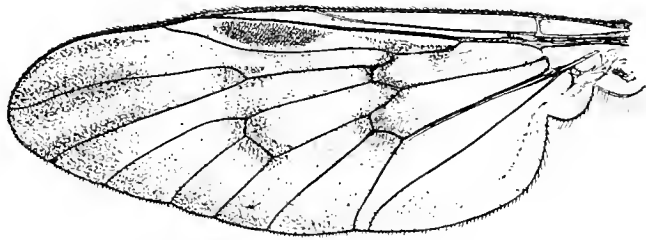


FIG. 163.—*Leptis scolopacea* ♂. × 8.

simple cubital vein and the widening anal cell of *Rhyphus* are quite distinct from any venation among the BRACHYCERA.

The *Leptidæ* (including the old families of *Xylophagidæ* and *Cænomyidæ*) are composed of about three hundred species from all parts of the world, though very few have been described from Africa. About ninety species are Palæartic, and we now admit nineteen as British (of which two are probably only varieties), though seven or eight others have in time past been reputed as British, and of these we may expect to find three or four. They usually occur in woodland districts or amongst shrubs and herbage in marshy places, while some species of *Leptis* rest head downwards on the stems of trees and sometimes have a disconcerting habit of suddenly darting at an observer; some species are said to be predaceous upon other insects, and some are said to be blood-suckers and to be capable of inflicting a severe bite on man, but I have never personally known of such a case; there

can however be no doubt about the females of some American species of *Symphoromyia* inflicting severe wounds. I cannot accept the records of the bites of *Leptis scolopacea* and *L. strigosa* as recorded by MM. Heim and Leprevost in Bull. Soc. Ent. France, LXI. c. and clv. (1892); to begin with, neither gentleman is well known in Dipterology, and in each case only one specimen was observed; M. Heim's specimen was first recorded as *L. scolopacea* but subsequently altered to *L. strigosa*, while M. Leprevost did not attempt to name his specimen but stated that it was named by M. Gazagnaire, whose name again is not known in Dipterology; I cannot help thinking that the aggressive appearance of *Leptis* led these gentlemen to believe that a species of that genus caused the bites which had been really given by *Hæmatopota*, as the bites of the latter cause in me the exact symptoms detailed; I would further remark that the status of *L. strigosa* is eminently uncertain and that it would require a very first-rate Dipterologist to identify that species or variety.

The metamorphoses of many species are well known; the larvæ of *Xylophagus* occur under the bark of trees, where they live a scavenging or predatory existence among the larvæ of wood-feeding Coleoptera and other insects; the larvæ of *Cænomyia* show close relationship to those of *Xylophagus* and have been found in the earthy débris of fallen trees; many species of *Leptinæ* live as larvæ in moss or earthy matter and may feed on worms; but the larva of *Vermileo Deggerii* is a veritable "ant-lion," and forms pitfalls in dry sand for the capture of small insects. The females of *Atherix Ibis* collect together in dense masses, and lay their eggs in these clusters, which are attached to dry branches overhanging water so that the larvæ when hatched fall into the water while the dead females remain together.

ARRANGEMENT:—If the *Leptidæ* be placed between the *Stratiomyidæ* and *Tabanidæ* the sequence of subfamilies is obvious, as the close affinity between the *Xylomyinæ* and *Xylophaginæ* compels the commencement with the latter, and then it becomes natural that the other subfamily which has an annulated flagelliform third antennal joint should precede those which have a simple third antennal joint; the *Cænomyinæ* must therefore come next, though otherwise the natural location of that subfamily is not obvious, as the venation of the genus *Cænomyia* is very distinct and the bidentate scutellum seems to show some affinity to the *Stratiomyidæ*; the other genera of the *Cænomyinæ*, however, do not exhibit these characters, and the early stages of *Cænomyia* prove its close relationship to *Xylophagus*; in the *Cænomyinæ* the fork of the cubital vein indicates a close relationship with the true *Leptinæ*, though the fact of all the tibiæ being spurred connects them with the *Xylophaginæ*. The *Vermilconinæ* have a level face without any socketed epistoma, and must therefore come before the *Leptinæ*, and possibly before the *Cænomyinæ* even though the antennæ are not flagelliform; and this is confirmed by

Lampromyia sericea from South Africa, in which species the elongate third joint of the antennæ shows traces of annulations; in the *Vermileoninae* also the arrangement of the tibial spurs seems to be variable. After clearing off these three subfamilies the *Leptinae* and *Chrysopilinae* are distinguished by the two spurs on the hind tibiæ of the former and the one spur of the latter, and although this character may appear to be trivial it is constant (although the spurs are stunted in *Hilarimorpha*).

Synonymy.—As the name *Leptis* is obviously derived from λεπτός (thin) I cannot understand the possibility of any family name except *Leptidæ*. Would those persons who advocate *Leptididæ* also use *Canididæ* or *Felididæ* because *Canis* and *Felis* end in “is”? *Empididæ* is comprehensible because there is a word ἐμπίς with a genitive ἐμπίδος, but even that emendation is unnecessary and undesirable.

The following is a translation of a short paper by Mik in the Wiener entomologische Zeitung, XVIII., 230, on the characteristic “touch-hairs” which exist on the tarsi of some *Diptera*:—

“Upon a hitherto unconsidered Organ of Touch in Diptera,
“especially in certain *Leptidæ* and *Tabanidæ*.

“Everybody who has noticed the life habits of Diptera when collecting them
“will have been struck by the peculiar behaviour of some of the small Empidæ,
“Dolichopodidæ, etc. on the leaves of plants. More particularly the species of
“*Tachydromia* (*Platypalpus*), and in the *Dolichopodidæ* the species of *Psilopus*, and
“*Hypophyllus*, *Agromyzidæ*, *Sciara*, *Psychoda*, and others, while running about on
“leaves at times lower their heads and press the mouth down on the surface of the
“leaves, after which they lift up their heads as if they had been drinking. Many
“Diptera are known to be carnivorous. Not impossibly they obtain through these
“movements the debris of other insects or very small mites, but not improbably
“they nibble drops of sugar from Aphides or suck up moisture, particularly such
“species as specially drink nectar.

“The behaviour of the species of the genus *Leptis* is remarkable, as they also
“apparently drink from leaves while making similar movements of the head to
“those mentioned before, though at the same time they make another movement
“with the front tarsi. Whilst using the posterior legs to rest upon, or move with
“slow steps on the surface of the leaves, they make curved movements with both
“front tarsi as if brushing or mowing off the upper side of the leaves, they rest the
“end of the tibiæ on the leaf and move the whole tarsus backwards and forwards
“in a curve on the upper side of the leaf, and at the same time the front tarsi
“tremble in a peculiar way, and these movements continue both when the fly is
“resting or moving. They are at rest only when the fly lowers its head on to the
“leaf and presses its proboscis to it, as stated of the other Diptera. This apparent
“drinking occurs with *Leptis* only when both front feet have come nearest to each
“other in the mowing movement, so that they can nearly touch the head on both
“sides. Involuntarily the idea is aroused that the fly holds what it has brushed up
“between the front feet so that it can more easily take it up with the proboscis.
“However I have not noticed with the naked eye any strange corpuscles on the
“surface of the leaves.

“But the movements of the whole insect show that it is seeking and feeling or
“groping about, and raise the question as to whether this apparent clearing away
“on the upper surface of the leaf with its front tarsi is not really a ‘touch’ move-
“ment, and whether something cannot be gathered from the formation of the tarsi
“which would indicate a ‘touch’ organ.

“In fact I believe I have found this organ, and consequently I interpret this
“sweeping trembling movement of the front tarsi as a sense of ‘touch.’

“I made my first observations on a male of *Leptis scolopacea* L. and subsequent
“ones on a female of *L. immaculata* Meig.

“The usual clothing of the tarsi of the species of *Leptis* is composed of shorter

“ straight hairs standing obliquely, and somewhat longer, straight, regularly arranged
 “ stiff bristles, which under the microscope appear like thorns; the hairs are more
 “ dense than the bristles and both are dark colored, being blackish brown or black,
 “ but on the under side of the anterior tarsi there are numerous isolated per-
 “ pendicular pale fine hairs which are usually rather hooked or bent towards their
 “ tips. On the front tarsi all these hairs exceed the other clothing in length and
 “ occur on all the joints, but are more numerous on the basal joint which also bears
 “ the most numerous thorn-like bristles. I consider that these pale long fine hairs
 “ are ‘touch’ hairs, for which I propose the name of ‘track’ or ‘hunting’ hairs
 “ (pili vestigantes). I notice also that on the two last joints of the front tarsi there
 “ are no bristles and only the straight oblique short hairs and the rather bent
 “ ‘hunting’ or ‘tracking’ hairs remain.

“ These hairs also exist on the middle tarsi but are more scarce and do not
 “ exceed the usual oblique hairs and bristles in length, while the hind tarsi have
 “ the ‘touch’ hairs entirely absent.

“ These ‘hunting’ hairs can readily be seen with moderate magnification and are
 “ plainly visible in dried specimens.

“ The formation of these extraordinarily organised hairs shows that they do not
 “ serve as mechanical means for accumulating foreign bodies near the fly’s head,
 “ because assuredly hairs for such a purpose would form a kind of brush.

“ An anatomical examination of these hairs would certainly be of great interest,
 “ but that must remain for others.

“ The ‘hunting’ hairs will be readily noticed in other Diptera, and among other
 “ things will have a systematic signification. In the last reference I mentioned that
 “ I have observed these hairs in all the specimens of *Leptis* in my collection, in
 “ some in greater, in some in less numbers. They occur plentifully in *Atherix*
 “ *marginata* Fabr. while they are absent in *Atherix Ibis* Fabr.,* and Rondani was
 “ therefore right in putting these species in different genera (he founded the genus
 “ *Ibisia* for the first in Prodrum, I., 154) even though the ‘touch’ hairs were
 “ unknown to him.

“ In examining the genera *Chrysopila*, *Symphoromyia*, and *Ptiolina* of the
 “ *Leptidæ* the ‘touch-hairs’ are entirely absent.

“ The movements of the front tarsi are remarkable in the species of *Tabanus*, as
 “ they sit in abundance on the stems of trees, on wooden palings and so on, and can
 “ be easily observed to carry on an extraordinary game with their front tarsi; they
 “ lift these up from the base and move them as if they were feeling about in the
 “ air, similar to *Chrysomyza* (*Chloria*) *demandata* Fabr. which occurs abundantly on
 “ our windows, or like many of the *Platystomas* and *Chironomidæ*.

“ An examination of the front tarsi of *Tabanus* showed that quite similar ‘touch’
 “ hairs occur as in the *Leptidæ*; I saw these first in a male of *Tabanus bromius* L.
 “ and this showed the same numerous fine ‘touch’ hairs on not only the front tarsi
 “ but also on the tip of the tibiae.

“ All the genus *Tabanus* in my collection show these ‘touch’ hairs, sometimes
 “ more, sometimes less. I have not examined other *Tabanidæ*.

“ I will not decide whether the gropings of these flies aim at espying booty or
 “ whether they are only trying to test the safety of their resting-place, but I believe
 “ that one must incline to the latter opinion.

“ The constancy and the different appearance of the ‘touch’ hairs in the genus
 “ *Tabanus* offer a probable new distinctive character for many species to the
 “ systematic examiner who will make a minute inspection. The great similarity
 “ and arrangement of the ‘touch-hairs’ in *Leptis* and *Tabanus* seem to me to afford
 “ a new proof of the close relationship of the *Leptidæ* and *Tabanidæ*.

“ I could not discover any similar ‘touch’ hairs in the above-mentioned
 “ *Chrysomyza*, *Platystoma*, and *Chironomus*, although the movements of their
 “ front legs agree entirely with those of *Tabanus*.

“ In conclusion, as a proof that abundant material for examination may be found
 “ in the occurrence of the ‘hunting’ hairs on the front tarsi of *Diptera*, I may
 “ mention that on the front tarsi of *Aricia erratica* Fall. ♂ I have found long pale
 “ ‘touch’ hairs, resembling those on *Leptis*, and that further, many *Anthomyidæ*
 “ possess one or more similar long ‘touch’ hairs at the base of the basal joint of the
 “ front tarsi. The following will serve as a further example: *Erigone consobrina*

* This is not quite correct (G. H. V.).

“ Meig. ♂ (Brauer, Sitzber, Akad. d. Wissensch. Wien, 1898, p. 534) which Schiner “ in his Fauna Austr. i., 451 gives as *Nemoræa rudis* Fall. has a thin ‘touch’ hair “ just before the end of each of the five joints of the front tarsi on each side, which “ is protected by the strong straight black lateral end-bristle which it almost touches. “ This ‘touch’ hair has the same direction (turned sideways) as the bristle and “ scarcely overtops it. On the middle tarsi the ‘touch’ hairs occur on only the “ three last joints, and there are none on the hind tarsi.”

“ It may be seen from these remarks that my examination of the ‘touch-hairs’ “ on the anterior legs of the Diptera has no claim to completeness. I only wished “ to note the occurrence of these organs and at the same time to point out that they “ possess a constant systematic value. Perhaps some student will find an induce- “ ment to make further and more minute investigations of this subject, which seems “ to me to possess sufficient interest.”

Type of venation of the LEPTIDÆ.

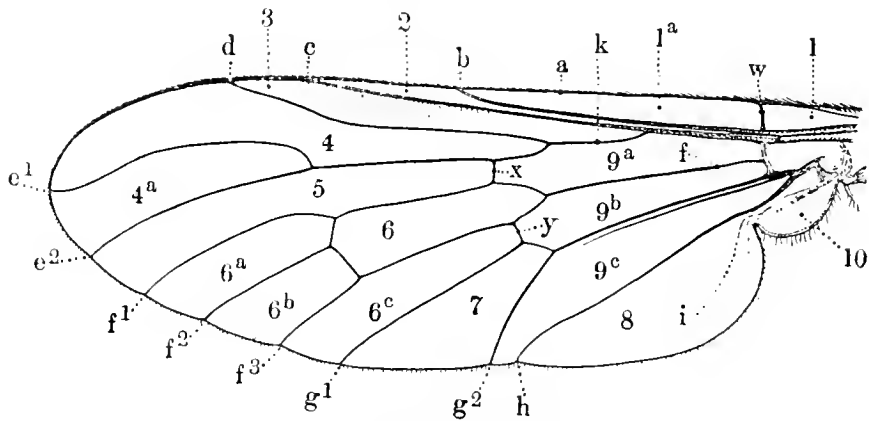


FIG. 164.—*Leptis tringaria* ♀.

Longitudinal (*or long*) veins.

- a* Costa (*or costal vein*).
 - b* Mediastinal (*or auxiliary*) vein.
 - c* Subcostal (*or 1st longitudinal*) vein.
 - d* Radial (*or 2nd longitudinal*) vein.
 - e* Cubital (*or 3rd longitudinal*) vein.
 - e*¹ Upper branch } of the cubital fork.
 - e*² Lower branch }
 - f* Discal (*or 4th longitudinal*) vein.
 - f*¹ Upper veinlet } from the discal cell.
 - f*² Second veinlet }
 - f*³ Third veinlet }
 - g* Postical (*or 5th longitudinal*) vein.
 - g*¹ Upper branch } of the postical fork.
 - g*² Lower branch }
 - h* Anal (*or 6th longitudinal*) vein.
 - i* Axillary vein.
 - k* Præfurca = the common stem of the radial and cubital veins.
- Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (*or transverse*) veins.

- w* Humeral cross-vein.
- x* Discal (*or middle*) cross-vein.
- y* Lower (*or small*) cross-vein.

Cells.

- 1 Costal (*or mediastinal*) cell.
- 2 Subcostal cell.
- 3 Marginal cell.

- 4 Submarginal cell.
 - 4^a Second submarginal (*or cubital*) cell (*or cubital fork-cell*).
- 5 First posterior (*or subapical*) cell.
- 6 Discal cell.
 - 6^a Second posterior cell.
 - 6^b Third posterior cell.
 - 6^c Fourth posterior cell.
- 7 Postical (*or 5th posterior*) cell (*or postical fork-cell*).
- 8 Axillary cell.
 - 9^a Upper (*or 1st*) basal cell.
 - 9^b Second (*or middle*) basal cell.
 - 9^c Anal (*or 3rd basal*) cell.
- 10 Alula.

Notes on the Venation of the LEPTIDÆ.

The venation in the various subfamilies exhibits a transition from the *Stratiomyidae* to the *Tabanidae*. In the *Xylophaginae* it is almost identical with that of the *Xylomyiinae*, but two important distinctions exist; in the *Xylomyiinae* (as in all the *Stratiomyidae*) the ambient vein is incomplete even though it may extend to the end of the second veinlet from the discal cell, but in the *Xylophaginae* (as in all the *Leptidae*) the ambient vein though faint is complete; the peculiar fork of the cubital vein, common to the *Xylomyiinae* and *Xylophaginae*, is seen no more in the BRACHYCERA, but the closed fourth posterior cell re-occurs in *Lampromyia* and becomes common in the DERMATINA and EREMOCHÆTA only to die out again after the *Asilidae*.

THE PRÆFURCA always starts well before the base of the discal cell.

THE CUBITAL VEIN is connected soon after leaving the radial vein with the discal cell on the basal third of the cell (whenever the cell exists) by the discal cross-vein. It is always forked and in the typical *Leptinae* the fork is long and more or less bell-mouthed but hardly more open than the first posterior cell; it begins almost opposite to or before the end of the discal cell and has the upper branch ending almost in the wing-tip, but in other subfamilies the fork is of a varied nature; as mentioned above, in the *Xylophaginae* (fig. 182) it is almost identical with that of the *Xylomyiinae* and its long lower branch ends almost in the wing-tip; in the *Vermileoninae* (fig. 184) it is wide open and includes the wing-tip in an equilateral triangle but yet is only moderately suggestive of the *Tabanidae*; in the *Cænomyiinae* (fig. 186) it includes the wing-tip at the end of a long bell-mouthed fork; in *Ptiolina* and *Spania* the whole fork is above the wing-tip because the lower branch ends almost in the wing-tip; and in *Hilarimorpha* (fig. 177) it is short and wide open but is mainly above the wing-tip. The character of the DISCAL CROSS-VEIN being placed on the basal third of the discal cell helps to distinguish the *Leptidae* from the *Asilidae* and *Therevidae*, though it is not an invariable character.

THE DISCAL CELL (when present) is always elongate and hexagonal (on the assumption that there are three angles at its base and three at its end). In the typical subfamilies the SMALL CROSS-VEIN is well defined, but in the *Xylophaginae* it is almost absent, and in *Cænomyia* the upper branch of the postical vein forms for a long distance the lower margin of the discal cell. The discal cell always emits three veinlets (irrespective of the upper branch of the postical vein) and consequently there are always five posterior cells (except in *Hilarimorpha*, which also has no discal cell).

THE POSTICAL VEIN is as simple as possible in the genus *Leptis*, but in other genera the lower branch very commonly joins the anal vein at or near the wing-margin and thereby forms a closed anal cell, and the upper branch as mentioned above sometimes touches the discal cell and in *Cænomyia* forms the under side of that cell for a long distance.

THE AMBIENT VEIN is always complete even though sometimes faint, and this character gives an unfailling distinction from the allied subfamilies of *Stratiomyidae*.

There are other peculiarities in the venation of the *Vermileoninae* (*vide* p. 257).

Table of the Palearctic Subfamilies and Genera of LEPTIDÆ.

- 1 (8) Face flat or produced, with no socketed epistoma margined by broad side-cheeks.

Cubital fork comparatively short, diverging and not bell-mouthed. *Ichneumon*-like flies.

- 2 (5) Third joint of the antennæ flagelliform, annulated, and without a long terminal arista (fig. 165).

All the tibiæ spurred. Lower branch of the cubital fork ending in the wing-tip.

XYLOPHAGINÆ (p. 244).

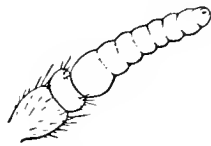


FIG. 165.—*Xylophagus cinctus* ♂. × 20.

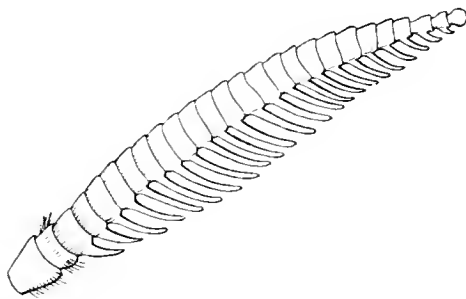


FIG. 166.—*Rhachicercus fulvicornis* ♀.
(After Snellen van Vollenhoven.)

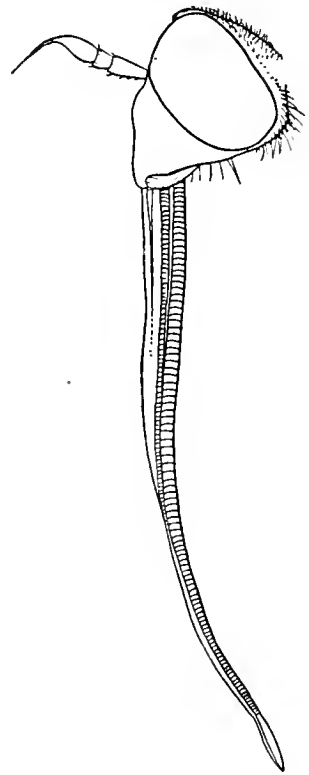


FIG. 167.—*Lampromyia funebris* Duf.
(From a specimen in the Paris Museum.)

- 3 (4) Antennæ with a multi-articulate, often pectinate, flagellum (fig. 166).

Fourth posterior cell almost or quite closed; small cross-vein long and distinct.

RHACHICERUS.

(*Xylomyiinarum*?).

- 4 (3) Antennæ with an eight-annulated simple flagellum (fig. 165).

Fourth posterior cell wide open; small cross-vein very short or even just absent (fig. 182).

1. XYLOPHAGUS.

- 5 (2) Third joint of the antennæ short and simple, or conical and indistinctly annulated, but in both cases with a long terminal arista. Alula absent.

Almost bare species. Lower branch of the cubital fork ending below the wing-tip.

VERMILEONINÆ (p. 256).

- 6 (7) Proboscis short. VERMILEO.
- 7 (6) Proboscis exceedingly long (fig. 167). LAMPROMYIA.
- 8 (1) Face with a rounded socketed epistoma margined by broad side-cheeks (figs. 171, 172).
Cubital fork long and rather narrow, more or less bell-mouthed, and with the lower branch ending below the wing-tip (except in *Hilarimorpha*).
- 9 (14) Third joint of the antennæ flagelliform and annulated (fig. 168).
All the tibiæ spurred. CÆNOMYINÆ (p. 259).
- 10 (11) Scutellum armed. Eyes hairy.
Small cross-vein absent and the upper branch of the postical fork forming for a long distance the lower margin of the discal cell (fig. 186).
Head small compared with the thorax. Anal cell open. CÆNOMYIA.
- 11 (10) Scutellum unarmed. Eyes bare.

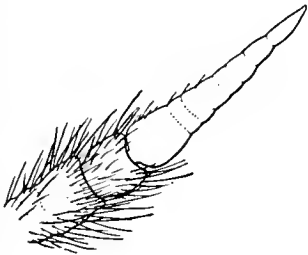


FIG. 168.—*Cænomyia ferruginea*
♂. × 22.



FIG. 169.—*Leptis scolopacea*
♂. × 33.

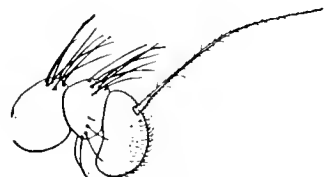


FIG. 170.—*Atherix marginata*
♂. × 43.

- 12 (13) Flagellum (=articulated third joint of antennæ) ending thin and pointed. Anal cell closed.
Small cross-vein hardly present. ARTHROPEAS.
- 13 (12) Flagellum ending in an annulated style. Anal cell open. ANACANTHASPIS.
- 14 (9) Third joint of the antennæ conical, round, or reniform, but never distinctly annulated.
Front tibiæ not spurred. Alula well developed (except in *Hilarimorpha*).
- 15 (20) Hind tibiæ with two spurs.
Eye-facets of the male approximately equal in size and without any horizontal separation. LEPTINÆ (p. 260).
- 16 (17) Third antennal joint bulbous or rather triangular (fig. 169); arista obviously apical.
Anal cell (in British species) always open. 2. LEPTIS.
- 17 (16) Third antennal joint reniform (fig. 170); arista apparently dorsal.
Anal cell always closed.

- 18 (19) Frons and sidemargins of the face in both sexes hairy (fig. 171).
3. ATHERIX.

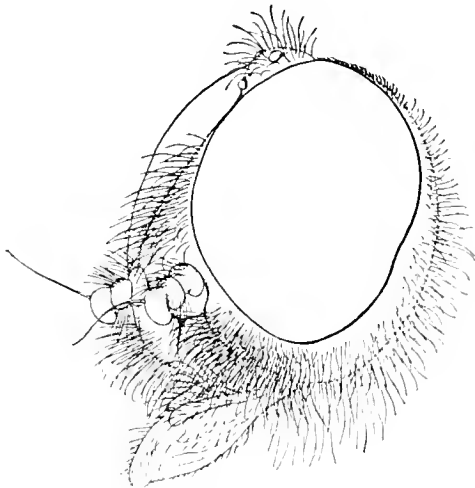


FIG. 171.—*Atherix Ibis* ♂. × 18.

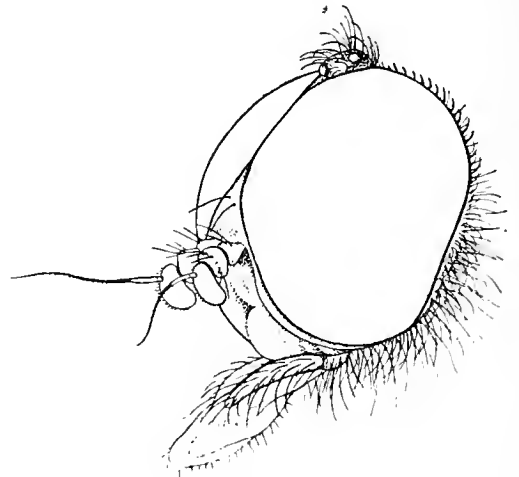


FIG. 172.—*Atrichops crassipes* ♂. × 20.

- 19 (18) Frons of the male (almost) and sidemargins of the face in both sexes bare (fig. 172).
4. ATRICHOPS.
- 20 (15) Hind tibiæ with only one spur (and even that sometimes indistinct).

Eye-facets of the male usually horizontally divided into large facets above and small facets below (but not in *Symphoromyia immaculata*).

CHRYSOPILINÆ (p. 295).

- 21 (30) Wings with five posterior cells (fig. 173); discal cell present.
- 22 (23) Third antennal joint reniform; arista apparently dorsal (fig. 174).
5. SYMPHROMYIA.

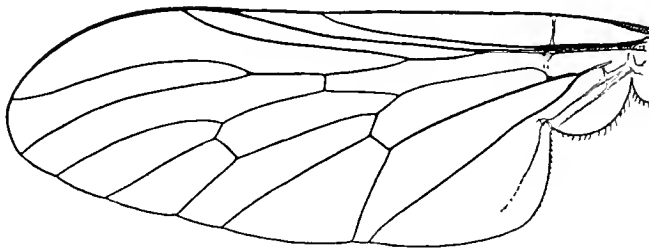


FIG. 173.—*Symphoromyia immaculata* ♂. × 17.



FIG. 174.—*Symphoromyia immaculata* ♂. × 43.

- 23 (22) Third antennal joint small, ovate, bulbous, or conical, but never reniform.
- 24 (25) Third antennal joint bulbous and bearing a long thin terminal arista.
Body bearing golden scales.
6. CHRYSOPILUS.
- 25 (24) Third antennal joint (even if bulbous) bearing a short and thick arista or style.
Body not bearing golden scales.

- 26 (27) Third antennal joint small and bulbose, bearing a short thick terminal arista which is longer than the antennæ (fig. 175).

OMPHALOPHORA.

- 27 (26) Third antennal joint rather large and ovate, bearing a style or prolongation (which in *Ptiolina* is not longer than the antennæ).

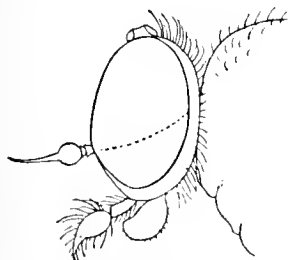


FIG. 175.—*Omphalophora oculata* ♂.
(After Becker.)



FIG. 176.—*Ptiolina obscura*
♂. × 48.



FIG. 177.—*Spania nigra*
♂. × 66.

- 28 (29) Third antennal joint with an almost central terminal style (fig. 176).
7. PTIOLINA.

- 29 (28) Third antennal joint with the lower edge of the joint prolonged into an (apparent) style (fig. 177).

Second veinlet from the discal cell almost always incomplete.

8. SPANIA.

- 30 (21) Wings with only four posterior cells (fig. 178); discal cell absent. Spurs all stunted. Pulvilli two only.

HILARIMORPHA.

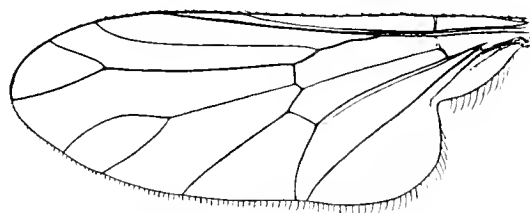


FIG. 178.—*Hilarimorpha singularis* ♂. × 18.

XYLOPHAGINÆ.

Face flat, with no socketed epistoma margined by broad side-cheeks. Palpi long and remarkably upturned. Antennæ with eight annulations on the flagelliform third joint (figs. 180, 181), or (if *Rhachicerus* belongs to this subfamily) with very numerous (twenty-two to thirty-two, or possibly even more) separated and sometimes pectinate joints (fig. 166). Eyes of the male not touching nor even approximated, though closer than in the female. Tibiæ all spurred.

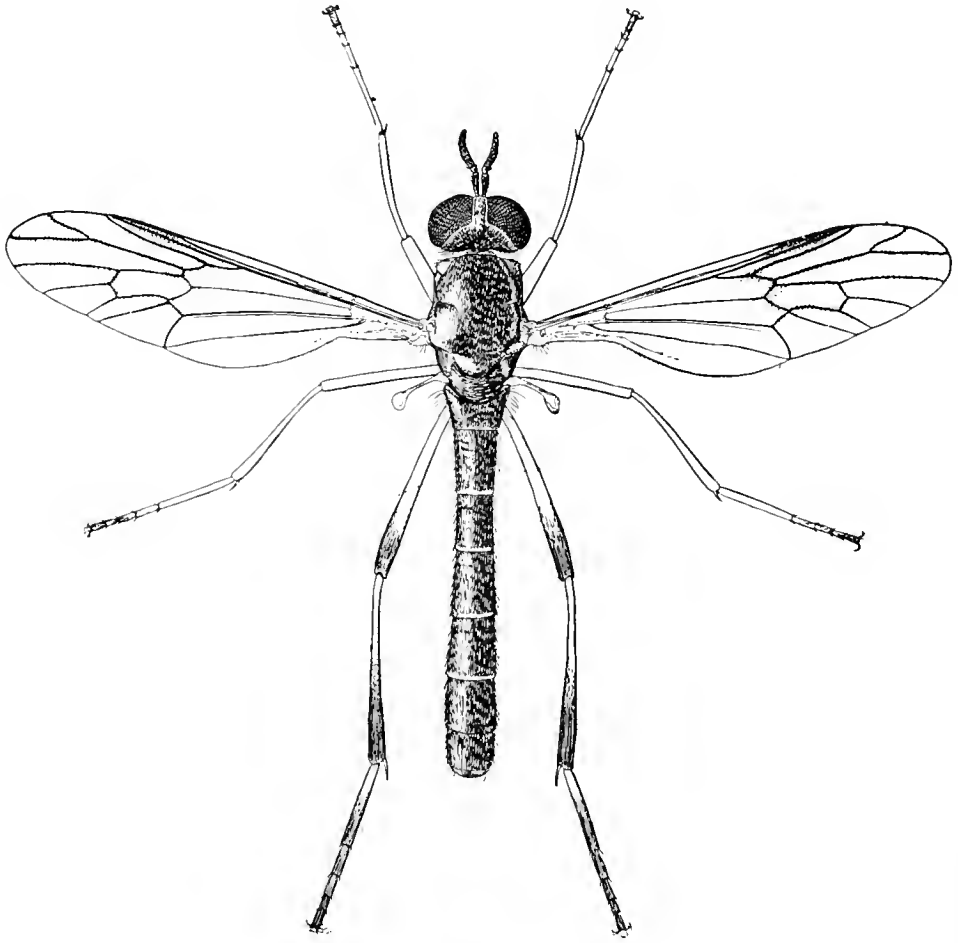


FIG. 179.—*Xylophagus ater* ♂. × 6.

Thorax almost bare, there being at most only slight soft very inconspicuous pubescence with no long hairs present. Scutellum smaller than in most *Leptidæ*; metanotum remarkably large and conspicuous.

Abdomen elongate, narrow, almost bare, with seven obvious segments. Genitalia of the male rather complicated; ovipositor long and telescopic.

Legs long and thin, without any bristles or even obvious pubescence, but all the tibiæ spurred; front tibiæ with one moderately long spur, middle and hind tibiæ with two rather long almost equal spurs.

Wings (fig. 179) diverging from the true Leptid type; cubital fork moderately long but with the lower branch ending in or just before the wing-tip and the upper branch not much more than half as long and ending in the wingmargin about half-way between the ends of the lower branch and of the radial vein; radial vein short, being curved up rather quickly; discal cell shorter than in the *Leptinæ*; small cross-vein almost absent; alula absent; ambient vein present though faint.

Larvæ amphipneustic, allied to those of *Cænomyiinae* and *Leptinae*, carnivorous, living under the bark of dead trees and preying upon other (probably dead) larvæ occurring there, especially those of wood-boring Coleoptera, or upon the débris and detritus left by those larvæ.

This subfamily is divergent from the typical *Leptidæ* in many ways, and more especially in the long flagelliform annulated third joint of the antennæ; it has this last character in common with the equally divergent *Cænomyiinae*, from which it differs widely in the imaginal state though allied in the larval stage. It seems to show more relationship to the concluding subfamilies of the *Stratiomyidæ*, and for a long time was associated with *Xylomyia* in forming an intermediate family which was called the *Xylophagidæ*; this old family differed from the *Leptidæ* in having the third antennal joint annulated, and from the *Stratiomyidæ* in having the tibiæ spurred, but subsequent investigations have proved that those characters are misleading and a closer knowledge of the larvæ has proved that *Xylomyia* is a Stratiomyid somewhat allied to the *Berina* (some of which have spurred tibiæ), while *Xylophagus* is allied to the *Leptidæ*, towards which the perfect insect also shows connecting links in its venation, its complete (though faint) ambient vein, its front coxæ, its prothorax, and its anatomy.

The subfamily may possibly be limited to the genus *Xylophagus*, but if *Rhachicerus* be included it is distinguished by its remarkable antennæ. *Pachystomus* was founded upon a female specimen of *Xylophagus cinctus* with crumpled antennæ.

Only three Palearctic species of *Xylophagus* and one of *Rhachicerus* are recognised.

1. XYLOPHAGUS.

Xylophagus Meigen, Illig. Mag., ii., 266 (1803).

Moderately large, almost bare, elongate, *Ichneumon*-like flies; blackish colored but sometimes in the female with the middle part of the abdomen considerably reddish.

Head broader than high, as broad as the thorax. Face retreating. Vertex rather drawn in so that the eyes appear rather swelled forward, and at no part does the frons or face protrude beyond the level of the eyes, but there is sometimes an antennal prominence. Proboscis prominent, with the moderately broad sucker-flaps and the conspicuous keel-shaped two-jointed palpi directed upwards. Eyes in both sexes separated almost equally from the vertex to the mouth; facets all almost equal. Antennæ (figs. 180, 181) as long as or longer than the head; basal joint slightly or considerably longer than the second; second joint short and transverse; third joint (=flagellum) longest, whip-shaped or cylindrical, with eight annulations but with no terminal arista or style.

Thorax rather elongate oval, little arched, almost bare, and without any sign of bristles; prothorax pubescent. Scutellum quite unarmed; metanotum very large and exposed.

Abdomen of the male long and parallel-sided, quite twice as long as the thorax and scutellum together, blunt at the tip, and with seven obvious segments; of the female less parallel-sided and much lengthened by the extended tube-like telescopic ovipositor.

Legs long and thin, almost without pubescence; front coxæ notably long, thin, and pubescent; front tibiæ with one rather long spur; posterior tibiæ each with two rather long spurs; empodium forming a middle pulvillus which is larger and broader than the other two; claws small.

Wings (fig. 179) long and narrow, rather clouded or apparently spotted; præfurca beginning very considerably before the discal cell; radial vein ending in the costa near the subcostal vein; cubital vein originating from the præfurca almost opposite the base of the discal cell, and ending in a long conspicuous fork of which the lower branch ends almost in the wing-tip while the shorter upper branch ends about half-way between the wing-tip and the radial vein; discal cell emitting three simple veinlets to the wingmargin, and the fourth posterior cell wide open though slightly narrowed towards the wingmargin; small cross-vein sometimes distinct but often reduced to a point at the place where the upper branch of the postical vein touches the discal cell; anal cell closed or almost closed at the wingmargin; fork of the postical vein rather short because all the basal cells are unusually long and the lower branch of the postical vein is short and steep; ambient vein present, though faint after the lower branch of the cubital fork. Alula absent. Wing-membrane minutely pubescent all over, but not rippled or ribbed. Alar squamæ moderately developed and with a short pale marginal fringe which is composed of several rows of hairs. Halteres rather large and with long stems.

The larvæ live under the bark of rotten trees such as Birch (*Betula*), Alder (*Alnus*), and Fir (*Pinus*), where they are said to be predaceous upon other larvæ such as *Pyrochroa coccinea*, etc. Dr Sharp states however that they only act as scavengers and refuse to eat anything except freshly dead larvæ, and he further says that they will not touch rotten larvæ but are always on the lookout to suck the juices of (not to eat) any larva which has just died. They are amphipneustic and show relationship to the *Leptinæ*, and the pupa throws off the larva-skin.

The flies are uncommon, but may be found on the stems of those rotten trees which show signs of wood-feeding coleopterous larvæ; they run about actively and apparently imitate some genera of *Hymenoptera*.

This genus used to include *Xylomyia* (*Subula*), which it resembles in the annulated third joint of the antennæ and somewhat in the venation, but Osten Sacken remarked (Berlin. Ent. Zeitschr., xxvi., 364, 1882) that in *Xylomyia* "the prosternal plate, intervening between the front coxæ and the anterior thoracic orifice is large; the front coxæ short; the abdominal segments but little extensile; in these characters *Subula* is like the *Beridina*. In *Xylophagus*, on the contrary, the prosternal plate is small, and hence, the interval between the front coxæ and the anterior thoracic orifice is short; the front coxæ are inserted very near the head; they are long, cylindrical and very movable; the abdominal segments are loosely joined, with extensile connecting membranes; all these characters are those of the group *Tabanidæ*-*Leptidæ*" (figs. 155, 156). The result of these distinctions is that *Xylomyia* is now relegated to the *Stratiomyidæ*, while *Xylophagus* is considered to belong to an outlying subfamily of the *Leptidæ*.

Xylophagus is composed of very few species, and only two have been well recognised from Europe, and even of these two the male of *X. cinctus* has hitherto been scarcely distinguished. I am however of opinion that closer examination will produce more European species, as I shall have to describe one from Central Europe as new to science. Several species occur in North America, of which some are very closely allied to, even if not identical with, European species, and one species has been recorded from South America.

Synonymy.—*Xylophagus* was established by Meigen in 1803 with "*Nemotelus cinctus* Deg." given as a representative species, but even in 1804 and 1820 Meigen had not yet seen a specimen of *X. cinctus* and therefore could not have established

his genus upon a knowledge of that species, and as he described the basal joint of the antennæ cylindrical (walzenförmig) as compared with the cup-shaped second joint, and in 1804 placed *X. ater* as his leading species, it may be concluded that the latter species is the type of the genus. Meigen sometimes too hastily gave a species of DeGeer as typical of a genus when he believed that he comprehended the species from specimens before him which were however not identical with DeGeer's species, and in such cases the type of the genus cannot be DeGeer's species, e.g. *Corethra* was a genus well designed by Meigen but *Tipula culiciformis* DeGeer being unknown to him could not have been the type of it, and therefore in that and other genera it becomes necessary to find out what species Meigen had before him before fixing the type species. Meigen did know *Xylophagus ater* and did not know *Xyl. cinctus*, and consequently if *Xyl. cinctus* could by any chance be placed in a distinct genus a new generic name would have to be formed for it, and not one for *X. ater*. In 1820 Meigen placed the species of our present genus *Xylomyia* in a separate section of his genus *Xylophagus*, and stated that Megerle had suggested the name *Subula* for them, and consequently they lose all claim to the name *Xylophagus*. As a matter of fact DeGeer's figure of "*Nemotelus cinctus*" is unmistakably that of a female *Xylophagus cinctus*. There is another point to be reckoned with in dealing with Meigen's genera which were indicated in Illiger's Magazine in 1803; Meigen only gave short characteristics of a hundred and fourteen genera, of which about ninety were new to science, yet in many cases he indicated no species as representative of the genus, and in these cases in all probability he only knew undescribed species, but in other cases he mentioned some already described species (even if unknown to him) as probably belonging to his new genus but not necessarily was typical; the paper was also only issued as a trial or experiment (Versuch) and was only the precursor (Vorläufer) of his subsequent work; I therefore attach no value to the indicated probable representatives (not the types) of Meigen's new genera in that paper, but I accept as types those species which were indicated as such in Meigen's next work. *Pachystomus* of Latreille (1809) was obviously founded upon a female *Xylophagus cinctus* with deformed antennæ, which had previously been described and figured by Panzer under the name of *Rhagio syrphoides*.

Table of Species.

- 1 (2) Basal joint of antennæ cylindrical, four times as long as the second (fig. 180). Thorax considerably shining. Abdomen of the female not at all reddish. 1 *ater*.
- 2 (1) Basal joint of antennæ rather globular, not twice as long as the second (fig. 181). Thorax dull except about the humeri.

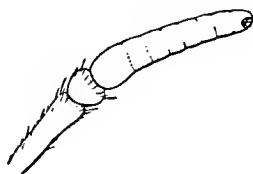


FIG. 180.—*Xylophagus ater* ♂. × 20.

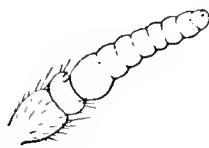


FIG. 181.—*Xylophagus cinctus* ♂. × 20.

Abdomen of the female conspicuously reddish about the middle. 2 *cinctus*.

A third European species occurred in Kowarz's collection under the label of *X. cinctus*, which however I take to be undescribed; the male of it may be distinguished by its entirely shining frons and by the broad dull disc of the thorax of which only the sides are shining black.

1. **X. ater** Fabricius. Antennæ with the basal joint cylindrical, nearly four times as long as the second. Thorax of the male mainly shining, but

of the female with two broad shining stripes. Abdomen of the female not at all reddish.

A long thin blackish *Ichneumon*-like fly.

- ♂. Head when viewed from above slightly broader than the thorax and proportionately long, about three-fifths as long as broad and rather flat behind and almost so in front; when viewed from in front the head is fully four-fifths as deep as it is broad at its broadest part, which is rather above the middle of the eyes; back of the head (when seen from above) but little excavated though sunken between the eyes, dull black with a greyish postocular margin on the lower part; upper part of the frons (not including the ocellar space) below the level of the eyes, but the lower part and the face only slightly below; frons widest at the vertex (about a quarter the width of the head) but gradually narrowing down to the antennæ, and being there nearly a fifth the width of the head; face glistening greyish white because of the dense pollen which covers it, but otherwise quite bare, nearly as wide as the lower part of the frons and with parallel sides; jowls absent; lower part of the back of the head rather puffed out, moderately shining æneous black but obscured by grey dust and bearing a rather long light grey pubescence on the lower part, but with darker pubescence on the upper part; about the middle of the back of the head the inflation dies away and all the upper part is flush with the eyes or even rather hollowed out and without any obvious pubescence; vertex and frons bare of pubescence but densely covered with minute greyish white down except on and about the considerably elevated ocellar triangle and on the shining black lower third (or thereabouts) of the frons. Proboscis rather long and exerted, pale luteous to deep orange, and bearing slight pale pubescence; palpi obvious, dull black, with a long cylindrical slightly pubescent reddish-orange base which lies close along the sides of the mouth, but they develop into a long stoutish prominent dull black bare projecting end. Eyes quite bare, in profile almost semicircular with the back part nearly straight; facets all rather large but those on the front part largest. Antennæ (fig. 180) less than one and a half times as long as the head, dull blackish brown; basal joint long and cylindrical, nearly four times as long as the slightly transverse second joint, and both basal joints bearing minute bristles; third joint nearly twice as long as the basal one (or rather less) and rather stouter, almost equal in bulk for its whole length, and with eight rather indistinct annulations of which the first is the longest and slightly the stoutest; at the tip of the last annulation towards the outer side there is a small pit; the third joint (= flagellum) is distinctly arched.

Thorax moderately shining black, but the humeri and a broad stripe along the sides of the disc to the wing-base polished, impunctate, and bare, except for a few minute bristles just before and after the suture, and alongside of these polished stripes are other broad dullish minutely roughened stripes which have straight sides but which begin only about half-way between the front of the thorax and the suture, and which extend almost to the hindmargin; these dull stripes are also bare of pubescence and vary a little in extent, but next to them on their inner sides are rather narrow stripes of pale greyish yellow pubescence (widened out on the shining part in front) which extend as less definite stripes almost to the hindmargin, while on the moderately shining middle part of the thorax there are some more slight short scattered pale hairs which tend to form a broad middle stripe on the hind part because they widen out and unite with the outer stripes of pubescence; down the middle of the front part is an indistinct short stripe of pale dust which widens out in front but does not extend so far back as the suture; the middle hind part of the thorax (after the suture and between the dull stripes) is depressed and is roughened by the punctures of the minute pubescence; humeral knobs prominent and sometimes brownish. Pleuræ mainly polished black and bare, but with a very slight minute pale pubescence about the upper hind corners of the mesopleuræ, sternopleuræ, and metapleuræ; prothorax with slight pale pubescence just above the front coxæ. Scutellum shining black but slightly dulled by faint roughening, almost bare and impunctate, but with a very sparse short

greyish pubescence whose roots cause a very sparse punctuation ; metanotum very large, shining black but a little dulled about the sides except on most of their front part, and with a faint yellowish line across just before this duller part, and on and about this yellowish line there is a sparse pale grey pubescence.

Abdomen tubular, more than twice as long as but distinctly narrower than the thorax and scutellum together, almost parallel-sided and ending rather bluntly ; it is composed of seven segments of which the basal one is not quite so long as any of the next five and scarcely as long as the seventh, and it is shining black though occasionally the hindmargins of the second to fifth segments are indistinctly yellowish, and the abdomen bears all over equal fairly conspicuous decumbent greyish white pubescence which is abundant but by no means dense and which is longer and more erect about the basal corners. Belly usually continuing to form the abdomen into a tubular shape for at least the four basal segments while the fifth and sixth segments may flatten up against the dorsal plates, though sometimes all the ventral plates flatten up against the dorsal plates or all may appear to form the tube, but in all cases the dorsal plates overlap at the sides and form an overhanging margin ; hindmargins of the segments inconspicuously brownish yellow, or in case the dorsal hindmargins are obscurely yellowish then the ventral ones are more conspicuously yellow. Genitalia formed by an apparent dull blackish brown eighth segment which is shorter than the seventh, and the upper part of which forms a large cap covering the lower lamellæ, and against the outer corners of this a pair of bright reddish orange rather short thick lamellæ can be seen, and when seen from below a pair of large broad ovate dull blackish brown side lamellæ are visible and bear rather dense decumbent minute grey pubescence, while before them right against the seventh ventral segment lies a small transverse ovate basal middle piece ; these side lamellæ and the basal piece often bear chestnut reflections.

Legs, including coxæ and trochanters, usually clear pale orange but sometimes rather darker orange ; marginal tip of the trochanters black beneath ; hind femora blackish at the tip on the upper side, and the hind tibiæ brownish or brownish black on the apical half or less ; two last joints of anterior tarsi blackish (at least above) and usually the tips of the other joints darkened, while on the hind tarsi the apical quarter of the basal joint and apical half of the second joint are usually darkened and the three end joints may be blackish or at least darkened ; front coxæ long and narrow, gradually diminishing in size, and bearing rather abundant short depressed pale yellow pubescence ; posterior coxæ rather darker orange, shorter and stouter ; hind coxæ shining black at the base ; front femora stouter and shorter than the others, but the middle pair thin and long, and the hind pair thin and very long but very slightly thickened on the apical half ; tibiæ all long and thin, especially the hind pair ; pulvilli greyish yellow, claws black. Front tibiæ with one fairly long yellow spur, middle pair with two rather long yellow spurs, and hind pair with two spurs as long as those on the middle pair but usually rather obscured in coloration. Pubescence of the legs almost imperceptible, very minute, adpressed, and pale yellow.

Wings (fig. 182) slightly greyish hyaline, with the base and the veins there

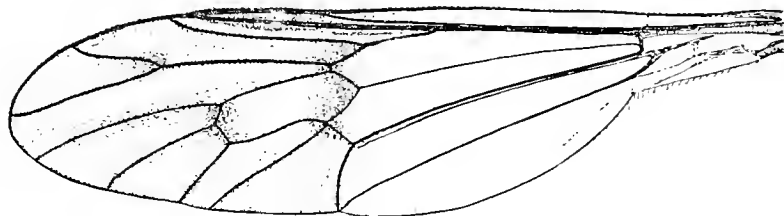


FIG. 182.—*Xylophagus ater* ♂. × 10.

pale yellow, but with a dark stigma and clouded cross-veins, and the other veins blackened and conspicuous ; stigma long and blackish or blackish brown, extending from the tip of the mediastinal vein to the tip of the radial, and making all the end of the subcostal cell black or blackish brown, and

even the long narrow marginal cell usually brownish; veins after the base conspicuously thick and black, except that the mediastinal vein is pale brown and the discal vein and all its branches are thinner than the other veins; there is a tendency to clouding about the base of the cubital fork and on the end veins of the discal cell, and there is a slight cloud crossing the triangular end of the upper basal cell, the base of the discal cell (sometimes rather conspicuously), and down both branches of the postical fork, while all the stem of the postical vein is margined dark brown, making it appear unusually thick; the præfurca has a pale piece just before the origin of the cubital as though a pellucid band crossed the wing thereabouts; stem of the cubital vein slightly longer than the lower branch of its fork, the upper branch more or less S-shaped and a little more than half as long as the lower branch and ending in the wingmargin about half-way between the ends of the lower branch and the radial vein; lower branch of the cubital fork ending immediately before the wing-tip; ambient vein continued all round the wing, though very thin on the hindmargin and not extending across the alula; the lower of the two veinlets forming the base of the discal cell slightly the longer; small cross-vein sometimes just existing, but often the upper branch of the postical vein just touches the discal cell at a sharp angle; the fourth posterior cell may be very slightly narrowed towards the wingmargin; anal cell usually closed at the wingmargin, but occasionally just open; alula absent, so that there is a long almost straight clear hyaline basal hindmargin of the wing up to the angle of the fold which extends up to the faint axillary vein. Wing-membrane all minutely pubescent but not in the least rippled. Alar squamæ small but distinct, pale yellow with a slight pale yellow fringe; thoracal squamæ absent, being only indicated by an unfringed pale yellow frenum. Halteres conspicuously long and large, whitish yellow to dull orange.

- ♀. Larger than the male, with the wing-markings much more conspicuous, and with a conspicuous long-pointed telescopic ovipositor. Frons at the vertex fully a quarter the width of the head, and the frons and face of almost equal width right down to the mouth or if anything slightly narrower at the mouth than at the vertex; frons shining black with a broad transverse band of greyish yellow pollen just below the ocelli or even including them and the absolute margins of the sockets of the antennæ light grey; upper part of the face also covered with light grey dust all across, but the lower part shining black; the narrow sides of the mouth are shining black; back of the head inflated on nearly the lower half (about one-third the width of the eye when seen in profile), but on the upper part almost flush with the eyes; palpi blackish almost to the base but obscurely orange there. Eye-facets rather large, but all equal in size. Antennæ, proboscis, etc., almost as in the male.

Thorax mainly dullish grey with two shining broad black stripes which are well separated but which widen out laterally in front so as to connect there with the broader shining black lateral stripes, but in some lights they only extend backwards on the disc just over the suture unless indistinctly and not shining, but in other lights they are still shining and even coalescing just after the suture; most of the thorax behind the suture is dull blackish grey, but the shining lateral stripes are continued right through and bend round the hindmargin so that only a comparatively narrow middle dull grey line extends towards the scutellum; humeri sometimes, and the postalar calli and their neighborhood, rather brownish. Scutellum shining black but brownish at the sides and on the ridge running from the postalar calli. Pubescence on the thorax and scutellum practically none, but some minute sparse light grey pubescence exists on the two shining dorsal stripes, especially after the suture.

Abdomen long, ending in a long-pointed telescopic ovipositor, glittering black or brownish black; first six segments almost equal in length, and the second to fourth as broad as the thorax, while the first and fifth are slightly narrower, and the sixth distinctly narrower; the seventh segment forms a narrow cone and emits the very long narrow yellowish brown ovipositor, which is distinctly longer than the seventh segment and which

ends in a pair of small ovate divergent yellowish brown lamellæ, but these elongate tubular segments are telescopic and may vary in length to almost any extent. Pubescence inconspicuous, depressed, and dark, except on the basal segment and on the sides of the second segment where it is a slight, pale, and more erect; in certain lights this pale pubescence continues on to the third and fourth segments but is there depressed and rather darker; all other pubescence as in the male. Belly less shining; fifth and sixth segments (and the fourth somewhat) flattened against the dorsal plate.

Legs distinguished from those of the male by the absence of any darkening at the tip of the hind femora; hind tibiæ varying from dark orange to all blackish.

Wings with the stigma blackish and followed below by a brown cloud which is about equally long in the marginal and submarginal cells, but below these cells the cloud is reduced to the end triangle of the upper basal cell, the basal third of the discal cell, just the base of the fourth posterior cell, the borders of the upturned part of the upper branch of the postical vein and down its lower branch, and there is clouding at the wingmargin on the lower third of the postical cell and at the margin of the fourth posterior cell, and again on both sides of the veinlets closing the discal cell so that that cell has a large pellucid kernel; the underside of the stem of the cubital vein is clouded as far as the pellucid piece, and so is the fork of the cubital vein; but all these cloudings may be less extended and at the same time more pronounced; the two veinlets forming the base of the discal cell almost equal in length; small cross-vein almost (or even distinctly) existing, but sometimes the discal cross-vein barely present, owing to the upper part of the discal cell almost touching the cubital vein; stem of the cubital vein just about as long as its lower branch or slightly longer. Squamæ and halteres as in the male.

Length about 9.5 mm. (♂) or 13 mm. (♀).

This species varies a little in the distinctness of any dull stripes on the thorax of the male which however are always faint, and occasionally in the hindmargins of the abdominal segments exhibiting traces of pale coloring especially beneath; both cross-veins vary in distinctness, the discal one being sometimes very short, while the lower one is usually hardly existing; the extent of the cloudings on the wings also varies considerably. I find very little value in Schiner's character of the relative lengths of the stem of the cubital vein and the lower branch of its fork, as usually the stem is slightly the longer but not unusually the two are almost equal in length. The only other recorded Palearctic species, *X. vinctus*, may easily be distinguished by the shorter basal joint of its antennæ and by the red-banded abdomen of the female, but there was an apparently undescribed species in Kowarz's collection which has the antennæ more like those of *X. ater* but has the frons more shining and the thorax more dull. I think that two North American specimens in Bigot's collection from Washington under the name of *X. reflectens* Walker are distinct from, though closely allied to, *X. ater*; the male has much more clouded wings and a duller frons in front, while the female (which may well belong to a different species) has a narrow shining black *middle* line on the thorax instead of the two separated shining lines.

X. ater is an uncommon British insect, though it can almost always be found in small numbers in some localities. There is a decaying tree near the village of Bank in the New Forest upon (or near) which Dr D. Sharp can depend upon taking a few specimens every summer, and Colonel Yerbury and Mr G. C. Bignell have found it not uncommon about Ivy-bridge and Plymbridge and the Avon Valley in South Devonshire. Colonel Yerbury has also taken it at the Black Mountain in Hereford-

shire and at The Mound in Sutherland, while he and others have taken several specimens at Nethy Bridge in Inverness. Dr F. Buchanan White found the larvæ at Braemar in 1873, and he said (Entom. Month. Mag., xiii., 162, 1876) "The larva lives between the bark and the wood of dead birch stumps, almost invariably in company with the larva of *Pyrochroa pectinicornis*, on which it probably feeds, though I never saw it attacking that or any other insect"; and "till I reared the imago I considered the larvæ that I found to belong to the same species as those of *X. cinctus*, to which they have a very great resemblance. The habits and times of appearance of *X. ater* are the same as those of *X. cinctus*"; through the kindness of Mr Alex. Rodger, Curator of the Perth Museum, I have seen some of Dr White's original specimens and can confirm their name. Previous to this Damianitsch in 1868 (Verh. zool.-bot. Wien., xviii., 118) described the metamorphoses and figured the larva which he found under the bark of an Alder (*Alnus*), and he then stated that the larva lived for ten months on earth and pieces of bark, and he suspected that it merely lived in the company of *Pyrochroa coccinea* and not on it. Zetterstedt (Dipt. Scand., viii., 2947) said "Larvæ hujus speciei in larvis *Pyrochroæ coccineæ* prædantes vivunt, teste D. Drewsen," and in saying this he probably relied upon Drewsen's note in Kroyer's Naturhist. Tidsskr., iv., 103, in which he stated that they feed upon the larvæ of *Pyrochroa coccinea* and *Tipula*. Dr Sharp has informed me that he has found the larvæ in various trees in the New Forest, such as Oak (*Quercus*), and Fir (*Pinus*), but most commonly on Beech (*Fagus*) and on Aspen (*Populus tremula*) at Nethy Bridge, while *X. cinctus* appears to be confined to Scotch Fir (*Pinus sylvestris*); he also states that the Oak specimens prey on the larva of the rare beetle *Phlæotrypa*. *X. ater* is recorded from Lapland to Middle Europe. My records of the perfect insect range from May 16th to July.

Synonymy.—Meigen described this species in 1804, though it is curious that he subsequently ascribed it to Fabricius whose description appeared in 1805; there cannot be much doubt but that Meigen had a female before him, as he says "Sie ist glänzend schwarz. . . . Das Bruststück ist grauschillernd, mit zwei schwarzen Rückenlinien." In 1820 he altered this to "Rückenschild des Männchens durchaus glänzend schwarz; des Weibchens mit drei breiten greisen Striemen," which fully answers to the description I have given. *X. compeditus*, of which the description was communicated to Meigen by Wiedemann, is probably a synonym of the female because of "Ueberall glänzend schwarz" and "Auf dem Rückenschild drei graue Längslinien" though various details do not quite agree; it is probably not a synonym of *X. cinctus* as Wiedemann would hardly fail to have noticed the short basal joint of the antennæ. *Empis subulata* of Panzer (1798) is commonly given as a synonym of *X. cinctus* of which it is possibly the male, but the figure is very suggestive of *X. ater*; as however it is impossible to prove which species it referred to it is not worth reconsideration.

2. ***X. cinctus*** DeGeer. Antennæ with the basal joint rather globular, not much longer than the second. Thorax dull except about the humeri. Abdomen of the female reddish all about the middle.

The male is rather like *X. ater*, but both sexes are easily distinguished by the diagnostic characters.

♂. Head broader and flatter than in *X. ater*; frons broad, being more than a quarter the width of the head, dull grey all across the middle, but shining

black on the large callus above the antennæ which extends from eye to eye, and dullish black on the upper part but shining about the ocellar space; frons much broader than in *X. ater* and with almost parallel sides; face very distinct from *X. ater*, deep black and brilliantly shining, very short, being about one-third the length of the frons, nearly as wide as the front part of the frons (*i.e.* nearly a quarter the width of the head), and with a conspicuous large silvery white broad triangle at the top of each side, and these white triangles extend narrowly past the outside of the antennæ to the lower corners of the frons; back of the head more puffed out and rounded out considerably from the eyes, dull black, and bearing on the lower part a long (longer than in *X. ater*) dense whisker-like whitish grey pubescence, while higher up (on the middle part of the back of the head) there is a very sparse row of postocular bristly hairs which die out on the upper part, and on the back of the head right away from the eyes there are numerous black or grey hairs. Proboscis yellowish; palpi dull deep black even to the base where there is a little tuft of pale hairs, much larger than in *X. ater*, and much more produced. Eyes in profile more circular; front facets inconspicuously larger than the others. Antennæ (fig. 181) dull black, placed on a small prominence and about as long as the head; basal joint stout, little longer than broad; second joint transverse, hardly half so long as the first; two basal joints bearing numerous minute black bristles; third joint hardly twice as long as the two basal joints together, and with eight crowded annulations.

Thorax all dull greyish black except on the shining black humeri and on the paler grey stripes; when viewed from in front there are three narrow grey lines rather close together running down the middle of the disc and also traces of grey side-lines, and the two resulting greyish black middle lines coalesce after the suture and run on to the hindmargin as one rather broad dark black middle stripe, and the black stripe after the suture is margined outside by two rather broad ashy grey stripes; when viewed from behind, the middle quarter of the præsutural part of the disc appears as an equal light ashy grey stripe with a narrow dividing black line, and (when viewed from above) there are light grey lines outside the postsutural broad black middle stripe, and the space between them and the sides is greyish black, but when tilted still more (so as to view the thorax in almost a horizontal line from behind) there is (behind the suture) a broad light grey middle stripe margined by two rather narrow black stripes outside which the thorax is greyish and only indistinctly striped; pubescence on the dorsum of the thorax composed of equal short very sparse greyish white sloping hairs which become rather more obvious on the back part; pleuræ rather greyish black, but brightly shining black on the mesopleuræ, and with rather conspicuous pale pubescence on the prothorax. Scutellum dull greyish black, but brownish at the sides and on the ridges running outwards from them and on the part of the thorax adjoining them; metanotum greyish black and both it and the scutellum bearing rather conspicuous thin whitish grey pubescence.

Abdomen very similar to that of *X. ater*. Genitalia much larger, with the upper side-plates more shining, and possibly without any orange processes.

Legs dull reddish orange; hind coxæ blackish grey at the base; hind femora scarcely darkened at the tip, but the hind tibiæ rather dark and with a faint broad darkened ring just after the base; all the tarsi blackish on about the last two joints; pubescence on the long front coxæ conspicuously whitish, almost dense; spurs dull orange.

Wings very similar to those of *X. ater*; rather smoky, but slightly orange about the base and with an obvious cloud across the middle, and usually with the end veins of the discal cell clouded, or the wings may be still more clouded; stem of the cubital fork shorter than in *X. ater*, being usually as long as the lower branch of the fork. Squamæ (alar) dull glassy yellowish, with a delicate long pale fringe near the angle. Halteres orange or reddish orange.

- ♀. Much larger than the male and not very similar to it. Frons at the vertex fully one-third the width of the head, and the eyes almost equally separated from the vertex to the mouth; frons entirely grey on more than the upper half (except on the shining black ocellar triangle) but brilliantly shining

black on the lower part down to the antennæ; a slight (often indistinct) stripe of grey dust runs across from just above each antenna to the eye; face bare and polished shining black and extending not narrowly down the sides of the mouth, with a conspicuous brilliant glistening white spot of tomentum on each side extending from under the base of each antenna to the eye; back of the head inflated on nearly the lower two-thirds to the extent of about half the width of the eye as seen there in profile, and bearing on that part rather long pale greyish pubescence, but on the upper part (well away from the eyes) the pubescence is shorter and blacker and extends inconspicuously across the occiput just behind the vertex; back of the head gently arched from the eyes, and greyish black on the upper part. Palpi very large and porrect; end-joint deep dull black, long ovate, and almost bare; basal joint thin and only about a third the length of the second joint, obscurely brownish orange, and bearing some rather long pale pubescence. Antennæ similar to those of the male but possibly a little stouter.

Thorax colored similarly to that of the male, but the middle pair of blackish stripes are a little broader and the grey stripes outside of them are about as wide as the middle black stripes but are rather vague and have on their outer side some curious sloping blackish cross-lines. Pubescence almost absent on all the thorax, but obvious though rather sparse on the scutellum and metanotum.

Abdomen shining black, but rather dull about the base and with the second and third segments conspicuously orange red as well as part of the disc of the fourth segment though the hindmargins of the second and third segments are narrowly blackish and sometimes the foremargins of these segments are obscured; the fourth segment has its margins and broad hind corners black, or sometimes the fourth segment is as red as the third and then the fifth segment may have a roundish red spot on the middle of the disc; pubescence short, black, rigid, and not dense. Belly rather rugose transversely, with the third segment lurid orange-red except on the front and hind margins, and with the second and fourth segments considerably lurid orange-red.

Legs rather darker reddish than in the male, and the hind tibiæ with the basal half (or thereabouts) almost blackish; front coxæ with shorter and less whitish pubescence; hind femora longer and slightly more clavate; spurs longer.

Wings rather resembling those of *X. ater*, but less clouded and less yellowish at the base and with the veins rather paler brown; middle cloud only occupying the extreme base of the submarginal cell, the extreme tip of the first basal cell, and the basal third of the discal cell, and hardly extended at all to the postical vein; the veinlets ending the discal cell a little clouded, but there is no clouding about the wingmargin though the basal part of the radial vein may be a little clouded; discal cross-vein well developed; lower cross-vein sometimes well developed and then sometimes unusually sloping; stem of the cubital vein varying from a little longer to a little shorter than the lower branch of its fork; the two upper veinlets from the discal cell well separated at their origin. Squamæ with the long fringe near the angle blackish. Halteres more yellowish.

Length about 11 mm. ♂, or 13 mm. ♀.

This species is usually rather larger than *X. ater* and is obviously darker orange on the legs and about the base of the wings; it may be known in both sexes from any other European species by the much shorter basal joint of the antennæ and by the thorax being entirely dull except at the humeri; the deep black face with the brilliantly white spots at the upper corners is very distinct from the greyish white face of *X. ater*, and as far as my experience goes the extensively reddish abdomen of the female will distinguish that sex from *X. ater* (though perhaps not from an unrecorded European species), though Loew has stated (Stettin. ent. Zeit., viii., 70) that this character does not always remain constant. An

unrecorded European species is allied but has the antennæ as in *X. ater*, and the thorax all brightly shining in the female or its sides broadly so in the male.

X. cinctus is only known as British from North Scotland; it was first recorded by Dr Buchanan White, who bred several specimens in 1873 from larvæ found beneath the bark of dead Fir-trees (*Pinus sylvestris*) at Braemar. The British Museum possesses a female which was taken at Rannoch by Mr Foxcroft, and in June 1905 Mr C. G. Lamb took a male at Nethy Bridge, and in June 1906 Messrs Sharp and Lamb made special search for it there and took a considerable number of specimens. Dr Buchanan White (Entomologist's Monthly Magazine, xiii., 160, 1876) gave a detailed description of the larva and pupa, and stated that "the larva lives beneath the bark of dead fir trees (*Pinus sylvestris*), where " it feeds on other larvæ. I once saw one with a small yellowish dipterous " larva impaled on the beak-like head, and I believe it sucks the juices of " its prey. The larva hibernates, becoming a pupa about the end of May " or June, and the imago emerges in June and July. The pupa is found " in the decaying matter between the bark and wood of fir trees. The " imago may often be found resting on the bark of the same trees." Messrs Sharp and Lamb found the larvæ limited to Scotch Fir (*Pinus sylvestris*), under the bark of which they lived on recently dead larvæ of wood-feeding Coleoptera. Dr Sharp states that the larvæ will not attack a living coleopterous larva nor a rotten one, but that they will hasten to suck the juices of a dead but undecayed one; he has found them sucking the larva of *Phloxotrya Stephensii*. Perris, in 1870 (Ann. Soc. Ent. Fr. (4) x., 202), described the metamorphoses at great length, and came to the conclusion that the larvæ "se nourrissent des détritüs et des déjections " d'autres larves, et je ne refuserais pas de croire que, dans l'occasion, elles " sont carnassières." It is recorded from quite Northern Europe to Austria, but it is by no means certain that all its records relate to this species.

Synonymy.—The continental descriptions of the European species of *Xylophagus* are so incomplete that it is impossible to identify the species with certainty; for about sixty years only two species have been acknowledged as European and the males of even those two have not been distinguished properly; the exponents of *X. cinctus* in Kowarz's collection belong to a quite distinct species which has the antennæ quite as long as in *X. ater*, and the frons and the sides of the thorax brightly shining, besides numerous other small distinctions. Loew in 1847 (Stettiner Entom. Zeit., viii., 70) distinguished our two species but upon very insufficient material, and he made the remarkable statement that the female of *X. cinctus* sometimes resembles the female of *X. ater* in coloring; a statement which I have never seen confirmed. *Rhagio sypphoides* of Panzer (upon which Latreille established the genus *Pachystomus*) was founded upon a monstrosity of the female, as was pointed out long ago. The North American *X. abdominalis* Loew, if correctly represented by a female under that name in Bigot's collection, only differs in having more reddish coloring on the abdomen.

VERMILEONINÆ.

Antennæ with the third joint not flagelliform but bearing a long apical arista. Face not at all socketed. Eyes separated in both sexes. Wings with the cubital fork wide open. Alula absent.

Head transverse and quite bare except for a slight pubescence on the back and to a moderate extent in *Lampromyia* on the lower part of the back. Face quite bare, or (in *Lampromyia sericea*) microscopically pubescent, without any trace of eyemargins or side-cheeks or a socketed epistoma, almost flat (but slightly arched on the lower part in *Vermileo*), while in *Lampromyia* it is steadily and considerably produced with an even surface to the front mouth part where it spreads out like a shield over the small sides of the mouth; in *Vermileo* the frons is about one-sixth the width of the head and has parallel sides, the face being if anything narrower than the frons and also continued downwards with parallel sides; in *Lampromyia sericea* (from South Africa) the frons is narrower but still with parallel sides, and the face is twice as wide; in *L. pallida* the frons is wide at the vertex, being a quarter the width of the head, but contracts down to the transverse suture just above the antennæ, where it is still more than half its width at the vertex, while below the antennæ the produced face gradually widens again but not quite to the width of the vertex; frons with a slight channel down each side, and in *Vermileo* with a well-defined narrow transverse channel a little above the antennæ, but in *Lampromyia* this transverse channel is less distinct; the frons is I believe equally broad in both sexes of *Vermileo* and *Lampromyia pallida*, but judging from the comparative narrowness of the frons in the male of *L. sericea* it is probable that it is broader in the female of that species; jowls almost absent; back of the head very little inflated even on the lower part; ocelli three on a slightly raised space; vertex in *Lampromyia* distinctly sunken between the eyes. Proboscis rather large and fleshy in *Vermileo*, but in *Lampromyia* extraordinary elongate, thin, horny, and without obvious sucker-flaps (fig. 168), being extended downwards almost perpendicularly (or rather drawn back) for quite twice the length of the head and thorax together; palpi rather small but slightly porrect in *Vermileo*, or rather long thin porrect and slightly clavate but not conspicuous and reaching as far forward as the produced mouth-edge with some sparse long pubescence beneath about the base in *Lampromyia*. Eyes bare, usually (always?) equal in both sexes and the facets all equal. Antennæ in *Vermileo* with the third joint small, shorter than the first joint, simple, and subtriangular, and bearing a moderately thick jointed apical arista; but in *Lampromyia sericea* with the third joint elongate conical and indistinctly 4-5-annulated, and bearing a thin pointed apical arista which is longer than the third joint; first joint of the antennæ rather cylindrical; in the only specimen of *L. pallida* that I possess the antennæ are missing.

Thorax in *Vermileo* all brightly shining and absolutely bare even on the metapleuræ, bright ochreous with black stripes; but in *Lampromyia* dull light reddish brown with darker stripes, and the disc of the thorax and the metapleuræ apparently not absolutely bare. Scutellum small, with a flat disc; metanotum large, and in all the specimens (three) of *Lampromyia* that I possess with curious depressions on the back part as though it had shrunken when dried.

Abdomen long and thin (like *Leptogaster*), with the end more or less curved down, and with seven obvious segments besides the genitalia, three or four times as long as the thorax, shining ochreous with black bands in *Vermileo*, but less shining and with glistening silvery bands in *Lampromyia pallida*, or all glistening silvery when seen from in front in *L. sericea*. Genitalia of the male large, with long produced upper lamellæ in *L. pallida* but with shorter transverse lamellæ in *L. sericea*.

Legs long and thin, but the hind legs longest and rather thicker than the others and with the tibiæ slightly clavate (again suggestive of *Leptogaster*); coxæ long, and in *Lampromyia* the front pair with minute pubescence in front, but otherwise the legs are quite bare; in *Vermileo* and in *L. pallida* the front tibiæ have one apical spur, and the posterior tibiæ each two, but in *L. sericea* the anterior tibiæ are not spurred

and only the hind pair bear two fairly long apical spurs. Pulvilli in *Vermileo* and in *Lampromyia sericea* three, rather small but equal, and the claws outspread as usual; but in *L. pallida* there are only two minute pulvilli, which are under the long straight approximated claws (as in *Leptogaster*).

Wings long and narrow; præfurca moderate in *Vermileo* (fig. 184), but rather long in *Lampromyia* (fig. 183); radial vein springing upwards from the præfurca, and in *Vermileo* ending after two very slight curves in the costa about half-way between the subcostal vein and the wing-tip, but in *Lampromyia* it has a strong S-curve (one curve near the base and the other at the tip) and ends rectangularly in the costa (as in many *Lomatineæ*); in *L. pallida* the radial vein starts level with the discal cross-vein (as in *Anthracineæ*); cubital fork wide open, being in *Vermileo* as widely open at the wingmargin as the upper branch is distant from the end of the radial vein, and the upper branch ending slightly nearer to the wing-tip than the lower branch does; but in *Lampromyia pallida* the branches of the cubital fork end equidistant from the wing-tip; discal cross-vein placed at about a third from the base of the discal cell; discal cell emitting three veinlets towards the wingmargin; posterior cells five, of which the fourth may be slightly

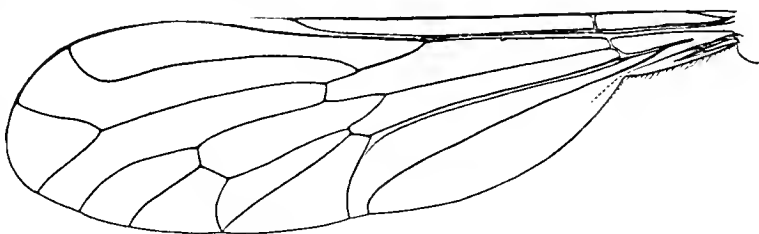


FIG. 183.—*Lampromyia funebris* Duf.
(From a specimen in the Paris Museum.)

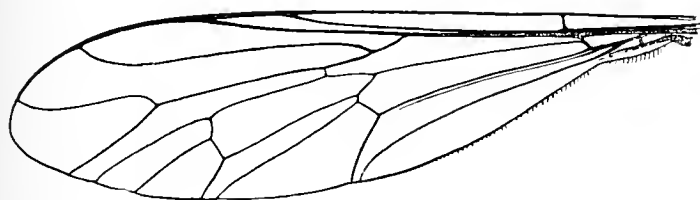


FIG. 184.—*Vermileo* DeGeeri ♂. × 12.

narrowed in *Vermileo*, or strongly contracted or even closed in *Lampromyia sericea*, or closed and even pedunculate in *L. pallida* (in one wing of the specimen I possess, but in the other wing malformed through the third veinlet from the discal cell splitting and one branch forming a cross-vein to the upper branch of the postical fork almost immediately after leaving the discal, while the other branch slopes quickly to the same upper branch and thereby encloses a small cell); small cross-vein very short, especially in *L. sericea*; anal cell open, or almost closed in *L. pallida*. Apparently the venation of many species in this subfamily is liable to irregular variation, as I have noticed such in *Vermileo* (fig. 185) and in *Lampromyia pallida*, while Loew remarks upon the same peculiarity in the North American genus *Triptotricha*. Wing-membrane not ribbed or rippled, but with abundant microscopic pubescence. Alula absent. Squamæ (alar) small, and without any fringe; thoracal pair absent. Halteres unusually long.

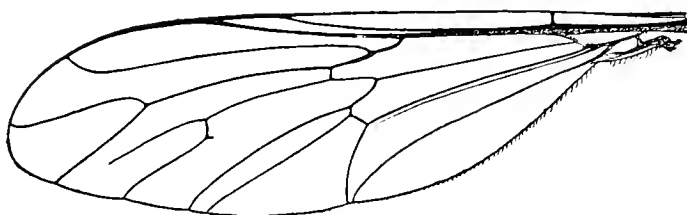


FIG. 185.—*Vermileo* DeGeeri ♂, var. × 10.

The *Vermileoninæ* being very few in number and very little known have caused me to give their characters in considerable detail in this work. They are exceedingly interesting flies, and their larvæ are veritable "Ant-Lions" and as such only inhabit hot sandy districts like the shores of the Mediterranean; it is practically certain that none of them will ever occur in Britain. They differ from the *Leptinæ* and *Chrysopilinæ* in the totally different structure of the face, the dichoptic eyes, the wide open cubital fork, the totally different shape, and (except in *Hilarimorpha*) the

absence of any alula, while the same characters and the presence of an apical arista distinguish them from the *Cænomyiinae*, and consequently they appear to be most allied to the *Xylophaginae*, but from them they may be distinguished by the very different structure of the antennæ. I have drawn up my description from six specimens of *Vermileo DeGeeri* (probably 3 ♂ 3 ♀), one of *Lampromyia pallida* (♂), and two of *L. sericea* (♂), all in my own collection. I know nothing about the North American genus *Triptotracha*.

There are many peculiar characters in the venation of the *Vermileoninae* which are suggestive of other families; the cubital fork is rather Tabaniform, and the final upward curve of the radial vein in *Lampromyia* resembles that of many *Bombylidae*; irrespective of the venation, the dichoptic head is only repeated among the *Leptidæ* in the *Xylophaginae*, while the shape of the abdomen and the genitalia are suggestive of *Leptogaster* in the *Asilidae*; the presence of only two pulvilli in *Lampromyia pallida* is proved to be unimportant by the presence of three in *L. sericea*; the long proboscis of *Lampromyia* reminds one of some *Cyrtidae*.

Synonymy.—In considering the proper name for this subfamily it is essential to investigate its origin. In 1758 Linné described a *Musca Vermileo*, and referred to "De Geer act. Stockh. 1752, p. 180, 260, t. 5." I am unable to collate this reference, but DeGeer himself, in 1776, gave it as "Act. Acad. Suec. 1752, p. 180, 261, Tab. 5, Mask-Leyonet, Sand-Masken," and consequently I do not think that DeGeer used the binomial *Musca Vermileo*. In 1776, however, DeGeer gave the life-history in great detail and described the perfect insect under the name of *Nemotelus Vermileo*, but in 1775 Fabricius had placed it in his genus *Rhagio*. In founding the genus *Rhagio* Fabricius included four species, of which the first two were the well-known *scolopacea* and *tringaria*, but of the third species, *Vermileo*, he said "Nimis præcedentibus affinis," and consequently *R. Vermileo* cannot be considered in any way the type of the genus *Rhagio*, even if Fabricius was not justified (as I think he was) in subsequently altering *Rhagio* (on the ground of preoccupation by *Rhagium*) to *Leptis*. In 1834 Macquart founded on this species the genus *Vermileo*, and renamed the species *Degeerii*; faulty though that action was, the name *Vermileo* holds generic priority, and consequently I call the subfamily *Vermileoninae*. In 1840 Blanchard is said to have proposed the name *Psammorycter* for the same genus (in spite of an existing *Psammoryctes* Poepp. Mamm. 1836, and subfamily *Psammoryctinae*), and that name was adopted by Loew, who founded on it in 1874 (Berl. Ent. Zeitschr., xviii., 381) the subfamily *Psammorycterina*; it is certain that Loew only adopted the name *Psammorycter* because he refused to accept Macquart's generic name of Latin derivation. The same genus was again described by Perris in 1852 under the name of *Apogon*, but there was already a prior genus of that name.

I am unable to collate all the references in Kertész's Katalog (1903), but I notice several mistakes. *Rhagio* Fabr. is Syst. Entom., 761 instead of 760; *Apogon* (Pisces) was, according to Agassiz, founded by "Lacép." and not "Lacord."; I do not think DeGeer gave the binomial *Musca Vermileo* in 1752, but Linné did in Syst. Nat., ed. x., 590 (1758), and DeGeer's second reference would be more correct as Mém. à l'Hist. Ins., vi., 168, *Nemotelus* (1776); the first reference to Fabricius should be Syst. Entom., 762 (*Rhagio*) (1775); Bigot's reference to *Lampromyia* should be (1885) and not (1855).

Lampromyia argentata Bigot, Bull. Soc. Ent. Fr. (6) v. lxxviii. (1885) = *Leptynoma sericea*, Westw., Trans. Ent. Soc. Lond., 1876, 518, but *Leptynoma* Westw. = *Lampromyia* Macq.

CÆNOMYINÆ.

Antennæ with the third joint flagelliform and annulated. Face socketed. Legs with all the tibiæ spurred. Wings with a long bell-mouthed cubital fork which includes the wing-tip.

Face socketed almost as in the *Leptinæ*. Palpi long, thin, porrect, and pointed, indistinctly composed of two almost equal joints. Eyes hairy (*Cænomyia*) or bare, touching in the male. Antennæ (fig. 168) with the third joint flagelliform and 8-annulated; the last annulation forming a stout terminal style without any arista.

Thorax bearing only short pubescence or almost bare; metapleuræ and the back part of the mesopleuræ with dense tufts of pubescence, which is longer in the male than in the female, but otherwise the pleuræ bear very slight pubescence. Scutellum armed with two short subapical spines (*Cænomyia*) or unarmed.

Abdomen rather large, and bearing only minute pubescence. Genitalia of the male small; ovipositor short and not telescopic, ending in two small oval lamellæ.

Legs moderately strong, almost bare; coxæ only moderately long; all the tibiæ spurred, one spur on the front the pair, two on each of posterior pairs.

Wings with a rather peculiar venation, in at any rate the genus *Cænomyia* (fig. 186). Cubital fork long and bell-mouthed, with the upper branch before, and the lower one after, the wing-tip; basal cells long, reaching to fully half the length of the wing; ambient vein complete; alula well developed; wing-membrane glittering in *Cænomyia*, not smooth but hardly ribbed or rippled, and with only a microscopical pubescence.

Not at all *Ichneumon*-like flies.

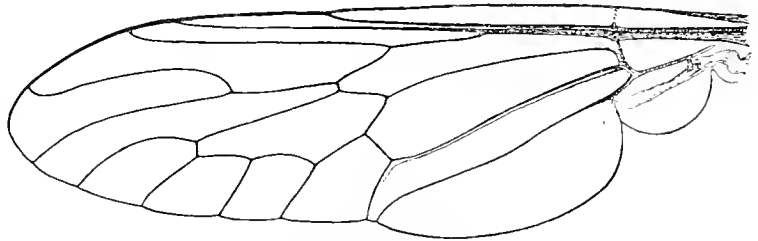


FIG. 186.—*Cænomyia ferruginea* ♀. $\times 4\frac{1}{2}$.

The *Cænomyinæ* and *Xylophaginæ* are the only *Leptidæ* with an obviously annulated antennal flagellum; the *Xylophaginæ* are distinguished by their marked *Ichneumon*-like appearance, the separated eyes of the male, and by the cubital fork being triangularly wide open with the lower branch ending in the wing-tip. Only one genus of *Cænomyinæ* (*Cænomyia*) containing a single species is known in Europe, though two other genera with a single species each are recorded from Siberia; the European species, *Cænomyia ferruginea*, is widely spread over nearly all Europe, even to the Netherlands and the North of France, and also occurs commonly in North America, but has never been even reputed to have been caught in England. There is a remarkably strong scent arising from this fly, which is most persistent and may be noticed after many years whenever a box containing specimens is opened.

Synonymy.—There can be no doubt that Latreille's original name for the genus was *Cænomyia* with a diphthong, but it is quite true that he afterwards sometimes used *Caenomyia*. In the *Précis* (1796) the diphthong æ was often used, as in *Phalæna*, etc., and as there is no obvious error in the original name, while the only derivation which I can find given about that time is "mouche a boue" in the *Encyclopédie Méthodique*, I prefer to retain the original spelling. The genus *Cænura* appears to me to belong to the *Pangoninæ*, as the cubital fork is of the true *Tabanus* shape, and the squamæ bear long dense pubescence, but the small antennæ have a terminal arista and the ovipositor is long and apparently telescopic; it also has the small cross-vein distinctly present, but this character almost occurs in the *Cænomyidous* genus *Arthropeas*.

LEPTINÆ.

Antennæ with the third joint simple and bearing a long apical (or apparently subapical) arista. Face socketed. Posterior tibiæ each with two spurs. Wings with a long slightly bell-mouthed fork.

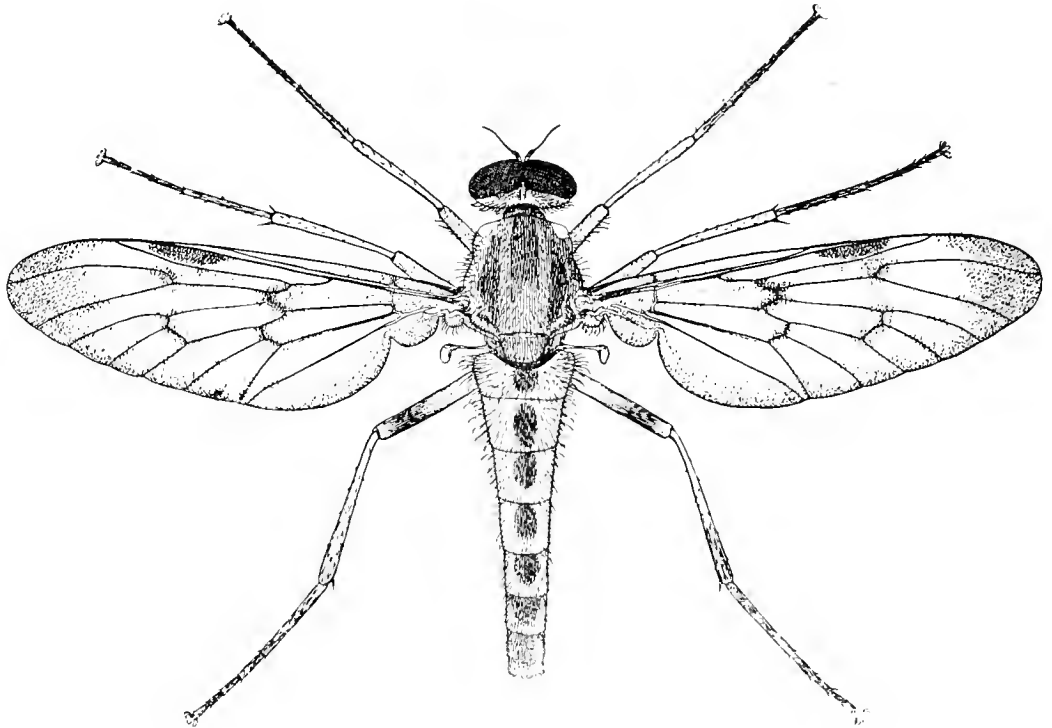


FIG. 187.—*Leptis scolopacea* ♀. × 5.

Face socketed and separated by a channel from the wide side-cheeks (figs. 171, 172). Palpi long and conspicuous, sometimes drooping. Eyes bare, usually but not always touching in the male, and with the facets (even in the male) all approximately equal. Antennæ with the third joint short, not annulated, and bearing a long apical (or subapical) arista.

Thorax with inconspicuous rather stiff pubescence, or with depressed more pilose pubescence. Scutellum unarmed, decidedly large; metanotum mainly concealed under the large scutellum.

Abdomen more or less conical. Genitalia moderate in size.

Legs rather long; tibiæ with rows of minute bristles, and the posterior pairs each with two apical spurs; front tarsi often with "touch-hairs" on the underside.

Wings often glittering; cubital fork long and rather bell-mouthed, with the upper branch ending before or almost at, and the lower branch well after, the wing-tip; fourth posterior cell never closed; alula well developed.

Alar squamæ moderate in size; thoracal pair absent.

The *Leptinæ* are distinguished from the *Xylophagina* and *Cænomyiina* by the simple third antennal joint and its long arista, and from the *Vermileonina* by the socketed epistoma, but they are very closely allied to the *Chrysopilina*, and the only character to be relied upon is the presence of two spurs on the hind tibiæ whereas the *Chrysopilina* possess only one such spur. The *Chrysopilina* almost always have the facets on the upper part of the eyes of the male conspicuously larger than, and

horizontally separated from, those on the lower part, but there are exceptions; and many *Chrysopilinae* bear a conspicuous depressed golden pile on the thorax and abdomen of which no trace occurs in the *Leptinae*; they also often have an apical style to the antennæ of a very different nature to the long arista of the *Leptinae*.

The Palæarctic Genera are tabulated on pages 241, 242.

2. LEPTIS.

Leptis Fabricius, Syst. Antl., 69 (1805).

Rather large or moderate-sized flies of conical shape, usually yellowish red with brown or black markings. Pubescence consisting of rather short hairs of a bristly nature (but never approximating to macrochætæ), and of shorter soft down. They are readily known by their short broad thorax and their elongate narrow tapering abdomen which is often translucent about the base.

Head short but almost as broad as the thorax, lying close to the thorax but drawn forwards rather flatly. Face very short, socketed between the large eyemargins, quadrangular, quite bare; the large eyemargins (or side-cheeks) separated from the face itself by a deep channel, and bearing long rather conspicuous pubescence; frons of the male quite bare and of the female almost so. Proboscis prominent, thick, cylindrical, with two ribbed sucker-flaps; palpi two-jointed, conspicuous, rather drooping, lying alongside the proboscis, and bearing considerable bristly pubescence. Eyes always bare, approximated or even touching for a long distance on the frons in the male, and with the facets all equal or only very inconspicuously differing in size; but well separated in the female by the rather broad frons, which has a shallow transverse suture a little above the antennæ. Antennæ (fig. 188) approximated at the base, porrect, and composed of three very short joints; two basal joints almost equal in length; third joint short, conical, or almost reniform, with a long rather fine upturned terminal arista.



FIG. 188.—*Leptis scolopacea*
♂. × 33.

Thorax flatly arched, short, almost quadrangular, with blunted angles; pubescence on the disc short but usually well distributed and of a bristly nature, but with depressed pile intermixed; pleuræ mainly bare, but the prothorax and the meta-pleuræ bear rather long distinct pubescence.

Abdomen almost twice as long as the thorax, rather elongate or conical, with at least seven obvious segments; pubescence fairly abundant, often of a bristly nature but never like adpressed pile, short except about the basal corners. Genitalia of the male rather prominent, knobbed and blunt; ovipositor jointed and appearing like an eighth segment terminated by two pairs of ovate lamellæ.

Legs elongate, especially the hindmost, and the hind femora usually rather thickened; coxæ rather long; front tibiæ without spurs, but the posterior pairs each with two conspicuous nearly equal spurs; front tarsi with "touch-hairs" beneath (*vide* page 236).

Wings (fig. 187) large and broad, smooth and glittering, exceedingly minutely pubescent; costa and subcostal vein bearing minute spines; cubital vein with a long conspicuous fork, of which the upper branch ends in or near the wing-tip and the lower branch about half-way between that and the upper veinlet from the discal cell; discal cross-vein placed at about one-fifth from the base of the discal cell, and the origin of the cubital vein almost opposite the base of the discal cell; discal cell elongate hexagonal, emitting three complete simple almost parallel veinlets to the wingmargin; postical vein with a simple wide open fork, of which

the upper branch is united by the small cross-vein with the discal cell rather near its base; the first four posterior cells are all almost equally wide open, while the fifth (= postical fork-cell) is more widely open; anal cell usually open though contracted, but closed in *L. nigra* Meig. Squamæ (alar) moderate in size, and with a rather abundant pale many-haired fringe (not in a single row, as in *Chrysopilus*); thoracal squamæ undeveloped.

The metamorphoses of several species have been observed; the larvæ usually live in earth and are predaceous, and that of *L. tringaria* is said to feed upon earthworms: the perfect insects occur on tree-trunks and on the leaves of shrubs. For its reputation of being able to inflict a severe bite, see page 235.

This genus is closely allied to *Chrysopilus*, but is ordinarily distinguished by its open anal cell (which is not an infallible character); it is however better distinguished by the presence of *two* spurs on the hind tibiæ and the absence of any peculiar adpressed golden pile on the thorax and abdomen of a distinct nature from the pale pubescence of *L. lineola* and its allies; the palpi in *Chrysopilus* are porrect, or even upturned, and not drooped. The short rather triangular third antennal joint distinguishes this genus from *Atherix* and *Atrichops*.

Leptis contains about sixty known species, of which about thirty are Palæartic and nearly as many American (North, Central, and South), the rest being odd species from South Asia and Australia. Some of the European species appear to be very variable and have consequently a confused nomenclature, and some seem to have light and dark forms which have sometimes been considered distinct species or sometimes only local or mountain races.

Synonymy.—As *Leptis* is the parent genus of the family, it ought to be fixed with the greatest possible certainty. In 1775 Fabricius, in his *Systema Entomologiæ*, p. 761, founded a genus *Rhagio* for four species, which occur in the following order, *scolopaceus*, *tringarius*, *vermileo*, and *diadema*; these all belong to the *Leptidæ*, and the first two to the present acceptation of the genus *Leptis*; on page 182 of the same volume he had founded a coleopterous genus, *Rhagium*, which still exists, and in 1805 (*Syst. Antl. Ind.*, p. 19) he wrote concerning *Rhagio*, "Nomen genericum, ne cum *Rhagium* Eleutheratorum confundetur, in *Leptis* mutatum est," and in the body of the same work he expressly stated "Character generis naturalis e *L. scolopacea* desumtus," although the only species he described in detail (which is often considered his type species in each genus) was *L. bicolor*. There can therefore be no possible doubt that *Rhagio* and *Leptis* are absolute synonyms, and that the type species of each is *L. scolopacea*; I cannot therefore agree with the acceptation of *L. vermileo* as the type of *Rhagio*, and I thoroughly agree with Fabricius' view that the genera *Rhagium* and *Rhagio* should not co-exist; what Bergroth means by stating (*Wien. ent. Zeit.*, viii., p. 296) that Latreille in 1809 fixed *Musca vermileo* Schrnk. as the type of the genus *Rhagio* I fail to comprehend, as I find that Latreille in 1809 (*Gen. Crust. et Ins.*, iv., p. 287) said "*Rhagio* (nunc *Leptis*)," and he expressly distinguished the larva of *R. vermileo* from the numerous other species of the genus, so that he emphasised its distinctness from the genus *Rhagio* instead of indicating it as the type of that genus.

Moses Harris in 1782 well distinguished this genus both by description and by figures, but his name "*Sylvicola*" can hardly be accepted even if amended to *Sylvicola*.

Table of Species.

- | | | |
|---|---|-----------------------|
| 1 | (2) Wings maculated. | 1 <i>scolopacea</i> . |
| 2 | (1) Wings without markings except for a blackish stigma. | |
| 3 | (8) Stigma blackish. Legs with at least the hind femora broadly and conspicuously black at the tip. | |

- 4 (7) Pubescence of the thorax pale. Rather small species.
- 5 (6) Abdomen mainly orange (δ), or considerably so (♀). Front and hind femora with a dark ring leaving nearly the basal half of the femora pale. *6 lincola.*
- 6 (5) Abdomen mainly darkened. Front and hind femora considerably more blackened. *7 monticola.*
(*var. prae.*)
- 7 (4) Pubescence of the thorax mainly black. Rather large species. *2 notata.*
- 8 (3) Stigma absent or inconspicuously yellowish. Legs normally all orange (except the tarsi), but if sometimes darkened then indeterminately so.
- 9 (12) Pubescence of the thorax (mainly) and of the abdomen black.
- 10 (11) Belly yellow on the three or four basal segments. Abdomen always mainly orange. Paler species. *3 tringaria.*
- 11 (10) Belly all blackish except on the hindmargins and side membranes. Abdomen often almost all blackish. Darker species. *4 nigriventris.*
(*var. prae.*)
- 12 (9) Pubescence of the thorax and abdomen pale. *5 annulata.*

1. *L. scolopacea* Linné. Wings conspicuously maculated. Pleuræ ashy grey. Palpi mainly with pale pubescence. Eyes of the male touching. (Fig. 187.)

A rather large fly of narrow shape, with obviously spotted wings and an orange abdomen on which is a dorsal row of black spots.

δ . Head when viewed sideways nearly twice as high as long, but when viewed from in front wider than high. Face and frons small and (including the side-cheeks) triangular and whitish grey, but the actual epistoma nearly quadrate and the side-cheeks each nearly half as wide as the epistoma; a deep furrow runs between the side-cheeks and the epistoma, and while the epistoma is quite bare the side-cheeks have on the lower half a fairly conspicuous rather long but rather sparse pale yellow pubescence, and this pubescence extends and becomes much longer on the small jowls and on the moderately inflated whitish grey back of the head; upper part of the back of the head shallow, and bearing on the upper quarter an irregular row of short black postocular bristles in front of any yellow pubescence; vertex small, dull blackish, and bearing some minute black bristles on the ocellar part, but grey and quite bare on the elongated front part. Proboscis dull greyish black, about as long as the palpi, and bearing numerous hairs beneath; palpi long, dull orange but often blackish about the base, rather drooping, and bearing rather abundant and fairly long pale pubescence, and sometimes with a few black rather bristly hairs intermixed on the basal half of the upper side. Eyes large, occupying almost all the head, and touching for about half the distance between the occiput and the antennæ; facets all equal. Antennæ (fig. 188) dull orange; basal joint short and bearing a few short black or yellow dorsal bristles; second joint shorter but also bearing a few black dorsal bristles;

third joint as long as the two basal joints together, subtriangular, and bearing a few short black dorsal bristles about the base, and otherwise bearing minute soft pale pubescence; arista springing from the point of the third joint, long and thin, being about twice as long as the antennæ, practically bare and slightly tapering, obscurely blackish, and in no way geniculate though obviously upturned.

Thorax dull ashy grey, with three broad blackish stripes of which the middle stripe is often narrowly split; humeri dull orange or with only a slight orange tinge, and the triangular space between the humeri and the mesopleuræ also orange, while a more or less distinct orange line runs along the dorso-pleural suture to the wing-base, and a thin line runs down the suture behind the mesopleuræ, and another line between the hypopleuræ and the hind coxæ. Pubescence inconspicuous and by no means dense, consisting of rather short black bristly hairs, though the hairs become slightly longer on and near the scutellum. Pleuræ light ashy grey, mainly bare but the prothorax has obvious pale pubescence and the inflated metapleuræ bear moderately dense rather long pale pubescence, and a few very tiny almost imperceptible pale hairs occur near the upper margin of the mesopleuræ; metapleuræ sometimes dull reddish black. Scutellum of the same ashy grey colour as the thorax but with the extreme tip dull ferruginous.

Abdomen elongate and conical, with seven obvious segments of which the basal five are nearly equal in length but the next two are shorter, while if an eighth segment is visible dorsally it seems to form part of the genitalia, dull orange with a row of black dorsal spots, of which the one on each of the five basal segments is usually isolated and touching the foremargin of the segment but not extended to the hindmargin; in very pale specimens the isolated spots continue on the sixth and seventh segments and may even be small, but usually the spot on the fifth segment is larger than the others and may leave little more than the hindmargin orange, while on the sixth segment blackish markings usually spread right across the base or may even occupy all the segment except the hindmargin, and the seventh segment is usually all black except for an occasional very narrow orange hindmargin; the sidemargins of the basal four or five segments are narrowly black, slightly widening about the base of each segment. Belly yellow on the four basal segments except sometimes at the extreme base (and as mentioned in varieties later on), but beginning to become black after the foremargin of the fifth segment to the tip, though in pale specimens these last three segments may be only orange, and in dark specimens even the fifth and sixth segments may have very narrow orange hindmargins. Pubescence dorsally short, inconspicuous, and all black, but longer about the sides of the four basal segments; ventrally the pubescence is pale and less rigid on the yellow part, not scarce but not abundant. Genitalia with a short dull black dorsal plate (which is probably the remains of an eighth abdominal segment), and after that with a pair of lateral blackish or orange-black lamellæ or plates (in pale specimens orange at the base) which are produced at their ends to a rather long narrow process which is often incurved and partly concealed, and these lateral lamellæ bear short black or yellow pubescence, while between them lies a pair of short clearer orange lamellæ, and there is a blackish basal ventral plate which is usually margined with luteous.

Legs dull brownish orange; front coxæ long, normally dull orange but more or less greyish black at the base and sometimes even almost to the tip, and clothed in front with fairly long and abundant pale pubescence which leaves a small shining darker bare space at the base; front trochanters obscurely blackish; posterior coxæ shorter, dull greyish black, but more or less obscurely orange about the tip or even apical half and behind, and bearing fairly long but less abundant pale pubescence in front of the middle pair and outside the hind pair, but quite bare on all about the basal half of the hind pair; posterior trochanters longer and more distinctly dull greyish black, with faint orange reflections; all the tarsi rather blackish though the anterior pairs are dull dark orange at the base; there is a broad indeterminate darkened ring near the tip of the hind femora, and sometimes the tip of the hind tibiæ is darkened. Pubescence practically none, but the legs are wholly beset with tiny black bristles among which

some slightly less tiny bristles form rows down all the tibiæ; front tarsi with a few "touch-hairs" beneath, and the middle tarsi with a few very small stouter plantar bristles; middle and hind tibiæ each with two nearly equal dull orange spurs, and front tibiæ with almost a circlet of tiny black bristles around the tip. Pulvilli and claws brownish.

Wings (fig. 187) large and long, slightly smoky and conspicuously maculated, the stigma being elongate and blackish brown and occupying most of the end part of the marginal cell but not the lower or apical margins of it, while the other cloudings extend across the cross-veins (including the fork of the cubital vein) and occupy the whole apical sixth of the wing, though the margin of this last cloud is not very determinate but extends less broadly all along the hindmargin; sometimes also the fork at the origin of the cubital vein and the base of the præfurca are clouded; costal and subcostal veins brownish yellow, but the other veins almost black; the costa bears at its base minute crowded black bristles which gradually diminish and disappear before the tip of the wing, after which they modify into a short fine ciliation round the hindmargin; the subcostal vein also bears similar minute bristles on its upper side, but not from the base until a little before the humeral cross-vein, and these bristles grow gradually shorter until they coalesce with the minute costal bristles; anal cell rather widely open, because the anal vein is a little curved down at its tip. Squamæ (alar) rather large, somewhat glassy yellowish, with an almost blackish margin and with a long pale fringe; thoracal squamæ only represented by the bare yellow frenum. Halteres dull orange.

♀. Similar to the male. Frons greyish orange, about one-fifth the width of the head at the vertex but gradually widening downwards, and the space between the eyes near the mouth nearly one-third the width of the head; back of the head (especially on the upper part) appearing more inflated because the eyes are smaller, more obviously pale grey, and with more numerous and more extended short black bristles near the upper part; frons apparently bare, though a very few irregular minute black bristles may occur; ocellar space blackish. Palpi with mainly black bristles but with some pale hairs at the sides and about the tip.

Thorax paler or more yellowish grey, with three broad dark stripes which may range from blackish to light brown with a blackish stripe splitting the middle one; side stripes narrower than the middle one and more abbreviated in front, but all three stripes ending in points just before the hindmargin.

Abdomen less sharply marked and considerably more blackish, especially towards the tip and about the sidemargins, and the pubescence about the sides shorter. Belly blackish, but usually orange at the base, on the sides of the second and third segments, and on the narrow hindmargins of segments, though not uncommonly the orange colour is reduced to the narrow hindmargins. Ovipositor ending in a pair of conspicuous though small oval brownish black lamellæ.

Legs as in the male.

Wings usually with the maculation more emphasised and the cloud on the wing-tip more defined.

Length about 10 mm., but varying from 7 mm. to 14 mm.

The foregoing is a description of what I consider normal British *L. scolopacea*, but the species seems to have a tendency to produce local races, and some of these races have a very distinct appearance. Dr J. H. Wood has taken regularly a small dark race at Shobdon Marsh in Herefordshire, and I have studied specimens taken there on July 23, 1903; the male seems to have the palpi rather shorter, less drooping, and less conspicuously yellowish, but bearing more black bristles; the antennæ more tinged with blackish on the basal joints, and the third joint comparatively short; thorax with the humeri darker and the connected pale lines hardly visible; scutellum not at all ferruginous at the tip;

abdomen with the black markings extended, the spots on the second and third segments large, the one on the fourth segment connected near its foremargin with the black side-markings, and the rest of the abdomen black except for a narrow rather dark ferruginous hindmargin on the fifth segment and the dull dark ferruginous middle lamellæ; the sidemargins blacker than usual, and more extended out triangularly near the foremargins of the segments; belly with the fourth segment dull black across its middle; legs often more obscured, and the knob of the halteres sometimes brownish, but the wings sometimes only faintly maculated; the female has the palpi sometimes all black haired, the wings well maculated but sometimes with an oval pellucid spot on the clouded wing-tip on the middle of the submarginal and cubital cells. I have seen other small dark forms in which the antennæ and front coxæ are darker, the front femora obscurely blackish on the basal three-quarters, the hind femora more extensively blackish and even the middle femora with traces of darkening, the stigma larger and blacker, the maculation on the wings more extended, the frons in the female brownish on its middle, the abdomen (♀) black with little more than the hindmargins orange, and the palpi blackish orange; while on the other hand pale specimens occur in which the hind femora show scarcely any trace of darkening, or in the case of a rather pale female taken by Colonel Yerbury at Parknasilla in Co. Kerry the wings have a slight blackish tinge. A continental female taken at Eger in Bohemia has large black markings and also indistinct side-spots on the abdomen, so that there are almost three rows of black spots connected along the foremargins of the segments, and in this specimen the belly is nearly all black except that the second segment is dull ferruginous, and the wing-markings are dark and diffuse. *L. scolopacea* is the only British species of the genus with maculated wings that I have seen, though *L. strigosa* Meig. was in all our lists; it is almost certain that Walker's *L. strigosa* is only one of the small dark forms, but the true *L. strigosa* (if distinct) may be known by its extreme yellowness on the pleuræ and scutellum. *L. maculipennis* Lw. and *L. Cavanna* Bezzi have entirely black-haired palpi, while *L. Cavanna* and *L. latipennis* Lw. have the eyes of the male obviously separated. *L. scolopacea* is recorded from extreme North Europe to Italy.

L. scolopacea is a common British species, and I have numerous records from Devonshire to Tongue and the Outer Hebrides, while Colonel Yerbury has taken it in several Irish localities. The dates range from May 21 to July 23. It is fond of sitting on tree-trunks in moderately wooded districts, and often dashes off in a disconcerting and apparently threatening manner, from which habit I expect it obtained its reputation (Bull. Soc. Ent. Fr., LXI., clv., 1892) of being able to inflict a very unpleasant bite; I have never been able to obtain any corroboration of this habit from any experienced Dipterologist, and I am convinced that its ferocious appearance and its maculated wings have caused it to be confounded with *Hæmatopota*.

2. **L. notata** Meigen. Wings not maculated, but with a conspicuous blackish stigma. Legs mainly black.

A rather large fly of narrow shape, with almost unicolorous

rather smoky wings on which is a conspicuous blackish stigma. Legs mainly black, even to the base of the femora.

- ♂. Epistoma socketed, rather quadrate, quite bare and light slaty grey, but the side-cheeks whitish grey and bearing conspicuous long whitish pubescence, while the pubescence becomes rather longer on the moderate-sized jowls and for about half-way up the back of the head, after which (as the back of the head becomes shallower) the pubescence becomes shorter and thinner and leaves some short black bristles near the eyes which become numerous on the upper quarter of the head; vertex rather deeply excised across the occiput, elongate triangular, bearing in the ocellar triangle several short black bristles which are sloped forwards greyish black, but with the small triangular space below the ocelli slaty grey and quite bare. Proboscis brownish black, and bearing some slight brownish hairs beneath; palpi greyish black, slightly drooping, and bearing conspicuous greyish white pubescence, intermixed with which near the base are usually a few black bristly dorsal hairs. Eyes touching for a third the distance between the occiput and the antennæ; facets almost imperceptibly decreasing in size upwards and backwards. Antennæ dark greyish brown; two basal joints short, but about equal in length and both bearing a few short black dorsal bristles; third joint minutely pubescent, not longer than each basal joint but differently shaped, being slightly pointed, and with the arista emerging from the point; arista upturned, bare, blackish and hardly tapering, twice as long as the antenna.

Thorax dull slaty grey, with three conspicuous blackish stripes of which the middle one may be very narrowly split, and this one extends back only two-thirds the length of the thorax but the side ones are shortened anteriorly and extend further back; a space between the humeri and the mesopleuræ, another space at the root of the wing, and the suture connecting these spaces slightly ferruginous. Pubescence fairly long and conspicuous though rather sparse, composed of rather long erect black bristly hairs, but varying considerably in length and leaving bare spaces on about the beginning of the middle (sometimes double) blackish stripe and also on large spaces on the outer stripes above the suture and again where these stripes widen out below the suture; the dull ferruginous space against the humeri bears some very short pale pubescence with a few ferruginous hairs intermixed; prothorax with conspicuous pale pubescence; metapleuræ with fairly abundant brownish yellow pubescence; mesopleuræ with a few tiny black bristles on the upper hind corner. Scutellum slaty grey, and bearing equal rather long and abundant black bristly pubescence.

Abdomen moderately shining orange ochre with black markings; basal segment blackish grey right up to the hindmargin; second and third segments each with an isolated black dorsal spot; fourth segment with a large black dorsal spot which occupies all the middle part from the front to the hindmargin; fifth, sixth, and seventh segments all black; seventh segment short; sidemargins on the second, third, and fourth segments with an equal narrow blackish line. Pubescence fairly abundant, all black, erect, and not short on the five basal segments, though adpressed on the disc, and much shorter on the sixth and seventh segments. Belly clear orange on the four basal segments with slight inconspicuous erect pale pubescence, but the fifth to seventh segments are blackish grey and bear slight short blackish pubescence. Genitalia with a pair of rather large blackish grey side lamellæ which end dorsally in a pair of dark orange long narrow hooks; there is some slight pale pubescence on these side lamellæ, and some pale pubescence on the ventral plate near them.

Legs mainly dull black, but the tibiæ (except about the last third of the hind pair) ferruginous as well as the apical quarter of the front femora and the apical half (or more) of the middle femora, while the front tarsi are very slightly and the middle tarsi obviously ferruginous at the base; apical third of the hind tibiæ somewhat indeterminately dull blackish. Front coxæ all slaty grey, with fairly abundant pale yellow pubescence on all the front side rising from small black punctures, but there is the usual polished black bare space in front near the base; front trochanters very short and

rather ferruginous; posterior coxæ grey, with pale pubescence in front of the middle pair and outside the apical half of the hind pair; tiny black bristles clothe all the legs, but the femora bear some stronger (though still very small) black bristles, while a few minute black bristles are scattered all over the tibiæ, and also some on the upper side of the basal joint of the front tarsi; spurs on the posterior tibiæ dark ferruginous; "touch-hairs" beneath the front tarsi rather numerous. Pulvilli pale brown; claws brown but black at the tip.

Wings smoky yellowish but brownish orange about the base; veins blackish but also brownish orange about the base; stigma long, black or brownish black, and conspicuous, but not touching the costal or radial vein; ambient vein black all round, even on the alulæ; costal and subcostal veins bristly as in *L. scolopacea*. Squamæ (alar) glassy yellowish, with an orange margin and a fairly abundant pale fringe; frenum scarcely widened, glassy whitish yellow. Halteres orange.

- ♀. Frons about one-sixth the width of the head and parallel-sided from the ocelli to the suture just above the antennæ, light ashy grey with a brownish tinge on a large part of the disc, practically bare but with a very few tiny black bristles scattered about; space between the eyes widening from the frons to the mouth, where it is about one-third the width of the head; epistoma light ashy grey, bare; side-cheeks greyish white, with very much less pubescence than in the male; jowls and back of the head a little inflated, and their pubescence almost as in the male, but there are a few black hairs on the jowls; palpi with the bristles all black except beneath, where they are pale.

Thorax and scutellum with less abundant and much shorter pubescence on the disc than in the male, though the bristly pubescence is quite as long on the sides; the ridge between the wing-base and the postalar calli rather ferruginous.

Abdomen more or less ferruginous, ranging from the three basal segments being orange ferruginous with only the extreme base of the first segment and a large dorsal spot on each of the segments black, to nearly all greyish black except a ferruginous spot at the basal corners of the second segment and also some narrow hindmargins; fourth and remaining segments obscure black with narrow ferruginous hindmargins, which are most conspicuous on the third, and sometimes sixth and seventh, segments; pubescence much shorter than in the male. Belly nearly all greyish black, except on the orange hindmargins where the dorsal coloring shines through; first and third segments, and the basal segments to a certain extent, with slight pale pubescence. Ovipositor with apparently four short obscure black segments which have narrow orange hindmargins, while after these comes the genital plate below with a pair of small oval brownish lamellæ above.

Legs almost as in the male, but the middle femora only obscurely blackish about the base beneath or even hardly at all blackish, and the hind tibiæ not so much darkened at the tip.

Wings more pellucid, and more orange about the base.

Length about 10 mm., but varying from 8 to 11 mm.

This species is distinguished by its wings being immaculate except for the conspicuous blackish stigma and by its extensively black legs; in fact, it is distinguished from any known European species by these characters and by its entirely slaty grey scutellum having no trace of ferruginous colour at its tip or on its sides. It varies very little unless from immaturity, as an immature female taken in Arran on June 6, 1882, has the femora all yellowish except a somewhat yellowish brown tinge beneath, the belly orange at the base, and the stigma practically absent because the whole marginal cell is unicolorously pale orange.

L. notata is rather common as a mountain species in the Midlands and the North, but I have no record south of Herefordshire (near the Black Mountain) and Worcestershire (The Malvern Hills); it seems to occur very

freely in the Scotch Highlands. My dates extend from May 23 to July 10. It is recorded from Central Europe and Denmark to Italy, but not from North Europe, which does not seem to accord with its British distribution.

Synonymy.—Curtis described and figured this species as *Rhagio Heyshami* from Ambleside, and later on mentioned *R. notatus* as having occurred near Cambridge but that record in all probability referred to *L. tringaria*.

3. **L. tringaria** Linné. Wings immaculate glassy yellowish, even the stigma being inconspicuous. Thorax with black pubescence. Abdomen mainly orange.

A rather large fly, with immaculate wings and the abdomen orange with black dorsal spots.

♂. Face and frons small and (including the side-cheeks) triangular and covered with yellowish grey dust, but the socketed epistoma is almost quadrate and is quite bare; side-cheeks nearly half as wide as the epistoma, and bearing (except on the upper third) rather long and conspicuous hardly sparse pale yellow pubescence, and this pubescence extending and becoming longer on the rather narrow jowls and on the rather shallow lower half of the back of the head, after which it becomes shorter and sparser and dies out but is replaced on the top third or quarter by a number of short black dense postocular bristles; absolute back of the head yellowish grey; vertex greyish black and bearing some minute black bristles behind the ocelli, but light grey and bare on the elongated front part; frons rather darkened at its upper point, quite bare. Proboscis orange, slightly browned and bearing some short thin pale hairs beneath; palpi orange (rarely darkened at the extreme base), slightly drooping, and bearing all over rather long yellow or greyish yellow pubescence, though a black hair or two may occur out on the middle part of the upper side, or there may be (as mentioned below) a few black hairs at the tip. Eyes touching for less than half the distance between the occiput and the antennæ; facets apparently all equal. Antennæ brownish black on the two basal joints, though the second joint may be ferruginous; the two basal joints are both short, and bear some very short black dorsal bristles; third joint orange, shorter than either of the two basal joints on the upper side (where some minute black bristles occur about the base) but dropped slightly kidney-shaped below its tip, and bearing at its outermost part the upturned dull blackish arista, which is nearly three times as long as the antennæ.

Thorax dull light greyish or yellowish brown with usually some faint indications of darker or lighter brown stripes of which the middle one may be split, but variations of colour are mentioned later on; humeri usually dull orange, and the underside of the postalar calli and the ridge extending to the scutellum less distinctly so; the triangular space below the humeri is also dull orange, while a dull orange line runs along the dorso-pleural suture to the wing-base, and another triangular space occurs just under the wing from which a narrow orange line runs down the suture behind the mesopleuræ; prothorax sometimes greyish orange; the metapleuræ and adjacent parts are also more or less obscure dull orange; prothorax and metapleuræ bearing fairly long and dense yellow or brownish yellow pubescence; mesopleuræ with a few exceedingly tiny black or yellow bristles near the upper margin or upper hind angle. Pubescence on the disc of the thorax composed of numerous equally distributed (except on quite the front part) short black bristles, but these bristles become longer about the sides and the hind part, and sometimes some pale hairs occur on the hind part. Scutellum dull orange with a slightly blackened base; pubescence distinctly longer than on the thorax but still rigid, usually all black but occasionally with a few pale hairs.

Abdomen slightly shining orange, with a row of isolated (*vide* varieties later on) black rounded or diamond-shaped dorsal spots; one spot occurs on

each of the four or five basal segments and is not extended to the front or hindmargin of any segment, but the fourth and fifth segments usually become rather darker orange, and the spot on the fifth segment is the largest and is sometimes united with the black sidemargins; sixth segment black, with usually an obvious dark orange spot on the middle of the hindmargin, seventh segment all black or with a very narrow obscure orange hindmargin; eighth dorsal segment forming a short basal plate to the genitalia; side-margins with an almost isolated blackish spot on the basal segment, and then with a more or less irregular narrow black line extending from near the base of the second segment to the end of the fourth segment, on the fifth segment more widely blackened especially near the base, and entirely black on the sixth and seventh segments in connection with the black dorsal part of those segments. Belly yellowish orange on the three or four basal segments, but usually becoming a little darker on the fourth segment; fifth segment black with narrow orange margins, sixth and seventh all black. Pubescence on all the dorsal part of the abdomen composed of short depressed black bristles which are rather dense and equally distributed, but there are longer and less depressed black hairs at the sides and especially on that part of the two basal segments; on the belly it is short and less dense, with a few pale hairs intermixed on the disc of the second segment. Genitalia small and short, beginning with a short dull black or greyish black basal plate (which is probably the remains of an eighth abdominal segment) which has an obscure ferruginous margin, and after that a pair of short dull black lateral lamellæ which bear an elongate dull orange second joint, and these second joints usually curve inwards and meet and bear minute pale pubescence; the basal part of these lateral lamellæ bears short black and yellowish bristly pubescence; between the lateral lamellæ are two short rounded dark brown lamellæ, and there is a dull black basal ventral plate extending all across. Other variations of the abdominal markings are given later on.

Legs dull orange; front coxæ obscure pale orange or pale brownish, covered with pale yellow dust and bearing fairly long and abundant pale yellow pubescence on all the front part (except on a shining black or orange space at the base anteriorly towards the inner side), trochanters darkened; middle coxæ mainly blackish but orange about the tip, with the usual pale pubescence in front but usually (though not always) with some black bristly hairs near the tip, tibial spurs dull orange; hind coxæ orange but sometimes greyish black or with blackish reflections outside, and usually with a few black hairs intermingled with the yellow hairs outside about the tip; posterior trochanters partly or completely blackened; hind femora usually slightly blackish at the tip, and the hind tibiæ more so but indefinitely; spurs brownish orange; tarsi blackish but rather obscurely orange at the base of at least the anterior pairs. Pubescence practically none, but the legs wholly beset with tiny black bristles except on some inconspicuous bare lines on the anterior femora, and there are rows of tiny black bristles down the tibiæ which are slightly longer than the ubiquitous bristles; front tarsi with a few "touch-hairs" beneath. Pulvilli dull brown; claws darker brown. Other variations of colour are noted later on.

Wings with a distinct orange tinge which is most conspicuous along the fore part as far as the tip of the marginal cell, but without any distinct stigma; veins obscure orange, growing brown towards the tip of the wing and towards the margin after about the tip of the subcostal vein; costal and subcostal veins with minute black bristles as in *L. scolopacea*; alulæ with a rather conspicuous orange or brownish yellow marginal line. Squamæ (alar) dull glassy yellowish with usually a darker orange margin on which is a moderate pale yellow fringe, and at the base on the upper part with a rather elongate triangular blackish space; thoracal squamæ only represented by the bare dull yellow frenum. Halteres orange or slightly darker.

- ♀. Similar to the male but altogether paler and with more testaceous coloring. Frons greyish yellow, fully one-third the width of the head at the vertex and with the sides almost parallel down to the transverse suture a little above the antennæ, but from that point downwards the eyes gradually diverge until

the face at its lower part is more than one-third the width of the head; frons practically bare though a few minute black bristles occur, but the ocellar space between and behind the two upper ocelli darker (but by no means black) and bearing rather numerous very short black bristles; face (including the broad eyemargins) pale greyish yellow, and the eyemargins bearing rather long pale pubescence on the inner part of their lower half, and this pubescence merging into the longer pubescence on the jowls and lower part of the back of the head; back of the head greyish yellow, but darker near the upper eye-angles, and apparently more puffed out because the eyes are smaller; the postocular short black bristles on the upper part of the back of the head become numerous and in fact dense. Palpi with some black bristly hairs included in the pubescence on the upper side.

Thorax dull yellowish grey, with a divided broad middle stripe and two broad side-stripes indistinctly brownish; the double middle stripe does not extend back much beyond the suture, and the side stripes are abbreviated in front but extend back and end in points not far from the hindmargin; humeri, a spot at the front end of the side stripes connected with the narrow yellowish thoracic stripes, and all the sides of the dorsum of the thorax (including the hindmargin) rather broadly though rather indefinitely orange, the orange colour being most conspicuous on the humeri and on the postalar calli (including the ridge towards the scutellum). Pleuræ practically all testaceous, but sometimes with the disc of the meso-, sterno-, and hypopleuræ obscurely greyish black. Pubescence on the dorsum of the thorax very short and depressed and inconspicuous except on the margins, all black and not at all abundant; on the prothorax it is yellow and rather abundant but occasionally with a few black hairs on the top or hind part, while on the metapleuræ the pubescence is rather longer but more scarce and sometimes several of the hairs on the upper part are black. Scutellum clear testaceous, rather shining, with short black pubescence which is however longer than that on the thorax but is very sparse on the disc.

Abdomen moderately shining, sharply diminishing in width from the second segment to the tip; three basal segments usually each with a conspicuous isolated black dorsal spot, the spot on the basal segment being the smallest or least defined, and the spot on the fourth segment (and sometimes the third) touching the foremargin and extending triangularly down about half or two-thirds of the segment; fifth segment small, compressed, dull orange with the base blackish; sixth and seventh segments tubular, blackish grey or light grey, with expanded telescopic orange hindmargins; eighth segment forming part of the elongate ovipositor; sidemargins blackish on the second segment, beginning fairly wide at the base but narrowing to a very thin marginal line at the end of the segment, and on the third and fourth segments the black margin is absent or is narrow, but in dark specimens mentioned later on the sidemargins are widely black; pubescence black, very short and inconspicuous except on the sides near the base. Belly normally dull orange on the three basal segments though the third segment has blackish reflections on its base and sidemargins, and the other segments blackish grey with narrow determinate orange hindmargins; pubescence very slight and nearly all black, sloping on the four basal segments but erect and very short on the remaining segments; far more extreme forms of coloration on the belly are given later on. Ovipositor elongate, blackish grey or light grey, ending in a pair of divergent ovate upper lamellæ which are blackish grey to orange, and in short ovate lower lamellæ which are obscurely blackish with obscurely orange bases.

Legs rather paler than in the male; front coxæ normally all orange, and the middle coxæ with a slight dull greyish tinge, or all the coxæ and trochanters may be entirely orange, or darker forms may occur as are mentioned later on; posterior coxæ with some black bristly hairs about the tip in front; hind femora and tibiæ normally without darkened tips.

Wings as in the male, or sometimes with a more or less pronounced yellowish tinge. Alar squamæ with a smaller blackish marking on the upper part.

Length about 10 mm., but varying from 8 mm. to 12 mm.

The preceding description is made from ordinary British specimens, but there are innumerable variations from it and I believe also local races. The variations which I have observed lie in the following characters:—

- ♂. Thorax with considerable variation in the extent of the testaceous coloring and in the distinctness of the dark stripes, so that sometimes the disc of the thorax is rather tinged with yellowish and at other times is rather dark grey; or the thorax may have three narrow light grey lines alternating with four broad dark grey stripes.

Abdomen varying very much in the extent of the orange and black markings, the dorsal spots being sometimes diamond-shaped or larger, with the spot on the fifth segment triangular and broadly touching the foremargin and with broad blackish sidemargins, or the spot on the fifth segment triangular so as to form a solid V-shaped black spot from the foremargin to a point on the middle of the hindmargin, and the sixth segment often black with a very narrow orange hindmargin. Belly sometimes beginning to become darkened after the middle of the third segment, or with the first, third, and fourth (especially the fourth) segments with blackish reflections of which a trace may exist on the second segment.

Legs varying slightly in colour; front coxæ not infrequently with a strong blackish tinge in front on all the basal half, and at the same time the posterior coxæ nearly all greyish black with abundant grey dust, or in some small specimens the coxæ may be still darker.

- ♀. Frons ranging from light yellowish grey to brownish orange and even with an almost blackish middle space; palpi varying in every gradation from entirely yellow pubescence in pale specimens to being very extensively black haired dorsally to almost the tip.

Thorax sometimes yellowish brown-grey with the sidemargins so little testaceous that scarcely more than the humeri and the lower side of the postalar calli are testaceous, while the pleuræ are nearly all obscured with blackish grey tints or on the other hand have the ground colour nearly all testaceous so that the sides, hindmargin, and pleuræ are practically all that colour.

Abdomen varying infinitely from orange to black, as a dark specimen may have large irregular black bands across the basal half of the second, third, and fourth segments, while the sidemargins are much more widely black and connected with the dorsal blackenings; or on the other hand a pale specimen may have the abdomen all orange (var. *vanellus*) except for an indistinct small dark spot on the disc of the second and third segments, and may have even the fifth to seventh segments almost all greyish orange. Belly sometimes all black except for the dark orange second segment (which may have a darkened middle line); pubescence on the belly sometimes with a few pale hairs on the two basal segments and also near the hindmargins of the sixth and seventh segments.

Legs sometimes with a blackish grey anterior patch on the front coxæ near the base and towards the inner side, in which case the front coxæ may bear a very few black bristles about the tip, and when the front coxæ are like this the posterior coxæ may be greyish yellow with even an obscure blackish tint.

A male taken near Barton Mills in Suffolk (upon which I originally recorded *L. nigriventris* Loew as British) has the abdomen very much blackened and with large dorsal spots, and the belly all darkened (but not blackened) except on the basal segment; the pale hairs on the back of the head extend more towards the vertex; palpi slightly darkened at the base; humeri pale greyish yellow and the space behind them light grey; postalar calli hardly at all orange; pleuræ all clear light ashy grey with a very faint yellow tinge; pubescence all over the disc of the thorax and scutellum showing a fair number of short pale hairs intermixed with the black hairs, and the yellow hairs becoming longer and more numerous and almost conspicuous about the hindmargin of the thorax. Abdomen scarcely contracted until the seventh segment and then only so much that the fifth segment is

nearly, and the sixth and seventh are quite, twice as wide as long; blackish coloring (though obscurely) occupying all the middle transverse of the basal segment and leaving only narrow front and hindmargins and even those hardly to the sides; second segment with a large oblong blackish dorsal spot which almost reaches the front and hind margins and the whole of the sidemargins broadly blackish extending inwards about two-thirds of the way towards the dorsal spot; third segment similar to the second but the orange coloring much more extended, leaving a diamond-shaped dorsal spot connected about the middle with the broad side-spots; fourth segment similar to the third but brownish black with the orange colour again more restricted; fifth segment black with a narrow orange hindmargin, and the remaining segments black, and consequently the whole sidemargins broadly but irregularly black. Belly with the membrane at the sides of the two basal segments clear yellow, and broadly so on the basal segment; disc of the basal segment rather darkened about the middle, and the next three segments light brown with narrow clear yellow hindmargins, each segment becoming darker; fifth segment darker brown with a narrow orange hindmargin; the revolute sidemargins broader and orange brown. Legs rather darker, with the darkening at the tip of the hind femora and tibiæ extensive though rather vague; coxæ all dark greyish brown with the tip and the hind part obscurely orange. Stigma faintly discernible. Length about 10.5 mm. Subsequent collecting on the same spot produced nearly every intermediate form to the normal one, except that the specimens showed a tendency to smaller size (which as usual tends to darkening), to greyish black coxæ, and to a flatter and more oblong abdomen.

A much darker form has been taken by Dr J. H. Wood at Stoke Wood in Herefordshire, and he sent me for examination two males and one female taken on August 17, 1903, from which I made the following notes:—

♂. Thorax light brownish grey, with four dark stripes fairly obvious but outwardly indefinite; pubescence including a few inconspicuous pale hairs on the hinder half of the disc, and also a few longer pale hairs on the scutellum; scutellum shining orange with a fair sized black base which is dilated on the middle to almost half-way down the disc. Abdomen with apparently a dark orange ground colour, but with the black markings occupying most of it; the four basal segments may be said to have three rows of rather indefinitely outlined black spots somewhat vaguely connected at about the middle of each segment; the dorsal spots gradually increase in size and become more diamond-shaped, while the continuous sidemargins are at their widest on the second segment though widened at the basal corner of each segment. Belly obscurely blackish orange on the four basal segments but with narrow sharply defined yellow hindmargins and a narrow sharply defined side membrane until more than half-way down the third segment. Front coxæ greyish black on all the front part, but posteriorly lighter grey with an orange tint; posterior coxæ ashy grey anteriorly; middle femora a little discolored beneath from just after the middle to almost the tip; hind femora and tibiæ with their tips broadly but not determinately blackened; hind femora antero-ventrally with a gradually widening blackish streak which commences just before the middle and which near the tip occupies all the under and front surfaces but leaves an obscure orange ring just before the actual tip. Wings strongly tinged with orange; subcostal vein darkened from near its base to about opposite the end of the mediastinal vein. Squamæ with brownish yellow margins.

♀. Frons brownish orange, but a little lighter around the ocelli and above the antennæ; face orange. Thorax brownish yellow with four faint broad brown stripes, the middle pair being the most distinct, but when viewed from behind all the dark stripes disappear; scutellum almost as in the male. Abdomen shining brownish black, but obscurely brownish orange about the basal segment and on the hindmargins of all the segments. Belly all black, moderately shining, with all the hindmargins narrowly but clearly yellow and connected with the yellowish dorsal hindmargins; sidemargins with a very narrow yellowish line along the edge of the dorsal plate. Legs

obscure brownish orange, but the knees obscurely paler and the front legs with a conspicuously darkened tint though by no means blackish; posterior femora with black points at the knees externally; coxæ all rather lighter than in the male and with the black hairs reduced to one or two on the posterior pairs; tarsi all black except the base of the middle pair. Wings less orange; subcostal vein all orange. Squamæ with orange markings. This female would answer to *L. nigriventris*.

Some specimens from Nethy Bridge appear to come closest to the continental type form, as they have the coxæ entirely of an equal pretty orange colour (except that the hind pair have anterior blackish reflections), the palpi without any black hairs, the sides of the thorax and the pleuræ more orange, the abdominal black spots small and sharply defined, and the black sidemargins restricted and sharply defined, while the five basal segments of the belly are clear orange.

A remarkable variety of the female occurred at Mildenhall in Suffolk on September 8, 1885, which has quite a large patch of rather bristly hairs on the jowls just under the eyes, and this same specimen has nearly all the hairs on the metapleuræ, as well as several on the upper part of the prothorax black, but has the coxæ almost all orange and the belly to a large extent blackish.

A male taken at Cusop Dingle in Herefordshire on September 7, 1900, has curiously monstrous venation as the left wing has an adventitious cross-vein above the discal cell soon after the discal cross-vein, while the right wing has the discal cross-vein anastomosing with the cubital vein and soon after that with two adventitious cross-veins of which one is before and one after the middle of the discal cell.

It will be seen that there is no specific value to be attached to the colour of the coxæ or the presence or absence of black bristly hairs on their tips, to the colour of the second joint of the antennæ or of the humeri and not much to that of the pleuræ, to the isolation or connection or size of the abdominal dorsal spots, to the absolute yellow coloring or almost entire blackish coloring of the four basal ventral segments, to the darkened tips of the hind femora and tibiæ or base of the tarsi, to the presence or absence of short pale hairs on the disc of the thorax and scutellum, or to the size of the specimens.

This species after allowing for its manifold variations is easily distinguished from any other British species except *L. annulata* by its immaculate wings without any distinct stigma, and from that species it may be known by its pale palpi and black-haired abdomen. *L. nigriventris* though now treated as a distinct species is probably only a very dark variety and intermediate specimens cannot be determined with certainty. It does not seem to vary so much in Central Europe and consequently writers there have laid too much stress upon such characters as its yellow coxæ, wherefrom English students are liable to be misled, but undoubtedly two or three closely allied species do occur in Europe and I have dealt with these in my synonymical notes.

L. tringaria is rather common in suitable localities, such as amongst shrubs on damp ground, and I have taken it from Cornwall (Penzance) to Sutherland while Haliday has recorded it from Holywood in Co. Down, but it has a tendency to form distinct-looking races. Omitting the extreme form, *L. nigriventris*, which I have treated as a distinct species, the Black Mountain form (occurring at an elevation of about 2000 feet) is a very dark one in which all the coxæ are mainly blackish grey, the hind femora and tibiæ considerably darkened at their tips, and the minute pale hairs on the thorax extended (though inconspicuously) to the front part, while the black sidemargins of the abdomen are so irregular as to almost form a row of black spots; an extremely large (12 mm.) male of a dark form was taken

by Colonel Yerbury at Hever in Kent on July 8, 1907. In localities where *L. nigriventris* occurs there seem to be always a number of specimens which can only be considered dark forms of *L. tringaria*, and it is only the remarkably distinct appearance of out and out *L. nigriventris* that has caused me to describe it separately. My records extend from May 28 to September 9. It is recorded from Lapland to Italy, but is rare in the extreme north.

Marchal (Bull. Soc. Ent. Fr., LXXII., 233, 1903) has stated that the larvæ prey upon earthworms (*Lumbricus*).

Synonymy.—In trying to work out the synonymy of this species it is well to commence by understanding the species which is known in Central Europe as *L. tringaria*. I take it that Kowarz was likely to know this, and in dealing with the specimens in his collection I find a male from Orsova which has the humeri sharply pale yellow; the postalar calli right away down through the metapleuræ, pteropleuræ, and upper part of the hypopleuræ rather orange; the scutellum all orange; the abdomen with narrow equal black sidemargins; the coxæ all pale orange and with yellow pubescence except inside at just the tip, the hind femora and tibiæ not at all darkened, and even the tarsi only brown to the tip; the wings long and yellowish; and this appears to me to agree with the species as distinguished by Schiner, Strobl, etc., from its allies. A male from Franzensbad has the abdominal sidemargins with five almost disconnected black spots, the hind coxæ with a blackened splash outside, and the trochanters blackened; and a male from Asch has the thoracal pubescence nearly all pale, the palpi with no black hairs, the metasternum shining black, the abdomen almost without any dorsal black spots, not even the posterior coxæ with any black bristly hairs, and the wings shorter. A female from Orsova is nearly all orange, but has pale brown thoracic stripes, the palpi with almost wholly black hairs, but no black bristles on the coxæ, and the abdomen without any black spots; and a female from Eger though mainly agreeing with the one from Orsova is smaller and has no dark stripes on the thorax, the palpi without any black hairs, and the posterior coxæ with a few black bristles.

Even these varying characters would appear to include *L. punctata* Loew, and *L. Goebeli* Strobl, but Loew contended that *L. punctata* had shorter pubescence; two males in Kowarz's collection under the name of *L. punctata* can hardly be the same species, one being as large and long winged as *L. florentina* but without any stigma (= *L. florentina* Loew), the orange coxæ with mainly black bristles, the palpi extensively black haired, the antennæ almost wholly orange, the abdomen without any black line on the sidemargins, and the legs orange with even the tarsi brownish orange; while the other specimen is remarkably small, but also has the antennæ almost wholly orange, and all the coxæ with a few black bristles near the tip. Loew in 1869 contended very strongly that *L. punctata* was distinct from *L. tringaria*, but knowing how variable *L. tringaria* is I can only follow Strobl and Bezzi in suppressing it. While *L. punctata* was supposed to be a widely distributed short-haired pale species closely allied to *L. tringaria*, *L. tonsa* Loew from Spain is supposed to be a short-haired dark species with brownish wings and a still browner stigma and considerably darkened femora and hind tibiæ; its status as a species or variation is not yet well determined; at the same time Loew described his *L. nigriventris* which I have dealt with at some length and have treated as a species, though I am convinced that it is only a dark black-bellied form of *L. tringaria*. *L. conspicua* Meigen (of which I have seen the types) represents a perfectly distinct species, which is very large, with long wings which have a black or conspicuous brown stigma, blackish grey coxæ and trochanters with no black bristles on the tip of the coxæ, long hind femora which are conspicuously blackened in the male or browned in the female on the apical half, palpi darkened but with only pale pubescence in the male and also in the type female but usually with a few black bristly hairs in the female, and the thorax blackish grey with the interstices between the middle and side stripes conspicuously lighter grey. Loew's *L. florentina* is closely allied to *L. conspicua*, but has no stigma, and has the palpi yellow with mainly black pubescence, the hind femora hardly darkened at all, and I have no doubt is represented by the large male *L. punctata* of Kowarz's collection just previously mentioned, but from this species all Gobert's synonyms given in Kertész's Katalog

under *L. florentina* must be excluded. Amongst the closely allied species must come *L. cingulata* Loew from Central Europe, but I believe that it may be satisfactorily distinguished by its browner wings and legs. *L. striola* Meigen according to the type is only *L. tringaria* with a dull dark orange stigma, rather blackened coxæ on which there are no black bristles, and palpi entirely pale haired. *L. ephippium* Zetterstedt is in my opinion only a still paler form of the variety *vanellus*. I consequently consider the true synonymy to be,

L. TRINGARIA L.

solivaga Harris
derelicta Harris
monotropus Harris
vermileo Schrnk.
scolopacea var. DeG.
 var. *vanellus* Fabr.
 ? *rufa* Scop.
reconditus Harris
simplex Meig.
ephippium Zett.

striola Meig.
 var. *punctata* Lw.
pilosa (laps. cal.) Strobl
Gœbelii Strobl
 var. *nigriventris* Lw.
conspicua Wing.
Pandellei Gob.
Perezii Gob.
Perrisii Gob.
Cartereaui Gob.

Linne's description must be accepted traditionally, just as tradition gives *vermileo* Schrank as a synonym.

4. **L. nigriventris** Loew. Allied to *L. tringaria* but much darker on especially the abdomen both dorsally and ventrally.

A species or variety belonging to the group of *L. tringaria*, being rather large and with immaculate wings, but by far the darkest form in that group.

♂. Thorax (compared with *L. tringaria*) sometimes darker greyish brown with but little yellowish tinge; humeri lighter grey or the same colour as the thorax; postalar calli with a greyish sheen on their prominences but not ferruginous beneath; pleuræ (including the metapleuræ) slaty grey, darker than in *L. tringaria*, and the prothorax either the same colour as the pleuræ or with a slight ferruginous tinge; pubescence on the dorsum all black, with seldom any pale hairs intermixed about the hindmargin. Scutellum shining blackish with more or less translucent brownish hue on the large apical part and in some lights on the disc, but with a greyish tinge when seen from quite in front, and with only black pubescence.

Abdomen in the darkest specimens black and but little shining, with slight brownish reflections in some lights, and in the next darkest specimens with the hindmargins of the first five segments distinctly but often very narrowly brownish orange but of the sixth segment only slightly so, and then these hindmargins are each nearly equal all across and are widest on the third and fourth segments to about one-tenth or even one-sixth of the segment, but do not extend to the side quarters or thereabouts; pubescence all black, fairly long on the sides of the five basal segments; belly shining brownish black in the darkest specimens, but in the next shade with each hindmargin rather sharply yellow up to at any rate the fifth segment but indistinctly so on the last three hindmargins; pubescence all black in the darkest specimens but generally pale to a large extent on the disc of the second segment and to a small extent on the third segment. In paler specimens the abdomen has dark orange dorsal markings, so that the hindmargin of the basal segment is orange, while the second and third segments are orange with a large diamond-shaped black spot on each which extends to the front margin but not to the hind margin and which is connected across near the middle of the segment with the broad black sidemargins; the fourth segment has its last quarter dark orange but not extended to the sides, and the fifth segment has a less distinct orange hindmargin; belly rather yellow on the disc of the basal segment. In a still paler specimen

taken by Colonel Yerbury at Tarrington on August 18, 1902, the thorax has one or two pale hairs near the scutellum, and the scutellum is more distinctly translucent luteous except for a large almost semicircular basal middle black spot; abdomen still more luteous, the basal segment being dark brownish orange, the second, third, and fourth segments with the dorsal black diamonds reaching neither fore nor hind margin of each segment, and the one on the fourth segment spreading out widely to the black side-margins, fifth segment black with a rather narrow orange hindmargin which does not extend to the sides; belly with a dark brownish orange hue on the three or four basal segments and with the hindmargins of segments and the sidemarginal hems conspicuously whitish yellow.

Legs in the darkest specimens obscure yellowish brown with all the femora and tarsi blackish, but the anterior femora with a slight brownish tinge and the tip of the anterior and the base of the hind femora ochreous for an indefinite distance; hind tibiæ darkened towards the tip; coxæ and trochanters dusted grey, and all the coxæ with greyish yellow pubescence in which there are no black hairs on the front pair but several bristly black ones on the posterior pairs at the tip in front. In the next stage the femora are not quite so much blackened, as the anterior femora and the underside and basal half of the hind pair are wholly brownish ochreous, while the front coxæ are slightly reddish on their outside. In the next stage the legs are yellowish brown, but the tibiæ rather more orange with the hind pair slightly darkened towards the tip; coxæ and trochanters blackish brown with a slight grey tinge caused by dust and with rusty brown pubescence, and the junction of the joints more luteous. In another specimen the basal two-thirds of the hind femora and tibiæ are more clearly orange and the apical third more distinctly blackish. In a Tarrington specimen the legs are more luteous, but blackened on the underside of the basal three-fifths of the front femora, and the broad blackish brown tip of the hind femora is extended back towards the base on the underside, the front coxæ have rather more lurid orange hues and greyish yellow pubescence, and the posterior coxæ have only traces of black hairs at the tip in front. Spurs blackish orange to rather clear dark orange; "touch-hairs" beneath the front tarsi neither numerous nor conspicuous. Pulvilli and claws dark brown.

Wings rather pale brownish yellow with the fore part from the base to the end of the marginal cell tinged darker or lighter, and the basal part of the subcostal and postical veins almost orange; alulae with a dark marginal line; sometimes the wings have a more yellowish hue, and sometimes the long narrow stigma is rather deeper yellow and by no means touching the radial vein. Squamæ darkened yellowish grey or sometimes almost all orange.

- ♀. Not unlike the male except for the frons and ovipositor. Frons orange brown, with a grey tinge at the sides on the upper part, but lighter grey just above the antennæ; ocellar space more or less darkened; face with a slightly browner tinge than in *L. tringaria*; pubescence on the eye-margins separated by a slight gap from the longer pubescence on the jowls. Eyes in life dark green.

Thorax orange brown with rather vague light brown stripes; the humeri and connecting lines obscurely dark orange, but the sides of the disc, the postalar calli, and the greater part of the pleuræ hardly at all orange, though the prothorax and metapleuræ may be slightly tinged, but the rest of the pleuræ light ashy grey with a faint yellowish tinge; pubescence all black. Scutellum with an extensive blackened reflection about the base, and with wholly black pubescence.

Abdomen in the darkest form brownish black with obscurely brown hind-margins and with distinct orange hems to the segments of the ovipositor; but in the next form with sharply defined narrow orange hindmargins to all the segments; while in the next form the two basal segments are more or less chestnut brown or brownish orange except on the blackish middle part, and the third and fourth segments like the previous two but less distinctly brownish, and the fifth and sixth segments usually with a greyish tinge on a blackish or brownish ground colour; in pale specimens the tip

of the ovipositor is rather pale brown; sidemargins all blackish. Belly blackish or blackish brown with narrow yellow hindmargins, and in light colored specimens with the basal segment (except on its middle) and the broad sidemarginal hems yellow, or in still paler specimens the belly may be more extensively yellow; pubescence pale on the disc of the second segment.

Legs brownish yellow, but in dark specimens the hind femora have a blackish dorsal blotch near the tip which runs back as a blackish streak along the front and hind surfaces, and all the tarsi are blackish; but in more usual forms the bases of all the tarsi are brownish yellow, and there is scarcely any notable darkening on the hind femora or tibiæ; anterior coxæ either dark brownish grey, or in lighter specimens blackish grey with rather obscure luteous markings, or greyish orange with a slight slaty tinge in front on the basal half of the front pair and on all the front of the middle pair; hind coxæ almost all slaty on the front and outer sides; front coxæ usually without any traces of black hairs at the tip in front though sometimes with indications of them, but the posterior coxæ always with some black bristly hairs at the tip in front; trochanters blackish in dark, or obscurely orange in lighter, specimens.

Wings in strongly colored specimens with an obvious orange tinge which becomes more conspicuous on the base and fore part and stigma.

Length about 10 mm., varying from 8 mm. to 12 mm.

This species (or form of *L. tringaria*) was distinguished by Loew in 1869 from Bavaria, and in typical specimens it certainly has a peculiarly distinct appearance, but as it has a strong tendency to vary towards orange markings while *L. tringaria* has a tendency to vary towards dark markings it is probably only a dark form of the latter. The darkest forms of all are apparently much darker than those described by Loew as *L. nigriventris*, and only a long series of specimens can indicate the gradual change towards *L. tringaria*; the darkest forms appear to be very local in Britain, and I think that I have only seen them from Porthcawl in Glamorganshire, but dark forms of *L. tringaria* are very common in Britain though apparently very rare on the continent; these forms seem to belong to local races, as almost all specimens occurring together show a great similarity in coloration and size. The extreme forms were first taken by Colonel Yerbury at Porthcawl in June 1903, but in 1906 he made a special study of them at that locality and came to the conclusion that no fixed boundary line could be drawn between the darkest forms and *L. tringaria*; an examination of his captures showed about 20 per cent. which would pass as *L. nigriventris*, and nearly 40 per cent. more which might be light colored *L. nigriventris*, while about 40 per cent. would range from dark to ordinary specimens of *L. tringaria*, and about 2 per cent. would belong to the form *vanellus*. *L. nigriventris* holds about the same position towards *L. tringaria* as *L. monticola* does to *L. lincola* or as *L. scolopacea* does to *L. strigosa*.

L. nigriventris has occurred not uncommonly at Porthcawl in Glamorganshire from June 4 to August 18, and the Rev. W. J. Wingate has taken very similar specimens rather commonly at Hesleden in Durham, while Colonel Yerbury took a male at Tarrington in Herefordshire. The female has I believe never been previously noticed.

Synonymy.—In my list of British Diptera (1888) I introduced this species as British, but my exponents of it were only some specimens of a small dark form of *L. tringaria* which occurred near Barton Mills in Suffolk. The Rev. W. J. Wingate recorded his specimens as *L. conspicua* Meig., but that species though allied is perfectly distinct and has longer wings and a distinct stigma.

5. *L. annulata* DeGeer. Wings without any distinct stigma. Legs almost wholly yellowish. Palpi and antennæ blackish. Pubescence mainly pale.

A rather large species belonging to the group of *L. tringaria* but distinguished by its pale pubescence.

The only recognisable description* I can find of this species is that given by Loew in his first work, *Bemerkungen über die in der Posener Gegend Diptera*, published in 1840, of which the following is a translation:—

♂. "Leptis (annulata?) cinerea, coxis concoloribus; abdomine flavo, trifariam nigropunctato, postice utrinque nigro, antennis palpisque nigris, alis immaculatis."

"Male; Head: Antennæ black, and palpi also but like the face with long silvery grey pubescence. Frons also bearing short silvery grey pubescence and appearing blackish in many lights. Thorax: rather dark grey with the usual stripes; coxæ also dark grey with silvery grey pubescence. Disc clothed with fine yellowish grey hairs, which are longer than in the allied species. Abdomen: yellow; first segment black above, pale beneath; second and third yellow with black dorsal spots and pointed triangular side spots, pale beneath; fourth segment like the two preceding but brownish beneath with a pale hindmargin; on the fifth segment the black middle spot unites with the side spots to form a doubly bowed band, it is black beneath. The two last segments are wholly black. The pubescence of the abdomen is yellowish white. Legs: yellow; front tarsi browned from about the middle of the basal joint, middle tarsi from the base of the basal joint; hind tarsi all brown; also the middle and especially the hind tibiæ are somewhat darker at the tip. Wings: rather hyaline, little colored, but more yellowish on the foremargin."

"Female very much like the male, but distinguished as follows: coxæ and palpi with much shorter pubescence which tends more towards greyish; frons brown on the upper part. Abdomen: first segment blackish above, with the exception of a yellow hindmarginal hem which widens towards the sides; second segment yellow above with a large black spot, which nearly reaches to the hindmargin; third segment also yellow with a black spot widened forwards band-like; fourth segment with a black posteriorly bowed band, but yellow on the hindmargin, like the subsequent anteriorly black segments. On the under side of the abdomen the colour goes from the base onwards gradually over to black, but the incisures remain yellow. The hind tarsi are somewhat less, and the anterior more browned than in the male. The pubescence of the abdomen tends more towards yellow than in the male."

Loew stated that the species was common near Posen, but I do not find any satisfactory recognitions or descriptions of it from 1840 to 1907.

♀. I have seen one English female specimen which I refer without hesitation to this species, as I believe it to be the only one of the *L. tringaria* group which bears mainly pale pubescence. I have made the following notes from it:—

Probably a dark specimen. Frons light grey at the top and bottom but with the middle part widely brown and becoming blackish about the centre; quite bare. Proboscis greyish black; palpi greyish black, bearing numerous black bristly hairs above but whitish hairs beneath and about the sides. Antennæ greyish black with faint traces of orange at the extreme tips of the two basal joints; arista hardly twice as long as the antennæ.

Thorax light ashy grey with the usual stripes blackish and the middle one split, causing the light grey intermediate stripes and the sides of the disc to stand out rather conspicuously pale; pubescence (rubbed?) consisting of

* Lundbeck has since described it in *Diptera Danica*, p. 147 (1907).

sparse short black bristly hairs amongst which are a few short yellow ones ; metapleural tuft with several black hairs on the upper part. Scutellum light ashy grey and bearing numerous pale hairs and a few black ones.

Abdomen with the blackish coloring so predominant that only the hind-margins are orange, but the orange colour spreads up on the second, third, and fourth segments (and slightly on the fifth) between the middle and the sides so as to cause the "doubly bowed" band and to leave the orange hindmargin narrow at its narrowest parts. Pubescence conspicuously yellow and depressed all over except about the basal corners where it is longer and less depressed, rather outspread at the sides of the two basal segments, and there are some very short inconspicuous black bristles on the disc of the first and second segments and a very few on the third segment. Belly greyish black with narrow yellow hindmargins on the three basal segments and with the orange dorsal hind corners of the fifth and sixth segments showing up conspicuously ; pubescence very short, depressed, pale and sparse on the four basal segments.

Legs with the coxæ dark ashy grey and more decidedly colored than in the darkest forms of *L. tringaria* and with only greyish white pubescence in which there are no black hairs even at the tip in front ; hind tibiæ only faintly darkened at the tip ; the small black bristles on the tibiæ rather conspicuous ; "touch-hairs" beneath the front tarsi rather numerous.

Wings only slightly yellowish, but the stigmatic space more deeply yellowish and the mediastinal cell yellowish, and the base rather orange. Squamæ yellowish white with only slightly yellower margins and with whitish not dense fringes.

Length about 10 mm.

This species may be distinguished from any of the *L. tringaria* group by its pale pubescence alone, but it also differs in its much less orange coloring whereby the thorax shows rather sharply defined pale ashy grey stripes, and the coxæ are decidedly dark ashy grey ; the palpi are also more decidedly blackish, and the antennæ show very little trace of orange.

L. annulata is only known as British from one female specimen taken by Dr J. H. Wood at The Dowards in Herefordshire on June 3, 1903. As however it is said to be a fairly common North European species (and even on mountains down to Austria), it is possible that it will not prove to be very rare now that attention has been drawn to it. It was reputed as British in Stephens' Catalogue of British Insects and in Curtis's Guide, but probably in mistake for some form of *L. tringaria*, though three specimens (1♂ 2♀) in the old collection of the British Museum under this name or that of "*annula*" are dark and strange looking.

Synonymy.—I cannot help doubting whether Schiner and other European writers properly recognised this species, as they do not refer to the pale pubescence which is its most striking character. In Bigot's collection seven specimens stood for it, of which four were *L. lineola*, one *L. monticola*, and two an allied *Leptis* of which one bore a label "Caucas."

6. **L. lineola** Fabricius. Rather small species, with only pale pubescence on the thorax. Abdomen with conspicuous orange markings. Legs orange, but with a broad blackish ring near the tip of the front and hind femora. Wings immaculate except for the conspicuous blackish stigma.

Very distinct from any other British species except *L. monticola*.

♂. Head when viewed sideways appearing to be short but not really much so if the puffed-out lower part of the back of the head be included. The bare

socketed epistoma is whitish grey, but the very broad side-cheeks are whiter still and bear rather conspicuous long erect whitish pubescence, which becomes longer and more conspicuous on the jowls and on the puffed-out lower part of the back of the head; the backmargin against the eye is rather widened about the middle and from that point to the jowls the back of the head becomes more and more puffed out, but above this prominence the occiput becomes concave and bears on its lower part a single row of pale bristly hairs and on its upper part only a row of short black bristles; vertex dull black, elevated and bearing rather short mixed black and tawny bristles which are all directed forwards; frons light grey, quite bare. Proboscis large and thick, brownish black to light brown, hairy on the sucker-flaps; palpi thin and rather pointed, not much drooped, dull blackish to light brown with rather long pale pubescence. Eyes quite bare, touching for fully half the space between the occiput and the antennæ; facets gradually and almost imperceptibly diminishing in size towards the back and top. Antennæ brownish black; all three joints almost equal in length, but the second joint the stoutest; all the joints bear a few tiny dorsal bristles; arista dull black, upturned, and slightly tapering on the basal part.

Thorax greyish black with hardly any indication of stripes; humeri rather indistinctly luteous, and the whole quadrangular space between them and the suture rather light grey; pleuræ all rather light grey. Pubescence all pale yellow, neither scarce nor short; on the pleuræ there is short pale pubescence on the prothorax and numerous long thin pale hairs on the metapleuræ, while all the mesopleuræ except the front and middle parts bear very short inconspicuous pubescence. Scutellum all dull luteous except on the black base, and bearing longer more erect pale pubescence than that on the thorax.

Abdomen dull luteous, with a large dorsal triangular blackish spot on each of the second, third, and fourth segments, of which the base lies broadly on the foremargin of each segment but the tip does not quite reach the hindmargin, nor do these spots reach the sidemargins; on the fifth and sixth segments these black dorsal spots are so much enlarged that only a large (sometimes indefinite) triangular dull luteous spot occupies each hind corner for about half-way up the sides, and these spots are only narrowly connected along the hindmargins; seventh segment dull black; the sidemargins bear no dark line on the four basal segments; pubescence fairly long and abundant but very inconspicuous because it is so pale, but a few stronger depressed black hairs may occur about the hindmargins of the later segments. Belly clear orange on the three basal segments and only slightly darkened down the middle of the fourth segment, but black on the rest; pubescence very pale yellow, not very scarce nor short, obvious on the black ground colour but very inconspicuous even though longer on the orange ground colour. Genitalia with a pair of small blackish side lamellæ which end in a pair of incurved orange hooks.

Legs luteous, but the front and hind femora with a conspicuous though rather badly defined broad blackish ring just after the middle, but on the front pair this ring does not quite extend to the tip, and sometimes the rings are only moderately distinct; coxæ slaty grey, with the usual abundant greyish white pubescence on the front pair; trochanters dull blackish; hind tibiæ indistinctly darkened about the tip; spurs orange with the extreme tip black; anterior tarsi brownish black with the base widely dull luteous, but the hind tarsi less luteous at the base. Pubescence and tiny bristles pale yellow on the basal half or more of all the femora, but black on the rest; "touch-hairs" present though sparse. Pulvilli brown; claws blackish brown.

Wings slightly smoky, but pale orange about the base; stigma long, conspicuous, and blackish, but not quite touching the radial vein or the tip of the marginal cell; veins blackish, but orange about the base and on all the subcostal vein and the stem of the postical vein; costal vein with some pale pubescence on the front part of the base, but with the usual tiny black bristles on the costal ridge which merge as usual near the tip into a fine ciliation; subcostal vein with rather dense short black bristles on all its length except at the base; cubital fork narrower than in the preceding species, and its branches ending more equidistant from the wing-tip; squamæ (alar) glassy yellow with orange margins and with moderate pale yellow fringes;

thoracal squamæ absent, leaving only the linear bare yellow frenum. Halteres dark orange.

- ♀. Rather like the male. Frons about one-fifth the width of the head, greyish white, parallel-sided from the upper ocelli to the transverse suture just above the antennæ, and with a few extremely minute black and yellow bristles about the sides; back of the head all puffed out and the eyes (in profile) more regularly oval; pubescence on the jowls and lower part of the back of the head conspicuously long and whitish; occiput with rather indistinct blackish spaces near the top corners of the eyes, and bearing several irregular rows of black bristles; ocellar space elevated, rather blackish, and bearing black and yellow short bristles as in the male. Eyes smaller and more oval; facets all small and equal; in life brown with a faint gloss of green. Antennæ with the second joint hardly stouter than the others but more ferruginous about its tip.

Thorax with shorter and less abundant pubescence than in the male, especially on the disc; humeri and the space from them to the wing-base rather luteous. Scutellum dull luteous even to (or almost to) the base.

Abdomen black and orange, moderately shining, the black colour consisting of large badly defined dorsal triangles on the second and third segments and of most of the subsequent segments except the rather broad hindmargins; pubescence all yellowish except for a few depressed black hairs on the disc mainly about the hindmargins. Belly obscure blackish, but most of the second segment orange. Ovipositor (not including the tubular abdominal segments) yellow, with a pair of outspread oval brownish yellow lamellæ.

Legs usually rather paler than in the male, the rings on the front and hind femora being usually less dark and less defined; coxæ and trochanters more ferruginous; front tibiæ slightly darkened at the tip, but the hind tibiæ less darkened there than in the male.

Wings and veins less dark; stigma more brownish. Squamæ paler. Length about 6 mm.

This species may be distinguished by its small size, its immaculate wings except for the conspicuous stigma, and its pale pubescence from all other British species except *L. monticola*, and from that it may be distinguished by its paler legs and abdomen; it is however probable that *L. monticola* is only a dark mountain form of it.

L. lineola is not at all uncommon in England, but is apparently much more common in Scotland or perhaps Ireland. I have English records from Devon, Dorset, Hampshire, Sussex, Surrey, Middlesex, Suffolk, Hereford, Gloucester, Lancashire, and Cheshire; Welsh ones from Glamorgan and North Wales; Scotch ones from Argyll, including the Isle of Jura, Haddington, Fife, Perth, Banff, Elgin, Nairn, Inverness, and Sutherland; and Irish ones from several localities in Co. Kerry. It usually occurs on shrubs in leafy glades in woods where it may be seen playing about on leaves in the sunshine, or it may occur on tree-trunks like *L. scolopacea*. My dates range from June 6 to September 14, but a specimen occurred in a small conservatory at Denmark Hill as early as March 15. It is recorded from extreme North Europe to at least Austria, but may be replaced further south by *L. monticola*.

7. ***L. monticola*** Egger. Rather small species allied to *L. lineola* but with the abdomen and femora mainly blackish brown.

Probably only a dark mountain form of *L. lineola*.

- ♂. Face grey, side-cheeks lighter but not so light as in *L. lineola* and with their pubescence yellower; hairs on the vertex all black; frons brownish

grey; palpi blackish. Antennæ blackish; arista about twice as long as the antennæ.

Thorax blackish brown, slightly shining; humeri, the quadrangular space behind them, and the pleuræ darker grey than in *L. lineola*. Pubescence on the thorax fairly long and conspicuous, brownish yellow. Scutellum entirely greyish black.

Abdomen brownish black, but lurid and somewhat pellucid on almost all the three basal segments, and almost ochreous about the hind corners of the second segment, more conspicuously shining than in *L. lineola*; pubescence brownish yellow, neither short nor scarce. Belly shining blackish brown but inclined to ochreous on the second segment; pubescence pale, rather long. Genitalia with the side lamellæ greyish, but the long incurved hooks and the middle piece dark orange.

Legs dull dark brown, but all the tibiæ dull obscure orange with the tip blackish; front femora obscurely and indeterminately orange on about the basal quarter, and also nearly all the middle femora and the basal half of the hind femora, though the posterior side of the hind femora is nearly all obscurely orange; middle tarsi obviously dull obscure orange on more than the basal joint, but the base of the other tarsi only slightly obscure.

Wings distinctly darker than in *L. lineola* and more brownish orange about the base. Halteres brown with yellow stems.

♀. Frons with a more brownish tinge than in *L. lineola*; palpi blackish brown.

Scutellum greyish black with only the tip broadly but indistinctly ferruginous.

Abdomen shining brownish black with the sides of the first segment and the sides and hind corners of the second segment ferruginous, and also obscurely though rather broadly ferruginous on all the hind margins.

Legs dull orange, but dull blackish brown on more than the apical half of the front and hind femora, though the front femora are (as in *L. lineola*) obscurely orange at the tip itself; tibiæ as in the male but the front tibiæ more distinctly blackish at the tip and the hind tibiæ indistinctly darkened on the apical quarter; tarsi much blacker than in *L. lineola*, the front pair being scarcely at all ferruginous at the base.

Wings much browner than in *L. lineola*, with the base more brownish orange; stigma blackish brown. Halteres more brownish orange.

Length about 6 mm.

This species is closely allied to *L. lineola*, and is probably only a dark form bearing the same relation to it as *L. nigriventris* does to *L. tringaria*; it is curious that several species of *Leptis* appear to have very distinct-looking light and dark races.

L. monticola was taken by Colonel Yerbury at Waterville in Co. Kerry on August 1 and 4, 1901, and my description is made from a male and a female taken by him. It is recorded from Central Europe and Italy.

Synonymy.—Egger described this (so-called) species in 1860, and Schiner accepted it in 1862; Loew in 1869 considered it to be probably only a dark form of *L. lineola*, but Becker in 1887 considered it a good species and stated that the male (only) had some black hairs on the thorax; he did not seem to recognise any connection between it and *L. lineola* either then or when in 1890 he compared it with *L. funebris*. Bezzi in 1898 gave it specific rank, but in Kertész's "Katalog" (1903) he placed it as a "var." of *L. lineola*. I have described it separately from *L. lineola* mainly because British collectors may otherwise imagine that they have found some new British *Leptis*.

3. ATHERIX.

Atherix Meigen, Illig. Mag., ii., 271 (1803).

Medium-sized moderately pubescent flies which have

maculated wings and usually a particolored abdomen, reminding one of *Chrysops*.

Head (fig. 189) semicircular, slightly narrower than the thorax and apparently flattened because the lower part of the face seems to be tilted forwards and upwards. Face with a quite bare rounded socketed epistoma lying between the large densely hairy side-cheeks, but with all the space surrounding the antennæ bare; jowls and back of the head bearing long and rather dense pubescence; back of the head all puffed out, most so on the lower part in the male but more equally in the female; frons hairy from the vertex to the antennæ in both sexes, and rather conspicuously so in the female. Proboscis protruding, thick, with long oval sucker-flaps which bear transverse stripes; palpi two-jointed, almost as much produced as the proboscis, upcurved on the basal third or more and then porrected straight forward. Eyes of the male almost touching on the frons and with the facets not conspicuously contrasted in size, but those of the female widely separated; quite bare in both sexes. Antennæ (fig. 191) short, well separated at the base; basal joint cup-shaped and about as long as the second, and both these joints bristly; third joint kidney-shaped, being deepened downwards, and bearing a long bare or slightly pubescent terminal arista which from the shape of the third joint appears to be dorsal.

Thorax flatly arched, and bearing rather dense though short pubescence; pleuræ with pubescence on at least the mesopleuræ and the metapleuræ, while the prothorax bears similar hairs. Scutellum with pubescence similar to that on the thorax but often longer and more erect; metanotum concealed by the depressed scutellum, and with its side humps bare.

Abdomen conical or oblong, hardly twice as long as the thorax, with seven segments. Genitalia in the male with long prominent lamellæ, but in the female more flattened and shortly pointed at the tip.

Legs moderate; hind pair rather elongate, but the front pair and especially the front tarsi thin and unusually long; front tibiæ shorter, middle tibiæ about equal, and hind tibiæ slightly longer than the tarsi; front coxæ rather long. Front tibiæ without apical spurs; middle tibiæ with two spurs of which the front one is considerably the longer; hind tibiæ with two nearly equal spurs. Front tarsi with "touch-hairs" beneath even though sometimes small and inconspicuous; front pulvilli and claws distorted in the male (fig. 190), but the posterior claws of normal length.

Wings with a venation rather similar to that of *Chrysopilus*, the anal cell being closed and petiolate, but the cubital fork is shorter and more widely open and more bell-mouthed, the discal and small cross-veins placed at one-third from the base of the discal cell, and the radial vein with an even curve upwards; conspicuous dark markings cover most of the wings but leave pellucid irregular incomplete bands. Squamæ (alar) moderate in size and with slight fringes. Halteres rather large.

This genus is easily recognised by the remarkable coloration of the wings; it is distinguished from *Leptis* by the closed anal cell and reniform third antennal joint, from *Chrysopilus* by the two spurs to the hind tibiæ and the remarkably distinct appearance, from *Atrichops* by the hairy side-cheeks and frons in both sexes as well as the more robust build, and from *Symphoromyia* by the two spurs to the hind tibiæ and the closed anal cell.

Atherix is a very well-known genus, consisting of about sixteen species which are recorded from all Europe, North and South Asia, South Africa, and North America, but only three species are well known from the European region, two of which occur in Britain. The metamorphoses of *A. Ibis* have often attracted attention from the peculiar habits of the females, who lay their eggs in a dense mass formed of their own bodies.

Synonymy.—It is important that the type of this genus should be fixed, as some confusion has arisen in the formation of subsequent dismembering genera.

1. The name *Atherix* probably first appeared in Meigen's paper in Illiger's Magazin für Insectenkunde, ii., 271 (1803), under the following description:—

“64. ATHERIX. Die Fühlhörner vorgestreckt, herunter gedrückt, dreigliederig: die beiden letzten Glieder etwas flach, rundlicht; das letzte auf der obern Seite mit einer aufwärts gekrümmten Borste.—Die Flügel halb offen. *Rhagio diadema* et *cinctus* Fabr.”

At first glance this would appear to make *Rhagio diadema* Fabr. the type of the genus, especially as *R. cinctus* Fabr. belongs to the *Nemocera*! A closer study of Meigen's paper shows an introduction written by Illiger himself, which states “Dieses ist der Vorläufer eines Werks über die europäischen Zweiflügler, das der Verfasser schon ausgearbeitet und mit den vortrefflichsten Zeichnungen der Gattungsmerkmale ausgestattet hat.” I take the word “Vorläufer” to mean “Precursor,” and consequently not to mean the “Work” itself, and it is noticeable that Meigen in all his subsequent writings scarcely ever made the slightest reference to this “Vorläufer”; in fact he ignored it almost as completely as he always ignored his Nouvelle classification des Mouches à deux ailes (1800). The two works may be taken as two of his progeny who died from premature birth.

If however the rigid priority-monger would try to assert the supposed legitimate rights of *Rhagio diadema* to stand as the type species of *Atherix* instead of the commonly accepted *A. Ibis*, a close examination of dates will I think prevent his establishing his case. Ordinarily the dates on the title-page of Illiger's Magazin (1803) and on the title-page of Meigen's Klassifikation (1804) have been accepted without question, but an examination of Illiger's “Zweiter Band” shows on page 285 that it contains reviews of works published in 1803, and consequently it could not have been published itself until very late in 1803 or more likely in 1804, while an examination of Meigen's Klassifikation, page iii. (misprint for viii.), shows that the “Erster Band,” as distinguished from “Zweite Band” (which never appeared), left Meigen's hands on “17. Mai 1803.” The actual date of its publication is unknown to me, but I am obliged to admit, as telling against my contention, that in my bound copy of Meigen's Klassifikation there is a leaflet between page 314 and the Plates, on which a book publisher's (Carl Reichard) list of works is given, and some of these, including Illiger's Magazin “3r Bd. 1 Thlr.,” were undoubtedly published in or before 1804, but this only proves the date of the binding.

2. In (probably) 1804 Meigen fully described and figured his genus *Atherix* in his Klassifikation, p. 293, Tab. xiv., fig. 26-31. He described two species 1. *Ath. maculatus* and 2. *Ath. immaculatus*, of which the first may well be considered the type, especially as he gave it primary place in his Syst. Beschr., ii., 104 (1820), under the older name of *A. Ibis*. We may therefore accept the original *Rhagio Ibis* of Fabricius as the type of Meigen's genus *Atherix*; his second species *A. immaculatus* has since been distinguished generically by the single spur on the hind tibiae and the open anal cell and is now placed in the genus *Symphoromyia*. Meigen quite ignored the genus *Atherix* of Illiger's Magazin, and transferred one of its supposed species to the *Nemocera* while he suppressed the other one into *Rhagio* (= *Leptis*).

3. In 1805 Fabricius adopted the generic name *Atherix* and included ten species under it. He however used the name in quite a different sense from Meigen, and his species were mainly those which we now place in the genus *Chrysopilus*, though he left Meigen's *A. immaculata* as his last species. *A. Ibis* was left in his genus *Leptis* (substituted for *Rhagio*) of which *L. scolopacea* is the type.

4. In 1820 Meigen enumerated twelve species in his genus *Atherix*, of which however four were unknown to him. He stated that the genus was allied to *Leptis*, especially his section B. (now forming the genus *Chrysopilus*), but that the main characters lay in the different shape of the third antennal joint and in the downward bent palpi. The eight species known to him fully agree with these characters and represent two species of *Atherix*, one of *Atrichops*, and several of probably *Symphoromyia*. It must be borne in mind that up to this date only two genera of European *Leptidæ* were recognised, so that what was not *Leptis* was *Atherix*.

5. The dismemberment of *Atherix* Meig. began in 1856 when Rondani proposed a genus *Ibisia* for “*Bibio marginata* Fabr.,” and *Atherix* for “*Atherix pilosa* Meig.” *Bibio marginata* F. is now known as *Atherix marginata* F. and is almost certainly congeneric with *Atherix Ibis*, and consequently Rondani's genus *Ibisia* may be considered to be an absolute synonym of *Atherix* Meig. As to Rondani's genus *Atherix*,

whatever *A. pilosa* Meig. may be it is a species which was not described until seventeen years after the genus *Atherix* was founded, and consequently cannot be its type. Meigen himself thought that his *Ath. pilosa* was the female of *A. melæna*, but anyhow Rondani's genus *Atherix* is an obvious synonym of *Symphoromyia* as now recognised. Schiner in 1862 sought to distinguish the two genera (*Atherix* and *Symphoromyia*), but mistakenly applied the name *Ptiolina* to the second one, and consequently his *Ptiolina* is again an absolute synonym of *Symphoromyia*. It was not until 1867 that the two genera became well recognised by Frauenfeld's elucidation of the confusion and his establishment of the genus *Symphoromyia*. I certainly cannot follow Griffini in using the word *Ibisia* for *A. Ibis*, etc., and *Atherix* for *Symphoromyia*.

Table of Species.

- | | | |
|---|------------------------------|----------------------|
| 1 | (2) Legs mainly dull orange. | 1 <i>Ibis</i> . |
| 2 | (1) Legs wholly black. | 2 <i>marginata</i> . |

1. **A. Ibis** Fabricius. Wings with conspicuous dark markings. Legs mainly dull orange.

A very distinct species, though the wings bear a superficial resemblance to *Chrysops* or *Anthrax*.

♂. Face and frons (fig. 189), as well as the narrow space on the latter between the eyes blackish or brownish grey; frons with rather dense fairly long black pubescence which is not extended upwards between the eyes and is not connected with the pubescence on the side-cheeks, the space all about and between the antennæ being quite bare.



FIG. 189.—*Ptiolina obscura*
♂. × 48.

Epistoma small and quite bare, but the large side-cheeks bearing a dense pubescence which is composed of more or less numerous yellowish hairs on the upper part, black hairs on all the middle part, and yellowish hairs again on the back part of the very wide jowls; the pubescence on the very broad under part of the head and on the rather broad lower part of the back of the head yellowish, but the upper part of the back of the head rather shallow though still protruding from the eyes, and bearing a shorter more bristly black pubescence near but not quite close to the eyes, and this pubescence rather dense but forming no ciliation; vertex with longer rather dense black pubescence, but the space immediately below the front ocellus quite bare. Proboscis large and protruding, blackish grey with a tinge of orange, and with a large bilobed tip and a channelled underside covered with short black bristles; palpi long and thin, but not so long as the proboscis, blackish grey with an orange tinge, strongly upcurved on the basal third but after that projecting forward, and bearing numerous and longer bristly hairs than those on the proboscis. Antennæ dull greyish black, short, the three joints nearly equal in length, but the third extended downwards kidney-shaped; basal joint with numerous long black bristly hairs above; second joint with similar but shorter hairs above and beneath; arista nearly three times as long as the antennæ, apparently bare and not very thin. Eyes in life (according to Girschner) of a beautiful green in the male, but in the female brown with greenish and reddish iridescence.

Thorax brownish black or nearly black, slightly shining, and with two widely separated brownish yellow lines which are slightly dilated in front and which extend from the front part almost to the scutellum but which slightly diverge at that end; there are also indications of brownish yellow colour on the humeri and on the sidemargins; pleuræ more greyish. Pubescence on disc of thorax rather short but rather dense, brownish yellow with more or less black hairs intermixed; mesopleuræ, prothorax, and the comparatively small roundish metapleuræ with longer pubescence, sternopleuræ with similar

but sparser pubescence, and all the rest of the pleuræ quite bare. Scutellum brownish with the tip almost blackish; pubescence longer, more erect, and paler than on the thorax.

Abdomen black and orange, broad at the base and tapering almost to a point, rather longer than the thorax and scutellum together; the black colour includes the basal segment, a triangular spot against the middle of the base and a spot on each side of the second segment, and a largish middle spot and distinct side-spots on the third and fourth segments; the fifth segment is also black except at the basal corners and hindmargin, while all the sixth and seventh segments are black. Genitalia long and stout, all orange except at the tip. Pubescence universal, depressed, rather abundant and fairly conspicuous on especially the hindmargins, pale orange with traces of a few black hairs across the disc and about the middle of the base of some segments and especially on the second and third segments. Belly with the very short basal segment black, but otherwise mainly yellow with a transverse black spot on the middle of the base of the second segment and on the disc of each of the next three segments, and with spots outside these and with still more conspicuous sidemarginal spots; on the third segment these spots may coalesce or the side-spots may be faint, and on the fourth and fifth segments the black spots do coalesce; sixth segment all orange; pubescence thinner and more erect than on the dorsal side.

Legs mainly orange, but the coxæ and trochanters greyish black, and the front femora mainly blackish or brownish black except on the apical quarter, while the posterior femora are usually nearly all brownish orange but partly blackened beneath on the basal half of the middle pair; the coloring of the femora however varies extensively, even to the greater part of the four posterior femora being almost blackened; tarsi obscured after the base; front tarsi about one and half times as long as, middle tarsi about equal to, and the hind tarsi shorter than, their tibiæ; hind tibiæ stout. Pubescence on the coxæ and behind the anterior femora rather long and mostly black, but pale on the front femora near the base and sometimes more pale beneath but black in front; middle femora with rather similar pubescence; the rest of the clothing of the legs mainly composed of tiny black bristles which become rather longer on parts of the hind femora and tibiæ; front tarsi with the "touch-hairs" very few, short, and inconspicuous; middle tibiæ with two spurs of which the front one is distinctly the longer, but the hind tibiæ with two almost equal spurs. Pulvilli on the front legs with the outer pulvillus reduced in size and the outer claw enlarged and twisted over it (fig. 190), but the middle pulvillus enlarged; posterior claws and pulvilli normal and not short.

Wings mottled blackish and hyaline, but with the mediastinal cell brownish; the blackish markings form three or four irregular and incomplete bands across the wings, of which the most conspicuous is the one which extends across the middle of the wing and forms a large blotch under the stigma extending fairly distinctly to the fork of the postical vein or even to the end of the postical vein. Stigma brownish black, but leaving the tip of the marginal cell conspicuously pale yellowish brown. Squamæ (alar) obscure whitish with a thick pale yellowish margin on which is a very short but rather dense fringe; thoracal pair consisting of only a narrow pale greyish yellow bare frenum. Halteres with large elongate dark-brown knobs and with brownish yellow stems.

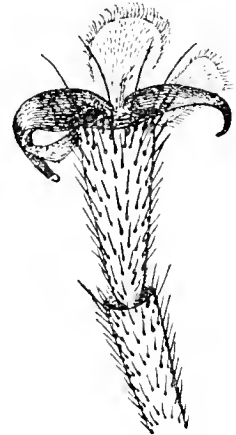


FIG. 190.—*Atherix Ibis* ♂.
Left front tarsus. × 50.

- ♀. Considerably distinct from the male. Frons at the occiput more than one-quarter the width of the head and gradually widening downwards, with no middle channel but with a rather short rather dense black pubescence except on the middle; back of the head light greyish brown, puffed out from the eyes, and bearing very numerous very short bristles on the upper part

near to but not touching the eyes; quite behind the head there is long pale pubescence.

Thorax with much shorter pubescence, which causes the four pale lines and the humeri to appear more conspicuously brownish yellow; sternopleuræ with more abundant pubescence.

Abdomen very distinct from that of the male, as there are no orange markings unless at the extreme tip, when viewed from above greyish black with pale hindmargins to the four basal segments, but when viewed from behind the ground colour is greyish yellow with a deep black band across the foremargins of the five basal segments; on the two basal segments this black band is wider but usually less defined than on the next three segments, but on these three segments it dies away at the sides and is widened at the middle down to the rather narrow yellowish grey hindmargin, and this hindmargin is well defined about the middle but merges into the greyish yellow tinge of the sides; but sometimes these black bands are broader and extend more towards the sides on especially the fourth and fifth segments, and a band is fairly visible on the middle of the base of the sixth segment; usually the sixth and seventh segments are greyish yellow with indications against the foremargin of very shallow black spots at the sides and at the middle of the sixth segment. Pubescence brownish yellow, as long and as abundant as in the male but more conspicuous because of the darker ground colour. Belly greyish black, with the hindmargins rather obscurely yellowish grey; terminal segments considerably withdrawn and the ovipositor almost concealed.

Legs with the coxæ all greyish black; posterior femora always paler than in the darkened males, being entirely dull orange except when slightly darkened beneath the basal half of the middle pair; hind tibiæ very slightly longer than the tarsi; "touch-hairs" beneath the front tarsi only just perceptible.

Length about 9 mm.

This species is easily distinguished from *A. marginata* by its paler legs; *A. picta* Loew (from North Russia to Siberia) is a very closely allied species of which only the male is known, but that has darker pubescence on the hinder part of the thorax and on the scutellum, an unspotted belly, and much blacker legs, while the stigma is dark brown even to the tip of the marginal cell. Loew also described a var. *femoralis* from Carinthia which has the femora quite as dark as in the darkest English specimens, but as our specimens vary so very much in this character I consider that we can supply the intermediate forms with which he seems to have been unacquainted; the North American *A. variegata* is closely allied to *A. Ibis*.

A. Ibis has never occurred to me as a common species but I have records from Devonshire (Avon Valley and Bickleigh), Sussex (Three Bridges), Derbyshire (Matlock), Cheshire (Bowden), Monmouth (Wye Valley), Brecknock (Hay), Northumberland (*t.* Wingate), Perthshire (Rannoch), Ayrshire (Barr), Kincardine (Banchory), Banff (Craigellachie), Nairn, and Inverness (Spey Bridge), from May 27 to June 28. Its metamorphoses have often been recorded because the females have a remarkable habit of bunching themselves together in large masses overhanging streams, and thereby attracting notice to themselves. I have never seen one of these bunches, but Walker said (Ins. Brit. Dipt., i., 70), "The female of this fly is gregarious, and attaches its eggs in large clusters to boughs hanging over streams, and there remains, and shortly dies. The cluster is generally pear-shaped, and sometimes contains many thousands of dead flies, and continually receives accessions by new comers settling upon it. When the larva is hatched it falls into the water, its future residence; it has a

“ forked tail about one-third of the length of the body, and has the power
“ of raising itself in the water by an incessant undulating motion in a vertical
“ plane.” It is recorded from all Europe and extends to Siberia and Japan.

Synonymy.—*Sylvicola melancholia* of Moses Harris is evidently this species, but I do not feel inclined to resurrect that name.

2. *A. marginata* Fabricius. Wings blackish with conspicuous clear markings. Legs wholly black.

A very distinct fly, obviously related to *A. Ibis* but smaller, blacker, and narrower.

♂. Face and frons blackish, but the epistoma and the side-cheeks bearing greyish dust; frons with numerous extra long but not dense thin black hairs which are continued up between the eyes quite to the ocellar space and which leave only a very slight gap before the similar pubescence on all the vertical part; epistoma quite bare, slightly channelled, fairly large, occupying distinctly more than half the space between the eyes; side-cheeks (narrower than in *A. Ibis*) bearing long pubescence similar to that on the frons, and this pubescence extending beneath the eyes to half-way up the back of the head, but on this latter part becoming shorter, more irregular, and separated from the eyes by a narrow bare space; jowls rather small, but the lower half of the back of the head considerably puffed out, and all this part of the head has a grey ground colour; the actual back of the head and the under part to the back of the mouth clothed with long thin dull whitish hairs; upper part of the back of the head reduced until it does not protrude behind the eyes, black with abundant short black bristly hairs which form no ciliation and which are abruptly contrasted with the long hairs on the vertex. Proboscis long, protruded, black, with inconspicuous short black hairs which become rather crowded about the tip; palpi long, being as long as the proboscis, thin and almost pointed, strongly upcurved on the basal two-fifths, black with a tinge of grey and bearing numerous conspicuous long black hairs. Antennæ (fig. 191) dull black, shaped as in *A. Ibis* but with the arista rather longer and bearing some sparse microscopical pubescence.

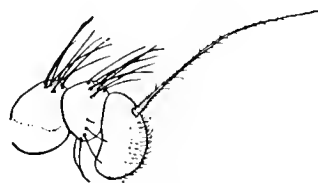


FIG. 191.—*Atherix marginata*
♂. × 43.

Thorax and scutellum shining black with no trace of any markings unless the humeri and the space behind them show a greyish tinge, and this colour increases until the pleuræ become entirely covered with close grey dust; thorax bearing all over the disc equally long but not dense black hairs, and the scutellum bearing similar but longer hairs; pleuræ with whitish grey pubescence on the upper hind part of the mesopleuræ, on the prothorax and space above, and on the metapleuræ, while the sternopleuræ (though apparently bare) have a faint pale pubescence on their upper part and a few very short scattered black bristles on their lower part.

Abdomen black with the sides of the basal segment grey, and (when viewed from above sideways) with fairly well-defined entire grey hindmargins to the segments, though when viewed quite from above showing large vague triangular grey spots on the sides and narrow grey side-lines on the hindmargins of the segments which nearly meet on the third segment and which do meet on the fourth and fifth segments. Pubescence fairly long, rather erect and conspicuous though not dense on the sides of the four basal segments, but shorter (though not very short) denser and black on the disc and on the fifth and sixth segments. Belly entirely covered with grey dust and bearing rather sparse pale pubescence. Genitalia very long and large, bearing pale pubescence beneath.

Legs wholly black, though the coxæ may be rather greyish; relative lengths of tibiæ and tarsi as in *A. Ibis*. Pubescence all black, except for a few grey hairs on the hind coxæ and numerous pale hairs above the basal

half of the hind femora ; even the spurs (which in form are the same as in *A. Ibis*) quite black ; pubescence on all the femora fairly abundant ; "touch-hairs" beneath the front tarsi unusually numerous even up to the last joint. The outer pulvillus and claw of the front tarsi distorted as in *A. Ibis*.

Wings blackish with conspicuous hyaline markings (fig. 192) and the apical quarter rather faded out and the posterior portion still more so ; two incomplete pellucid bands cross the wings, the first one just before the middle beginning beneath the subcostal vein and extending irregularly downwards but not to the hindmargin and having the end of the second basal cell

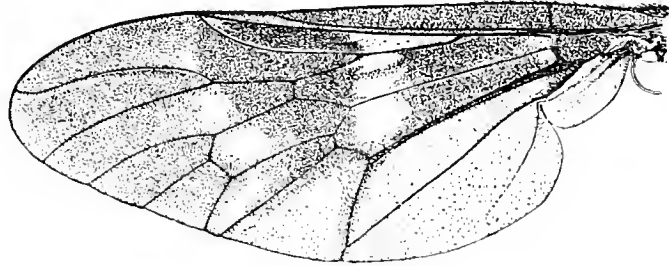


FIG. 192.—*Atherix marginata* ♂. × 10.

conspicuously hyaline, the second one forming an interrupted fascia about half-way between the first one and the tip of the wing ; stigmatic space entirely blackened right up to the tip of the marginal cell. Squamæ (alar) blackish, with a faint pale fringe which is longer but much sparser than in *A. Ibis* and which may perhaps be in a single row. Halteres blackish, base of stem rather brownish.

♀. Very much like the male. Frons about one-quarter the width of the head and bearing a deep middle channel, moderately shining black, with slight grey dust about the sides and surrounding the base of the antennæ ; pubescence on frons all black, fairly abundant but not dense, absent on the grey sides and down the middle channel ; when viewed sideways the vertex and frons appear much more extensively grey ; side-cheeks with the pubescence pale on their upper part but black below and then continued in a single line under the eyes, and behind this line the wide jowls and the bottom of the head bear long fairly dense dull yellowish white pubescence, which grows shorter up the lower half of back of the head, leaving the actual margin against the eyes bare ; above the middle of the back of the head the pubescence is rather short and the bristly black hairs are not so sharply contrasted with the longer pubescence on the vertex as in the male.

Thorax with shorter, sparser, and more recumbent pubescence which is pale with a few inconspicuous black hairs intermixed.

Abdomen with the seventh segment and the ovipositor forming a short black triangle.

Legs with pale pubescence on the coxæ, and with the pubescence on all the femora shorter ; "touch-hairs" beneath the front tarsi very numerous.

Wings more hyaline about the base, and the costal cell only pale yellowish brown.

Length about 8 mm.

This species can hardly be confounded with any other if attention be given to its wholly black legs.

A. marginata is rather local, but I know of numerous Devonshire localities where Colonel Yerbury has often found it at the sides of streams. It has also occurred in the New Forest commonly on Alders (*Alnus glutinosa*), and at Barmouth, Rydal, and according to J. F. Stephens near London, while Curtis mentioned Darenth. Colonel Yerbury has also taken it in Ireland at Waterville and Kenmare. The dates range from June 10 to August 26. From the abundance of the "touch-hairs"

beneath the front tarsi I should not be surprised to learn that it is a biting fly. It is recorded from nearly all Europe except the extreme north. Mr G. C. Bignell bred a female on July 4, 1888, from a "water moss."

4. ATRICHOPS.

Atrichops nov. gen.

Frons of the male (practically) and the side-cheeks in both sexes bare; third joint of the antennæ reniform. Abdomen not conical. Anal cell closed.

This genus is formed for the species which has been usually known as *Atherix crassipes* Meigen.

Head (fig. 193) more rounded and less tilted than in *Atherix*; side-cheeks bare; frons of the male practically bare, of the female slightly narrowing from the vertex to the antennæ; palpi slightly drooping, and hardly more than half the length of the proboscis. Antennæ reniform as in *Atherix*.

Thorax not densely pubescent, but bearing only depressed moderately sparse pale pubescence; metapleuræ as in *Leptis* with not very conspicuous pubescence. Metanotum small and rather concealed beneath the scutellum, and with the side-humps bare.

Abdomen oblong, not at all conical, narrower than the thorax and with almost parallel sides, banded dorsally but not spotted. Genitalia of the male large and somewhat separated from the abdomen.

Legs long; the anterior pairs thin, but hind pair rather dilated on femora, tibiæ, and tarsi; front pulvilli and claws of the male distorted as in *Atherix*, but the posterior claws unusually short; front coxæ with less pubescence than in *Atherix*; "touch-hairs" beneath the front tarsi obvious.

Wings (fig. 194) with a venation almost as in *Atherix*, but the cubital fork long and rather narrow beginning narrowly and ending with a very slightly bell-mouthed opening; cross-veins placed rather nearer the base of the discal cell (at about one-quarter from the base); anal cell closed. The wings have a faint clouding about the middle and round the outer margin, but no conspicuous markings as in *Atherix*. Squamæ (alar) with a thin margin on which is a sparse but not short single-rowed fringe.

Atrichops (ἂ θριξ ὤψι) is easily distinguished from *Atherix* by its figure and by the bare side-cheeks.

1. **A. crassipes** Meigen. A rather small fly. Wings slightly clouded, and the stigma conspicuously blackish. Hind tibiæ moderately, and hind tarsi considerably, dilated.

Rather like a *Rhyphus*.

♂. Head (fig. 193) about as wide as the thorax and about one and a half times broader than long, rounded off behind because the eyes curve round and even bend in a little to the vertex. Frons and face entirely covered with light grey dust, but otherwise quite bare all over including the rather broad eyemargins and the front part of the jowls, except for two inconspicuous hairs on the upper part of the frontal triangle; frons and face forming a triangle; the sunken middle part of the face not small, and extending across under the

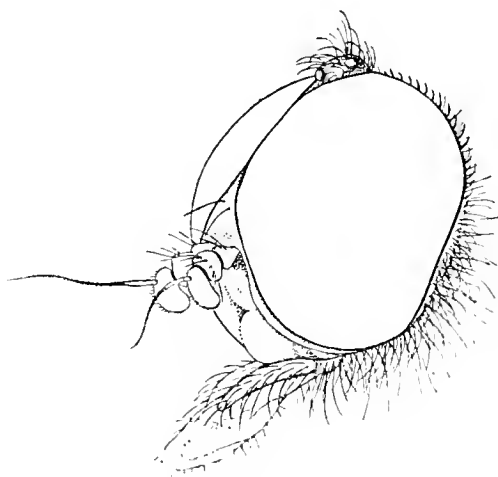


FIG. 193.—*Atrichops crassipes* ♂. × 20.

antennæ; the raised epistomal knob rather prominent and slightly more blackish grey; jowls small but obvious; pubescence on the back part of the jowls and on the moderately and equally puffed-out lower two-thirds of the back of the head rather long and abundant though not very conspicuous, greyish white and outstanding; upper third of the back of the head almost flush with the eyes and still with greyish though shorter pubescence and with a row of small bristles quite close to the eyes; the whole back of the head rather darker grey than the face; ocellar triangle very much elevated, brownish grey, and bearing moderately long pale pubescence which slopes forward; vertical triangle long and pointed, so that its lowest point and the highest point of the frontal triangle extend towards each other and leave the eyes closely approximated (though hardly touching) for about one-third the distance from the occiput to the antennæ. Proboscis dull blackish brown, long and produced, with large sucker-flaps; palpi greyish black, long, thin, and slightly drooping, more than half as long as the proboscis, and bearing dark bristly hairs. Eyes bare; facets on the front part possibly a little enlarged but hardly perceptibly so. Antennæ blackish brown, but with a grey shimmer caused by minute dust; two basal joints transverse, almost equally long, and bearing on their upper side dark bristly hairs which are directed forwards; third joint reniform, being small at the upper part but extended downwards in a rather hammer-like shape far below the lower line of the basal joints, and minutely pubescent on what may be called the tip as it is the part farthest away from the head, but altogether the third joint not so long as the second though much deeper; arista arising from near the base of the third joint or (say) at the angle where the third joint bends over, more than twice as long as the antennæ, thin though slightly less thin on the basal fifth, and microscopically pubescent but with the extreme tip very thin and bare.

Thorax and scutellum shining black, hardly obscured, rather sparse very fine grey dust, and with sloping greyish yellow pubescence which is not short or scarce and which occurs all over the disc but not abundantly enough to appreciably affect the ground colour; humeri and postalar calli with a yellowish grey tinge; pleuræ ashy grey, but a large triangular patch which occupies the upper front corner of the mesopleuræ is greyish yellow, and the pteropleuræ are also rather yellowish; pubescence of the pleuræ limited to a few pale inconspicuous hairs on the hind and lower parts of the mesopleuræ and on the metapleuræ; metanotum greyish black.

Abdomen narrower than the thorax and about twice as long as the thorax and scutellum together, almost parallel-sided, shining black with luteous cross-bands; the first luteous band occupies the hindmargin of the basal segment rather narrowly and the foremargin of the second segment rather broadly; the second band occupies the hindmargin of the second segment and the foremargin of the third segment and consequently the second segment has a brownish black band across its middle of which the foremargin undulates because it rises a little at the sides and has a long shallow arch on its middle; the third luteous band is not so sharply defined and occupies about the hind third of the third segment and sometimes just the foremargin of the fourth segment; a still less defined fourth cross-band occupies the hind quarter of the fourth segment, while sometimes there are traces of a band on the hindmargin of the fifth segment; the five basal segments nearly equal in length but the sixth, seventh, and eighth so short dorsally as to be hardly visible, though easily distinguished ventrally; pubescence sparse and equally scattered, not short but inconspicuous, suberect, long and yellow, though there are a few shorter black bristly hairs on the middle of the disc of the third segment. Belly luteous on the three basal segments and on the hindmargin of the fourth segment, but on the other segments of the same shining blackish brown colour as on the dorsal side, and with minute sparse pale dust; sixth, seventh, and eighth segments well defined and nearly equal, but jointly hardly longer than the fifth segment; pubescence long, sparse, straggly and pale on the four basal segments, but short, grey, and inconspicuous on the last four segments. Genitalia large and well separated from the abdomen, with a large greyish-black brown dorsal plate which covers everything, not so wide as the last dorsal abdominal segment, dulled and bearing sloping

black bristly hairs all over; the dorsal plate ends in a truncate luteous margin which has two small luteous lamellæ spreading out like short lateral horns; when seen sideways this dorsal plate curves up to the luteous hindmargin, and a pair of rather large thick short lower lamellæ extend almost as far as the tip of the dorsal plate, and these lower lamellæ also have each a short thick end-joint and bear black bristly pubescence, but the luteous hindmargin of the dorsal plate is bare.

Legs long and mainly yellow; front coxæ long, yellow, and with very little pubescence which consists of a few rather long thin pale hairs; front trochanters with a blackish spot beneath at their junction with the femora; posterior coxæ a little obscured in front at the base; posterior trochanters all obscured; hind femora with the apical two-thirds blackish and rather dilated; hind tibiæ brown and further obscured by the abundant minute black bristles, often appearing paler at the base but growing brown at the tip, slightly dilated and bearing a neat rather short dorsal ciliation; hind tarsi nearly as long as the tibiæ, with the basal joint considerably dilated and longer than the other four joints together and bearing about six short dorsal bristles sloped away from the base, and with the second joint also about as much dilated; front tibiæ and tarsi with abundant suberect short delicate pale pubescence, and the front tarsi with "touch-hairs" beneath all the joints; front tarsi one and a half times as long as the tibiæ, with the joints very thin and gradually decreasing in length; anterior tarsi becoming obscure soon after the base, and the hind tarsi apparently all darkened but really the two basal joints brown like the tibiæ but obscured by abundant tiny black bristles; any pubescence on the femora is very slight and pale. Pulvilli dull yellowish, posterior claws very short, but on the front legs the middle pulvillus is large and rounded while the outer pulvillus and claw are distorted as in *Atherix* (fig. 190).

Wings (fig. 194) slightly smoky; stigma conspicuously large and blackish,

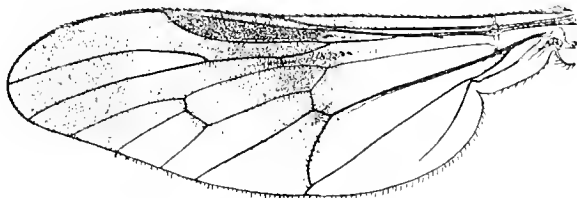


FIG. 194.—*Atrichops crasstipes* ♂. × 10.

occupying all the marginal cell from the origin of the cubital vein to its end and widening as the cell widens but leaving the exact margin of the radial vein not darkened; a rather faint cloud extends from the stigma downwards over the cross-veins, and the apical quarter of the wing as well as a good deal of the hindmargin are faintly clouded, and this clouding becomes more obvious on the downward curve of the postical vein; base of the wing very pale yellow and the basal part of the subcostal vein also yellow; subcostal vein bearing abundant minute bristles. Venation as given in the generic characters; small cross-vein as long as the basal part of the upper branch of the postical vein and consequently the lower basal cell widened. Squamæ (alar) whitish yellow with a blackish spot on the upper part; margin thin and yellow and with a very slight though not short pale fringe which is in a single row. Halteres yellow, but with nearly all the knob conspicuously blackish.

♀. Frons occupying nearly one-third the width of the head and contracting very slightly from the vertex to the antennæ, dusted light ashy grey on a blackish ground colour and in some lights this ground colour shows up more blackish on the depressed middle part (but not near the antennæ); pubescence obviously pale though sparse, long from the level of the front ocellus to the suture before the antennæ, and on each side not far from the eyes four or five of these pale hairs form a fairly conspicuous row sloping forwards and outwards; there is a slight middle channel running down from the front ocellus to between the antennæ, crossing the slight transverse suture a little before the antennæ and becoming much narrower and more sharply defined on this last piece between that suture and the antennæ; ocellar space raised

and bearing a few pale hairs which are almost erect, and from which shorter inconspicuous pubescence extends to the upper eye-angles; face widening downwards less than in the male; back of the head more equally puffed out because the upper part of the eyes is not so much ridged but slopes more gradually to the occiput. Antennæ with the two basal joints slightly brownish, and with the bristles on the basal joint shorter and more or less pale.

Thorax with the humeri conspicuously greyish luteous, and with all the margin of its dorsum and the basal corners of the scutellum brownish luteous.

Abdomen with alternate black and orange bands, the orange colour rather predominating up to the end of the fourth segment, but after that with only a trace of an orange band rather before the hindmargin of the fifth segment; sixth segment rather greyish black and hardly one-third as long as the fifth, while the seventh and eighth segments are each only about half as long as the sixth; pubescence mainly pale but extensively black on the black parts, neither abundant nor conspicuous. Belly orange on the five basal segments except for a blackish band across the middle of the fifth segment, and after that segment more blackish though the hinder parts of the sixth and seventh segments are broadly but obscurely luteous; eighth segment indistinct; pubescence inconspicuous and pale. Ovipositor showing a pair of short broad rounded brownish yellow lamellæ.

Legs rather similar to those of the male but the hind femora have the apical blackening more restricted to the upper side; hind tibiæ all dull brownish luteous and not at all dilated; hind tarsi with the basal joint also brownish luteous and also hardly dilated though long and strong. Pubescence or ciliation very slight except for the abundant minute black bristles, but there is a short ciliation on the hind tibiæ which is not so regular or neat as in the male; "touch-hairs" almost as in the male. Front pulvilli and claws simple.

Wings, squamæ and halteres as in the male.

Length about 6 mm.

This species somewhat resembles *Leptis lineola*, but may be at once distinguished by the generic characters; *L. lineola* also has seven gradually decreasing abdominal segments, and its male has a very short genital plate. Any superficial resemblance to a *Rhyphus* is removed upon examining the venation in regard to the forked cubital vein and the closed anal cell.

A. crassipes was first noticed in England by Mr Henry W. Andrews in fair abundance in some water meadows near Ticehurst Road Station in Sussex on July 10, 1900; the specimens generally occurred on the leaves of Alder (*Alnus glutinosa*) and were found again in the same locality on July 6, 1901; since then it has been found in two or three localities in the New Forest by Dr D. Sharp and Mr C. G. Lamb, in abundance in a little meadow at Milford on Sea about the end of June 1904, and in the New Park Enclosure in July 1904, and by Mr H. W. Andrews as late as July 23, 1904. It seems to be very little known on the continent, but was recorded by Meigen in 1820 from Marseilles and in 1830 from near Luttich, by Schiner from (probably) Austria, by Coucke from Amersfort in Holland, while I possess a male from Attica and a male from Kowarz's collection taken by Loew at Meseritz in Prussia; it would appear to be widely spread in Europe but occurring in only small colonies.

Synonymy.—No doubt can arise as to this being *Atherix crassipes* of Meigen, but I cannot recognise *Rhagio nebulosa* of Fabricius in it because according to Meigen that species has the anal cell open; it is however almost certainly *Atherix nebulosa* of Macquart from North France (which he specially says has the anal cell closed) and of Zetterstedt in his Note in Dipt. Scand., viii., 2990 (as received from "St Sever" in France). All other descriptions appear to be merely copies.

CHRYSOPILINÆ.

Antennæ with the third joint simple, and bearing a long apical or subapical arista or a style of varying stoutness and length. Face socketed. Middle tibiæ with two apical spurs, but the hind tibiæ with only one. Wings with a long cubital fork.

This subfamily is very closely allied to the *Leptinæ*, and the only certain character lies in the presence of only one spur to the hind tibiæ, and even that is indistinct in *Spania* and *Hilarimorpha*. There are however several characters which assist in separating the two subfamilies, such as the almost universal rule that in the males of the *Chrysopilinæ* the facets on the upper part of the eyes are conspicuously larger than, and are separated in a horizontal line from, the smaller facets on the lower part, the only exception I know being *Symphoromyia immaculata*; the *Chrysopilinæ* also derive their name through the species of *Chrysopilus* bearing a conspicuous adpressed golden pile on the thorax and abdomen (which is very easily rubbed off); and many genera have the end of the antennæ provided with a style instead of an arista, but this style varies considerably in stoutness and length; the cubital fork also is different from the type of the *Leptinæ* and is sometimes almost wholly above the wing-tip, while even in the closely allied *Chrysopilus* there is a delicate distinction in the shape of this fork as it is rather narrower on the basal part, though the smaller species of *Leptis* (*L. lincola*, etc.) approximate in this character.

The genus *Hilarimorpha*, which has no discal cell and only four posterior cells, the cubital fork short and placed above the wing-tip, the tibial spurs all stunted, and the pulvilli two only, may possibly not belong to this subfamily, but being cremochætous must belong to the *Leptidæ*.

5. SYMPHOROMYIA.

Symphoromyia Frauenfeld, Verh. zool.-bot. Wien., xvii., 496 (1867).

Allied to *Atherix* and *Atrichops* in the form of the antennæ, but the hind tibiæ with only one spur and the anal cell open.

Head broader than the thorax in both sexes, not so much flattened as in *Atherix*. Face longer than in *Atherix*, and with broad side-cheeks which may be bare (*S. crassicornis*) or which may have a slight pubescence (*S. immaculata*) or even long dense pubescence (*S. melæna*). Frons in the male small, or large and inflated (*S. melæna*), and either bare or with long dense pubescence, but in the female always broad and bearing numerous short bristles. Palpi porrect and bristly, rather drooping at the tip. Eyes in the male either just touching or only closely approximated on the frons, but in the female very widely separated. Antennæ wide apart at the base, and with the third joint kidney-shaped (figs. 195, 196); arista apparently subapical as it is inserted well above the most prominent part of the third joint, long and thin, two or three times as long as the antennæ.

Thorax normal in shape and bearing fairly equal but hardly dense pubescence which is rather long in the male but short in the female, and this pubescence is hardly of a bristly nature anywhere. Pleuræ with a rather dense tuft of pubescence

on the metapleuræ. Scutellum with pubescence similar to but rather longer than that on the thorax; metanotum and its side-humps quite bare.

Abdomen even at its base narrower than the thorax, conical, usually somewhat compressed in the male, and with seven obvious segments but the seventh segment sometimes very short. Pubescence moderately long and outstanding and fairly conspicuous all over. Genitalia distinct.

Legs of the usual Leptid type though proportionately shorter than in the allied genera, but still with the front tarsi longer than the tibiæ; front tibiæ without a spur, middle tibiæ with two nearly equal fairly long spurs, hind tibiæ with one distinct spur. Pubescence moderate, but rather long and distinct on the femora of the male. "Touch-hairs" apparently absent, though there may be traces of them beneath the front tarsi of the male of *S. crassicornis*.

Wings of the ordinary Leptid type (fig. 198); cubital fork long and narrow; two upper veinlets from the discal cell well separated at their base and apparently not varying as in *Ptiolina*; anal cell open. Alar squamæ rather well developed and with a delicate marginal ciliation which runs in a single row until near the angle and then becomes longer and in several rows.

This genus is a fairly natural one and cannot well be confounded with its allies if attention be given to the shape of the antennæ and arista, the single spur on the hind tibiæ, and the open anal cell.

Symphoromyia is represented by only a few species in Europe, but several are known from North America. They frequent long grass and usually occur in some numbers when found. The metamorphoses of *S. crassicornis* are known. Osten Sacken has stated that the females of a Californian species bit him quite painfully and drew blood like a *Tabanus*, and though there is no other well authenticated case of a Leptid biting the statement of such a Dipterologist as Osten Sacken is beyond doubt, and as some confirmation Bezzi has recorded that the females of *S. grisea* settled on his hands as if intending to attack him. The genus is recorded from Europe and North America.

Synonymy.—When Frauenfeld formed this genus in 1867 he gave *S. melæna* Meig. as the type and associated with it *S. crassicornis* and *S. immaculata*, and to these three another previously little known European species (*S. grisea*) has been added.

Table of Species.

- 1 (2) Larger species. Basal antennal joint very much dilated in the male (fig. 195) and clothed with long pubescence, and even in

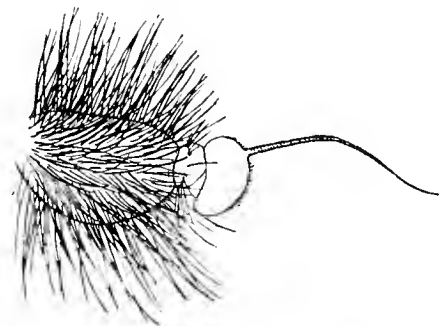


FIG. 195.—*Symphoromyia crassicornis* ♂. × 30.



FIG. 196.—*Symphoromyia immaculata* ♂. × 43.

the female dilated (fig. 197) and at least five times as long as the second.

1 *crassicornis*.

- 2 (1) Smaller species. Basal antennal joint small and not longer than the second in either sex (fig. 196), and with only short inconspicuous bristles.

2 *immaculata*.

S. melæna has often been recorded from Britain and may occur here ; it is nearly as large as *S. crassicornis* but is a blacker insect with the wings and squamæ blackened in both sexes, long and dense black pubescence on the frons and side-cheeks of the male, basal antennal joint short, frons of the male large and inflated. I do not know the distinctive characters of *S. grisea*, but I believe it has normal antennæ and yellowish wings.

1. **S. crassicornis** Panzer. Basal joint of antennæ elongate, considerably dilated, and conspicuously pubescent.

A Leptid with the appearance of a moderate-sized *Anthomyia*.

♂. Head broader than the thorax. Face broad and rather large, with especially wide side-cheeks ; face and side-cheeks light grey and quite bare ; the small triangular frons blackish grey and also quite bare ; jowls and back of the head darker grey, the jowls being very broad and bearing rather dense fairly long black pubescence intermingled with which are some longer straggling pale hairs ; lower part of the back of the head inflated but abruptly narrowing, and bearing on the upper quarter only a single line of longer upright (*i.e.* not overhanging) black bristly hairs ; vertex rather large and rather elevated, triangular, greyish brown, and bearing black bristly hairs which point rather forwards. Proboscis large, but not so long as the palpi, and bearing a slight black pubescence on the underside ; palpi very long and equally thick, slightly drooping about the tip, greyish black, and densely clothed with conspicuous long black pubescence, but with some rather long pale pubescence beneath the basal joint. Eyes almost touching for a very short space, quite bare ; facets enlarged on the upper two-thirds and rather abruptly contrasted with the smaller facets on the lower third. Antennæ (fig. 195) rather long, because the basal joint is enormously dilated and lengthened ; basal joint greyish black and clothed with dense long black pubescence ; second joint by contrast very small and short, and with a few very short bristly hairs above and beneath ; third joint kidney-shaped, apparently nearly twice as deep as long ; arista quite as long as the antennæ and almost geniculate just before its middle, rather thin up to the geniculation but thinner and tapering afterwards, bare and inserted more towards the front part than towards the base of the third joint.

Thorax greyish black, with three very indistinct darker stripes of which the middle one is rather narrow while the side ones are broad in certain lights ; pubescence not dense but black, erect, and fairly long all over the disc, and with each hair originating from a punctate dot ; pleuræ grey, bearing rather long black pubescence on the mesopleuræ and similar but greyish pubescence on the metapleuræ. Scutellum dark grey, with rather longer pubescence than that on the thorax especially towards the tip.

Abdomen rather attenuated and rather compressed, about as long as the thorax and head (without the antennæ), dark ashy grey. Pubescence fairly abundant but never dense, and each hair arising from a punctate dot. Belly arched from side to side, dark ashy grey, and bearing similar pubescence to that on the upper side. Genitalia obvious ; side lamellæ rather large and with two smaller elongate club-shaped intermediate lamellæ.

Legs black with the knees narrowly orange ; coxæ with rather abundant blackish pubescence ; femora with black not scarce rather inconspicuous pubescence ; hind tibiæ with a slight postero-ventral fringe and also with a still slighter antero-dorsal one ; the two spurs on the middle tibiæ and the one on the hind tibiæ distinct ; "touch-hairs" absent or exceedingly faint. Pulvilli obscurely yellowish ; claws black, rather small.

Wings smoky with an orange tinge about the base and with the marginal cell darkened towards its tip so as to form a slight stigma ; veins blackish after the basal part ; fourth posterior cell sometimes a little narrowed towards the wingmargin ; anal cell narrowly open. Squamæ (alar) moderate in size, glassy yellowish with pale margins, and with a short pale fringe above the

angle but a rather long one below it; frenum forming a narrow obscure pubescent orange line. Halteres with large dull blackish brown knobs, but with the stem rather blackish orange.

- ♀. Very distinct from the male, being much lighter grey in colour. Face (including side-cheeks) very broad, light (almost whitish) grey, and either bare or with a very few scattered black bristly hairs on the epistoma; frons at its upper part fully half the width of the head and (as well as the vertex) rather densely beset with rather short black bristly hairs which leave the lower half of the margin against the eyes bare as well as a suture which separates the orbits from the occiput and ocellar triangle, and these bristly hairs all slope forwards; back of the head all the way from the jowls to the vertex fairly equal in width, light grey, and bearing fairly conspicuous pale pubescence on the jowls but with numerous short blackish bristly hairs all over the upper part; palpi

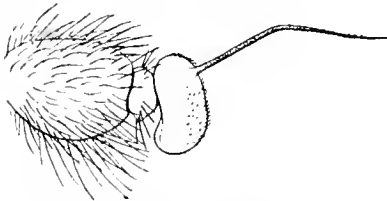


FIG. 197.—*Symphoromyia crassicornis*
♀. × 30.

shorter, drooping at the tip and not so long as the proboscis, blackish grey or light brown, and clothed with moderate yellowish pubescence and sometimes with a few black hairs about the tip. Eyes separated on the frons by about half the width of the head at even the narrowest part which is just above the antennæ, though the frons only gradually narrows from the vertex to this part, and then the face more obviously widens downwards. Antennæ much shorter than in the male (fig. 197), but still with the basal joint elongated and dilated and bearing a short rather dense black bristly pubescence; the antennæ sometimes have a slightly yellowish or reddish pale grey tinge; second joint very short but bearing short black bristly hairs above and beneath; third joint strongly kidney-shaped being quite twice as deep as long with the lower part extending below the second joint more than the upper part extends above it.

Thorax light grey, usually but not always with four blackish grey stripes (because the middle dark stripe is almost always split into two); when present the middle dark stripe (or double-stripe) does not extend so far back as the side stripes. Pubescence much shorter than in the male, and rather yellowish about the humeri.

Abdomen conical, light grey, and not at all compressed; the four basal segments nearly equal in length, the fifth about half as long, and the sixth and seventh each about half as long as the fifth. Pubescence on the hindmargins and sidemargins rather long and yellowish, but on the disc shorter blacker and more bristly. Ovipositor with a pair of widely spread out lamellæ.

Legs with all the tibiæ dull dark ferruginous. Pubescence rather conspicuously pale yellow on the front coxæ but less obviously so on the others, slight and partly pale on the femora, and with no longer postero-ventral ciliation on the hind tibiæ.

Wings with a browner tinge; veins orange about the basal half and only brownish on the rest.

Length about 7 mm.

This species does not vary to any important extent, and should not be confounded with any other (unless *S. grisea* be allied) though it is a rather inconspicuous-looking fly.

S. crassicornis is apparently a mountain species as it occurs freely in the Scotch Highlands (Strathblane, Rannoch, Aviemore, Nethy Bridge, Nairn, Spey Bridge, Banff, and Tongue), and also at Aberlady, Kirkmuirhill in Lanarkshire, and in the Lake District. I have further records from Dolgelly, Herefordshire (probably the Black Mountain), Lancashire (Rivington), and Durham. Being found the larvæ in earth beneath turf on a cart-road near a wood. My dates extend from June 24 to July 29. It is recorded from extreme North Europe to Italy.

2. *S. immaculata* Fabricius. Antennæ with the basal joint short and inconspicuously bristly. Frons of the male bare. Wings inconspicuously smoky. Small species.

An inconspicuous small greyish black fly.

♂. Epistoma small, light grey, and bare, but the comparatively narrow side-cheeks bear a few rather long inconspicuous pale hairs, and similar but longer and much more conspicuous hairs occur on the moderate-sized jowls; back of the head moderately and almost equally inflated and bearing much shorter pale hairs and some rather bristly black hairs out on the actual back of the head, while on the upper part there are some longer fairly conspicuous postocular black bristly hairs which bend slightly forwards; vertex rather elongate, narrow and greyish, and (as the eyes do not quite touch) the numerous black bristly hairs on the vertex contrast with the bare frons and narrow connecting space. Proboscis rather large but shorter than the palpi. dull brownish black; palpi long, porrected, dull black or blackish brown, slightly drooping at the tip, and sparsely bristly, with the bristles mainly pale but with a few black ones at the tip. Eyes large and almost circular, quite bare, and not quite touching on the frons; facets all equal in size. Antennæ (fig. 196) dark brown; two basal joints short and almost equal in length, bearing very short dorsal bristles; third joint kidney-shaped with the lower part curving back almost to the base of the second joint, and bearing short downy pubescence; arista more than twice as long as the antennæ, thin but still tapering, bare, and inserted at about one-third from the base of the third antennal joint.

Thorax light brownish grey with faint indications of two broad darker stripes, or sometimes even with a faint broad middle stripe in addition which may be split down the middle, plentifully besprinkled with moderately long black bristly hairs of which each one arises from a punctate dot on the disc, and these hairs become longer towards the sides; pleuræ blackish grey, bare except for a few inconspicuous pale hairs on the upper margin of the mesopleuræ and for the more obvious tuft of pale pubescence on the metapleuræ; none of the bristly hairs on any part of the thorax ever approximate to true bristles. Scutellum rather more blackish and bearing rather longer pubescence on at least the margin and tip.

Abdomen ashy grey with six nearly equally long distinct segments and a very short seventh, compressed from the third to the sixth segment (both inclusive). Pubescence greyish white, fairly conspicuous and long (especially at the sides) but not dense, mixed with shorter more depressed and more bristly black hairs, and each hair arising from a somewhat conspicuous punctate dot. Belly similar in colour and with pale but slightly shorter pubescence; the ventral part of the abdomen well separated from the dorsal part and is arched from side to side. Genitalia obvious; lateral lamellæ moderately small with a pair of small triangular intermediate lamellæ and a short bristle-like middle organ.

Legs obscure brownish black with the tibiæ rather luteous especially about their base. Pubescence very slight; coxæ with moderately abundant long pale pubescence; femora with a slight pale fringe which is postero-ventral on the anterior pairs but antero-ventral on the hind pair; posterior tibiæ with two rows of minute bristles; the two spurs on the middle tibiæ and the one on the hind tibiæ obvious; no "touch-hairs" visible beneath the front tarsi. Pulvilli and claws small.

Wings (fig. 198) slightly smoky with the marginal cell darker; venation very constant, so that the two upper veinlets from the

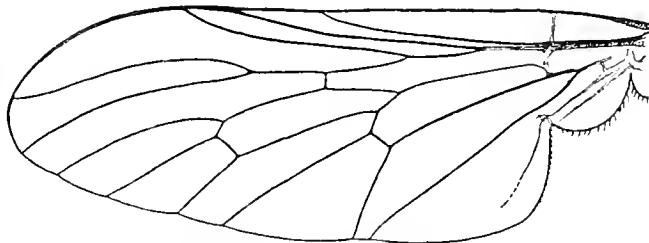


FIG. 198.—*Symphoromyia immaculata* ♂. × 17.

discal cell are always well separated and the anal cell is obviously though rather narrowly open; fourth posterior cell sometimes slightly narrowed towards the wingmargin. Squamæ (alar) rather small, glassy smoky or dull orange with short pale fringes. Halteres dull orange or dull yellow, but with the stem sometimes darker; knob rather large and ovate-globose.

♀. Rather similar to the male, but the light grey frons occupying about a third of the width of the head, and the frons and occiput rather densely beset with short black bristles (except on the channel between the orbits and the occiput), and these bristles (especially on the frons) mostly directed forwards.

Thorax ashy grey with three dark stripes (not well defined) of which the middle one is broad and extended to the front but abbreviated behind, while the side ones are abbreviated in front and interrupted at the suture. Pubescence much shorter, black and bristly. Scutellum ashy grey.

Abdomen with less conspicuous whitish pubescence except about the base, and with much shorter and mainly black dorsal bristly pubescence; sixth segment short, but more conspicuously separated from the distinct seventh segment. Ovipositor with a pair of distinct outspread lamellæ.

Legs almost as in the male but with hardly any pubescence on the femora.

Wings paler, especially about the stigma. Squamæ more whitish glassy. Halteres yellow.

Length about 4 mm.

I believe that there is no closely allied species in Europe (unless possibly *S. grisea*), nor do I think that it varies, and consequently no mistake should be made if attention be given to the reniform third antennal joint and the open anal cell.

S. immaculata is very little known as a British species, but I once found it in fair abundance near Seaford in Sussex on June 15, 1890, when I caught numerous males but only two females. There are several specimens in the British Museum from Mr A. Piffard who took them on June 18, 1893, at Felden in Hertfordshire. Walker recorded it in 1851 as "Common in Darent Wood, Kent," and I have no doubt correctly as it was properly named in the Entomological Club collection, but though I often collected there about 1870 I never met with it. It is recorded from Central Europe only.

Synonymy.—No doubt has ever arisen as to the identity of this species, but Walker's character of "Abdomen clothed with short black hairs" is misleading. *Atherix unicolor* Curtis (1824) which was described as "Male cinereous, sparingly clothed with longish pale hairs: antennæ blackish, 3rd joint reniform: eye reddish-brown: thorax obscurely striped: tibiæ lurid and subochreous towards the base: wings slightly fuscous, 3rd costal cell a little darker: halteres ochreous: length 3 lines," taken at "Mickleham the end of June" which is not far from Darent, must be a synonym, as the reniform third antennal joint makes it a *Symphoromyia* and not (as I suggested in Entom., 1890, p. 153) a *Ptiolina*. It is probably my error which caused Bezzi in his Katalog der Paläarktischen Dipteren, ii., 89, to assign it as a synonym of *Ptiolina paradoxa* Jaen. I can only imagine that *Ptiolina melæna* of Walker (Ins. Brit. Dipt., i., 71, 1851) must refer to *S. immaculata*, but his *Atherix melæna* of 1836 (Entom. Mag., iii., 180) to *Ptiolina obscura* Fall.

6. CHRYSOPILUS.

Chrysopilus Macquart, Mém. Soc. Sci. Lille, 1826, 403.

Moderate-sized to rather small flies of elongate shape, which are always bedecked with recumbent golden scales or scaly hairs, and which have the wings rather broad.

Face socketed like a dimple. Palpi standing out straight or upturned, not at all drooping. Eyes with the facets on the upper part enlarged and more or less conspicuously contrasted with the smaller facets on the lower part; in life often bright golden green. Antennæ (fig. 199) with the third joint bulbous, not longer than the second joint; arista terminal, long and thin, and starting from about the centre of the end of the third joint.

Thorax with coarse golden or pale yellow depressed pile or scales, amongst which there may be some longer thinner erect hairs; pleuræ with the usual clumps of pubescence on the mesopleuræ and metapleuræ; metanotum with a large dense clump on each side-hump.

Abdomen even if elongate yet proportionately short when compared with *Leptis*. Pubescence mainly composed of short coarse depressed golden or pale yellow pile or scales which may be easily rubbed off.

Legs long, thin, and graceful; tibiæ and the basal joint of the tarsi especially long and thin; front tibiæ shorter, but the posterior tibiæ longer, than their tarsi. Femora bearing curious golden brown scales behind the anterior pair except at the tip, and in front of the hind pair; front tibiæ without any spur, middle tibiæ with two strong equal spurs, hind tibiæ with only one spur; front tarsi without any "touch-hairs"; front claws and pulvilli of the male not distorted; claws small.

Wings rather broad, of true Leptid venation but with the anal cell always closed; cubital fork long and rather narrow on the basal half; radial vein dipped down to make room for the stigma; discal cross-vein placed at the basal quarter of the discal cell; small cross-vein very near the base of the discal cell; subcostal vein bearing tiny bristles. Alar squamæ of moderate size and with a short marginal fringe composed of a single row of hairs.

The species occur in moist meadows and near water; they very soon lose their delicate coloring and their golden scales, and consequently fresh specimens in very perfect condition are eminently desirable for collections. The larvæ live in rotting wood or vegetable mould.

This genus may be distinguished from *Leptis* by the single spur on the hind tibiæ, by the outstanding not drooping palpi, by the golden pile on the thorax and abdomen, and practically always by the closed anal cell, though there is one European species of *Leptis* (*L. funebris* Meig.) with a closed anal cell; the shape of the third joint of the antennæ distinguishes it from any of the *Chrysopilina* except *Omphalophora*, and from that the long thin arista at once separates it. The dense clump of pubescence on the hump on each side of the metanotum provides a character which distinguishes it from the allied genera.

Chrysopilus is a well-recognised genus containing a large number of species from most parts of the world, though their headquarters appear to be in North and South America.

Synonymy.—Macquart distinguished this genus in 1826 under the name of *Chrysopilus* and although he altered the name to *Chrysopila* in 1834 there is no need to accept his change, nor need Loew in 1840 have claimed to have corrected Macquart's original name to *Chrysopilus*.

Table of Species.

1	(2) Femora black. Larger species.	1 <i>cristatus</i> .
2	(1) Femora yellow. Smaller species.	2 <i>aureus</i> .

C. cristatus appears to be very common in England, and is distinguished from the very common European *C. auratus* by its wings being less brown and becoming orange about the base.

1. **C. cristatus** Fabricius. Wings brownish and with no markings except the stigma. Abdomen without bands. Femora black.

A deep black fly, easily known by its golden pile when in good condition.

- ♂. Head conspicuously large, wider than the thorax. Epistoma strongly socketed and quite bare, but covered with brownish dust; the very broad side-cheeks light grey and appearing to be bare, but with some slight short hairs on the side of the deep channels between them and the epistoma; these channels curve towards each other and enclose the epistoma on the upper part, but widen out about the mouth and make the side-cheeks narrower there though still rather broad; the side-cheeks continue without any interruption on to the jowls, but the jowls widen out again and are blackish grey with rather stiff dense longish black or blackish grey pubescence; there are numerous yellowish hairs right behind the mouth opening; the light grey lower part of the back of the head moderately inflated but dying out just above the middle of the head, and on this inflated part the absolute eyemargin is bare, but above the middle the back of the head is almost flush with the eyes and bears no fringe of overhanging hairs or row of small bristles close against the eyes; vertex dull black, considerably elevated, and bearing numerous short black hairs; frons quite bare, grey near the antennæ, but velvety black on the upper

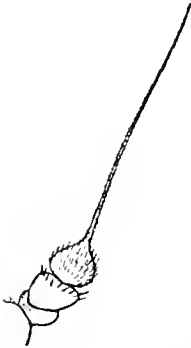


FIG. 199.—*Chrysopilus cristatus* ♂. × 32.

point which runs so far up between the eyes that the latter only actually touch for about a third of the distance between the occiput and the antennæ; the side-cheeks when viewed from above sink steeply below the level of the eyes but the rounded prominence of the epistoma projects out very considerably, and the palpi and proboscis project farther still. Proboscis dull black, almost perpendicular, and with very slight pubescence, almost as long and as prominent as the palpi; palpi long, thin, rather upturned but not curved, black or greyish black, and clothed with numerous conspicuous rather long black hairs. Eyes (in death) reddish brown; facets on the larger upper part much larger than those on the smaller lower part, and the dividing line so strongly marked that there is a perceptible depression caused by the less prominence of the lower facets, but the small facets extend somewhat upwards on the back margin and the change in size is only gradual there. Antennæ (fig. 199) brownish or greyish black; all three joints about equal in length, and the two basal joints bearing microscopical black bristles; third joint minutely pubescent, almost onion-shaped with a slight apical point from which the arista projects; arista long and thin, but tapering and microscopically pubescent, about two and a half times as long as the antennæ.

Thorax dull velvety black, slightly shining about the sides and especially between the wing-base and the scutellum; postalar calli usually a little brownish; two faint rather broad greyish black stripes (sometimes difficult to detect) run down the disc from the front part to beyond the middle, and between them is a narrow middle velvety black line; pleuræ and the space behind the humeri dull greyish black. Pubescence on the disc composed of fairly long suberect scattered thin black hairs, intermingled with which are numerous more recumbent shorter scattered almost golden hairs which are easily rubbed off, as in fact is the whole of the pubescence; on the pleuræ there is almost bushy brownish yellow pubescence towards the top front part and a line of similar pubescence extends down the back part of the mesopleuræ, but this pleural pubescence is composed of longish thin almost shaggy hairs; the rest of the mesopleuræ is bare, but the sternopleuræ have some very slight pale pubescence on the upper part and some black hairs on quite the lower part, while the prothorax bears dull yellowish pubescence; metapleuræ with dull yellowish pubescence on the front part, and with a conspicuous dense radiating tuft of curved orange hairs on the hind part, and these hairs curve up almost under the alar squamæ to above the level of the root of the wing, while besides these tufts there is another one on the hump on each side of the metanotum which though large and dense is not so long-haired. Scutellum black, rather shining; pubescence composed of

rather long erect not scarce black hairs with some short golden hairs intermixed on the disc and sides.

Abdomen dull black or brownish black, narrower than the thorax and usually conical, being less than half as wide at the tip as at the base, with the segments after the second gradually diminishing in length; pubescence forming a very conspicuous golden fringe or crest across the hindmargin of the basal segment, but otherwise with only moderately conspicuous long golden hairs on the five or six basal segments, and these hairs are not abundant anywhere but are seen best when viewed from behind, and there are also abundant shorter but more erect inconspicuous blackish hairs especially about the hindmargins, and these blackish grey hairs become more abundant and exclude all the golden pile on the end segments except on the middle of the disc. Belly black, rather shining; pubescence similar to that on the dorsal surface but shorter and the golden hairs less prominent, and there is no sign of any golden fringe near the base. Genitalia with a dull black semicircular emarginate or bilobed middle basal piece, close to but clear of which lie the two-jointed side lamellæ, the basal joint being large and oblong with the lower outer angle projecting and the underside bearing a delicate pale fringe, but the second joint elongate ovate and curved inwards and having a brown tip.

Legs dull black, but testaceous on the extreme tip of all the femora, on all the tibiæ, and on the basal joint (except indeterminately at its tip) of all the tarsi; front coxæ greyish black, large, and bearing rather abundant long black pubescence all over the front part, though a few hairs towards the inner side may be rather tawny; middle coxæ rather similar, but the hind coxæ with the long black hairs restricted to about the apical half on the outside and sometimes considerably mixed with golden hairs; front femora with very slight scattered blackish pubescence beneath and postero-ventrally, but postero-dorsally bearing a patch of adpressed brownish yellow scales on about the basal two-thirds; middle femora with the brownish yellow or blackish postero-dorsal scales extended almost to the tip, while at the tip both antero- and postero-ventrally there are some small inconspicuous black bristly hairs; hind femora with the scales almost as on the middle femora except that they are antero-dorsal, and with a short black ciliation beneath; all tibiæ and the basal joint of all tarsi long and thin, with the usual tiny black bristles but with no "touch-hairs" beneath the front tarsi; front tibiæ slightly shorter than the tarsi, but the middle and hind tibiæ each increasing in length and longer than their tarsi; middle tibiæ each with two long testaceous spurs, and the hind tibiæ with one rather short antero-ventral one; front tarsi with the last joint inconspicuously flattened. Pulvilli brownish yellow; claws small, black.

Wings smoky brownish to the very base, and with a conspicuous dark brown stigma which is elongate ovate and which lies in but does not reach the end of the marginal cell; base of the cubital fork usually rather rectangular; anal cell closed well before the wingmargin; veins dark brown or black, rather thick on especially the fore part; base of the costa with a rather conspicuous tuft of rather long black bristly hairs; subcostal vein with minute scattered black spines on the basal half. Squamæ (alar) obscure pale brown, rather large, smoky blackish orange with blackish margins; fringe short and equal, with the hairs in a single row. Halteres long, dull black with a brownish orange stem.

- ♀. Very distinct from the male. Head scarcely wider than the thorax, and mainly light grey or brownish grey; frons and face of almost equal width from the ocellar space to the mouth, being nearly half the width of the head; frons with a very narrow channel down the middle, on each side of which is a large undefined brownish patch (on which are often but not always a number of tiny black bristles), while higher up on each side of the ocellar space is usually a smaller patch on the front part of which are always some short black bristles; a sloping channel (or ridge between two small channels) bounds the upper part of the frons and extends from each eye towards the back of the head above the ocellar space, and just above the antennæ an indefinite transverse channel crosses the frons, and this channel is projected

upwards at its middle as a small triangle on which is a small blackish spot; the socketed epistoma darker grey and the side-cheeks light grey, and both bare except that the side-cheeks bear a few short black bristles almost hidden in the lower part of the channel which runs between them and the epistoma; jowls small, light grey, and bearing on the back part fairly long and dense brownish pubescence (sometimes bleached in old specimens or black in deeply colored specimens); back of the head light grey, bearing abundant short black bristles but with the margin against the eyes quite bare, and a little above the middle of the head these bristles disappear for a short gap and then reappear rather more scattered; occiput hollowed out at the middle in a deep curve so that when viewed from above the broad eyemargins seem puffed out, and all this part of the head quite bare; ocellar space very much elevated, rather dark brown or blackish, and bearing rather numerous short sloping black bristles. Palpi greyish black, with black bristly hairs which are shorter and scarcer than in the male. Eye-facets all equal. Antennæ more grey and bare than in the male, and the third joint apparently slightly larger and more pubescent.

Thorax light bluish grey with a pair of clear dark brown or blackish stripes, and these stripes slightly widened anteriorly but not nearly reaching the front of the thorax nor quite extended to the hindmargin, and the grey space between the stripes is itself split by a very narrow sharply defined dark brown middle line; the outer less defined broad brown stripes can be detected (when viewed from above) extending from the humeri to above the wing-base; humeri brown. Pubescence on the disc consisting of scattered depressed golden (or whitish yellow) pile, but this golden pile becomes more dense towards the sides between the humeri and the wing-base and right across the hind part; there are also a few longer more erect thinner (usually) black hairs along the sides between the humeri and the wing-base and on the postalar calli, but sometimes these hairs are tawny, and a few of these hairs occur on even the disc itself. Scutellum blackish, with numerous suberect black hairs and rather abundant shorter depressed golden pile.

Abdomen black, but in perfect specimens the ground colour entirely concealed by dense closely adpressed coarse yellow pubescence amongst which are no erect and no black hairs but this pubescence very easily rubbed off; the abdomen is rather pointed at the tip. Belly dull brownish black, with sparse yellow pubescence which ends abruptly at the end of the fourth segment. Ovipositor blackish brown and composed of several tubular segments which end in a pair of small rounded lamellæ.

Legs similar to those of the male; front coxæ with fewer hairs which are often mainly brownish yellow, while the middle coxæ may have their pubescence all brownish yellow or at least with several pale hairs on the basal part, and the hind coxæ have nearly all their few hairs yellow; the brownish yellow scales on the femora less dense, especially on the hind pair.

Wings more pellucid; spines on the subcostal vein slightly stronger and extending almost to the tip.

Length about 6.5 mm.

This species varies considerably in general appearance according to the condition of the specimen, as the golden or yellow pile rubs off very readily while the erect thin black hairs disappear almost as quickly, and sometimes the entirely denuded abdomen appears to be shining brownish black. It is very closely allied to the common European *C. auratus* Fabr. (as identified by Loew), but *C. auratus* has the wings much more brownish with the base very obviously dark orange and with the subcostal vein conspicuously orange, the stigma lighter brown and usually rather thicker through, the squamæ more orange on the surface and with only pale brown margins, the metapleural tuft darker and less conspicuous, the hind femora more brownish, and the pubescence on the anterior coxæ more greyish black; while the female of *C. auratus* differs in a similar way in the wings and squamæ, and has the pubescence on the inner part of the side-cheeks

and the bristles on the frons (even though very tiny) more distinct, the thorax with the stripes more obscured by golden pile (a very doubtful character) and with the pair of stripes narrower and shorter and the middle line hardly perceptible or with the stripes sometimes hardly visible, and the femora with the scales much more extended. I believe the two species are quite distinct and (remarkable to state!) Bigot had them nearly correctly separated, though most of his specimens were in atrocious condition; his *C. aurata* was mainly the species known by that name, while his *C. atrata* was *C. cristatus*, which (though his specimens were unlabelled) tends to prove that *C. cristatus* is by no means confined to Britain. *C. mærens* Loew is a perfectly distinct species known at once by its very long and faint stigma and by other characters given by Loew. *C. erythrophthalmus* Loew can scarcely be considered a close ally, as it is much larger and thinner, with lighter femora, and with no long thin black hairs on the thorax or abdomen. *C. atratus* Fabr. is probably identical with Loew's *C. siculus* (which Bezzi states is common in all Italy) and is distinguished by its pale haired coxæ and jowls. Bezzi wrote to me that a pair of *C. cristatus* which I had sent to him were "une espèce alliée du *Chr. auratus* (F.) Lw. (= *atratus* Schin.) comme je l'entende; il a aussi dans le ♂ la barbe noire et les poils noirs aux hanches antérieures; la crête de poils fauves sur la base de l'abdomen se trouve aussi dans *l'auratus*!—Mais c'est une espèce que je n'avais pas encore vue, distincte par la taille mineure, et dans le ♂ pour la coloration des ailes qui est beaucoup plus foncée, surtout vers l'extrémité, et dans la ♀ pour l'absence des poils gris pressés sur l'abdomen." I do not think that any other well-recognised species can be confounded with *C. cristatus*.

C. cristatus is moderately common in Britain and I have numerous records from Penzance to Sutherland and to Orkney, so I think it is likely to occur in any suitable marshy localities; it likes the long grass and low herbage in the vicinity of water. Colonel Yerbury took it at Glengariff in Co. Kerry, and says "Common everywhere." My dates extend from June 6 to August 28, but specimens very soon show a worn appearance, and a peculiar male taken at Lulworth Cove on August 21, 1906, is extremely small, deep black with scarcely a golden pile left, and with the wings unusually pellucid though not in the least orange about the base. The species is recorded from the British Isles only at present, though I think there were continental specimens in Bigot's collection, but when better distinguished from *C. auratus* I have no doubt it will be found to occur throughout Western Europe. The common *C. auratus* is recorded from nearly all Europe, and occurs in Italy in company with the South European *C. siculus*, so it is probable that we shall find the true *C. auratus* in Britain, but I have not been able to detect a specimen for certain at present; unfortunately most specimens that I have seen have been in very bad condition.

Synonymy.—Loew in 1869 (Beschr. eur. Dipt., i., 56) dealt exhaustively with the synonymy of the two species which he identified as *C. aurata* Fabr. and *C. splendida* Meig., and his synonymy has since been almost universally adopted. Since that time however Loew's reasons for the adoption of the name *C. aurata* have been weakened; firstly he had no idea that a very closely allied species existed in England, and secondly he did not know that *C. aurata* occurred in Italy, and he to a large extent used the name *C. aurata* as applying to a Danish species and rejected the older name of *C. atrata* because it was originally given for an Italian species. In the latter action he has been justified, as it is most probable that

R. atratus Fabr. is the same as the common Italian *C. sicula* Loew, even though Fabricius persistently said "pedibus nigris," but recently Bezzi has stated that *C. auratus* also occurs in Italy. The older name is *C. atratus* (1781), and it is noteworthy that Meigen in 1804 adopted that name for the common European species, and that Fabricius in 1805 appears to have accepted Meigen's identification but forthwith described an *Atherix aurata* as a new species from Denmark. It is also certain that when Loew wrote of Fabricius's *Atherix aurata* "Es ist unzweifelhaft, und es hat in der That bis jetzt noch Niemand daran gezweifelt, dass dies die Beschreibung des Weibchens des *Chrysop. aurata* ist," he and others had no notion that Fabricius's words "thorace cinereo nigro trilineato, . . . alis albis : . . . Caput cinereum . . . Thorax cinereus : lineis tribus dorsalibus, approximatis atris ; intermedia tenuiore" could possibly apply better to the common British species than to the common European one. There is however a still older name, *Musca cristata*, (Fabr. Syst. Ent., 782, 1775) which was given to a species caught in England on May 20, and which was discussed by Loew but unwillingly rejected because Fabricius himself subsequently (Ent. Syst., iv., 276, 1794) suppressed it under his *Rhagio atratus* ; I quite agree with Loew in refusing to identify an English species "Pedes nigri, tibiis pallidis" with an Italian species "pedibus nigris," and furthermore Fabricius merely suppressed the *Musca cristata* of his Mantissa, ii., 349 (1787) which was not referred to as identical with his *Musca cristata* of 1775. Fabricius may well have given the name "*cristata*" to our species in reference to the crest of golden pile on the hindmargin of the basal abdominal segment, as that is a prominent characteristic of the British species even though it may be shared with others.

I would not have resuscitated Fabricius's name if it suppressed any known name for this species, but whether the species be known in future as *C. cristatus* Fabr. or *C. cristatus* Verr. is to me a matter of complete indifference.

Walker endeavoured to recognise a common *Chrysopilus* in *Styrex holosericeus* Scopoli (1763) ; if he had succeeded he might as well have revived the generic name *Styrex*. I cannot possibly recognise any species from Scopoli's description.

2. **C. aureus** Meigen. Legs all yellow. Wings hyaline without any dark clouds except the stigma.

A small very graceful species.

- ♂. Dull brownish black, obscured about the humeri and pleuræ by light grey dust, and in good specimens almost covered with golden pile. Epistoma and side-cheeks covered with light grey or yellowish grey dust ; socketed epistoma bare, nearly circular and globular ; side-cheeks apparently bare, but with a faint ciliation on the lower third of the side of the channel between them and the epistoma, and this ciliation continued on to the jowls ; at the lowest hind corner of the jowls (almost behind the mouth-opening) there is considerable long whitish pubescence, which gradually shortens as it ascends the moderately inflated light ashy grey lower part of the back of the head, but the actual margins against the eyes are bare ; all the upper part of the back of the head is almost flush with the eyes and is almost bare, as there is only a slight pale fringe near but not quite close to the eyes ; ocellar space considerably elevated, greyish, and bearing a few short yellow hairs ; frons ashy grey, running up to a long point between the eyes and with a deep middle channel, but leaving the eyes touching for about one-third the distance between the occiput and the antennæ. Proboscis thick and yellow, with the sucker-flaps large ; palpi elongate and thin, blackish brown, and bearing numerous obscurely whitish long outstanding hairs. Eyes in life brilliant golden green, or rather coppery green on the upper three-fifths and green on the lower two-fifths ; facets distinctly large in front about the part where the eyes touch, but also rather larger on more than the upper half than on the lower part, but the change is little perceptible. Antennæ brownish black ; basal joint very small ; second joint transverse and the largest ; third joint small and transverse ovate ; arista about four times as long as the antennæ, very slightly pubescent.

Thorax and scutellum dull brownish or greyish black without any distinct

markings, though sometimes in completely denuded specimens with faint traces of a pair of widely separated narrow pale grey stripes which may extend transversely along the suture, but in good specimens the ground colour mainly hidden by abundant decumbent coarse golden or yellow pile, amongst which some longer thin erect obscurely yellow hairs occur on the sides between the humeri and the wings, and also on the postalar calli, on the hind part of the thorax (dorso-central rows?), and on the margin of the scutellum; pleuræ ashy grey, with moderate pale yellow or whitish pubescence on the prothorax, on the upper part of the mesopleuræ, and on the extreme hindmargin of the pteropleuræ, and with the usual thin though extensive tuft on the lower part of the metapleuræ, which is followed after a bare space by the shorter denser more conspicuous tuft on the outer humps of the metanotum.

Abdomen slender from the end of the second segment to the widened knob-like seventh segment and genitalia, dull dark greyish brown or greyish, with only the broad base of each segment darkened or even almost blackened, but the ground colour obscured in good specimens by rather short depressed golden pile which is fairly abundant all over except on the blackish basal part of each segment, and even in worn specimens a slight crest is usually left on the hindmargin of the basal segment; pubescence on the sides of the four or five basal segments long, erect, and pale, though rather inconspicuous. Belly greyish black, with fairly abundant moderately short sloping pale pubescence on the five basal segments but with shorter black pubescence on the next two segments. Genitalia knobbed; lateral lamellæ two-jointed, the basal joint being large and almost oblong and densely pubescent above, but the thin and shorter second joints arched inwards and almost meeting each other and enclosing the pair of short black basal lamellæ and the pointed middle piece, and usually leaving a clear open space between the end of these and the approximated (or touching) tips of the lateral lamellæ.

Legs dull yellow, but the tarsi becoming obscured soon after the middle of the basal joint; coxæ and trochanters darkened, but the coxæ covered with light ashy grey dust with usually a translucent tinge of yellow, and bearing not very conspicuous obscure pale yellow pubescence; hind femora rarely darkened on the upper side of the apical half. Pubescence practically none, but the spurs yellowish with black tips, the two spurs on the middle tibiæ being longer than the one on the hind tibiæ.

Wings hyaline with a very slight greyish tinge; stigma blackish brown or sometimes lighter, short but broad and nearly reaching the end of the marginal cell; radial vein rather suddenly curved up to the costa; anal cell closed only a little before the wingmargin; base of the wing and the veins thereabouts tinged (often strongly) with orange or light brown, but the veins gradually becoming darker until they become black long before the end; subcostal vein with very minute scattered spines on nearly all its length; in very perfect specimens there is a small tuft of yellow hairs at the extreme base of the costa. Squamæ (alar) glassy with a blackish spot on the upper part against the wing, and with clear orange or pale brown margin and pale yellow fringes. Halteres with the knob, or at least its top half, brown, but the stem obscure yellow or even quite orange.

- ♀. Not unlike the male. Frons light ashy grey with sometimes a tinge of brown, more than one-third the width of the head at its narrowest part (= the middle), but widening considerably towards the occiput; face (including the side-cheeks) beginning as wide as the adjacent part of the frons but widening downwards; frons with scattered tiny blackish or obscurely luteous bristles, and with rather longer and yellower bristles behind the ocellar space (leaving the sides near the ocellar space broadly bare), and there is a row of similar bristles extending down the back of the head near but not quite close to the eyes and then extending to the more numerous and longer whitish bristly hairs, which in turn merge into the longer pubescence on the lower part of the back of the head. Palpi sometimes more ferruginous and with only rather sparse hairs. Eyes in life vivid green with a faint brownish line across just above the middle but only visible in certain lights, or (as noted in another specimen) evenly green with a slight coppery gloss in some lights. Antennæ below the middle of the head; third joint slightly larger.

Thorax almost as in the male, but in an entirely abraded specimen a broad brown middle stripe extends though rather vaguely well forward and two broad side stripes occur which are widely interrupted at the suture and a small brown patch exists on each side almost above the wing-base.

Abdomen without any distinct blackish bands across the base of the segments. Ovipositor with long telescopic joints which have dull orange hindmargins, and ending in a pair of very small ovate lamellæ.

Legs with the coxæ and trochanters less darkened.

Wings, etc., as in the male, but the veins near the base sometimes strongly orange.

Length about 5.5 mm.

This species may be known by its almost entirely pale legs, its small size, and its conspicuous stigma. It is very difficult to obtain in perfect condition because its golden pile is very easily rubbed off or bleached. Continental specimens seem to be slightly larger, and in perfect specimens the ground colour of the abdomen seems to be deeper black, while sometimes the antennæ are rather ferruginous, the hind coxæ entirely luteous, and the golden scales on the front and hind femora fairly numerous though indistinct on the yellow ground colour. A continental female has all the ground colour of the thorax and abdomen concealed by dense whitish yellow pile except on the last three segments of the abdomen (which seem to form part of the ovipositor). The European *C. splendida* has much blacker femora, and the eye-facets of the male more distinctly unequal.

C. aureus is hardly so common as *C. cristatus*, but still may occur anywhere in rather marshy localities, as I have records from Cornwall (Penzance) to Sutherland (Inchnadamph). My dates range from June 20 to August 3. It is recorded from Denmark to Italy.

7. PTIOLINA.

Ptiolina (Stæger) Zetterstedt, Dipt. Scand., i., 21 and 226 (1842).

Small dark colored flies, which differ very much in the sexes.

Head rather large; epistoma small and bare, socketed between the broad side-cheeks; side-cheeks occupying more than two-thirds the space between the eyes, and either pubescent or bare. Eyes bare, touching for a considerable space and leaving only a small triangular bare frons just above the antennæ and a small vertical triangle at the top in the male, but widely separated in the female; facets considerably enlarged on the larger upper part and sometimes very sharply separated from the small facets on the smaller lower part, or sometimes the distinction rather gradual. Antennæ (figs. 200, 201) with the two basal joints short; third joint comparatively large and long, short ovate, and bearing an almost apical stout bristle-like style which is hardly longer than the third joint.

Thorax and scutellum simple, equally pilose without any distinctive bristles.

Abdomen simple, with seven distinct segments which gradually decrease in length and breadth from the second to the seventh, the seventh being rather short in proportion to the others; all equally and moderately pilose. Genitalia of the male rather knobbed, being rather short and blunt.

Legs simple, evenly pilose or almost bare; front tibiæ without any spur, middle tibiæ with two obvious nearly equal spurs, hind tibiæ with one small spur; front tarsi as long as the tibiæ and with a few "touch-hairs" on the underside of the basal joint, which is almost as long as the other four joints together; middle tarsi rather shorter than the tibiæ; hind tarsi about as long as the thin straight tibiæ.

Wings (fig. 202) with a true Leptid venation, but the cubital fork long and almost straight-sided (not bell-mouthed) starting with an acute angle and with its upper branch ending well before the tip of the wing but much nearer to the lower branch than to the radial vein, while the lower branch ends at the tip of the wing; the two upper veinlets from the discal cell start close together and sometimes even from a common pedicel (figs. 204, 205), but this character is very variable in individual specimens (and even in individual wings), and in one or two females (fig. 206) the divergence apparently begins in one wing before the end of the discal cell; radial vein curving upwards to the costa so as to margin the long dark stigma; discal cross-vein placed on the basal quarter or third of the discal cell; anal cell closed. Squamæ (alar) large and bearing a fringe single-rowed on the lower part but many-rowed on the upper part.

The first author to realise that there were several closely allied species of *Ptiolina* was Wahlberg, who (Vet. Akad. Förhandlingar, 1854, p. 214) described with care four Scandinavian species in both sexes, and if our commonest British species is among them it must be the one described as *Pt. obscura* Fallén. Since then no doubt has ever arisen as to the limits of the genus unless over *Spania*, but considerable doubt has arisen about the identification of the European species.

This genus contains only four or five well-recognised European species but about as many more doubtful ones; some of them are said to have occurred at times in large numbers among reeds (*Arundo*), but *P. obscura* has usually occurred in rather dry places. It appears to be probable that the species sometimes occur in considerable numbers for a very short period.

Most of the species occur in Northern Europe, but records are given of one from Italy and three from Canada.

Table of Species.

- 1 (2) Antennæ almost bare on the two basal joints (fig. 200). Side-checks sparsely pubescent. 1 *obscura*.



FIG. 200.—*Ptiolina obscura* ♂. × 48.

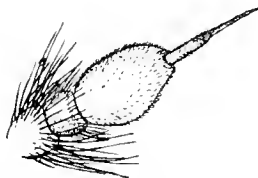


FIG. 201.—*Ptiolina atra* ♂. × 48.

- 2 (1) Antennæ with long hairs on the basal joints of the male (fig. 201) and with short hairs in the female. Side-checks bare. 2 *atra* (*nigra* Zett.).

Synonymy.—Zetterstedt described the genus "*Ptiolina* Stæg." in 1842 for *Leptis obscura* of Fallén and a new species *Pt. nigra* Stæg. in litt.; the generic characters given on page 21 of *Diptera Scandinaviæ*, vol. i., sufficiently define the genus, but the characters given on page 226 are useless. From the very beginning the genus seems to have suffered from synonymical troubles, and although Fallén's species may have been well recognised by North Europeans it has been much misunderstood or incorrectly described by others; *Pt. nigra* started in 1842 with the following synonymy:

Ptiolina nigra Stæger in litt. 1838. ♂.

Leptis nigrina n. sp. ♀. Wahlb. *Observationes Dipterologicae* in Manusc.

Leptis obscura var. *specimina Darlecarlica* Zett. *Ins. Lapp.* 527, 7.

Spania atra Stæg. in litt. *recentioribus Hafniæ* 6 Nov. 1841.

but even this synonymy will not bear investigation (*v. Dipt. Scand.*, xii., 4595), because in 1842 Zetterstedt stated that he only knew of two (or possibly three) males and one female, and that even of these he had not seen the female, and these three specimens did not include those specimens ("quales") which he had seen from "Dalecarlia" and which had been taken by Boheman; *Pt. nigrina* Wahlb. is a distinct species, and the name *Spania atra* of Stæger is worthy of consideration because it is obvious that when Stæger suggested the generic name *Ptiolina* in 1838 he had overlooked the genus *Spania* of Meigen (1820), but that between 1838 and November 1841 he had come to the conclusion that his suggested genus *Ptiolina* was only a synonym of *Spania*, and that as there was already a *Spania nigra* of Meigen he proposed the new name of *Spania atra* for his own species. The genus and species *Spania nigra* Meig. have also been frequently misunderstood, and it is essential that the type species of each genus should be thoroughly identified; I believe I have succeeded in doing this, and I hope that the three species described in this work have now been rescued from all doubt.

There can be no doubt but that *Spania* and *Ptiolina* are very closely allied, and Meigen caused the first confusion by placing *Spania* in his *Hybotinæ* between *Ocydromia* and *Trichina*; Meigen however suspected his error, as he wrote "ihr "Adernverlauf kommt viel mit *Atherix* überein." I do not think that anybody who has once known the genuine *Spania nigra* of Meigen has ever confounded it with any other species, but many writers who have not known the true *Spania nigra* have mistaken species of *Ptiolina* for it. Probably the most ridiculous errors concerning *Spania* were made by Bigot in 1856 and 1857, as after stating in 1856 that *Ptiolina* was identical with *Spanda* (a misprint) he corrected himself in 1857 (*Ann. Soc. Ent. Fr.* (3) v. 523), and stated that *Spania* was quite distinct from *Ptiolina* and should be placed near "*Clinocera* Meig., tribu des *Leptidi*, après la soustraction "du genre *Chauna*," whereas *Clinocera* belongs to the *Empidæ* and *Chauna* to the *Stratiomyidæ*! *Ptiolina* was a genus unknown to Schiner in 1862, but was adopted by him for the genus now distinguished as *Symphoromyia* (perhaps misled by Walker in *Ins. Brit. Dipt.*, i.); however in 1868 Schiner learned to know the true genus *Ptiolina*, and dealt with the then known species which he distinguished in a most unsatisfactory manner. Frauenfeld in 1867 (*Verh. zool.-bot. Ges.*, p. 491) well distinguished *Ptiolina* and *Symphoromyia* but unfortunately knew nothing about *Spania*. In the meantime (1849) Zetterstedt (*Dipt. Scand.*, viii., 2991), probably prompted by Stæger, but still without actually knowing *Spania nigra*, was almost convinced that *Spania* and *Ptiolina* could form only one genus, and again suggested that *Ptiolina nigra* should be called *Pt. atra*; but in 1855 (*Dipt. Scand.*, xii., 4595) when he knew the true *Spania nigra* he had no hesitation in retaining both genera. Becker in 1900 (*Ent. Nachr.*, xxvi., 103) separated the two genera, though strange to say he complimented Zetterstedt for being accurate about the antennæ at the time when the latter had never seen *Spania* but inaccurate after he had seen it! It is to be hoped that no further confusion will arise between the two genera, but I consider them too closely allied to allow the specific name of *nigra* to be retained in each and I have therefore adopted Stæger's proposed change of his *P. nigra* to *P. atra*.

To return to the type of the genus *Ptiolina*, I believe I have correctly identified *Leptis obscura* of Fallén, which must be the type, but there is an important distinction between my description and that of Becker (*Ent. Nachr.*, xxvi., 110), even though Becker's description was made from specimens in Boheman's and Zetterstedt's collection; I have however dealt with this in my synonymical notes upon *Pt. obscura*.

1. **P. obscura** Fallén. Side-cheeks sparsely pubescent. Antennæ with very short bristly hairs on the basal joints in both sexes (fig. 200).

A small obscure blackish Leptid.

♂. Face, including the broad side-checks, brown; epistoma small and quite bare; side-cheeks very broad, being broader than the epistoma, and bearing long but rather sparse brownish hairs; jowls large, brownish black, and bearing rather long blackish brown pubescence; lower part of the back of the head broad and bearing similar pubescence, but the upper part shallow and bearing a moderately long black postocular fringe; vertex blackish, considerably elevated, forming an equilateral triangle, and bearing rather short black

pubescence; frons small, blackish, quite bare. Palpi produced, almost as long as the proboscis, not at all dilated towards the tip, blackish brown, and bearing rather long blackish bristly pubescence. Eyes touching for less than half the distance between the occiput and the antennæ; facets on about the lower third most conspicuously smaller than those on the upper two-thirds and so sharply differentiated that the lower part of the eye is sunken as against the part with the enlarged facets. Antennæ (fig. 200) blackish brown; basal joints short and bearing short inconspicuous bristles; third joint evenly short

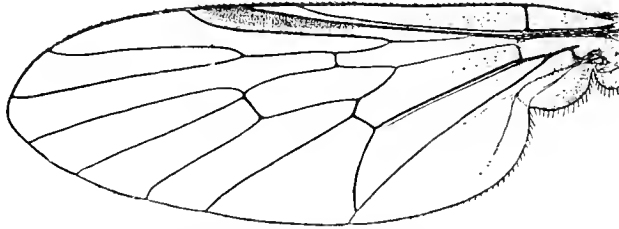


FIG. 202.—*Ptiolina obscura* ♀. × 13.

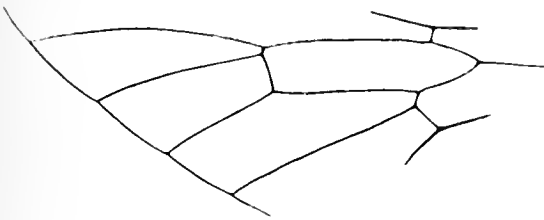


FIG. 203.—*Ptiolina obscura*.

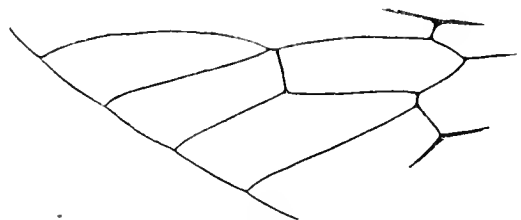


FIG. 204.—*Ptiolina obscura*.

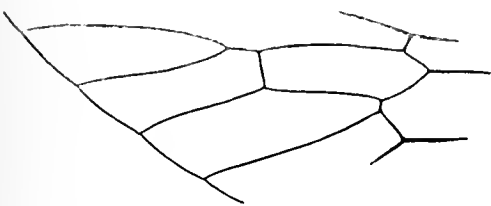


FIG. 205.—*Ptiolina obscura*.

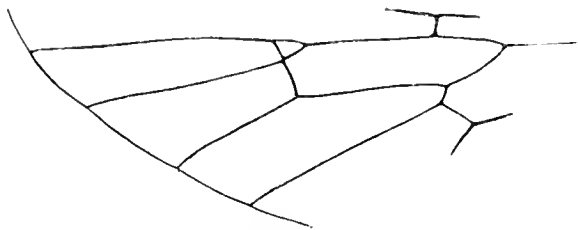


FIG. 206.—*Ptiolina obscura*.

ovate with an almost terminal coarse style which is about as long as the third joint itself; this style is rather thick but tapers a little from its base to its tip.

Thorax black with a faint gloss, and absolutely without stripes; pubescence moderately long and abundant, blackish brown, and all almost equal as there are no conspicuous setæ or lines of bristles; pleuræ chocolate brown, quite bare. Scutellum similar to the thorax, but with the marginal ciliation slightly longer.

Abdomen of the same black colour and the same slight gloss as the thorax; pubescence moderate, equal, rather inconspicuous, more recumbent on the disc, and all blackish. Belly brownish black, with very short inconspicuous pubescence. Genitalia blunt, very slightly longer and broader than the seventh abdominal segment, and with some obscure blunt lamellæ.

Legs dull blackish brown; anterior pairs almost bare, especially on the tibiæ, but with a slight ciliation beneath the femora; hind femora with a ciliation beneath, and the hind tibiæ with a short rather inconspicuous dorsal (and still shorter ventral) ciliation; front tarsi with obvious (about six) "touch-hairs" beneath extending all along the basal joint and about the ends of the next three joints. Pulvilli obscure orange.

Wings with a strong smoky blackish tinge; stigma brownish black, large and long; the two upper veinlets issuing from the discal cell closely approximated at their base (figs. 202, 203), or with a very short united stem (fig. 204), or with a long stem (fig. 205), or even occasionally in one wing only of a specimen the fork may appear to commence back in the discal cell (fig. 206). Squamæ (alar) smoky brownish with a darker margin on which

is a short pale brownish ciliation. Halteres brown, with the large knobs blackish brown.

- ♀. Resembling the male in venation but otherwise very distinct. Frons and face light to rather dark brownish grey, nearly half the width of the head at the narrowest part which is at the slight suture crossing the frons a little above the antennæ; frons with rather sparse short black setose pubescence all over except on each side of the ocellar triangle, near the occipital bristles, and close to the antennæ; face bare on the epistoma but with rather sparse short black pubescence on the broad side-cheeks; side-cheeks slightly produced from the eyes in profile; jowls and back of the head rather broadly inflated and bearing rather short setose black pubescence, but the actual postocular margin bare until above the middle of the head, after which the bristles become longer on the top fifth and some of them come close to the eyes; actual back of the head bare. Proboscis and palpi blackish; proboscis slightly the longer and with short sparse pubescence beneath; palpi with black setose pubescence. Eyes rather small; facets all equal in size. Antennæ similar to those of the male, but the two basal joints and the base of the third joint faintly ochreous.

Thorax brownish or brownish black with a slight gloss and usually (but not always) with indications of three or five darker brown rather broad stripes; humeri rather ochreous. Pubescence all evenly and moderately subsetose, but without any special bristles though with longer pubescence on the posthumeral district and on the margin of the scutellum.

Abdomen pointed, rather shining chocolate brown or almost black, with moderate black pubescence. Ovipositor apparently composed of several joints which end in a pair of elongate lamellæ.

Legs brownish black or blackish, very similar to those of the male but the hind legs show no special ciliation except antero-ventrally on the femora; spur on the hind tibiæ short; "touch-hairs" shorter than in the male.

Wings as in the male, though they may be more smoky blackish brown; veinlets from the upper corner of the discal cell varying almost as in the male. Halteres rather paler.

Length about 4 mm.

This species may be distinguished from *Pt. atra* in the male by the basal joints of the antennæ bearing only very short bristles, and in both sexes by the pubescent side-cheeks and less hairy thorax, abdomen, and legs, and by the more rounded third joint of the antennæ. To distinguish it from allied European species attention must in addition be given to the thorax and abdomen being by no means bare, while the thorax is dull in both sexes and not striped in the male, but the European species are still very little known and not satisfactorily differentiated. It varies considerably in size and to a certain extent in darkness of coloration, and a pair from Glanville's Wootton in the late Mr C. W. Dale's collection have very blackish wings, the thorax of the male deep velvety black, and the abdomen and legs quite black, while in the female the thorax and abdomen are blackish grey with scarcely any trace of stripes on the thorax. The specimens I have figured prove the valuelessness in this genus of any characters derived from the presence, length, or absence of a stem to the two upper veinlets from the discal cell.

P. obscura is uncommon in Britain and is only now beginning to be well understood. I caught it in the New Forest and in the Isle of Wight (Bonchurch) in June 1885, and Dr Sharp and Mr C. G. Lamb found it in abundance near the village of Bank in the New Forest in June 1901 and 1902, and it occurred sparingly in that spot in 1905. I have also taken single specimens at Bettws-y-Coed and Ulleswater; Dr J. H. Wood has taken it near Tarrington in Herefordshire, and Colonel Yerbury at

Barmouth and Porthcawl; I suspect also that B. Cooke's record (*Naturalist*, v., 134) of *Ptiolina melana* at Whaley-Bridge in Cheshire refers to this species. The dates range from June 12 to 29.

Synonymy.—It is very necessary to identify this species correctly, as upon its determination many other names depend. The type of the genus is the species which Zetterstedt (or Stæger) recognised as *Leptis obscura* of Fallén. Fallén's original description was as follows:

"11. *L. obscura* griseescens, abdomine pedibusque lividis; nervo alarum postico angularem formante arcuato, crasso.

"In Scania non nisi rarissime obvia.

"FEM. Obscura, præcedentibus minor. Abdomen lividum, an in vivente flavo-maculatum? Pedes obscuri.—Ab omnibus speciebus supra commemoratis satis distincta: nervo alarum illo postico, qui nervum format *angularem*, ceteris crassiore et arcuatim flexo.

"Mas."

This description, though insufficient, is not contradictory to our British species, and in itself fairly defines the genus *Ptiolina*, but one must recognise that many additional European species of *Ptiolina* are now known. The next writer who knew the species—Meigen merely copied Fallén—was Zetterstedt, who was intimately acquainted with Fallén's collection, and his description in *Insecta Lapponica* under the genus *Leptis* is perhaps worthy of being given in detail:

"7. *L. obscura*: nigra aut fusca, alis hyalinis, basi concoloribus, antennarum articulo primo brevi, ultimo ovato. ♂ ♀.

"Mas.: Totus niger immaculatus, subpilosus, alis fumato-hyalinis; Fem.: Fusca aut griseo-fusca, parum pubescens, thorace subvittato; alis hyalinis.

"Var. a. ♂ ♀. halteribus nigris.

"Var. b. ♀. halteribus albidis; paullo major obscurior.

"Mas. et Fem. In hoc genere minima, vix ultra 2 lin. longa, de cetero hujus omnino subdivisionis. Mas.: niger, hirsutulus. Palpi erecti. Antennarum articulus ultimus ovalis, subcompressus, seta longitudine fere antennæ, apicali. Oculi viventis brunnei, vix æneo-micantes. Alæ totæ obscure hyalinæ; linea stigmaticali lata, obsoletissima. Area angularis conclusa, angulo acuto ad marginem interiorem non usque retracto, omnino ut in prioribus, sed areæ nervo superiori crassiori. Pedes toti nigri. Femina: obscura aut griseescens, parum pubescens. Thorax subvittatus. Alæ hyalinæ. Pedes obscure lividi. De cetero omnia ut in mare.—Variat ♂. duplo minor; variat etiam alis albidis, nervis fuscis, stigmatibus nigro, quales in Dalekarlia a D. BOHEMAN lectos vidi."

There are numerous contradictory statements in this description which render its identification with our species rather difficult when compared with subsequently differentiated species. Under his diagnosis Zetterstedt says "alis hyalinis, basi concoloribus," but under his note of the male he says "alis fumato-hyalinis" and of the female "alis hyalinis"; now in our British specimens the male has the wings "fumato hyalinis" but the female has the wings by no means hyaline; this character is however strongly modified by Zetterstedt later on in *Dipt. Scand.*, i., 227, when he says of both sexes "alis hyalinis, stigmatibus fuscis; halteribus albis, clava obscura," and with a "Var. a. ♂ ♀. halteribus clava nigricante" and "Var. b. ♀. halteribus clava alba; paullo major," then later on "Alæ cinereo-hyalinæ, stigmatibus obscurioribus. . . . Femina tota, etiam fronte lata, obscure cinerea, thorace subvittato." At that time no other species of the genus was recognised except Zetterstedt's new species *P. nigra*, which (from subsequent descriptions) was easily distinguishable by its strongly pilose basal antennal joints but which included under its description an allied species *P. nigrina* Whlbg. This was written in 1842, but in 1854 Wahlberg dealt with four species known to him, and while *P. nigra* (= *atra*) and *P. nigrina* are well distinguished from all known European species by the long and densely pilose basal antennal joints, and *P. nitida* by the brilliantly shining vertex of at least the female, *P. obscura* is described in words absolutely fitting our British species, such as "epistomate et basi antennarum pilis raris brevibus munitis, . . . thorace obsolete fusco-3-lineato (♀), . . . alis dilute fuscescentibus stigmatibus saturatiore, . . . Femina antennis basi interdum subferrugineis." I cannot doubt but that our British species was included in Wahlberg's description of *P. obscura*, and therefore I adopt that name for it.

Zetterstedt in 1855 almost copied Wahlberg's descriptions and thereby brought his *P. obscura* into line with our species. In the meantime it would be interesting to know what species Walker included in a genus *Tyrolina*, List Dipt. Brit. Mus., i., 220 (1848) with a species *T. tristis*, which in 1849 in the Errata (p. 1153) he altered to *Ptiolina* and at the same time sank his *T. tristis* under *Pt. obscura* Zett., and also recorded *Pt. nigra* Zett. as a British species; the old collection at the British Museum has a specimen labelled *P. nigra*, which is a female in very bad condition but probably belonging to the species I am now describing as *P. obscura*. If *Pt. Wodzickii* (not *Wodzickii*) of Frauenfeld (1867) is a good species it may be distinct from *Pt. obscura* in having no trace of darkened lines down the thorax of the female, but Strobl in 1892 considered *Pt. Wodzickii* as a synonym of the species which he considered to be *Pt. grisea* Meig. Strobl's article (Wien. ent. Zeit., xi., p. 121) is however hopeless in all he says about *Spania nigra* Meig., as he had not seen the true *Spania nigra* at all at that time, but had a *Ptiolina* before him, as he recognised later on in Mitth. Naturw. Ver. Steiermark, 1897, p. 196.

Strobl also distinguished a second *Ptiolina* which he considered to be the true *Pt. obscura* Fall. Becker in 1900 (Ent. Nachr., xxvi., 108) dealt with Strobl's second species and also with six other European species, amongst them being *Pt. obscura* Fall., but I cannot understand his statement that *Pt. obscura* has the side-cheeks bare in the face of Wahlberg's "epistomate et basi antennarum pilis raris brevibus munitis," and I observe that Lundbeck has noticed this error; Becker inexactly quoted from Zetterstedt, who in turn simply copied Wahlberg, and it is too much to imagine that Wahlberg included the jowls in his "epistoma," and what is more the "Backen" never have "pili rari" in the genus *Ptiolina*. I am afraid that Schiner, Strobl, and Becker have each in turn only added to the confusion of nomenclature in this genus while attempting to elucidate it. It is natural that the comparatively common British species should be the first one recognised in the genus, and it is not improbable that our second species is the second one recognised. My continental material is very slight, but a pair of specimens labelled *Pt. obscura* in Kowarz's collection are probably the same as my species even though the abdomen of the male has distinctly longer and more conspicuous pubescence, while there are longer ciliations on the hind tibiæ and femora and to a certain extent on the anterior femora, and the wings are somewhat dark ochreous about the base; the female has the thorax without stripes and the legs paler brown, but seems to be otherwise indistinguishable. A female in Bigot's collection under the name of *Eurytion paradoxus* is distinct and is probably the species accepted by Strobl as *P. grisea* Meig. (and now placed under *P. paradoxa* Jaenn.); it is larger, with the side-cheeks quite bare, the beard light grey, the palpi with short hairs, the basal joints of the antennæ almost bare and the third joint elongate oval with a rather stout style, the legs lighter brown, the hind femora with a long fringe beneath (much longer than in *P. atra*) and a moderate dorsal fringe, the hind tibiæ with a dorsal fringe (longer than in *P. atra*), and the wings yellowish at the base. In Dale's collection there were four specimens under the name of *Ptiolina unicolor* which were (1) *Pt. obscura* ♂, (2) *Pt. atra* ♂, (3) *Symphoromyia immaculata* ♀ with the anal cell just closed, and (4) *Ptiolina obscura* ♀. It is also probable that the *Atherix melana* of Walker in Entom. Mag., iii., 180 (1836) referred to *Ptiolina obscura*, because he suggested that it belonged to the genus *Spania* and that its venation varied very much. Curtis's description limits *Atherix unicolor* to the genus *Symphoromyia*. I long ago recorded *P. obscura* as British under the name of *Pt. Wodzickii*.

2. **P. atra** Stæger in litt. Side-cheeks bare. Antennæ with numerous bristly hairs on the basal joints, which are long in the male (fig. 201).

Very much like the preceding species.

- ♂. Epistoma small, greyish black, quite bare of hairs but clothed with very short fine down; the broad side-cheeks occupy more than two-thirds the space between the eyes and are also quite bare, and they are greyish black against the epistoma but are more decidedly black against the eyes; jowls broad, deep black, and bearing abundant long greyish black pubescence which

extends on to the moderately inflated lower part of the back of the head ; upper part of the back of the head rather shallow and deep black, with a long black postocular fringe ; vertex elevated, greyish black, and bearing moderate black pubescence ; frons small, dull black, quite bare. Proboscis prominent, dull black ; palpi produced and long, being nearly twice as long as the proboscis and bearing rather long black bristly hairs, stout but hardly in any way dilated about the tip unless they may appear slightly so from some points of view. Eyes touching for less than half the distance between the occiput and the antennæ ; facets on about the lower third obviously smaller than those on the upper part. Antennæ (fig. 201) dull black ; basal joint short and bearing numerous long black bristly hairs ; second joint about as long as the basal one and also with conspicuous though shorter bristly hairs ; third joint long ovate, with an almost apical style which is about as long as the third joint and sometimes appears to be jointed because its basal half is stouter than its tapering apical half.

Thorax black, slightly greyish, with a faint gloss in some lights ; in front there are two dull deeper black stripes with a narrow separating middle line, and the intermediate spaces when viewed from behind give an impression of a pair of blackish grey stripes ; humeri and postalar calli greyish black ; pubescence long and abundant but not dense, of a rather bristly type and all about equal ; pleuræ bare, black with brownish grey dust especially on the lower parts. Scutellum greyish black with similar pubescence to that on the thorax.

Abdomen black, rather shining ; pubescence long, black, equal, abundant but not dense, and all of a rather bristly type. Belly rather more shining black, and with similar but shorter pubescence. Genitalia blunt, rather knobbed.

Legs black ; femora and tibiæ with rather long and rather abundant pubescence composed of black rather bristly hairs which form a rather long and conspicuous but not abundant dorsal ciliation on the anterior tibiæ and an unusually long dorsal ciliation on the hind tibiæ ; "touch-hairs" just visible beneath the basal joint of the front tarsi. Pulvilli obscure pale yellow.

Wings with a decided blackish tinge ; stigma greyish black, large and long ; first and second veinlets from the discal cell sometimes emitted separately or sometimes united for a short stem. Squamæ greyish black, with obscurely greyish marginal hairs. Halteres brownish at the base, but with large dull black knobs.

- ♀. Frons (at its narrowest part) less than a half the width of the head, ashy grey (less brownish than in *P. obscura*), with scattered short black bristles ; face and the broad *side-cheeks* ashy grey and *quite bare* ; jowls moderately broad and bearing rather long but rather sparse pale pubescence which extends on to the lower part of the back of the head, but on the upper half of the back of the head the pubescence is black, longer and more bristly, and comes closer to the eyes. Antennæ with the bristles on the two basal joints rather short though more abundant and longer than in *P. obscura* ; third joint agreeing with the male in being longer and less rounded than in *P. obscura*.

Thorax rather dark ashy grey with three broad brownish black stripes which occupy nearly all the front part of the disc except in front of the shortened side-stripes and down the narrow intervals between the stripes, but these dark stripes die out well before the hindmargin ; the ashy grey coloring about the sides gets a yellowish tinge in some lights especially about the humeri ; pleuræ ashy grey, quite bare. Pubescence of the thorax and scutellum similar to that of the male.

Abdomen blacker, with longer and much more conspicuous pubescence than in *P. obscura* ; eight segments (without the ovipositor) easily visible, the second segment being the longest.

Legs blackish ; hind tibiæ distinctly ciliated dorsally and less so (but still obviously) beneath ; "touch-hairs" barely visible.

Wings less blackish than in the male, though with a more evenly blackish tinge quite to the base.

Length about 3.75 mm.

This species is easily distinguished in the male from *P. obscura* by the long bristly hairs on the two basal joints of the antennæ, and in both sexes by the absolutely bare side-cheeks; the only other known European species with similar antennæ is *P. nigrina* Whlbg., but that has the side-cheeks conspicuously pubescent. *P. atra* appears to be slightly smaller than *P. obscura*.

P. atra was first known to me as British from two males which were taken in May 1904 at Aberlady in Haddingtonshire by the Rev. Jas. Waterston. Colonel Yerbury took a male at Brodie in Elgin on June 5, 1905, and seven males and a female at Porthcawl in Glamorgan on May 18, 1906, which he recognised at the time, but though he made repeated searches for more specimens (in which I joined him on June 10) it was without success. The Porthcawl specimens occurred on short herbage near a shallow pool right out in the sand-hills, and the Aberlady specimens apparently in similar but more marshy ground. Mr J. R. Malloch took a male at Bonhill in Dumbartonshire on June 9, 1906; there was also a male (under the label of *Ptiolina unicolor*) in the collection of the late Mr C. W. Dale; and it is possible that Walker correctly identified it when he introduced *Ptiolina nigra* Zett. as British (List Brit. Mus. Dipt., i., 1153), though a very bad representative now in the British Museum looks like a female *P. obscura*; Walker recorded *P. obscura* at the same time, but in his *Insecta Britannica Diptera* (1851) he did not mention either species, and furthermore gave an entire misconception of the genus *Ptiolina*.

Synonymy.—Zetterstedt described this species in 1842 as "*Ptiolina nigra* Stæger "in litt. 1838" and "*Spania atra* Stæg. in litt. recentioribus Hafniæ, 6 Nov. 1841. It is obvious that Stæger at this later date considered his genus *Ptiolina* a synonym of *Spania*, and that consequently his suggested name of *nigra* had to be altered in the face of *Spania nigra* Meig. (1839). The genera are so closely allied that I prefer to adopt Stæger's own recommendation of the name *atra*. Zetterstedt's original description is not very recognisable and was subsequently admitted to be a mixture of *P. atra* and *P. nigrina*. In the revised description given by Wahlberg in 1854 I was at first misled by the term "palpis dilatatis," but I now believe that Wahlberg referred to the whole palpus as distinguished from that of his *P. nigrina* with "palpis apice dilatatis," and consequently I feel no further doubt about the identification of our British species.

8. SPANIA.

Spania Meigen, Syst. Besch., vi., 335 (1830).

Small, almost bare, dull black flies.

Head semicircular; face (including the wide side-cheeks) short, bare, and shining; frons bare, broad and shining in the female; ocellar knob very much elevated in both sexes. Eyes touching for the middle third of the distance between the occiput and the antennæ in the male, but widely separated in the female; facets considerably and abruptly enlarged on the upper part in the male. Antennæ (figs. 207, 209) placed well above the middle of the head; basal joint very small and in the male easily overlooked; second joint larger though still transverse in the male and almost so in the female; third joint pubescent, considerably longer and larger than the second on its ovate or almost oblong basal part, and in the male produced on its lower part (fig. 207) in a way which resembles a long stout but tapering pubescent style, or in the female (fig. 209) more equally produced into a long style-like projection which is stouter, less tapering, and even more pubescent.

Thorax and scutellum with very short pubescence; pleuræ bare.

Abdomen narrower and rather longer than the thorax, gradually tapering in both sexes, and composed of seven segments.

Legs simple, and with only minute pubescence; middle tibiæ with two tiny but distinct spurs; hind tibiæ with perhaps one very indistinct minute spur.

Wings (fig. 208) almost as in *Ptiolina* and also variable, but the third veinlet from the discal cell is usually (though not always) abbreviated; discal cross-vein placed at or just before the middle of the discal cell, and consequently the upper basal cell longer than the second one; anal cell closed, but sometimes barely so. Squamæ (alar) large, with short fringes; thoracal pair small and indistinct. Halteres very large and long.

This genus is very closely allied to *Ptiolina*, in fact so much so that various authors have sunk *Ptiolina* as a synonym of it; I however agree with Wahlberg and Becker in keeping it distinct. It differs from *Ptiolina* in the shape of the third antennal joint and its apparent style, and usually the third veinlet from the discal cell is abbreviated, while the discal cross-vein is placed nearer the middle of the discal cell.

Spania at present contains only one European species, but it has been recorded from North America possibly in mistake for *Ptiolina*.

Synonymy.—The original type species, *S. nigra*, is now well known, but was often placed by old authors among the *Empidæ*; probably Stæger when suggesting the genus *Ptiolina* in 1838 overlooked *Spania* and then in 1841 having noticed it was willing to sink his own genus as a synonym, as he suggested altering the name of his *Ptiolina nigra* to *Spania atra*. There are two misleading inaccuracies in Becker's paper on *Leptidæ* in Ent. Nachr., xxvi., 104 (1900), when he stated that Zetterstedt did not overlook the basal joint of the antennæ and where he quoted Zetterstedt in proof of the same; both these errors are due to Becker having overlooked the fact that Zetterstedt's statements in 1849 were made on specimens of *Ptiolina*, as Zetterstedt at that time did not know the true *Spania nigra*; when however Zetterstedt in 1855 described the latter genus he expressly emphasised the "antennæ articulis tantum 2 distinctis," and "antennis articulis tantum duobus evolutis"; it is however possible that Zetterstedt even then did not personally know either the species or the genus, but was paraphrasing Boheman's statements (Öfv. Vet. Akad. Förh., xi., 216).

1. **S. nigra** Meigen. Dull black. Third veinlet from the discal cell usually abbreviated.

A small black fly, in fact the smallest fly described in this volume; a true Leptid but looking like an Empid.

♂. Face moderately shining black, broad and retreating, and with its broad side-cheeks quite bare; jowls moderate in size, and bearing black or greyish pubescence which extends about half-way up the shining black back of the head; back of the head rather puffed out on the lower half, and bearing on the upper half a short black postocular ciliation; ocellar space dull black, very much elevated, and bearing short black pubescence; frons triangular, dull black and quite bare, rather sunken between the eyes; proboscis rather long and blackish, but the palpi apparently still longer, thin and upturned, and with distinct black pubescence. Eyes touching for nearly half the distance between the occiput and the antennæ; facets abruptly enlarged on rather more than the upper half, but the small facets extend a little way up the back part of the eye. Antennæ (fig. 207) dull black, apparently two-jointed because the basal joint is so very small and short; second joint much larger, transverse cup-shaped, slightly brownish on its outer margin; both the basal joints with minute black bristles; third joint (not including the apparent style) longer and



FIG. 207.—*Spania nigra*
♂. × 66.

stouter, rather longer than deep but not at all tapering, minutely but coarsely pubescent, and produced from the underside of its tip like a style which is about two and a half times as long as the stout part of the third joint and is also shortly but coarsely pubescent; this apparent style is thick, straightly projected, and slightly tapering to a point and there may possibly be an articulation as indicated in fig. 209.

Thorax and scutellum dull black, but with a faint gloss in some lights and perhaps with faint darker stripes; pubescence not scarce but composed of inconspicuous short black (in some lights rather greyish) bristly hairs, which become longer on the posthumeral calli and round the margin of the scutellum; pleuræ bare, rather greyish brownish black.

Abdomen moderately shining brownish black, rather longer than the thorax and scutellum together but much narrower and rather tapering, and with a tendency towards compression on the apical half; pubescence blackish, very short and inconspicuous. Genitalia concealed in the last segment.

Legs brownish black or almost black (lighter colored when immature), thin and quite simple, without any pubescence except a moderately distinct ciliation; middle tibiæ with two tiny spurs, but I cannot distinguish any spur on the hind tibiæ unless there may be a very minute one.

Wings (fig. 208) with a slight smoky blackish tinge, all minutely pubescent, and with a large darkened stigma which occupies all the end of the marginal

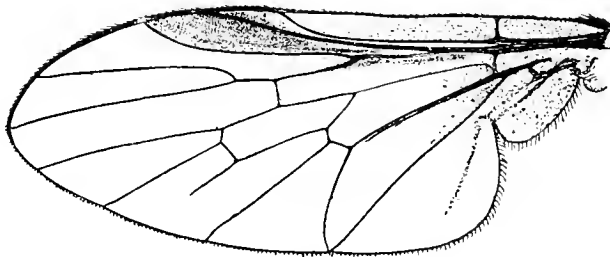


FIG. 208.—*Spania nigra* ♂. × 20.

cell; the two upper veinlets from the discal cell usually sessile, but frequently separated (sometimes widely) and not uncommonly petiolate as in *Ptiolina* (figs. 204, 205), while the third veinlet is usually abbreviated but is sometimes complete; it is also not uncommon to find a spurious cross-vein connecting the two upper veinlets from the discal cell soon

after their origin, and thereby forming a small complete cell above the end portion of the discal cell (almost as in fig. 206); discal cross-vein hardly before the middle of the discal cell; anal cell sometimes barely closed or sometimes distinctly petiolate; it is very usual to find the venation varying differently in the two wings. Squamæ (alar) fairly large, smoky blackish with short fringes; thoracal squamæ practically absent. Halteres very large, long, and conspicuous, dull black.

♀. Rather larger and more shining than the male. Frons very broad, being nearly half the width of the head, and with the almost equally broad face (including the broad side-cheeks) shining black or brownish black (immature?) and quite bare; ocellar space still highly elevated. Eyes very much smaller, and the facets all equally small, but the back of the head (away from the large vertical space) still scarcely inflated. Antennæ (fig. 209) with the basal joint distinct though small; second joint larger than in the male and almost as long as broad; third joint with its basal portion enlarged, globular or subquadrate, thicker and longer than the second joint, and with its underside shelving off gently into a long thick style-like projection which is about two and a half times as long as the stout basal portion; this style-like projection starts on its upper side at a more clearly defined angle from the stout basal portion, and is so conspicuously pubescent that it appears to be more than half as thick as the stout basal portion, and on its apical quarter it indistinctly tapers to almost a point, and this portion may be articulated as indicated in fig. 209 but I am uncertain about this as I have had only one good specimen before me for examination.

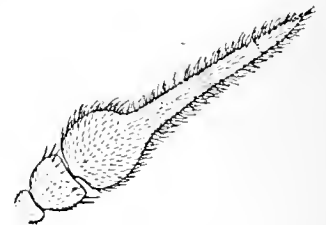


FIG. 209.—*Spania nigra* ♀. × 66.

Thorax shining black with very slight indications of grey dust, and bearing

short depressed sparse greyish black pubescence. Scutellum with distinct marginal hairs.

Abdomen shining black, less pilose and more tapering.

Wings less infuscated; third veinlet from the discal cell abbreviated or entire.

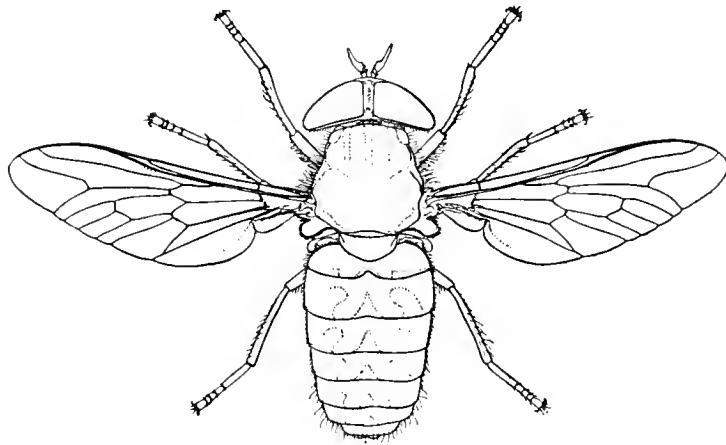
Length about 2 mm.

This species varies a great deal in size and venation, and no specific characters dependent thereon can be trusted in either this or the allied genus *Ptiolina*; the variations of the venation are very frequently quite different in the two wings of a specimen, and even the abbreviated third veinlet from the discal cell does not afford a trustworthy character in either sex, as I know it is sometimes complete in the male while in the three females I have seen it is abbreviated in two but complete in the other; nevertheless as I have not seen a *Ptiolina* with this veinlet abbreviated it may be a useful distinctive character when present. It also varies in the intensity of coloring on the face, frons, and legs, according to the maturity of the specimens. As there is no other known European species of this genus it only requires comparison with species of *Ptiolina*, and they all differ from it in the shape of the third joint of the antennæ.

S. nigra has been insufficiently distinguished not only in Britain but also in Europe, and the females seem to be very rare. The species is not uncommon in Scotland as I have seen numerous male specimens from Tongue, The Mound, Nethy Bridge, Gairloch (Ross), and Arran, and females from The Mound, and St Fillans in Perthshire; in England it may have been overlooked as my only record is from Tarrington in Herefordshire where Colonel Yerbury found the males common on *Cornus sanguinea*, and he has taken it at Porthcawl in South Wales. Haliday recorded it as occurring "In moist places of open groves, hovering about " and alighting on leaves of evergreens. North of Ireland and Wicklow." My dates only extend from May 20 to June 28. It is recorded from Sweden to Silesia, and it was probably in France that Abbé Kieffer (Wien. ent. Zeit., xv., 247, 1896) found a larva in the thallus of *Pellia Neesiana*.

Synonymy.—No doubt can arise about this species being the true *Spania nigra* of Meigen (1830), but Strobl contended (Wien. ent. Zeit., xi., 124, 1892) that it was the same as *Atherix grisea* Meigen (1820) and that the older name must stand; Mik however (Wien. ent. Zeit., xv., 124, 1896) maintained that Meigen's *A. grisea* must be a *Symphoromyia* or *Chrysopila*, and just about the same time Griffini found what is apparently the true *Symphoromyia grisea*. At the same time Strobl contended that *Pt. nitida* Whlbg. was only a dark over-matured form of *S. nigra*, which is very improbable because Wahlberg described both sexes of *Pt. nitida* at the same time as he described the two sexes of *Sp. nigra*, and at the same time he distinguished the two genera; beyond that Wahlberg was a writer who could be trusted to be almost always accurate in his conclusions. Strobl's further conclusions that *Pt. Wodzickii* Frauentf., *Pt. lapidaria* Now. (= *Eurytion paradoxus* Jaennicke), and *Pt. nigripes* Zett. were also synonyms show that at that time Strobl did not know the true *Spania nigra* at all but that he had (as he subsequently admitted) a true *Ptiolina* before him of which *Pt. Wodzickii*, *Pt. lapidaria*, and *Eurytion paradoxus* were probable synonyms; *Pt. nigripes* is also probably a true *Ptiolina*, but I have dealt with many of these species under the genus *Ptiolina*. *Atherix unicolor* Curt. must be a *Symphoromyia*.

IV. TABANIDÆ.

FIG 210.—*Tabanus maculicornis* ♀. × 3.

Orthorrhaphous braehycerous eremochætous flies of moderate to very large (but never small) size, of bulky build, and more or less broad flattened shape; usually thinly pilose but never densely or furry haired; thoracal squamæ large and rather upraised.

Head large, transverse, somewhat flattened behind, and with the back of the head flat or concave and fitting closely to the thorax. Frons at the vertex almost flush with the eyes, and either with or without ocelli; face with large side-cheeks on which is a soft rather bushy pubescence. Proboscis projecting, sometimes very much elongated (but not in any British species); palpi two-jointed, conspicuous with the second joint elongated or thickened and differing very much in the sexes, being porrect in the male but pendulous and pointed in the female. Eyes large, pubescent or bare, touching on the frons in the male but well separated in the female by a more or less wide frontal stripe, and usually in life brilliantly translucent green with purple bands or markings; facets usually enlarged on the upper or anterior part in the male. Antennæ porrect, approximated at the base, nearly always clearly three-jointed, but the third joint always annulated (three to eight segments) though very rarely flagelliform, and the basal annulation of the third joint large and frequently rising into a peculiar characteristic dorsal hump soon after the base (fig. 214), while the other annulations usually form a sort of thick style.

Thorax not very convex dorsally but rather flatly quadrate, strongly built, and usually bearing inconspicuous erect thin black pile intermixed with which is a fine or scaly pale pubescence, but never with any trace of chaetotactic bristles; metapleuræ with a dense tuft of pubescence. Scutellum rather large, flattened, and never with any marginal spines or tubercles or even bristly hairs; metanotum almost or quite concealed under the scutellum.

Abdomen broad and rather flat, moderately elongate or short, never slender or constricted or compressed, composed of seven obvious segments, and without any sign of bristles. Genitalia never prominent in either sex.

Legs moderately stout, occasionally thin but never long, and without any trace of bristles unless in the form of a minute serration on the underside of the front femora; middle tibiæ always and the hind tibiæ sometimes (*Pangonia*) bearing

apical spurs ; front coxæ rather long ; the legs very rarely exhibiting any dilatation or structural ornamentation, but very frequently the front tarsi, and even tibiæ near their tip, bearing several "touch-hairs" on the underside. Pulvilli three, almost equally pad-like.

Wings with the normal fully developed venation of the BRACHYCERA ; veins usually all ending simple and entire in the wingmargin, except that the lower branch of the postical fork meets or almost meets the anal vein before the wingmargin and consequently the anal cell is always closed or almost so, and sometimes the first and fourth posterior cells are also closed near the wingmargin ; radial vein long ; cubital fork not long but very wide open, commencing well after the end of the discal cell and with the upper branch ending well before but the lower branch far after the wing-tip ; discal cell near the middle of the wing, long and hexagonal, and emitting three usually simple veinlets to the wingmargin, though the upper one may be sometimes united to the lower branch of the cubital fork a little before the wingmargin, and the lower one sometimes united to the upper branch of the postical vein also near the wingmargin so that the first and fourth posterior cells or one of them may become closed ; the upper branch of the cubital fork often emits a short recurrent veinlet ; the lower branch of the cubital fork always ends much nearer to the end of the first veinlet from the discal cell than to the upper branch of the cubital fork ; discal and small cross-veins quite distinct at about the basal quarter of the discal cell, and consequently there are five well-distinguished posterior cells ; basal cells long and equal in length ; ambient vein entire, encompassing the whole hindmargin of the wing ; alula strongly developed though not very large ; wing-membrane conspicuously rippled, and very densely but very minutely pubescent. Alar squamæ moderate in size or rather large and having folds, very short fringed on the usually dark margin but with a long and shaggy tuft at the angle ; thoracal squamæ strongly developed and rather upraised, lying close against the angle of the frenum, and bearing a short fringe. Halteres not much concealed by the squamæ.

The *Tabanidæ* form one of the most easily distinguished families of the EREMOCHÆTA, as the annulated third joint of the antennæ is only shared in the Palæarctic region by the very distinct *Stratiomyidæ* and by a few aberrant *Leptidæ*. From any *Leptidæ* they are at once distinguished by the strongly developed raised thoracal squamæ, by their broad flat shape, very distinct wide-mouthed cubital fork, and the blood-sucking habits of the females. From the *Stratiomyidæ* they are almost always distinguished by the large thoracal squamæ, and in any *Stratiomyidæ* when these squamæ are well developed they are of a very different texture and have woolly surfaces, while at the same time the ambient vein is entirely absent and the anterior veins are all crowded together on the foremargin of the wing. The only other family of the EREMOCHÆTA with large thoracal squamæ is the *Cyrtidæ*, and their globular hump-backed figure, diminutive head, and balloon-like abdomen at once differentiate them in a most striking manner.

The *Tabanidæ* are composed of the well-known biting "Horse-Flies," and are distributed over the whole world. About 1600 species are known, of which nearly 200 are Palæarctic and about 200 North American. Many of the species are conspicuous from their large size and none are small. The females are persistent blood-suckers and are always ready to attack man as well as animals, but the males are much more rarely met with and may be seen resting on tree-trunks, palings, etc., or on flower blossoms, though Osten Sacken states that they hover in the air on mountain-tops at sunrise, and Schiner says that the males of *Hæmatopota*

hover in the air in the morning and towards evening; Colonel Yerbury has informed me that he has seen the males of *Hæmatopota* dancing in small groups in hot sunshine, and he has also observed the male of *Therio-plectes distinguendus* hovering, but has not noticed that habit in any other large species of *Tabanidæ*.

The metamorphoses have recently been thoroughly worked out in several North American species by Hine, and he states that all the species of *Tabanus* which he has been able to observe lay their eggs on the stems or leaves of marsh plants (*Sagittaria*, etc.), and the larvæ are carnivorous and live on small crustaceans and minute invertebrates either alive or dead; very few of the species can live actually in the water, but they require marshy ground; one species lives under water in "riffles" under stones, but they live best in damp sand. Brauer once bred a *Hæmatopota* from a larva which came out of a coleopterous larva into which it had bored, but of course it is possible that the coleopterous larva was dead before it was attacked by the *Hæmatopota* larva. Hine states that the perfect insects pair about eight o'clock in the morning for less than a quarter of an hour, and that they collect in numbers overnight but disperse each morning before noon.

ARRANGEMENT.—If the character of the tibial spurs indicates special affinity to the *Leptidæ*, or if anybody thinks there is any connection between *Chrysops* and *Atherix* (which I think as unlikely as with *Anthrax*!) it would be necessary to place the *Pangoninæ* next to the *Leptidæ*, but if (as seems more likely) *Pangonia* with its elongated proboscis shows affinity with the *Nemestrinidæ* the *Pangoninæ* should come last and lead on to the *Nemestrinidæ*. I am in favour of this latter view, even though the venation and antennæ show no stepping-stones, and consequently I commence with *Hexatoma*, which has the most flagelliform antennæ, and pass through *Hæmatopota* to *Tabanus*, and thence to the *Pangoninæ*, beginning them with their most Tabaniform genus *Silvius*, followed by *Chrysops*, and close the family with *Pangonia*. The presence of "touch-hairs" beneath the front tarsi undoubtedly shows some strong affinity with the *Leptidæ*.

Type of venation of the TABANIDÆ.

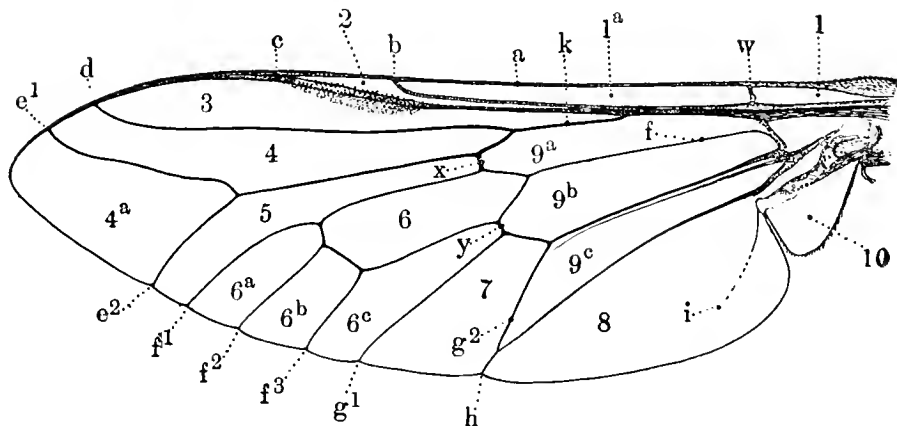


FIG. 211.—*Tabanus bromius*.

Longitudinal (or long) veins.

- a* Costa (or costal vein).
- b* Mediastinal (or auxiliary) vein.
- c* Subcostal (or 1st longitudinal) vein.
- d* Radial (or 2nd longitudinal) vein.
- e* Cubital (or 3rd longitudinal) vein.
 - e*¹ Upper branch } of the cubital fork.
 - e*² Lower branch }
- f* Discal (or 4th longitudinal) vein.
 - f*¹ Upper veinlet } from the discal cell.
 - f*² Second veinlet }
 - f*³ Third veinlet }
- g* Postical (or 5th longitudinal) vein.
 - g*¹ Upper branch } of the postical fork.
 - g*² Lower branch }
- h* Anal (or 6th longitudinal) vein.
- i* Axillary vein.
- k* Præfurca = the common stem of the radial and cubital veins.
- Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (or transverse) veins.

- w* Humeral cross-vein.
- x* Discal (or middle) cross-vein.
- y* Lower (or small) cross-vein.
- Anal cross-vein = *g*² = the lower branch of the postical vein.

Cells.

- 1 Costal (or mediastinal) cell.
- 2 Subcostal cell.
- 3 Marginal cell.
- 4 Submarginal cell.
 - 4^a Second submarginal (or cubital) cell (or cubital fork-cell).

- 5 First posterior (*or subapical*) cell.
- 6 Discal cell.
- 6^a Second posterior cell.
- 6^b Third posterior cell.
- 6^c Fourth posterior cell.
- 7 Postical (*or 5th posterior*) cell (*or postical fork-cell*).
- 8 Axillary cell.
- 9^a Upper (*or 1st*) basal cell.
- 9^b Second (*or middle*) basal cell.
- 9^c Anal (*or 3rd basal*) cell.
- 10 Alula.

Notes on the Venation of the TABANIDÆ.

The most characteristic features in the venation of this family lie in (1) the præfurca and its origin; (2) the cubital fork; and (3) the small cross-vein.

(1) THE PRÆFURCA always starts from the subcostal vein far before the base of the discal cell, and is always long.

(2) THE CUBITAL FORK is very characteristic and in itself will almost always allocate a species to this family, though a few aberrant *Leptidæ* (*Vermileoninæ*) and some *Bombylidæ* have a somewhat similar fork. The Fork is very wide open triangularly, with the upper branch rather longer than the lower one and ending well before the wing-tip, while the lower branch ends considerably more than that distance after the wing-tip; normally the upper branch ends rather near the radial vein and about as far from it as the lower branch does from the upper veinlet from the discal cell, and *the wingmargin included between the branches of the fork is many times longer than that of the adjoining cells*, but the upper and lower veinlets from the discal cell often vary until the uppermost one may connect before the wingmargin with the lower branch of the cubital fork, and the lowest veinlet from the discal cell may connect in a similar fashion with the upper branch of the postical fork. The Fork begins after the end of the discal cell, and the upper branch often emits a short recurrent veinlet (as in many *Bombylidæ*) from the angle soon after its base, but this character is of only minor specific value as it is not constant.

(3) THE SMALL CROSS-VEIN is always present, and that character combined with the five posterior cells gives an infallible distinction from the *Bombylidæ*.

Other details worthy of note lie in the complete Ambient Vein, the long hexagonal Discal Cell with the Discal Cross-Vein placed on its basal third almost opposite to the (always present) Small Cross-Vein, and the well-developed Alula.

Table of the Palearctic Genera of TABANIDÆ.

- 1 (6) Hind tibiæ without any spurs. Ocelli often absent.
TABANINÆ (p. 327).
- 2 (3) Third antennal joint not dilated nor dorsally humped near its base nor with any style-like termination, but apparently divided into a long simple cylindrical basal and three shorter apical joints (fig. 212).
HEXATOMA.
- 3 (2) Third antennal joint dilated soon after its base and often dorsally humped there (fig. 214), and with three or four subsequent annulations which are hardly separable into joints.
- 4 (5) Wings grey with hyaline dots indicating numerous imperfect ocelli (fig. 222). Third antennal joint dilated near its base but not dorsally humped there (fig. 213), and with three subsequent annulations. Frons of the female as broad as, or

broader than long, with a frontal tubercle (in European species) about four times broader than long.

1. HÆMATOPOTA.

- 5 (4) Wings mainly hyaline without spots or dots (in British species). Third antennal joint dilated and dorsally humped near its base (fig. 214), and with four subsequent annulations. Frons of the female much longer than broad, with the frontal tubercle absent, quadrate, or longer than broad.

2. TABANUS.

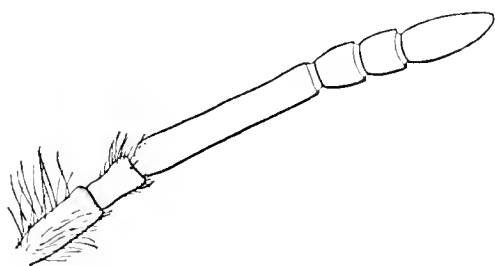


FIG. 212.—*Herotoma pellucens* ♂. × 13.

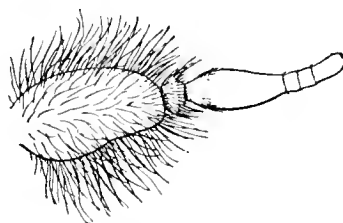


FIG. 213.—*Hematopota pluvialis* ♂. × 16½.

1 (4) Eyes pubescent.

2 (3) Ocelligerous tubercle more or less distinct. Upper branch of the cubital fork simple. THERIOPLECTES.

3 (2) Ocelligerous tubercle absolutely absent. Upper branch of the cubital fork (in British species) with a recurrent veinlet (fig. 215). ATYLOTUS.

4 (1) Eyes bare. Ocelligerous tubercle absent.

TABANUS (sensu stricto).

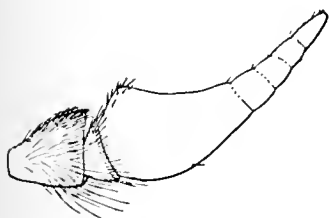


FIG. 214.—*Tabanus autumnalis* ♀. × 20.

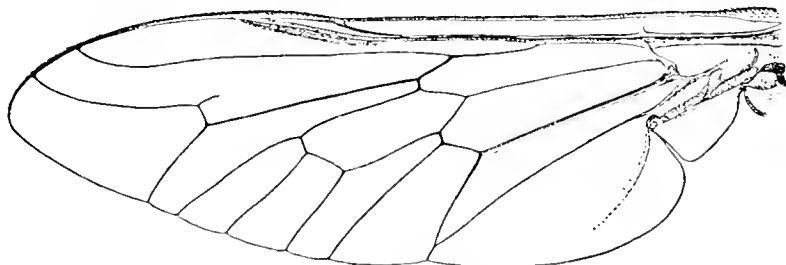


FIG. 215.—*Atylotus fulvus* ♀. × 6½.

6 (1) Hind tibiæ with apical spurs (fig. 216). Ocelli usually present. PANGONINÆ (p. 422).

7 (8) Second antennal joint as long (or almost as long) as the first. Wings with conspicuous black bands or markings. Frons of the female with a tubercle or callus. 3. CHRYSOPS.

8 (7) Second antennal joint distinctly shorter than the first. Wings without black bands or markings, even though there may be small spots or a brownish smudge across the middle.

9 (10) Third antennal joint with eight annulations of which the first is broad and short, being not much longer than broad (fig. 217). Proboscis exceedingly produced, horny, with very small pointed sucker-flaps. Face (and frons of the female) without any tubercle or callus. PANGONIA.

- 10 (9) Third antennal joint with five annulations of which the first is very long and hardly broad (figs. 218, 219). Proboscis but little produced, horny, with moderately broad sucker-flaps. Frons of the female with a tubercle or callus.



FIG. 216.—*Chrysops cecutiens* ♀. Left hind tarsus.

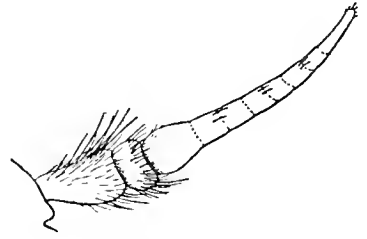


FIG. 217.—*Pangonia maculata* ♂. × 19.

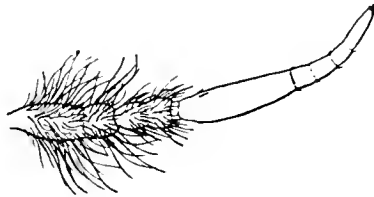


FIG. 218.—*Nemorius vitripennis* ♂. × 19.

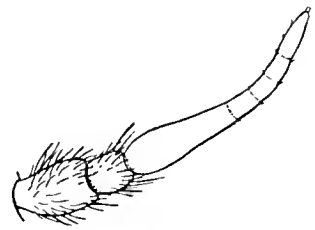
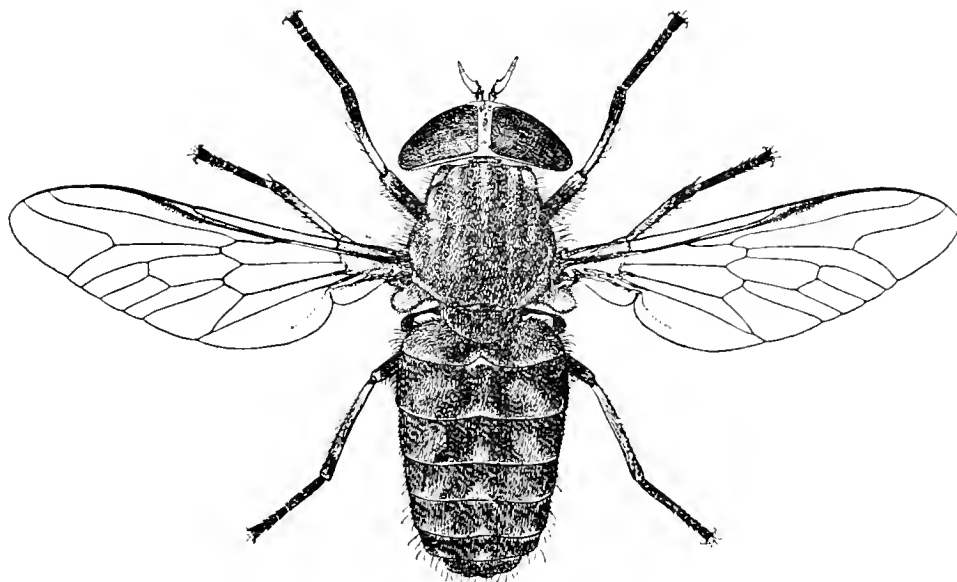


FIG. 219.—*Silvius vituli* ♂. × 19.

- 11 (12) Third antennal joint not much longer than the two basal joints together; second joint much longer than broad (fig. 218).
 NEMORIUS.
- 12 (11) Third antennal joint much longer than the two basal joints together; second joint as broad as long (fig. 219). SILVIUS.

TABANINÆ.

FIG. 220.—*Tabanus maculicornis* ♀. × 4.

Ocelli often rudimentary or absent, and sometimes even the ocellar tubercle absolutely absent. Proboscis never porrect and elongate. Eyes in life usually brilliant green, but often banded (*Tabanus*) or with curious zig-zag bands (*Hæmatopota*); upper and anterior facets often enlarged in the male. Hind tibiæ without any apical spurs.

Abdomen usually brownish grey or blackish with from one to three rows of light grey dorsal spots or flecks.

Legs without any apical spurs on the hind tibiæ, though there are two spurs on the middle pair. "Touch-hairs" always (?) present beneath the front tarsi, and often also beneath the end portion of the front tibiæ.

Wings hardly maculated in any British species of the (comprehensive) genus *Tabanus* though often blackened or banded in foreign species; in *Hæmatopota* however the wings are rather darkened and bear numerous hyaline spots which tend to form incomplete ocelli. Venation simple, the only variation in British species being that of the recurrent veinlet from the upper branch of the cubital fork.

The females of this subfamily are all blood-suckers, but the males may be found sitting on tree-trunks or posts and rails, while some of them hover in bright sunshine especially in the early morning.

The only fully recognised character for separating the *Tabaninæ* from the *Pangoninæ* lies in the absence of apical spurs to the hind tibiæ.

The *Tabaninæ* are however a very homogeneous subfamily, and possess a "facies" which almost always differentiates them at a glance; it lies in the square build and robust appearance as contrasted with the more elegant or more varied shape of the *Pangoninæ*. The *Tabaninæ* never have the elongate porrect proboscis which so often occurs in the *Pangoninæ*, nor have they the bright coloration of *Chrysops*.

1. HÆMATOPOTA.

Hæmatopota Meigen, Illig. Mag., ii., 267 (1803).

Moderate-sized rather hairy flies of elongate shape and of grey or greyish black colour broken up by lighter grey markings. Wings peculiarly ornamented by curved hyaline markings on a grey ground.

Head (when seen from above) quite three times broader than long, with the back part almost straight except for a slight notch in the middle in the male, and very slightly concave with a slightly concave arch between the eyes in the female; when seen from in front the head is twice as broad as high. Face very broad in both sexes, and descending considerably beneath the eyes so as to form broad but rather flat jowls; immediately beneath the antennæ there is a cross channel which (in the female) rises up at the sides and separates the cheeks from the frons, and from which two linear furrows descend and separate the very broad shelving side-cheeks from the epistoma, and these furrows end in darkened pits near the mouth margin; face broad, side-cheeks and jowls light grey, the upper part of the side-cheeks usually dotted with small black spots, and the face, cheeks, and jowls all bearing long almost erect pale pubescence; frons of the male reduced to a triangle above the antennæ (as the eyes touch or almost touch for a long space) and with a shining usually black middle space, and only slightly protruding, but that of the female occupying fully one-third the width of the head from the vertex to the antennæ and more or less grey with a shining usually black callus right across the lower quarter close to the antennæ, and above that callus with two widely separated rounded dull black spots, and still further upwards with a smaller (often indistinct) dark spot right out on the middle of the grey part of the frons which may be an indication of the otherwise absent ocelli or ocellar space. Proboscis prominent, and with broad sucker-flaps; palpi of the male porrect, with the second joint elongate, ovo-conical, or somewhat pointed, and bearing long soft pubescence, of the female elongate, pointed, and hanging down against the proboscis. Eyes of the male (fig. 221) touching or almost touching for a long space, irregularly ovate, higher than long but often narrowed towards their upper part (when seen sideways), densely hairy, and with the facets enlarged except on about the lower quarter and the hindmargin; in life unicolorous brown or brownish green on the large facets, but on the lower part brown or purple with brilliant green or bluish or black zig-zag bands. Eyes of the female (fig. 223) more circular because the facets are all equal, widely separated and almost bare; in life, brown or vivid green with brownish purple or black zig-zag bands. Antennæ porrect, longer than the head; basal joint long, and in the male considerably dilated and bearing long thin pubescence; second joint short, cup-shaped, and bearing a circlet of short black bristles; third joint elongate, not humped near the base dorsally, and with its basal annulation more or less stout near the base but tapering to its tip, and with the other three annulations about as wide as the tip of the first annulation and appearing to form a stout blunt style; this first annulation of the third joint is as long as or longer than the other three together, and often appears to be divided again into further sections, while the next two annulations are almost transverse and the last one longer than either of the two previous ones; third joint bare (unless microscopically) except for some tiny black bristles which often occur in an incomplete (mainly dorsal) ring near its base.

Thorax slightly longer than broad, black (♂) or greyish black (♀) (in British species) with light grey stripes (sometimes indistinct in the male) which sometimes resolve themselves after the suture into light grey spots. Pubescence fairly long and dense, suberect in the male, but sparse and more depressed and mainly light grey in the female; the pubescence is longer, shaggier, and pale over almost all the pleuræ, but the hypopleuræ are almost bare; no bristles or bristly hairs occur anywhere. Scutellum lying flat on the entirely hidden metanotum, and bearing pubescence similar to that on the disc of the thorax.

Abdomen as narrow as the thorax but much longer, almost parallel-sided and rather flat; dark colored in the British species, and often with grey spots, flecks, or a dorsal stripe, or even (in the male) with ferruginous lateral markings near the base. Genitalia inconspicuous.

Legs simple but strong; front coxæ long; front femora bare beneath but inconspicuously so because the bare part is of the same grey hue as the rest and is not margined with tiny bristles; front and hind tibiæ without any apical spurs, but the middle pair with two spurs; front tibiæ and tarsi with "touch-hairs" beneath in both sexes.

Wings (fig. 222) mottled grey and hyaline, with somewhat band-like hyaline spots or incomplete ocelli, in repose lying roof-like over the abdomen. Venation of the normal type of the *Tabanidae*, but the upper branch of the cubital fork always with a short recurrent veinlet near its base; all the posterior cells wide open. Squamæ moderately large, the alar pair extending about half-way across the thorax when they are against each other; thorax pair outspread and in no way covering the halteres; and both pairs with distinct margins which bear short fringes which are inconspicuous except for the usual Tabanidous tuft of long hairs at the angle.

This genus is easily distinguished by its peculiarly mottled wings, its comparatively simple antennæ, and its comparatively small size, but the species are exceedingly difficult to separate; in my Presidential Address to the Entomological Society in 1900, I said, "It is an exceedingly difficult thing to name a British or European species of *Hæmatopota*, because we meet with them in hundreds, though only in three or four species, but it is easy to name a South-African *Hæmatopota*, because we have so few specimens for examination that almost each specimen can be clearly distinguished from the others. I prophesy that when we have hundreds of specimens of North-African, Mid-African, and South-African *Hæmatopota*, we shall be infinitely less certain about the nomenclature than we are now. It is only by the accumulation and examination of long series of specimens that difficult groups of species can be effectually dealt with."

The metamorphoses are I believe but very little known, which seems to be strange for such very common flies. Brauer once bred up a larva from the body of the larva of *Helops lanipes* (Coleopt.) through whose skin it had evidently bored, and Perris (Ann. Soc. Ent. Fr. (4), x., 196, 1870) described the metamorphoses in detail but still remained uncertain as to its habits.

Hæmatopota is represented by about half a dozen recognised species in Europe and by one or two in North America, while apparently numerous species occur in South Asia and in Africa. The flies are common at a distance from human habitations (especially in the neighborhood of cattle) and the females are most persistent blood-suckers of both man and beast, especially on hot days. The bite of the female may have very different effects upon individuals; to me it is always a seven days' matter, as if I am bitten on a Sunday I feel merely a sharp needle-puncture (which usually causes a squashed fly!), and then I do not feel the slightest further effect until on Monday a very slight irritation can be noticed at the spot of the bite, on Tuesday the spot becomes irritable, and on Wednesday it swells up and becomes troublesome, while on Thursday it reaches its maximum in size and irritability, then on Friday it rapidly diminishes, and is only just sensitive on Saturday, after which no further effects are felt. The males sometimes dance in hot sunshine between eleven and twelve o'clock, in groups of from six to nine

individuals above pine stumps (as seen by Colonel Yerbury at Nairn on July 9, 1904); they alternately rise and fall between five and twelve feet from the ground, and when the sun is obscured rest on the pines; I have never seen this habit, but have commonly found them resting on posts or rails, or towards evening on flowers.

Table of Species.

MALES.

- 1 (2) Third joint of antennæ entirely blackish, no trace of reddish colour being visible.

The blackest species of the genus. Basal joint of antennæ very much swollen and practically all shining black. Wings darkly marmorate. Actual base of front tibiæ distinctly blackish and followed by a rather narrow luteous band.

2 *crassicornis*.

- 2 (1) Third joint of antennæ more or less reddish brown about the base.

Brownish black species. Basal joint of antennæ obviously dulled by dust on the basal portion.

- 3 (4) Tuft of hairs behind the vertex long and black.

Actual hindmargin of wing to a large extent hyaline. Knob of halteres not conspicuously pale on the top.

1 *pluvialis*.

- 4 (3) Tuft of hairs behind the vertex shorter, denser, and all tawny.

Actual hindmargin of wing not at all hyaline. Knob of halteres whitish on the top. Scutellum and base of abdomen with longer much more bushy pubescence than in the other species. Actual base of front tibiæ indistinctly darkened and followed by a broad luteous band.

3 *italica*.

N.B.—*H. Bigoti* ♂ probably resembles *H. italica*, but may have more sharply defined markings, especially on the abdomen, and less washed-out wing-markings.

FEMALES.

- 1 (6) Basal joint of antennæ more or less ovate, and shining on at least the tip.

- 2 (5) Antennæ with the third joint more or less reddish about the base.

Basal joint of antennæ moderately incrassate, and shining at the tip only.

- 3 (4) Femora blackish on the ground colour.

Wings muddily marmorate. Abdominal markings hardly extended to the two basal segments.

1 *pluvialis*.

- 4 (3) Femora luteous on the ground colour.

Abdominal markings extended to even the basal segment.

4 *Bigoti*?

- 5 (2) Antennæ with the third joint entirely blackish.

Wings darkly and clearly marmorate. Femora entirely blackish. Basal joint of antennæ considerably incrassate, and almost wholly shining.

2 *crassicornis*.

- 6 (1) Basal joint of antennæ elongate, not in the least ovate (fig. 225), and wholly dulled even to the extreme tip.

Femora often more or less luteous.

3 *italica*.

I am convinced that there are several undistinguished European species, as I possess two females from Greece which are undoubtedly distinct from any of our species, and I think I also possess three other species from Spain and Portugal.

Our British species are rather difficult to distinguish until well known. It may be almost taken for granted that the first species to be found will be the ubiquitous *H. pluvialis*, though in Scotland I think *H. crassicornis* will be found to be the predominant species, and along the coasts of Essex and Suffolk *H. italica* may supersede both of them. I have taken *H. pluvialis* and *H. crassicornis* in company, and also *H. pluvialis* and *H. italica*, but not *H. crassicornis* and *H. italica*, while Colonel Yerbury is of opinion that at Walton-on-Naze in Essex only *H. italica* and *H. Bigoti* occur.

1. **H. pluvialis** Linné. Third antennal joint partly reddish; basal joint incrassate elongate ovate, shining at the tip. Pubescence behind the vertex wholly black in the male. Wings muddily or yellowish marmorate.

A common biting fly, known in Scotland as "The Kleg"; easily recognised by the mottled wings, which character however it shares with the other species of the genus.

- ♂. Head much broader than the broadest part of the thorax, but not so short as in *H. italica*. Face in profile rounded anteriorly though sloping up rather straight from the antennæ to the vertex, moderately and equally produced from the eyes, whitish grey but with the broad side-cheeks thickly speckled all over with small black spots which crowd together so much on the upper part that they coalesce and form a black patch near the antennæ; the middle part of the face with no black spots; frontal space quite bare, yellowish grey but with all the middle part deep black leaving the elongate triangle which extends up between the eyes covered with the yellowish grey dust, the triangle formed by this grey dust being twice as high as broad; jowls fairly broad, whitish grey and without any black spots except the tiny dots caused by the roots of the hairs; immediately after the jowls the lower quarter of the back of the head is only slightly inflated and is whitish grey, while a very narrow postocular rim runs up the rest of the back of the head, which however bulges out at the top into the ashy grey slightly inflated sides of the vertical space, these sides being separated by a channel and so much so posteriorly that there is a conspicuous fissure at the middle of the occiput. Pubescence on the side-cheeks conspicuous, rather long but only moderately dense, erect and black; on the middle part of the face and above the mouth the pubescence is less conspicuous and is all whitish yellow, while on the jowls and all the rest of the neighborhood of the mouth it is longer, denser, shaggier, and pale yellow, but it does not extend at all up the back of the head, though a shorter yellowish grey pubescence does extend a little up the lower quarter behind an inconspicuous black postocular ciliation; above the lower third of the back of the head this *postocular ciliation* grows longer and more conspicuous until on nearly the upper half of the head it becomes very conspicuously long, black, and rather dense right up to and including the vertical space, though the front part of the vertex may very rarely have a few pale hairs; the absolute back of the head is ashy grey, almost bare, and considerably hollowed out. Palpi porrect, second joint yellow or yellowish, covered with a whitish grey dust, elongate equally ovate, and bearing abundant but not at all dense long pubescence (except on the bare inner side), and this pubescence is mainly yellowish white but to a greater or less extent mostly black about the tip; basal joint darker grey, and also bearing similar pale pubescence. Eyes rather shallow in profile, being almost or quite as long

as deep, clothed with rather dense though not very conspicuous moderately long pale brown pubescence, which appears in some lights to be almost whitish, and this pubescence becoming more sparse on the lower and hinder parts. Eyes in life (fig. 221) brown with a slight greenish tinge on the large facets which occupy the upper two-thirds, then with an obscure narrow dark band all across, and below that with two zig-zag bands which are brilliant green with a faint coppery tinge, and which leave three almost isolated brownish purple spots against the dark middle line, and a narrow brownish purple band between the two green ones which has two deep

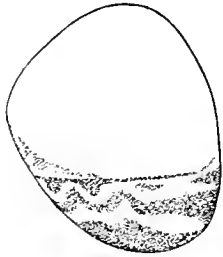


FIG. 221.—*Hematopota pluvialis* ♂.
Left eye in life.

dentations on the front half but becomes wider and not indented on the hind half, while the lower third or more of this colored part is brown and has two moderate dentations on the front half; all the dark bands narrowly unite on the hindmargin; facets large except on the lower (or apparently outer) third and for a short zone extending about halfway up the back part. Antennæ (fig. 213) hardly one and a half times as long as the head; basal joint dilated, elongate ovate, quite twice as long as deep, almost or quite as long as the third joint, shining black but with obvious grey dust about the base extending on the inner side for slightly more than the basal half, and bearing all over long not dense pubescence which may be all black or may be pale on the underside; second joint very short cup-shaped but projected dorsally a considerable distance over the third joint,* black, and bearing a shorter denser black bristly pubescence; third joint annulated, with its basal segment longer than the other three together and usually rather lurid reddish orange, and this segment stoutest about its middle but nearly three times as long as the width of its stoutest part and with a number of short black decumbent dorsal bristles a little before its middle and some more beneath which seem to indicate a circlet around what might be a further subdivision of the segment; the other three segments of the third joint form a dull blackish brown cylinder.

Thorax dull brownish black with three narrow widely separated grey lines commencing quite from the front, of which the middle one is very narrow but extended right through to the scutellum, but the side ones not quite so narrow and interrupted at the suture and often extended for only a short distance after the suture but on the other hand often extended more or less distinctly to the hindmargin, and sometimes forming inconspicuous wider grey spots just after the suture; outside these lines the sides of the disc of the thorax are less distinctly greyish, and the præalar calli are distinctly greyish; postalar calli and their neighborhood greyish or brownish grey; pubescence long and moderately abundant, mainly composed of rather sloping yellowish grey hairs, but with numerous inconspicuous more erect black hairs intermixed. Pleuræ dark ashy grey, with long and shaggy greyish yellow pubescence which is sparse on the lower part and which includes a patch of black hairs on the back part of the mesopleuræ, while the pubescence on the back part of the pleuræ is more yellowish and less grey. Scutellum dark grey, and bearing long almost erect black and greyish yellow hairs intermixed.

Abdomen dull black, with the hindmargins of the segments (after the basal one) ferruginous or grey and the sides of the three basal segments (especially the second and third) brownish red; the normal coloring has greyish hindmargins which tend to widen into triangles at the middle, especially from the fourth segment onwards, and on that fourth segment the traces may begin of a grey dorsal line and a roundish grey spot on each side of the dorsal line rather above the middle of the segment; a similar dorsal line and rounded grey spots become more distinct on the fifth and sixth segments, until on the sixth segment only the sides and two rather large spots remain blackish brown, and the short seventh segment shows mainly a greyish hindmargin; but in darker specimens there may be but little trace of the grey dorsal line or side-spots; the brownish red at the sides about the base seems to be always distinct on the second segment but may be diminished in amount on the first and third segments. Pubescence suberect, long but not

* This is not perceptible from the point of view in Fig. 214.

at all dense, mainly black on the disc but with shorter more sloping pale (usually grey but sometimes ferruginous) hairs on the hindmargins which can rarely be said to form fringes; sidemarginal pubescence long and outstanding and usually all grey or brownish yellow along the actual margin, though sometimes these fringes are more or less black. Belly ashy grey with the sides at the base ranging from being very faintly ferruginous on the second and third segments only to the sides on the three basal segments being all conspicuously and extensively ferruginous; pubescence rather short and sloping on most of the disc but longer about the sides, and longer and more tangled on the two basal segments, by no means sparse, and all pale grey except for the numerous erect but curved bristly black hairs on the disc of the seventh segment. Genitalia dark ferruginous with a two-jointed lamella on each side, of which the basal joint is subquadrate and the second joint half ovate, and these lamellæ extend beyond the lower processes.

Legs dull black and orange; the orange colour forming broad rings just after the base of the front tibiæ, at the middle knees, at two-fifths and four-fifths of the middle tibiæ, on the basal two-thirds of the basal joint of the middle tarsi, and on similar parts of the hind legs only more narrowly at the knees; the middle dark ring on the posterior tibiæ more or less brown and not very sharply defined; all the femora dusted grey; front coxæ long and strong, obscurely greyish ferruginous or greyish black, and bearing long pubescence which is yellowish on the basal half (or more) but black afterwards and shorter on the outside; posterior coxæ short and greyish and bearing rather long mainly yellow pubescence. Pubescence behind the front femora long and mainly dark colored, behind the middle femora nearly all yellow but black about the tip, on the hind femora antero-ventrally long and almost all yellow but denser and shorter all about the tip; front tibiæ with inconspicuous black dorsal ciliation though there are pale hairs on the orange part; front tibiæ with a few "touch-hairs," and the front tarsi with numerous distinct "touch-hairs" beneath and at the sides as well as long dorsal black hairs at the tip of the basal joint and on the other joints; middle tibiæ with numerous scattered long black hairs, and some shorter pale hairs on the pale bands, spurs equal and black; hind tibiæ with a long conspicuous rather dense black antero-dorsal fringe, and with a longer finer but almost equally dense postero-ventral fringe, but with some pale hairs on the pale bands; basal joint of the hind tarsi with inconspicuous black pubescence. Pulvilli brownish grey; claws black.

Wings (fig. 222) marmorated with hyaline spots or incomplete ocelli on a muddy greyish or slightly yellowish ground colour, and these hyaline markings (though varying) have a distinctive character whereby the species can almost

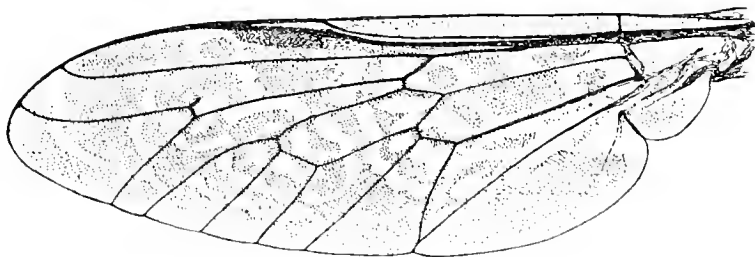


FIG. 222.—*Hematopota pluvialis* ♀. × 8.

always be identified. A usually easy distinctive character for separating this species from *H. crassicornis* lies in the discal cell, as in *H. pluvialis* that cell includes two incomplete hyaline ocelli which are well separated by the dark middle part of the cell, while in *H. crassicornis* those two ocelli are less defined and meet in the middle of the cell so that they usually form a white Y-shaped hyaline marking but this character must like all the wing-colour characters be used with a wide allowance for variation; the first posterior cell has scarcely any regularly defined hyaline marking on its basal half; the lower veinlet ending the discal cell is usually margined hyaline; there is only one incomplete hyaline band just before the tip of the wing, and this is continued as a hyaline margin all along the posterior margin of the wing

(this character is more complete in *H. pluvialis* than in the others, while it is completely absent in *H. italica* and *H. Bigoti* ?), and there is usually a vague indication of a moderately large ocellus beginning just after the middle of the discal cell and continuing vaguely in the fourth posterior cell and then turning up just outside the discal cell and interruptedly returning along the lower part of the first posterior cell to its starting-point, or a larger incomplete ocellus can be traced outside this one; altogether the hyaline markings are of a less large and bold character than in *H. crassicornis*. Squamæ rather large, greyish brown with a dark brown margin to the alar pair and a brown margin to the thoracal pair, while both pairs have a short inconspicuous grey fringe which develops into a not very conspicuous longer light grey tuft on the alar pair near the angle; alar pair extending about half-way across the thoracal pair when the wings are partially raised. Halteres with a brown or dark brown knob on a dull pale yellow stem.

- ♀. In general resembling the male. Frons occupying fully one-third the width of the head and very slightly widening from the occiput to the antennæ, yellowish grey with a large shining black callus right across the lower quarter down to the furrow which separates the frons from the cheeks, and in profile this black callus is raised; there are also two large roundish dull velvety black spots a little above the shining black callus which are separated from each other by more than their own diameter but by less than half their diameter from the eyes (sometimes touching them) and from the black callus; still higher up right on the middle of the grey part of the frons is a small black spot or dot which may be the only trace of a vertical space or of ocelli; the shining black callus loops up a little about its middle and rounds off a little at the upper angles near the eyes and extends downwards between the antennæ, but the upper rims of the antennal pits are greyish orange; the black parts of the frons are bare, but the grey part bears moderate rather inconspicuous sloping pubescence (shorter than in the other two species) which (when viewed sideways) appears mostly pale and rather conspicuously so just above and below the dull black spots, but is to a large extent black on all the middle part. Face yellowish ashy grey or pale grey, widening out rapidly under the eyes, and the cheeks and jowls of almost equal width almost as far as the back of the eyes, though the jowl part retreats rather flatly and is almost half as wide as the depth of the eyes; the front (or upper) half of the side-cheeks dotted with black spots which hardly crowd together or coalesce; epistoma pale greyish but with a small black spot on each side close to the cheeks in addition to the black pit on each side lower down. Face, cheeks, jowls, etc., all clothed with abundant rather long yellowish white pubescence, and that on the jowls mixing with the longer but similar pubescence on the prothorax; back of the head yellowish grey on a distinct though narrow postocular margin, and with a short dense rather brownish yellow ciliation (just behind the bare eye-rim) which does not become any longer on the upper part and which becomes inconspicuous and sparse behind the vertex; actual back of the head dark ashy grey and hollowed out. Palpi apparently orange but obscured by dense whitish dust and sometimes with a slight blackish hue outside about the middle of the second joint, while the blackish hue is more pronounced under the white dust of the basal joint; palpi porrect, second joint usually not at all, but sometimes distinctly, drooping, bearing outside some small black bristles on the apical two-thirds, and with longer pale hairs above and below and about the base, but with all the inside bare; basal joint bearing rather long pale pubescence. Eyes (when seen sideways) almost as long as deep, rather flattened below; pubescence short, sparse, and inconspicuous; in life (fig. 223) brilliant green on the two middle green bands, more brownish tinged on the upper one and reddish on

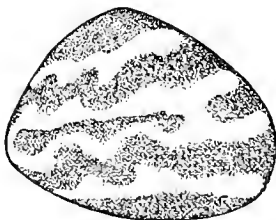


FIG. 223.—*Hematopota pluvialis* ♀.
Left eye in life.

the lower one, with five brownish purple bands, of which the uppermost and lowermost occupy the top and the bottom margins, while the second and fourth are zig-zagged all across with two deep dentations inwards about the middle (or rather more towards the front); the middle dark band isolated, starting from

behind the middle of the eye with a smallish rounded spot and then contracting to a line, and subsequently with two dentations (especially downwards), but ending in a point almost at the eyemargin level with the lower part of the large lower frontal callus; hindmargin of the eye all brownish purple and narrowly uniting all the bands except the middle one, and with a projection at the middle towards this middle band; the second and fourth brownish purple bands converge narrowly on the front margin almost to each other; this description (made from a female taken at Barton Mills in Suffolk) does not exactly agree with fig. 223, more especially in the shape of the isolated middle band, and I find that the eyes vary somewhat in these markings, the lower purple band sometimes enclosing the fourth almost simple light band (not indented so much as in fig. 223), while the middle purple band may be entire from front to back. Antennæ about one and a half times as long as the head; two basal joints black, but mainly covered with grey dust which leaves only almost the end half of the basal joint shining black on the upper side and rather more at the sides; basal joint rather dilated for a considerable length about the middle (but not obviously ovate) and quite two and a half times as long as its broadest part, bearing small black bristles all over and with some thin pale hairs beneath on the basal half; second joint short cup-shaped, extending on the upper side cap-like over the third joint, and bearing black bristles similar to those on the basal joint; third joint much longer than the basal joint, obscurely brownish red on the basal half of its first segment (=all except the three terminal segments), but otherwise dull brownish black, and this first segment (apparently composed of two segments, because of the annulated constriction at about a quarter from the base is more than three times as long as broad, thickest at about a third from its base but thinner at its base and end than all about its middle, and with several short black bristles above and a few beneath at the end of the constriction near its base; the three terminal annulations about as thick as the end of the basal segment and hardly tapering, the first two being subquadrate and the terminal one the longest.

Thorax greyish black (not dull black as in the male) with five yellowish grey or grey lines which all begin quite in front, and of which the middle one is narrow and entire while the next pair are rather interrupted at the suture but are continued (more or less indistinctly about midway) to the hindmargin; the lateral stripes are broad and rather vague and divide indistinctly just after the suture but reunite later on so as to enclose a greyish black island spot; along the hindmargin the grey stripes are more or less connected. Pubescence pale greyish yellow, short, rather depressed and rather sparse all over, though several longer erect black hairs occur on the præalar calli and also a few above the wing-base; pleuræ ashy grey, bearing all over long rather silky greyish white pubescence. Scutellum all dark brownish grey, bearing only moderate pale pubescence.

Abdomen in a well-marked specimen greyish brown-black but ashy grey on a moderately broad dorsal line, on all the hind and side margins, and on a pair of moderately large rounded spots on each segment (after the basal one) in the middle of the brownish black space, and sometimes whitish ashy grey on the sides, but on the fifth to seventh segments these ashy grey markings tend to coalesce and towards the tip occupy nearly the whole of the segments. When viewed from behind the dark markings appear to form blackish brown circles on the second to fourth segments, of which the inner arc is broad and the upper arc on the third and fourth segments is partly hidden under the hindmargin of the preceding segment, while on the fifth and sixth segments the brown markings are fairly well defined, and when viewed from behind the grey markings appear pale ashy grey with a slight yellowish tinge. In other specimens the grey markings may be more extensive and less defined, though at the same time the pair of spots on the second segment may be small; the fifth to seventh segments often have inconspicuous ferruginous sides. Pubescence short depressed and more extensively greyish yellow than in the other species, but more or less blackish on the dark brown ground colour, and longer and less depressed down the sidemargins, while it is black on the sidemargins of the fifth to seventh segments except at the hind corners. Belly darker yellowish ashy grey or whitish grey with a broad slightly darker

middle part; pubescence sloping, not dense, and pale except for some erect black hairs under the seventh segment and to a small extent (though less erect) on the sixth segment.

Legs colored as in the male. Pubescence very much less; front coxæ with long fine pale pubescence which becomes usually but sometimes only slightly bristly and black at the tip; front femora with moderate pale pubescence beneath which grows black behind towards the tip; posterior femora with slight pale pubescence beneath which becomes crowded, bristly, and black about the tip; posterior tibiæ with black pubescence which is rather long dorsally on the middle dark ring; "touch-hairs" on the front tarsi and tip of tibiæ as in the male.

Wings slightly less dark, but with similar hyaline markings. Squamæ and halteres as in the male, but the knob of the halteres usually more whitish on the top.

Length about 9 mm., but varying from 7 mm. to 10.5 mm.

This species is very closely allied to the others, but may be distinguished from *H. crassicornis* by its more muddily colored wings, by its less incrassate basal joint of the antennæ in both sexes (though this joint may be as incrassate in the male of *H. pluvialis* as in the female of *H. crassicornis*) which is distinctly dusted with light grey about its base, by its longer antennæ, by the more separated pale ocelli in the discal cell, by the ferruginous markings about the sides of the abdomen in the male, and by its less blackish hue in general; *H. italica* has the antennæ of the female still longer, the basal joint being unusually long and not at all incrassate and all covered with light grey dust, while it is a more elongate species with more washed-out marmoration of the wings, more ferruginous femora, and in the male with pale tawny pubescence behind the vertex. *H. Bigoti?* is not yet well distinguished, but has the femora of the female luteous and the abdominal markings far more defined even on the basal segment. There may be other insufficiently distinguished European species, but much more critical study is necessary. *H. pluvialis* varies a little in size, and in intensity of markings on the thorax, abdomen, and legs.

H. pluvialis is far too common all over the British Isles, as the bite of the female is very annoying and, to many people, very painful and persistent; I have mentioned under the generic notes that the effects of the bite last with me just a week. There are numerous records from Ivybridge in Devonshire to Inchnadamph in Sutherland and to Orkney, and even to St Kilda, while Colonel Yerbury has taken it in many Irish localities; my dates extend from May 28 to September 16. Unless it has been confused with its allies it occurs over all Europe and North Africa and has been recorded from North America (possibly in mistake for *H. crassicornis*) and from South America, but without a more critical knowledge of the species this latter and several of the European records require confirmation as I am inclined to believe that there are numerous closely allied undistinguished species; even of the six representatives of the male of *H. pluvialis* in Kowarz's collection four are smaller and have the head less wide than the other two. In Scotland the flies are commonly called Clegs or Klegs, and Curtis says they are called Stouts in Dorsetshire.

Synonymy.—I have little to note about this except to say that it is only in recent years that some of the allied species have been satisfactorily distinguished; there can however be no doubt about Meigen's interpretation of the species in 1805. Duncan

in 1837 considered that he could only distinguish one British species, but his description shows that he (in company with Mr J. C. Dale) found *H. crassicornis* at Rannoch in July 1825; he stated that his Rannoch specimens belonged to Curtis' *H. hirsuta*, but Curtis himself subsequently declared that his *H. hirsuta* was only the male of *H. pluvialis*.

2. *H. crassicornis* Wahlberg. Third antennal joint wholly black; basal joint in both sexes ovate incrassate, mainly shining. Pubescence behind the vertex mainly tawny in the male. Femora of the female always blackish. Wings darkly marmorate.

Very similar to the other species, but a more blackish fly with more darkly marbled wings and with the basal joint of the antennæ more dilated in the female and less dusted about its base.

♂. Head when seen from in front flatter than in the other species because the eyes diverge at a wider angle, and when seen from above proportionately narrower and not so short as in *H. italica*, and when seen in profile more evenly rounded above the antennæ. Face with the black spots on the side-cheeks coalescing into a larger blotch near the antennæ; postocular ciliation long and black on the upper part but forming between the eyes at the vertex a small tuft of still longer hairs which may be entirely composed of tawny hairs (though not so conspicuously pale tawny as in *H. italica*) or may have a few or even many black hairs intermixed (but never forming so conspicuous or so exclusively a black tuft as in *H. pluvialis*); the slightly puffed-out sides of the vertical triangle blackish grey; upper part of the frontal triangle almost equilateral, and the dust there and at the sides of the frons more whitish grey than in the other species; palpi with a more blackish tinge than in *H. pluvialis* and with more black pubescence. Eyes with their lower margin diverging more widely in front so as to make the head appear flatter, and when viewed in profile more deepened and rounded below or less produced to the antennæ so that they appear to be a little deeper than long; pubescence slightly darker, but much shorter than in *H. italica*; facets on the upper part less enlarged than in *H. pluvialis* and *H. italica*; in life iridescent brownish green on the upper half (rather less on the back part) but on the lower half darker green with three brilliant bands, of which the largest and most conspicuous is reddish on a vivid green ground colour and is irregularly wavy all across near the middle of the eye, there being a deep wave upwards near the antennal end of the band and a projection upwards after its middle; the lower band is straighter, all green, and just below the large band, but extending only for about half as far and not extended at all towards the back part of the eye; the upper band is only represented by a greenish spot on the hindmargin of the eye just above the middle. Antennæ barely one and a quarter times as long as the head; basal joint more dilated than in *H. pluvialis*, being only one and a half times as long as deep, shorter than the third joint, and bearing no grey dust about the base except a very inconspicuous amount on the inside; second joint slightly longer than in *H. pluvialis*, but not produced dorsally over the third joint; third joint with its basal segment thinner, being more equal in stoutness all along, and with very few tiny depressed black dorsal bristles before its middle, and not at all reddish; the other cylindrical segments of the third joint are nearer the same stoutness as the end of the basal segment and are more continuous with it than in *H. pluvialis* and *H. italica*.

Thorax deep dull black, with two widely separated conspicuously whitish grey stripes which are well interrupted at the suture and which form just after the suture only rather conspicuous wider whitish grey spots, but there is sometimes a faint narrow middle line; a grey spot also occurs just above each wing-base, and the postalar calli are occasionally dark chestnut; pubescence almost erect, brownish grey, and with very few black hairs intermixed except

about the sides and abundantly on the dark grey præalar calli. Pleuræ with abundant shaggy yellowish grey pubescence and a large dense tuft of black hairs on the mesopleuræ. Scutellum dull black, very slightly grey about the sides; pubescence almost as on the disc of the thorax but with a very few black hairs intermixed.

Abdomen deep dull black with the hindmargins (after the basal one) conspicuously pale grey, and the fourth to sixth segments each bearing a pair of conspicuous round pale grey (almost whitish) spots above the middle (or even close to the foremargin on the fifth and sixth segments); there is neither a dorsal grey line, nor any ferruginous markings about the sides near the base. Pubescence on the disc suberect long and mainly black, though pale hairs are sometimes intermixed on the middle of the basal segment, near the foremargin of the third segment, about the grey spots on the fourth and fifth segments, and near the sides of the fore and hind margins of the fifth segment, and also extensively on the sides of the hindmargin of the sixth segment, but none of these pale hairs are conspicuous; sidemarginal pubescence long (when seen sideways) brownish yellow and rather conspicuous and extending a little along the hindmargins of the fourth, fifth, and sixth segments, though numerous black hairs occur very near the sidemargins of the third segment. Belly grey, with rather abundant rather sloping greyish yellow pubescence, but with several black hairs on the disc of the sixth segment, while all the disc of the seventh segment bears erect curved bristly black hairs; pubescence on the two basal segments and partly on the third longer and more shaggy than on the rest.

Legs colored black and orange very similarly to *H. pluvialis*, but the dark parts are blacker and the orange rings considerably narrower, while the knees are hardly at all orange; front coxæ greyish black, with long pale pubescence on the basal half but with black pubescence on the anterior apical half; front tibiæ black with a comparatively narrow conspicuous orange ring near the base. Pubescence behind the front femora longer and blacker, and there is a slight fringe behind the basal half of the front tibiæ; pulvilli pale greyish brown.

Wings (fig. 224) more darkly and boldly marmorated than in *H. pluvialis*,

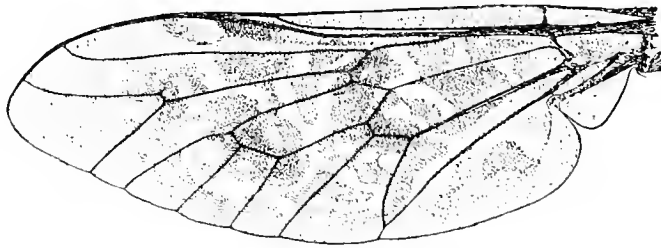


FIG. 224.—*Hematopota crassicornis* ♀. × 8.

the ground colour having no trace of muddiness or yellowish tinge, while the hyaline markings form a larger and bolder pattern; the two incomplete hyaline ocelli in the discal cell usually meet in the middle of the cell and form there a Y- or V-shaped marking, though sometimes they do not meet but still are not so widely separated as in *H. pluvialis*; the first posterior cell has more clearly defined hyaline markings above the discal cell, while the fourth and fifth posterior cells have more or less V-shaped hyaline markings; the lower veinlet ending the discal cell is usually margined dark; there are usually two incomplete hyaline bands before the tip of the wing of which the outer one is very imperfectly continued round the posterior margin of the wing, and there is usually a vague indication of a large ocellus beginning with the hyaline middle of the discal cell and passing down along the middle of the fourth posterior cell and then turning upwards through the third, second, and first posterior cells and back along the top of the first posterior cell to the starting point. Squamæ darker greyish brown than in *H. pluvialis* and with brown margins, or even blackish grey with almost black margins even on the thoracal pair. Halteres as in *H. pluvialis*.

♀. Distinguished from *II. pluvialis* by the darkly marmorated wings, wholly black antennæ, and the smaller amount of grey dust on the basal part of the more ovate basal joint of the antennæ. Frons slightly widening from the vertex to the antennæ, more blackish grey than in the other species, with the shining black callus hardly looped up about the middle, and the dull black spots very close to the eyes; upper rim of antennal pits greyish yellow; frons bearing conspicuous rather long sloping pubescence, which is pale about the sides and becomes conspicuously whitish above and below the dull black spots but is extensively black on all the middle part and pale again against the occiput. Face whitish grey with the black spots confined to the inner upper quarter and crowded and rather (or extensively) confluent there; back of the head pale ashy grey, with a dense longer more yellowish or whitish grey postocular ciliation which becomes slightly longer still towards the top angles of the eyes and which extends rather more down the back of the head. Palpi yellowish, covered with dense whitish dust, and with a slight blackish hue which is more obvious on the basal joint; on the apical half of the outside of the second joint there are a few inconspicuous black bristles but the joint is mainly clothed with abundant rather conspicuous *longer* whitish pubescence. Eyes (when seen sideways) rather longer than deep, and bearing rather dense short pale brownish pubescence. Antennæ one and a quarter times as long as the head, all black without any reddish brown coloring; basal joint incrassate ovate, rather more or less than twice as long as broad, much shorter than the third joint, mainly shining black but dulled on more than the basal half, by blackish or dark grey dust above and inside, and bearing more numerous longer black bristles than in *II. pluvialis* but with more whitish hairs beneath on the basal half; second joint dullish black, almost as in *II. pluvialis* but not extended cap-like over the third joint; third joint more equal in shape from base to tip, longer than the basal joint, and with its basal constriction less obvious (unless closer to the base) and with no small black bristles there.

Thorax dull black with a very slight greyish tinge, and with three conspicuous narrow whitish grey dorsal stripes of which the middle one is the narrowest and is extended almost to the hindmargin; the next pair of dorsal stripes are conspicuous down to the suture and then after a distinct interruption are continued on as rather conspicuous short whitish grey spots just after the suture and as very faint spots near the hindmargin; the lateral stripes which are evident in *II. pluvialis* are only faintly indicated in *H. crassicornis* but are continued over the postalar calli almost to the outer dorsal stripes; pubescence sloping and not very short, whitish grey and moderately equal all over but not at all dense, in fact almost sparse, the erect black hairs on the præalar calli conspicuously long and erect, while similar but shorter black hairs occur above the wing-base and on the postalar calli; pleuræ and their pubescence almost as in *II. pluvialis* but both of a more whitish tint, and there is often a large patch of black hairs near the back part of the mesopleuræ. Scutellum almost of the blackish tint of the thorax, but greyish about the middle of the disc, and with longer more erect and more whitish grey pubescence.

Abdomen deep black with a slight greyish tinge which becomes more evident on and after the fourth segment; sides of the two basal segments rather conspicuously pale ashy grey, and sometimes traces of ashy grey occur on the sides of the third and fourth segments; fourth and fifth segments with a faint narrow ashy grey dorsal line and a pair of more or less conspicuous ashy grey spots against their foremargins, and the third and sixth segments often with traces of similar spots; sidemargins of the sixth segment and hindmargin of the seventh segment rather ferruginous; sometimes the pale ashy grey markings of the abdomen are more extensive, so that the sides of the third and fourth segments are widely grey as well as most of the fifth to seventh segments, while the round spots may be larger and a small pair may occur on the second segment, and those on the third to sixth segments may be fairly large, while the seventh segment may be entirely grey and the sixth almost so; there may also be traces of a grey dorsal line on the third and sixth segments as well as on the fourth and fifth; the hindmargins of the second to sixth segments

are whitish grey but vary in narrowness and sharpness of definition, being most sharply and conspicuously defined when the abdomen is mainly dark brown black. Pubescence short depressed and black on the disc, but the fringes on the sides of the hindmargins pale (distinctly so on only the three basal segments), and all the pubescence widely on the sides of the two basal segments longer more erect and conspicuously whitish, while this whitish pubescence extends (though shorter and more sloping) down the sidemargins of the third and fourth segments except that sometimes parts of the sidemargins of the fourth to sixth segments have black hairs; on the other hand sometimes all the marginal pubescence is whitish, or the hindmargins of the sixth and seventh segments may bear inconspicuous brownish orange pubescence. Belly dusted pale ashy grey (when seen from the base) on a blackish ground colour, but more blackish on the last three segments and with no dark middle stripe; pubescence moderately long and abundant, sometimes all whitish except beneath the seventh segment, but more commonly black on the disc of the last three segments, though sometimes yellowish on the third and fourth segments, and sometimes brownish orange about the sides and hindmargins of the last three segments.

Legs colored as in the male but less pubescent, shorter and thicker (especially the hind tibiæ) than in *H. pluvialis*. Pubescence more extensive than in *H. pluvialis*; front coxæ with long white pubescence quite to the tip; front femora with a fair amount of pale pubescence on the basal half, which grows to black behind the apical half; pubescence more abundant than in *H. pluvialis* on the posterior femora and pale with only a few black bristly hairs at just the tip; "touch-hairs" on front legs shorter than in *H. pluvialis*.

Wings, squamæ, and halteres very similar to those of the male, but the wings slightly lighter colored; knob of the halteres light brown (but by no means whitish) on the top.

Length about 9 mm. Austen says 8-11 mm.

This species is very closely allied to the others, but may be distinguished by its more darkly marmorated wings, shorter antennæ of which the basal joint is more incrassate and more extensively shining black and the third joint entirely dull black, by the absence of ferruginous markings at the sides of the abdomen in the male, by the less separated light ocelli in the discal cell, by paler pubescence immediately behind the vertex in the male, and by its generally blacker hue. It varies in the distinctness of the light grey markings on the thorax and abdomen, but not in such a manner as to confuse it with its allies.

H. crassicornis was common at Rannoch in June 1870, and had obviously been taken there in July 1825 by Messrs Duncan and J. C. Dale. I have other records from Hampshire (New Forest), Sussex (Blackboys), Kent (Abbey Wood), Surrey (Camberwell), Cambridgeshire (Wicken and Wisbech), Suffolk (*t. C. Morley*), Norfolk (Brandon and Hunstanton), Herefordshire (Tarrington), Cumberland (Buttermere), Glamorgan (Porthcawl), Bute (Arran), Perth (Aberfoyle), Inverness (Nethy Bridge), Sutherland (Inchnadamph), and Co. Cork (Glengariff). It therefore probably occurs almost anywhere but no doubt has been mistaken for *H. pluvialis*, and I know that both species may occur in the same districts as I have met with both in the New Forest (near which also *H. italica* has occurred), in the Isle of Arran, and at Inchnadamph. My records extend from June 5 to August 14, and I believe the males appear before the females, as Colonel Yerbury caught some males at Porthcawl as early as June 5 and Mr C. J. Wainwright took three males at Brockenhurst on June 12, while my earliest dates for females are usually in July, though I caught one in Arran on June 15. Austen ("British Blood-Sucking Flies") extends its distribution to South Devon, Banffshire, and Co. Galway, and also records a specimen taken as

early as May 24. It was first described by Wahlberg from Scandinavia and has since been found (though rarely) in Central Europe, but has not been well recognised; I saw some strange forms of French *Hæmatopota* in the Museum at the Jardin des Plantes, but none answering to our *H. crassicornis*.

Synonymy.—Duncan obviously took this species at Rannoch in July 1825, and said it was the same as Curtis *H. hirsuta*, though Curtis himself stated in 1834 that his *H. hirsuta* was only the male of *H. pluvialis*; under any circumstances *H. hirsuta* is only a “*nomen nudum*.” The characters by which Osten Sacken distinguished the North American *H. americana* seem to exactly agree with *H. crassicornis*.

3. *H. italica* Meigen. Third antennal joint partly reddish; basal joint elongate and entirely dull in the female. Wings rather washed out marmorate. Pubescence behind the vertex wholly tawny in the male. Femora of the female often obscurely ochreous.

Closely allied to the other species, but easily distinguished in the female by the elongate entirely dull basal joint of the antennæ.

♂. Head in profile more evenly rounded anteriorly than in the other species, being less produced upwards towards the vertex; checks, jowls, and postocular rim whitish grey, except for the usual black spots on the side-cheeks; postocular ciliation long and black on the upper third of the eyes and standing out conspicuously, but *between the eyes* on the slightly puffed-out vertical space *the pubescence is* soft and thin and rather dense and forms a rather conspicuous *pale tawny* tuft; the puffed-out vertical space is slightly larger than in the other species and is whitish ashy grey with a conspicuously more yellow tinge when seen from above. Palpi dull pale orange in one specimen but in another specimen with a blackish tinge, and bearing rather long but not dense pale orange and black hairs. Eyes in profile nearly as long as deep, rounded below, and bearing dense pale grey pubescence which has a slight brownish tinge on the front part, and which is distinctly longer than in *H. pluvialis* or *H. crassicornis*; facets on the upper two-thirds considerably enlarged, and the rather distinct dividing line sloping downward from the front part of the eye but curving up again towards the hindmargin and leaving a less defined zone of small facets which dies out soon after the middle of the hindmargin. Antennæ longer than the head; basal joint not quite twice as long as stout, shining black but with whitish grey dust on the dorsal basal half (much more conspicuous than in *H. crassicornis* but less so than in *H. pluvialis*) and on the inner underside almost up to the tip, and bearing conspicuous long pale brownish yellow hairs (much more dense than in the other species) intermingled with which (especially near the tip) are a few inconspicuous black hairs; second joint very short and with the usual circlet of short black bristles; third joint with its basal segment brownish orange but apparently divided into a short and a long articulation, and with a few tiny black bristles about the end of the basal annulation; this entire basal segment of the third antennal joint is only a little swollen about its middle and is longer than the other segments together, and these other segments are narrower and form a thick dull blackish brown style; third antennal joint (including all its segments or annulations) very little longer than the basal joint.

Thorax dull dark greyish brown or almost black with three light grey stripes, of which the middle one is very narrow but extends from the front almost back to the hindmargin, but the side ones are interrupted at the suture and only reappear as wider somewhat triangular rather conspicuous

light grey spots just after the suture ; præalar calli and vague lateral stripes after the suture broadly but indefinitely dark ashy grey ; postalar calli ashy grey towards the hindmargin, and this colour extending along the outer thirds of the hindmargin and widening a little up on to the disc at the inner ends ; pubescence fairly long and abundant and composed of thin pale grey or pale brownish grey hairs, except for a few black hairs on the præalar calli and about the sides after the suture. Pleuræ covered with pale ashy grey dust and bearing abundant shaggy pale greyish yellow pubescence and a tawny tuft on the metapleuræ, with a fairly conspicuous tuft of long black hairs on the middle of the mesopleuræ. Scutellum greyish brown, with soft silky pale grey pubescence and with scarcely any admixture of black hairs.

Abdomen dull brownish black with the sides of the three basal segments slightly or indistinctly ferruginous ; hindmargins of all the segments pale grey and running up into shallow triangles at the middle ; when viewed from behind there is a grey dorsal line which is conspicuous and fairly broad on the sixth and fifth segments and is obvious (though not quite extended to the foremargin) on the fourth segment, and faint traces of this dorsal line exist on the third or even on the second segment ; grey side-spots also exist which are large on the sixth segment and which are almost connected with the grey dorsal line and the grey hindmargin of the fifth segment, but on the fifth segment the similar side-spots though large and roundish are separated from the dorsal line and do not quite reach the foremargin ; on the fourth segment there are similar grey spots, but on the third segment they may be smaller ; the sidemargins of the third to sixth (and vaguely second) segments are greyish and when viewed quite from behind are so broadly grey as to widely touch the grey spots on the fourth, fifth, and sixth segments. Pubescence rather long and almost erect, mainly black, but brownish yellow on the sides of the basal segment and at the hind corners of the other segments (when seen from above), while on the disc the pale hairs may be almost limited to the pale grey hindmargins (especially on the widened middle triangles) but the pale hairs may be scattered about on the disc and become more numerous towards the tip, and when viewed sideways the sidemargins are seen to bear a long yellow or brownish yellow dependent pubescence which becomes extra distinct on the yellowish hind corners of the fourth, fifth, and sixth segments ; when viewed from behind the pubescence on the basal segments of the abdomen and on the scutellum appears longer and more bushy than in *H. pluvialis* and *H. crassicornis*. Belly uniformly ashy grey except on the narrow yellow hindmargins and bearing sparse greyish white pubescence which though mainly depressed is longer and more erect on the two basal segments, while a few black hairs occur on the disc of the sixth segment and several on the seventh segment. Genitalia greyish brown ; basal joint of the lateral lamellæ about as long as the subquadrate second joint.

Legs (especially the tibiæ) rather more slender than in the other species, greyish black with luteous annulations ; front coxæ covered with very pale ashy grey dust and bearing abundant long silky whitish yellow pubescence, and the other coxæ clothed similarly but less obviously ; front femora obscured by grey dust and bearing long abundant pale fine-haired pubescence behind but the pubescence behind the apical half black, and all the pubescence on the underside whitish except at the tip ; posterior femora similarly clothed but the less conspicuous pubescence black at only just the tip ; front tibiæ with the base indistinctly darkened (less so than in *H. pluvialis* and much less than in *H. crassicornis*), followed by a broader luteous ring so that the next darkening does not begin until just before or even just after the middle and even then not so much blackened as in *H. crassicornis* ; middle tibiæ also mainly luteous but with a blackish brown ring on the basal (not at the absolute base), middle, and apical fifths, or they may have only a faint narrow dark ring near the base, an indistinct dark band on the middle sixth, and the apical eighth black ; hind tibiæ with similar markings to those on the middle tibiæ but either with the middle dark band longer and more distinct, or with a narrow basal band, an indistinctly brownish band on the middle fifth, and the apical eighth blackish ; front tarsi black, but the posterior tarsi brownish black after the luteous base ; "touch-hairs" rather

numerous beneath the front tarsi; spurs blackish. Pubescence on the front tibiæ forming rather long but not conspicuous black ciliations above and behind on the basal two-thirds; on the middle tibiæ long not dense mainly pale haired ciliations above and behind, and a shorter black ciliation beneath on the middle quarter; on the hind tibiæ the usual dense black antero-dorsal fringe and a long dense softer postero-ventral ciliation, and on the pale bands some pale hairs in both these fringes.

Wings more like those of *H. pluvialis* than of *H. crassicornis* but with the dark coloring more washed out, and without the muddy yellowish tinge of *H. pluvialis* or the dark marbling of *H. crassicornis*, and the hyaline markings may be broader and perhaps less defined than in either of those two, and there is no trace of any hyaline markings along the absolute hindmargin of the wing. Squamæ paler glassy yellowish brown and with yellower margins. Halteres whitish, with the basal half of the knob blackish on the upper and under sides.

- ♀. Very much like the male. Frons yellowish grey or sometimes blackish grey, quite one-third the width of the flattened head, and almost parallel-sided; the shining black callus hardly looped on the upper margin; the dull black spots rather rounded, and the middle spot sometimes more distinct than usual; pubescence on the frons longer, denser, stronger, more erect, and blacker than in *H. pluvialis*, though there may be some short pale inconspicuous pubescence in very perfect specimens and there is some longer but comparatively inconspicuous pale pubescence just below the dull black spots. Face whitish grey, with the black dots on the upper part of the side-cheeks small and not at all crowded; epistoma whitish, but with the usual four small black spots; pubescence of the face, side-cheeks, jowls, etc., white or yellowish white; postocular ring greyish yellow or greyish white with a short dense rather brownish yellow ciliation behind and sometimes on the upper third an anterior sparse row of slightly longer black bristly hairs; this brownish yellow ciliation grows slightly longer near the upper eye-angles, but is sparse behind the vertex, and there are a few longer curved thin black hairs on the back part of the vertex between the eyes. Palpi dull greyish yellow, bearing numerous but not at all crowded black bristles on the outside of the second joint almost to the base, with a few short pale ones intermixed on the basal half and some long thin whitish pubescence beneath near the base. Eyes longer than deep, flatter above than below, and bearing short inconspicuous pubescence; in life the eyes are plain brown with black zig-zag bands, the two lower bands being similar to those of *H. pluvialis* and the interrupted middle band rather similar but the round middle spot larger and connected by a very narrow line to a much smaller spot, though the third spot is almost as large, the second band from the top is thinner and more sharply angled the angle which is dipped towards the connecting part of the middle line being very deep, and on the hindmargin this band is more connected with the top one, and the top band with one sharp angle extending into the gap in the dip of the next band; it must be noted that this comparison with the eye of *H. pluvialis* is only that of one individual specimen against another and therefore may not always hold good; in another specimen the eyes—reversing the bands—were noted as rich chocolate brown with four green zig-zag bands, of which the top one had one deep dentation near the frons and a smaller one still nearer, while the second band had loops to allow for the dentations of the upper band and was connected with the third band, and the third band had two upward dentations towards the loops in the second band, while the fourth band was only undulated. Antennæ (fig. 225) one and a half times to more commonly twice as long as the head; basal joint usually only a little shorter than the third joint, about four (sometimes only two and a half) times as long as broad, and not in the slightest degree ovate though rather compressed about the base, and usually with a constricted ring near the tip; this basal joint is entirely dulled even to the absolute tip with light grey dust, and bears the usual black dorsal and lateral bristly hairs but

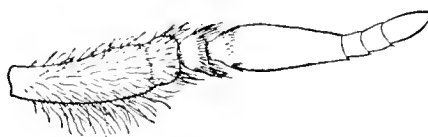


FIG. 225.—*Hamatopota italica* ♀. × 10.

has abundant longer whitish pubescence beneath for the whole length; second joint covered with similar dull light grey dust and with a fairly conspicuous circlet of black bristles round the tip, which is very slightly produced dorsally over the third joint; third joint apparently beginning with a very short bare brownish orange basal segment,* followed by a rather longer more greyish black or blackish orange segment upon which some short black bristles form an irregular or incomplete terminal circlet, and after this by a long segment which begins wider than the previous segment and is obviously though sometimes inconspicuously brownish orange on its basal quarter but dark greyish brown on the rest and gradually tapering up to the blackish brown three terminal segments, and these terminal segments form a style which is as thick as the end of the previous segment and as long as that segment after the circlet of tiny black bristles.

Thorax dull black (blackier than in *H. pluvialis*) with three narrow light grey stripes from the front part to the suture, of which the middle one is continued almost to the hindmargin but the side ones are interrupted at the suture and continued after that by much wider though short conspicuous whitish grey or almost whitish spots (more conspicuous than in *H. pluvialis*) and then continued onwards more faintly to the hindmargin, though widening out again and becoming rather more conspicuous close to the hindmargin; humeri and sidemargins rather broadly (especially on the præalar calli) obscurely grey, and this colour curves round to the lowest end of the postalar calli, while another obscure broad grey stripe near each side extends from the suture to the inner end of the postalar callus; pubescence almost like that of *H. pluvialis* but with some erect or suberect inconspicuous black hairs almost all over the disc. Pleuræ pale ashy grey, or even whiter than in *H. pluvialis*. Scutellum dark ashy grey, considerably darker than in *H. pluvialis*.

Abdomen dark brownish black, with a fairly broad not very sharply defined yellowish grey or brownish yellow dorsal line which widens out triangularly on the second segment into the brownish grey or pale ashy grey hindmargin, the hindmargins of other segments being also brownish grey or ashy grey with faint indications of shallow middle triangles; sidemargins broadly but indistinctly ashy grey; each of the segments from the third to the sixth bearing a pair of fairly large rounded brownish ashy grey or brownish yellow spots which touch the foremargin of each segment and which are placed about half-way between the middle and the sidemargins, and the second and seventh segments bearing faint traces of similar spots, while the spots on the sixth and seventh segments often get nearer the middle line. Pubescence on the disc mainly black, short, and depressed, but whitish grey on the hindmargins of segments, on the sides (except at the front corners of the end segments), and on the end, being longer on the sides and end. Belly light grey with a broad greyish black middle stripe from the second segment to the tip (when viewed from behind), or with a pale brown stripe (when viewed from in front); seventh segment blackish and bearing all over the middle of the disc longer erect curved black bristly hairs, of which there are indications on the sixth segment, all the other pubescence being short, depressed, and greyish white.

Legs paler and longer than in *H. pluvialis*; femora covered all over with whitish grey dust and usually rather obscurely luteous but not uncommonly with an apparently blackish ground colour; in the most luteous forms the anterior femora are darkened on the basal quarter and more or less so along the upper side to the tip, or slightly along the upper side and at the tip, while the hind femora are slightly darkened at just the base and obviously so about the apical sixth; front tibiæ with a broad (one-third the length of the tibiæ) luteous ring just after the base (the base itself being brown), after which they are brown for about half of the remaining part and black on the apical quarter, though there may be a trace of a darker ring on the upper part of the brown portion; middle tibiæ with three less distinct dark rings than in *H. pluvialis*. Pubescence more conspicuously whitish, and with only a few black hairs behind the apical third of the front femora and a short antero-ventral ciliation, while only just the tip of the posterior femora bears a few black bristly hairs.

* Hardly visible in fig. 225.

Wings (fig. 226) as in the male. Squamæ light grey, with rather broad brown margins and an inconspicuous pale marginal tuft on the alar pair near

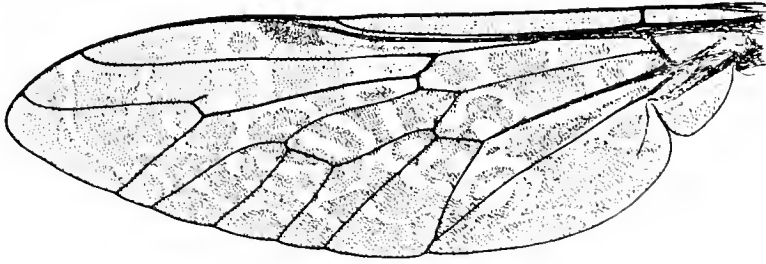


FIG. 226.—*Hematopota italica* ♀. × 8.

the angle. Halteres whitish yellow, with the inner and outer part of the knob blackish except at the tip.

Length about 10·5 mm. but varying from 9·5 mm. to 11·5 mm.

This species is similar to the others, but the male may be distinguished from *H. pluvialis* by the pale pubescence at the back of the vertex, and the female from the other species by the elongate (not in the least ovate) entirely dull basal joint of the antennæ; the male may be distinguished from *H. crassicornis* by the very different tint of the wing-coloring. Other distinguishing characters lie in the usually larger size, more elongate shape, usually ferruginous femora and more conspicuously black-haired frons of the female, and the more washed-out wing-markings.

It varies in the female in having the basal segment of the third joint of the antennæ almost entirely dull blackish brown, the spots and pubescence on the abdomen ranging in colour from the normal brownish yellow to occasionally pale ashy grey, and the spots also varying in distinctness though never occurring on the basal segment and only very faintly on the second segment, and the femora ranging from light greyish black to obscure luteous, while the amount of luteous colour or the intensity of the dark bands on the tibiæ may vary; the basal joint of the antennæ is ordinarily very regular in length, but is occasionally shorter but even then not in the least ovate.

H. italica has hitherto been but little known as a British insect; Curtis figured it in 1834 from some females taken at "Mersey-Isle, Essex," to which locality Duncan in 1837 added the word "Southend"; about 1870 the late Mr Howard Vaughan gave me a female from the same neighborhood; Mr Chawner recorded it from Matley Bog in the New Forest, and Miss Ricardo took one at Netley, Hants, on July 22, 1893. The Mersey-Isle record caused Colonel Yerbury to go in search of it at Walton-on-Naze in Essex in August 1907, and he found it not at all uncommon there though he only succeeded in obtaining two males (the first of that sex known as British and from which my description has been taken); towards the end of that month I joined him at Woodbridge in Suffolk and up to August 31st the females were not uncommon there in company with *H. pluvialis*, while one female occurred at Aldeburgh as late as September 19. Newman (*Entomologist*, iv., 215, 1869) recorded "*Hæmalopota longicornis*, a new British Dipteron," and stated that there were "two specimens in the Entomological Club cabinet—one from the "neighbourhood of Balcombe, in Sussex; the other from the Kent coast." If correctly identified it occurs from North Europe to Italy.

Synonymy.—Although the principal figure attached to *H. italica* in Curtis' British Entomology, 525, belongs to that species, the dissections are obviously made from *H. pluvialis*. Newman's record of *H. longicornis* mentioned above is probably a synonym, and in fact Macquart's *H. longicornis* is probably the same. The synonymy as given in Kertész's Katalog can only be founded on tradition and guesswork, and it may be noted that there is no such species as *H. elongata* of Curtis, he having called his species *H. italica* while the date on his plate is 1834; I made a note however when I examined Meigen's collection in 1906 that his *H. grandis* was only *H. italica* with darkened femora and indistinct abdominal spots. *H. nigricornis* Gobert appears to be a synonym according to the description and also according to three out of five females so named in Bigot's collection, the other two being specimens of *H. Bigoti*? I have adopted the name *H. italica*, but until the European species are better distinguished the identity of Meigen's species must remain uncertain. *H. variegata* Fabr. was described from "Tanger" and from the words "Antennæ testaceæ: articulo ultimo nigro. . . . Pedes rufi" should be very distinct from either *H. italica* or *H. pluvialis*.

4. **H. Bigoti** Gobert? Third antennal joint partly reddish; basal joint slightly ovate, and shining at the tip in the female. Femora of the female obscurely ochreous. Wings moderately but not yellowish marmorate.

A recently distinguished species of which I do not know the male.

♂. Unknown; but probably distinguished from *H. crassicornis* by reddish coloring on the third joint of the antennæ and by less darkly marmorated wings; from *H. pluvialis* by the absence of any hyaline markings on the hindmargin of the wings, and by more distinct abdominal markings; and from *H. italica* by its less washed out wing-markings and its more distinct thoracic and abdominal markings. I should expect to find that the pubescence behind the vertex was all tawny as in *H. italica*.

♀. Most allied to *H. italica* but distinguished at once by the antennæ. Head broader than in the other species; side-cheeks dotted as in *H. italica* but with the spots rather larger; frons bearing strong black pubescence as in *H. italica* but with distinctly more pale pubescence at the sides of, and just after, the dull black spots, and the middle frontal spot by no means small. Palpi with very few black bristles. Eyes colored as in *H. italica* (according to notes made by Colonel Yerbury on a living specimen, though in a second specimen the bands were different in colour). Antennæ rather long; basal joint not so long as is usual in *H. italica* and distinctly though slightly ovate, and shining at the tip (even to a third of the length on the inside), while in one specimen the basal joint is obscurely reddish except at the tip and a second specimen shows similar traces; second joint not extended cap-like over the third; third joint (exclusive of the three-jointed style) wholly brownish orange, slightly tapering after its circle of bristles, and longer than the style.

Thorax very similar to that of *H. italica*, but the side-lines developing into rather more conspicuous spots near the hindmargin.

Abdomen with more conspicuous markings than in any of the other species, every segment (even to the basal one) having a well defined pair of pale brownish grey spots; the grey dorsal line and hindmargins of segments also clearly defined, and (when seen from above) the naked eye can at once distinguish the pale triangle on the second segment more distinctly than in any of the other species.

Legs colored as in the palest forms of *H. italica*, the front tibiæ having only the tip blackened; hind tibiæ with rather distinct pale pubescence on the pale bands.

Wings marked rather like those of *H. italica* as there is no trace of any

hyaline hindmargin, but rather less washed out and the individual hyaline markings wider. Squamæ with broader and blacker margins. Halteres in some specimens without any conspicuous whitish tip to the knob.

Length about 10.5 mm.

This species is altogether broader than *H. italica* and larger than most specimens of *H. pluvialis*, while the abdomen is more elongate than that of *H. crassicornis*; the wings have a less washed out appearance than in *H. italica* but have none of the muddy yellowish tint of *H. pluvialis*. Even if a hybrid could be found between *H. pluvialis* and *H. italica* it would not be likely to differ from both parents so strikingly in the abdominal markings.

H. Bigoti? is at present only known as British from four females taken by Colonel Yerbury in company with *H. italica* at Walton-on-Naze in Essex from August 11th to 23rd, 1907.

Synonymy.—When in Paris in May 1906 I was much puzzled with Gobert's species of *Hamatopota* and I could not satisfactorily identify them with our British species; I made a note however that *H. Bigoti* seemed to resemble *H. italica* but had the wings not much washed out, which would agree fairly well with the Walton-on-Naze specimens. Gobert's description is hopelessly inadequate but not contradictory, and as he gave no indication of sex it is very probable that he also did not recognise the male.

2. TABANUS (*sensu lato*)

(including THERIOPLECTES and ATYLOTUS).

Tabanus Linné, Syst. Nat., Ed. x., T. i., 601 (1758).

Large moderately pubescent flies of usually brownish black or grey colour, but sometimes with brownish ferruginous or conspicuous reddish orange markings and usually with longitudinal rows of grey spots or flecks on the abdomen.

Face broad, with broad cheeks all down the sides which are much more prominent than the sunken middle part of the face (= epistoma) and these cheeks bear more or less bushy pubescence which continues on to the jowls and thence to the lower part of the back of the head; upper part of the back of the head not (or but little) puffed out in either sex; ocelligerous tubercle present or absent, but never conspicuous, and the actual presence of ocelli doubtful even when the ocelligerous triangle is present. Frons in the male limited to a triangle above the antennæ which extends up to a point between the eyes, but in the female this "frontal triangle" is continued as the "frontal stripe" right up between the eyes to the vertex, and the parts of the eyes near where the frontal stripe merges into the frontal triangle are known as the lower angles of the eye; the frontal triangle separated from the cheeks by a furrow running sideways from the lower margin of the antennæ and sloping upwards to the eyes; frontal stripe of the female bearing some spaces (usually black) denuded of dust or pubescence which are known as the frontal "calli," and of these the lower one occupying a position immediately above the frontal triangle, and the middle one placed at about the middle of the frontal stripe and varying specifically in shape (when present) from quadrate to linear, and very frequently connected with the lower callus by a narrow black line; the upper callus is seldom distinct but often indicated by a blackish or darkened space about the

ocelli. Proboscis (figs. 227, 228) powerful, produced, and bearing rather large sucker-flaps. Palpi very conspicuous, two-jointed, with the end joint elongate and in the male (fig. 227) globular and outstanding with a more or less blunt tip; or in the female (fig. 228) cylindrical and drooping to a point, lying on the proboscis and mainly clothed with small depressed bristles; basal joint short ovate and bearing long pubescence. Eyes large; very large in the male and touching for a long space, but separated in the female by the frontal stripe which is from two to six times longer than broad; practically bare (*Tabanus* sens. strict.), or distinctly pubescent (*Therioptectes*), or sometimes only indistinctly pubescent in one or both sexes; in life brilliantly colored in some iridescent or opalescent tint of green, and usually with purplish transverse bands, but in death these markings and colorings fade, but can to a certain extent be renewed by damping, and the absence or presence and number of these bands form useful specific distinctions; in the male the eye-facets are often conspicuously or moderately enlarged on the front and upper

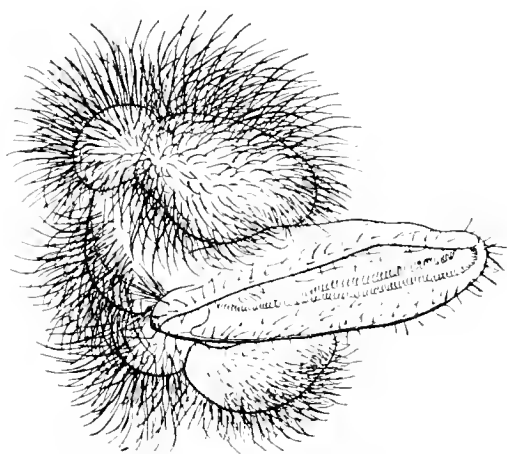


FIG. 227.—*Therioptectes distinguendus* ♂. × 22.
Palpi and proboscis seen almost from
beneath.

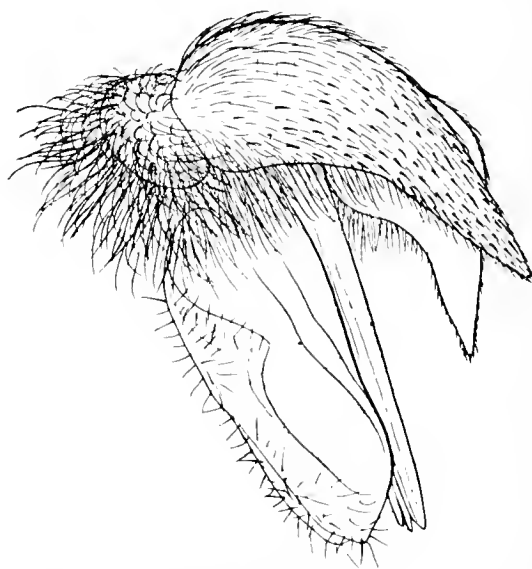


FIG. 228.—*Therioptectes distinguendus* ♀. × 22.
Palpi and proboscis seen sideways, and with
the proboscis depressed.

parts and the extent or amount of this enlarging may also afford good distinctive characters. Antennæ as long as, or slightly longer than the head; basal joint short but longer than the second, and often produced cap-like over the base of the second, bearing numerous short (usually black) bristles and usually some rather longer thin hairs; second joint also bearing numerous short black bristles placed more or less in a subterminal circlet, and often dorsally produced cap-like over the base of the third joint; third joint elongate and segmented, the segments after the basal one forming a very stout style; basal segment of the third joint large and long, enlarged about its base and bearing on its upper side before or at the middle a peculiar hump (fig. 214) which varies specifically from a moderately raised hump to an arched hook; the style-like terminal part of the third joint composed of four joints, of which the last is the longest, and consequently the whole antenna apparently composed of seven segments.

Thorax large, quadrate with rounded angles; humeri distinct, with a large rounded præalar callus between them and the wing-base, and this callus often rather differently colored from the disc of the thorax. Pubescence on the disc rather inconspicuous and usually composed of two distinct kinds of hairs, of which one kind stands erect almost bristle-like over most of the disc and scutellum (and is usually black) but does not exist on the front part of the disc, while the other kind is hair-like and pale and lies more depressed all over the disc and at least round about the margin of the scutellum and is much thinner and more liable to be rubbed or worn away than the erect black hairs; in addition to these there are patches of depressed hairs above the wing-bases and against the postalar calli (which are analogous to similar patches in the *Anthracinae*); pleuræ with longer shaggier pubescence; there are no bristles of any description on any part of the thorax or scutellum.

Abdomen as broad as or slightly broader but hardly longer than, the thorax, rather flattened, rather more pointed at the end in the male than in the female. Pubescence short and inconspicuous, but by its colour assisting to show up the grey spots or flecks which almost always exist in a dorsal row and very frequently in two outer rows; seventh abdominal segment always with some distinct erect black bristly hairs on its underside.

Legs simple, but with two apical spurs on the middle tibiæ; front coxæ long, being fully two-thirds as long as the femora; hind tibiæ rather ciliated; femora dull, clothed all over with soft pubescence except along the underside of the front femora and on a streak behind the apical quarter of the hind femora, these parts being bare and usually shining; the bare part of the underside of the front femora minutely transversely striate and margined anteriorly with minute black bristles; * front tibiæ about the tip and the front tarsi beneath or about the sides with peculiar "touch-hairs," which are analogous to those in the *Leptidæ*.

Wings (in European species) rarely spotted or marked in any way, and with scarcely any deviation from the typical form of the *Tabanidæ* (fig. 211), except that the upper branch of the cubital fork has sometimes (*Atylotus*) a recurrent veinlet near its base (fig. 215) as in many *Bombylidæ* and *Asilidæ*; posterior cells normally all open, but the first one sometimes narrowed or even occasionally closed; anal cell closed; wing-membrane rippled all over, practically glabrous. Alulae strongly developed, and so large that when the wings are at rest they are pushed upright against the sides of the scutellum. Squamæ very well developed, and with darkened margins which bear a short ciliation except on the alar pair near the angle where there is a conspicuous tuft of long hairs; thoracal pair largest but outspread or elevated and not concealing the halteres. Halteres moderate.

The larvæ live in damp earth, in sand, or under rotting leaves and stalks on damp earth; M. Lecaillon (Ann. Soc. Ent. Fr., lxxiv., 20, 1905) has described how *T. quatuornotatus* lays its eggs in a cluster on stems, and how the larvæ feed on dead or decaying animal or vegetable matter, and that they can live in almost any degree of moisture from dry earth to absolute water. Hine has also recently bred several North American species as I have noted under the description of the family (p. 322).

The flies occur commonly around pasturing animals or sit on tree-trunks, and the bloodthirsty females rarely attack though they continually threaten human beings; the males may be seen sitting on rails or on flowers, and hover in the sunshine at early morn even before sunrise especially in high mountainous regions; Colonel Yerbury has seen *T. distinguendus* hovering during the day time. When confined in a small box the living flies have a remarkable habit of breaking off the tips of the wings and sometimes even the whole wing; this is probably done by the fly striking its wings against something in its short jerky attempts at flight.

Tabanus in its wider sense is a very natural genus, but it contains such an enormous number of species (885 in Kertesz's "Catalogus "Tabanidarum," published in 1900) of which many are exceedingly closely allied that attempts have naturally been made to subdivide it, and, as far as British species are concerned, the adoption of *Theriopectes* and *Atylotus* is a great convenience; about sixty species are known to occur in Europe (and more than double that number are recorded from the Palæartic Region) of which about twenty belong to *Theriopectes* and about eighteen to *Atylotus* (in Brauer's sense of that subgenus); fifteen or sixteen species are recorded in this work as British; more than one hundred and fifty species have been recorded from North America and more than two hundred from South America, about one hundred and fifty from South Asia, over fifty from Africa (excluding Palæartic), and about fifty from Australia and New Zealand.

* This character has just recently been noticed by Lundbeck (Diptera Danica, Part I., 86, 1907) and is worthy of closer investigation, as it is probable that some specific distinctions will be afforded by it. I had only partially observed it and it is now too late for me to follow it up as thoroughly as I could wish; it appears to me that the bare under side of the front femora, which is often sunken and margined anteriorly by a close row of minute bristles, is provided as a receptacle for the front tibiæ when the latter are folded against the femora. Lundbeck also calls attention to the intensely black front tarsi of the species of *Tabanus* and the peculiar way in which they move the front legs when held in captivity.

According to the probable derivation of the name of this genus the second "a" should be pronounced long = *Tabānus*.

Synonymy.—Linné founded this genus in the 10th edition of the *Systema Naturæ* in 1758, but naturally his genus was of a rather comprehensive nature; he included twelve species of which six were European, one being a *Hæmatopota* and one a *Chrysops* but the other four belonging to the present comprehensive genus. *T. bovinus* has always been correctly accepted as the type species.

Table of Subgenera.

- | | | |
|---|--|-----------------------------|
| 1 | (4) Eyes pubescent. | |
| 2 | (3) Ocelligerous tubercle more or less distinct. Upper branch of the cubital fork simple. | THERIOPLECTES. |
| 3 | (2) Ocelligerous tubercle absolutely absent. Upper branch of the cubital fork usually with a recurrent veinlet (fig. 215). | ATYLOTUS. |
| 4 | (1) Eyes bare. Ocelligerous tubercle absent. | TABANUS
(sensu stricto). |

THERIOPLECTES.

(Subgenus of *Tabanus*).

Theriopectes Zeller, *Isis*, 1842, p. 819.

“Eyes pubescent, with three or four purple cross-bands and intervening green intervals; ocelligerous tubercle more or less distinct; head of the male not differing much in size or shape from that of the female; the difference in size between the large and small facets on the eyes of the male is but very moderate, and the dividing line between them indistinct.”

The above quoted words are those used by Osten Sacken in his last definition of this subgenus (*Western Diptera*, 215, 1877), and are only a slight modification of characters previously given by him when founding the subgenus *Atylotus*.

Zeller when founding *Theriopectes* gave no character beyond “mit behaarten Augen in beyden Geschlechtern,” but he separated *T. fulvus* Mg., *T. rusticus* Fabr., and *T. plebejus* Fall. into a “Zweyte Unterabtheilung,” and consequently when Osten Sacken found a character common to these three species which was not shared with the majority of the hairy-eyed *Tabani* he was justified in giving a new subgeneric name (*Atylotus*) to them, even though it subsequently became considered that the first species of Zeller’s “Erste Unterabtheilung,” *T. tricolor* Zell., was also an *Atylotus*; furthermore it is by no means certain that Osten Sacken intended his subgenus *Atylotus* to include such species as *T. tricolor* Zell.

Osten Sacken’s character derived from the comparison between the large and small facets on the eyes of the male does not hold good in regard to all European species, as in some species the facets are very different in size and rather abruptly contrasted by a dividing line.

Theriopectes is easily distinguished from *Tabanus* by its hairy eyes in both sexes, even though microscopic examination may often detect hairs

on the eyes of some true *Tabani*, but from *Atylotus* it is not so easily distinguished. In our British species however *Atylotus* may be known by the large head of the male, the entire absence of any ocelli or even ocelligerous tubercle, the recurrent veinlet from near the base of the upper fork of the cubital vein (fig. 215), and the shifting irregular spots on the eyes in life.

Table of Species.

MALES.

- 1 (2) Legs entirely black. Frontal triangle shining black. 1 *micans*.
- 2 (1) Tibiæ mainly yellowish. Frontal triangle grey.
- 3 (8) Abdomen mainly blackish grey or black, with only moderate dull reddish or brownish red lateral markings near the base. Eyes in life with three purplish bands.
- 4 (5) Vertex with a tuft of black hairs behind the ocelli. Rather large species. Middle tibiæ conspicuously pubescent; eyes touching for a long space. 2 *tropicus*.
- 5 (4) Vertex without any tuft of black hairs behind the ocelli. Smaller species.
- 6 (7) Wings without clouds on any cross-veins. Eyes touching for a long distance, and bearing short pale pubescence. Last joint of palpi long and pointed. Antennæ usually mainly reddish. Middle tibiæ only moderately pubescent. Abdomen indistinctly shining. 3 *montanus*.
- 7 (6) Wings with clouded cross-veins. Eyes actually touching for a comparatively short distance, and bearing long dark pubescence. Last joint of palpi broad and stout. Antennæ mainly blackish brown. Middle tibiæ with long and abundant pubescence. Head flattened. Abdomen conspicuously shining. 4 *luridus*.
- 8 (3) Abdomen mainly bright brownish or reddish orange with a black dorsal stripe. Eyes in life with two purplish bands.
- 9 (10) Eye-facets only moderately enlarged on the front and upper parts, and not sharply contrasted with the smaller lower ones. Eyes with rather short brown pubescence. 5 *distinguendus*.
- 10 (9) Eye-facets very much enlarged on the front and upper parts, and sharply contrasted with the smaller lower ones. Eyes with long pale pubescence. 6 *solstitialis*.

FEMALES.

- 1 (2) Legs entirely black. Frontal triangle shining black. 1 *micans*.
- 2 (1) Tibiæ mainly yellowish.
- 3 (8) Abdomen mainly blackish grey or black, with light flecks, and with only moderate (if any) dull reddish or brownish red lateral markings near the base.
- 4 (7) Frontal triangle grey.

- 5 (6) Vertex with a tuft of black hairs behind the ocelli. Rather large species. Middle tibiæ conspicuously pubescent. Palpi blackish orange. *2 tropicus.*
 a (b) Abdomen considerably brownish red. *tropicus.*
 b (a) Abdomen hardly at all brownish red. var. *bisignatus.*
- 6 (5) Vertex without any tuft of black hairs behind the ocelli. Rather small species. Middle tibiæ only moderately pubescent. Eyes with short pale pubescence. Palpi whitish. *3 montanus.*
- 7 (4) Frontal triangle shining black. *4 luridus.*
- 8 (3) Abdomen mainly bright brownish or reddish orange with a black dorsal stripe.
- 9 (10) Reddish coloring always extended to the fourth segment, and that segment bearing soft pale yellow short pubescence. *5 distinguendus.*
- 10 (9) Reddish coloring almost always extended to the third segment only, and the fourth segment with mainly black short pubescence. *6 solstitialis.*

Some of the species of *Theriopectes* are very difficult to name with certainty either from descriptions or from single specimens. There can be no doubt about *T. micans* or the female of *T. luridus*, and the two reddish species (*T. distinguendus* and *T. solstitialis*) are easily distinguished from the others though not from each other, even though I am not sure but that there may be some close connection between the females of *T. solstitialis* and *T. tropicus*. *T. tropicus* (as I understand it) is a rather larger species than either *T. montanus* or *T. luridus* (though one female from Herefordshire and several continental specimens which I possess hardly bear this out) and may be known from either by the distinct little tuft of black hairs behind the ocelli, as well as by its middle tibiæ being far more pubescent than those of *T. montanus*. *T. montanus* is (according to a large number of specimens I have seen) very variable in the coloring of the abdomen of the female, but may be known by the short pale pubescence of the eyes, and the shorter pubescence on the middle tibiæ and basal joint of the antennæ, as well as by the short frontal pubescence and the absence of any postocellar tuft of black hairs. *T. borealis* has been recorded from Scotland but (as I have said in the synonymical notes under *T. montanus*) I think incorrectly; it might however occur there, and should be distinguished by the distinctly pale hindmargins to the abdominal segments.

1. **T. micans** Meigen. Legs entirely black; front tarsi of the male with peculiar long hairs. Frontal triangle shining black.

A rather large species, distinguished from any British species of the genus *Tabanus* (sens. lat.) by its hairy eyes and black legs.

♂. Head not remarkably large in comparison with the thorax and abdomen. Frontal triangle small, moderately shining black, quite bare, but with traces of greyish brown dust about the upper angle and in the antennal sockets and sometimes about the sides; face with broad side-cheeks which are pale grey in some lights but dark slaty grey in others, and these side-cheeks are all covered with long dense pubescence which is blackish near the eyes but whitish grey on just the inner sides, and which there partly overhangs the recessed epistoma; the actual margin against the eyes is whitish grey from the level of the antennæ down the face and round to two-thirds of the way up the back of the head; in profile the face protrudes from the eyes to the lower angle of the mouth but is shallow beneath the eyes, and the head is

shallowly inflated for a short distance up the back of the eyes; a band of black pubescence extends from the face to beneath the eyes and then grows shorter until it becomes a very short black ciliation about the middle of the back of the eyes, but after that it again becomes a little longer up to the vertex; jowls and all round the mouth with a long whitish grey beard which extends nearly half-way up the back of the head, and there are some longish pale grey hairs on the upper part of the back of the head right behind the black ciliation; vertex very small, brown, hardly elevated, and bearing a sparse tuft of moderately long black hairs which extend quite back to the occiput. Palpi blackish grey; last joint large and elongate oval but moderately pointed at the tip and bearing long rather dense black hairs with a few grey hairs intermixed; basal joint with numerous unusually long whitish hairs on its underside. Eyes clothed with rather long and dense light brownish grey pubescence, and in life (according to Brauer) bright greenish with three purple bands on the lower half, or else the lower part of the eyes purplish or violet with three green red-margined bands; facets large on all the middle part and up to the junction of the eyes, but becoming gradually smaller outside and beneath so that there is only a narrow outer zone of very small facets on the upper part but a broader zone on the outer and lower parts which extends to about a quarter the width of the eye; the eyes touch for a very long space. Antennæ dull greyish black; basal joint dilated and bearing long conspicuous black bristly pubescence; second joint with similar but much shorter pubescence on the upper side though almost as long on the under side; third joint with only a small triangular dorsal hump near the base, which bears a few very short black bristles.

Thorax moderately shining black, bearing erect black pubescence on the main portion of the disc with no pale hairs intermixed except over the wing-base and on the back part of the postalar calli, but the pubescence on the front part of the disc shorter, rather depressed, and light grey; pleuræ with mainly dense shaggy grey pubescence but the large dense tuft on the middle and back part of the mesopleuræ conspicuously black haired. Scutellum also moderately shining black and bearing erect black pubescence.

Abdomen moderately shining black, but the hindmargins of the second to sixth segments bear at the middle a small shallow triangle of white hairs and (at least on the second segment) these hairs stand on a greyish ground colour, and in various lights (especially from behind) large grey side-flecks can be traced nearer the sides of the segments; the absolute hind corners of the second to sixth segments also bear small whitish tufts and the upper margins of the lateral genital plates bear a little whitish pubescence. Belly black, with fringes of white hairs on the very narrowly white hindmargins of the segments but with the other pubescence black.

Legs wholly black; front coxæ with long pubescence which is greyish about the base but black afterwards; femora with rather dense blackish pubescence; front femora beneath for their whole length with a broad bare dull black slightly channelled space for the reception of the folded-back tibiæ, and the anterior margin of this bare space bearing a dense row of short bristly hairs; middle tibiæ with rather conspicuous longish pubescence and with two conspicuous black spurs; hind tibiæ with dense but rather short pubescence; *front tarsi* with from two to four remarkable *upstanding long bristly hairs* (fig. 229) at the tip of each of the four basal joints, last joint with moderate inconspicuous brownish grey hairs about the end; there are a few "touch-hairs" beneath the basal joint of the front tarsi and one at the tip of each of the next three joints. Pulvilli brown; claws black.

Wings strongly greyish, but brownish black about the base and towards the costa; there is a small dark spot at the fork of the cubital vein, and a dark cloud down the cross-vein at the end of the discal cell, while the stem

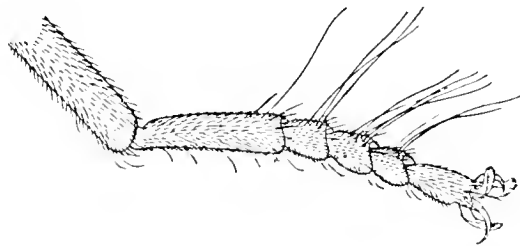


FIG. 229.—*Therioplectes mteans* ♂. Right front tarsus. $\times 14$.

of the postical vein is also clouded as well as its upper branch as far as the small cross-vein and along that cross-vein and the short basal piece of the cubital vein. Squamæ dark glassy grey with blackish brown margins; fringes short except for a rather conspicuous white tuft at the lowest part of the alar pair. Halteres blackish brown.

- ♀. Resembling the male. Frontal stripe comparatively broad and short as it is scarcely more than three times as long as its breadth at the lower eye-angle, and it only very slightly diminishes in width from the vertex down to that eye-angle; the frons is grey and bears three black calli of which the lowest one is shining black and is rather transverse all across just above the frontal triangle, and may be joined by a thin black stripe to the long narrow oval middle callus, which in turn may be rather vaguely connected with the dark ocellar callus; the frontal stripe bears obvious black pubescence on the upper two-thirds, that on the vertical portion being rather longer than that on the middle part, but on the lower third pale hairs are conspicuously intermingled with the black hairs; *frontal triangle* quite bare and *shining black*, but grey just above the antennæ, and divided by a furrow from the lowest frontal callus; ocellar space roundish and obvious, though but very slightly raised above the level of the frons. Face with shorter and less bushy pubescence on the side-cheeks, and with a few whitish grey hairs intermixed with the black ones; the whitish pubescence on the inner sides of the cheeks, about the mouth, and at the back of the mouth, more conspicuous; jowls under the eyes at the back part and the back of the head right up to the vertex slightly and equally puffed out, whitish grey, and bearing a rather short black ciliation all along near the eyes, and behind this black ciliation (especially near the upper part) is a long straggly light grey pubescence. Palpi dull dark greyish black, broad at the base but quickly attenuating after the bend to a rather blunt tip, about four times as long as the thick part is deep, densely clothed with black bristles but with rather inconspicuous long white pubescence about the base both above and below. Eyes with rather sparse and short light grey pubescence, but almost or quite bare along the hindmargin; facets all small and equal; in life (according to Brauer) they bear three or four purple bands. Antennæ black, slightly greyish; the long hairs on the basal joints not so conspicuous as in the male.

Thorax with the black pubescence less obvious than in the male, and with two widely separated stripes of rather inconspicuous whitish grey pubescence running down the disc; pleuræ with larger clumps of greyish white pubescence under the wing-base and all about the prothorax. Scutellum with numerous scattered thin light grey hairs interspersed all over the disc.

Abdomen with the pubescence much shorter than in the male, and with more signs of grey side-flecks and whitish pubescence; there is a small whitish grey triangle of pubescence at the middle of the hindmargin of each of the second to sixth segments, and there are large grey side-flecks on the second segment which are rather conspicuous (partly through the whitish pubescence on and about them) even to the hindmargin and side corners; there is also a considerable amount of whitish pubescence on the sides of the two basal segments, at the extreme hind corners of segments, on most of the hindmargin of the fifth segment though not connected with the middle spot, and as hindmarginal fringes on the sixth and seventh segments; the third to sixth segments have very narrow inconspicuous light grey hindmargins. Belly with very extended rather conspicuous whitish pubescence, especially as fringes along the hindmargins.

Legs black; pubescence on the femora dense and black but not so long as in the male, and the bare space beneath the front femora just as in the male; middle tibiæ with obvious though sparse rather long dorsal ciliation on the middle part; hind tibiæ with a coarse dense black dorsal ciliation except about the base.

Wings, squamæ, and halteres as in the male.

Length about 13 mm. (♂), or 14 mm. (♀).

This species may be known at once from any other British species of the extended genus *Tabanus* by its wholly black legs; the only other quite

black legged European species at all likely to occur in Britain is *T. aterrimus* Meig., which has the front tarsi of the male normal, and the frontal triangle of the female all grey.

T. micans is not common in Britain, as my records seem to be limited to Hampshire (Fordingbridge and Lyndhurst), Cumberland (Saddleback), Merioneth (Dolgelly and Barmouth), and Inverness (Nethy Bridge); B. Cooke recorded *T. austriacus* from Warrington in Lancashire. My dates extend only from June 11 to 23. It is recorded as uncommon from Sicily to Central and Western Europe, but there is no record from Northern Europe and Lundbeck does not include it in his *Diptera Danica*.

Synonymy.—Walker described this species as *T. austriacus* Fabr., which is a probable synonym.

2. **T. tropicus** Meigen. Tibiæ mainly tawny, but nearly the apical half of the front (and often of the hind) pair blackish; middle tibiæ conspicuously pubescent. Abdomen not conspicuously orange-red. Vertex with a tuft of black hairs.

A (normally) rather large species which is without the conspicuous orange-red abdominal markings of *T. solstitialis* and *T. distinguendus*.

♂. Head not large in comparison with the thorax. Face dark grey, bearing on the side-cheeks moderately dense rather long black pubescence which becomes rather more sparse below and hardly extends round to the lower part of the back of the head, and with long greyish white pubescence on the inner part of these side-cheeks (partly overhanging the depressed middle part of the face), on the jowls, and all about the mouth, and with similar pubescence extending all up the hollowed out back of the head; eyemargins all down the face and round to the back of the head narrowly and inconspicuously lighter grey; jowls very little prominent, and all the lower part of the back of the head hardly at all inflated, leaving only a narrow rim which bears on its hind-margin extremely short black ciliation until above the middle of the head, after which the pubescence becomes slightly longer and is pale, while well before the top it becomes distinctly longer (though still not conspicuously long) and forms a pale fringe up to the vertex, and there is an obvious tuft of forwards-curved black hairs just behind the ocelli; vertical space very small, dark chestnut, slightly but distinctly elevated; frons quite bare, conspicuously whitish grey and almost glistening, though there is a slight darkening across from the eyes to the antennæ, and below this the sides of the face are grey but darker than the frons. Palpi blackish grey, but with the tip brownish yellow and the inner side yellowish orange; last joint forming a regular oval, hardly twice so long as broad and with the tip hardly pointed, and clothed above, outside, and beneath with rather abundant mainly black hairs, intermixed with which are usually some pale hairs, but on the under side (especially near the base) the hairs are greyish white, and the inner side is almost bare; basal joint with much longer more conspicuous abundant greyish white hairs intermixed with which are usually only a very few black hairs. Eyes touching for quite twice the length of the frontal triangle, and clothed with dense not long brownish pubescence which becomes rather paler brownish grey on the lower part; facets on the prominent front part and on the middle up to the part where the eyes touch rather larger than those outside that space, but not at all conspicuously so and the change only very gradual; in life (according to Brauer) the eyes have three purple bands, and the undermargin green without any band. Antennæ greyish black at the base, but the third joint extensively reddish for more than its basal half and reddish brown on the rest; basal joint thickened and bearing conspicuous

long dense black pubescence, though a few hairs beneath near the base are pale, and this joint is prolonged cap-like on the upper side over the short second joint; second joint also with black pubescence which is however very short on the upper side; this black pubescence on the two basal joints is much longer and more conspicuous than in *T. montanus*; third joint with a conspicuous triangular dorsal hump near the base and with very short black bristles on this hump.

Thorax black, slightly greyish and moderately shining, with faint traces of two widely separated narrow grey stripes down the disc and of two side stripes which tend to connect with the inner stripes on the front part and about the suture; præalar calli not at all ferruginous. Pubescence erect, rather dense, black but with some (or a very few) thin grey depressed hairs intermixed on the disc, and with more obvious grey hairs on the front part to which the black hairs do not extend; the hairs just above the wing-base are sometimes rusty black; pubescence on the pleuræ long dense and mostly greyish black but mainly grey along the dorso-pleural suture and sometimes on the upper part of the mesopleuræ and under the front part of the wing-base where there is a tuft, while there is a dense conspicuous whitish or yellowish white tuft on the prothorax and a very large tuft on the meta-pleuræ. Scutellum colored like the thorax and with similar black pubescence, but with a few long grey hairs towards its tip.

Abdomen black, moderately shining, with the sides of the second and third and part of the first segments brownish orange; basal segment black with about a quarter of the hindmargin near each side rather broadly (about one-third the segment) brownish orange; second and third segments brownish orange with rather less than the middle third black (and sometimes the sides of the third segment obscurely blackish); sometimes just the sides of the fifth and sixth segments obscurely ferruginous; the second and third segments each have a conspicuous tuft of greyish white hairs at the middle of the hindmargin, that on the second segment being the more distinct and resting on a small indeterminate greyish triangle, while that on the third segment is less conspicuous and is on a less distinct grey ground colour, and sometimes a trace of a similar grey tuft exists on the middle of the hindmargin of the fourth segment; the greyish triangle on the second segment extends nearly up to the middle of the segment; the second to sixth segments have a whitish or orange hindmarginal fringe for a long portion of each side but not on the middle third; when the abdomen is seen from behind the orange markings appear more or less pale grey, sometimes only slightly, but sometimes widely on the second segment and sometimes on all the orange part, and the third to sixth hindmargins may have narrow pale grey or orange hems, and a very narrow grey hem may be visible on the seventh hindmargin; sidemarginal pubescence distinctly black except at just the hind corners of the segments. Belly pale brownish orange on the second, third, and fourth segments though sometimes only indistinctly so; basal segment black, and sometimes with a narrow base to the second segment which widens on the middle quarter or more to nearly half-way across the segment, and also just the sides of the fourth segment, while the rest of the belly is blackish; hindmargins of the second to sixth segments with distinct white or pale yellow fringes; pubescence on the second, third, and fourth segments mainly pale and depressed, but often black about the middle part and more widely towards the base of the segments, while there may be a longer more conspicuous black tuft on the blackened middle base of the second segment; the fifth and sixth segments bear sloping black pubescence and a few pale hairs about the sides; seventh segment with rather conspicuous almost erect black bristly hairs which are not dense but are longer and stronger than the other pubescence. Genitalia with large triangular greyish black lateral plates, which bear pale pubescence especially as a longish fringe on the upper margins, and between these lateral plates are two subquadrate plates which have a brownish orange endmargin and a pale marginal fringe.

Legs black, but brownish red on the extreme tip of the femora and on nearly the basal half of the front tibiæ; middle tibiæ obscurely reddish or orange up to near the tip, and also the hind tibiæ for about the basal half or more though usually only obscurely so posteriorly for nearly all the length

but with the antero-dorsal edge all blackish except just at the base, in fact one may sometimes almost say that the apical third of the hind tibiæ is blackish; posterior tarsi hardly at all ferruginous at the base. Pubescence on the front coxæ long and rather dense, mainly pale grey but blackish and shorter about the tip; that on the front femora black behind but towards the base postero-dorsally longer, less dense, and grey, while the bare subfemoral space is almost as in *T. micans*; that on the middle femora black and not dense antero-ventrally, but dense and grey behind; that on the hind femora abundant beneath and mixed black and grey, though a shorter almost adherent pubescence is conspicuously pale all about the tip (except beneath); front tibiæ with only short inconspicuous pubescence; middle tibiæ with long conspicuous delicate hardly dense pubescence all over except at the base; hind tibiæ with a coarse dense rather sloping dorsal ciliation and a finer ciliation beneath, but rather in front of the latter is a delicate remarkably long suberect fine ciliation which does not quite extend to the base or tip (very distinct from anything in *T. montanus*); middle ankle joints orange, and the spurs brownish red with a black tip, while the middle tarsi have reddish soles; hind tarsi obscurely reddish beneath. Pulvilli brownish yellow; claws dark brown at the base but black at the tip.

Wings slightly greyish or brownish, but brownish yellow or pale brownish at the base up to the basal cross-veins; subcostal vein strong, dark brown, widening about its end and with brownish orange or blackish brown marginal clouding there which forms a long narrow indefinite stigma. Squamæ glassy greyish, the alar pair being rather smoky with a slight or distinct blackish tinge and a narrow blackish margin, and the thoracal pair with a light brownish orange margin; fringes minute and pale, but with the usual rather conspicuous whitish yellow tuft of longer pubescence at the lower angle of the alar pair. Halteres with small brown knobs.

- ♀. Similar to the male. Frontal stripe light brownish grey, but with a blackish sheen down the middle, distinctly contracting from the ocelli to the front eye-angles and about three and a half times as long as its broadest part or six times as long as its narrowest part; lower callus almost quadrate, not quite touching the eyes, but continued upwards in a narrow black line which represents the middle callus; vertical space darkened, with the hind ocelli sometimes conspicuously red; pubescence on the frons (when seen sideways) rather dense and by no means short, black, (normally) sloping forward, and distinctly longer on and about the vertical space; cheeks with less bushy black pubescence than in the male and with a few grey hairs intermixed, and the black hairs not extending so far as the lowest part of the eye; pubescence on the back of the jowls and all about and behind the mouth brownish or greyish yellow, rather dense and conspicuous; back of the head with a narrow light grey bare rim which is only slightly widened on the lower part, and behind this rim lies a short brownish yellow ciliation which grows longer on the upper part but which does not merge into the longer black pubescence about the vertex; frontal triangle light grey, almost whitish, quite bare. Palpi orange with a blackish tinge; second joint clothed with short dense black bristles which are not quite dense enough to obscure the ground colour but bare on the inner side, rather broad at the base and gradually diminishing to a point, more than three times as long as the broadest part, and bearing a little pale pubescence beneath at the base; basal joint blackish grey, and bearing pubescence which is long and pale beneath but black and not so long or abundant dorsally. Eyes with the facets all nearly equal in size; pubescence still dark brownish when seen from above, longer on the front part than in the females of the allied species, dense on the front part but becoming short, sparse, and pale on the upper, lower, and hind margins; in life (var. *bisignatus*) bright green with three brownish purple bands, of which the middle band is entire and runs straight from the top of the frontal triangle to the middle of the back of the eye, upper and lower bands equidistant from the middle one but not quite so sharply defined at the front end, rather broader and on the hind quarter sharply converging until they each almost touch the middle line; the part above the uppermost band rather more bronzy green than the rest. Antennæ with the basal

joint blackish grey and bearing dense black bristly hairs which are however longer and less bristly beneath and have a few pale hairs intermixed there; second joint reddish or with at least a reddish tinge, and with a circlet of dense black bristles about the tip which are very short on the upper side but rather longer on the under side; third joint reddish with its large basal segment usually darkened dorsally about its middle, and with the thick jointed style darkened, or even entirely blackened; hump moderate but well formed and bearing minute black bristles, depth of the segment at the hump fully two-thirds its length.

Thorax similar to that of the male, but with more pale hairs above the wing-base, on the disc, and on the end part of the scutellum; pleuræ with more long grey pubescence on the lower back part of the mesopleuræ.

Abdomen (in the type form) broad and rather ovate, with the brownish red coloring more restricted to the side thirds of the second segment and just the sides of the basal segment, and extending on that segment rather vaguely and narrowly along about the outer thirds of the hindmargin; middle row of dorsal whitish spots more conspicuous, extending distinctly to the fourth segment and faintly to the fifth and sixth segments; there are faint traces of large grey side-flecks on the third (and possibly the fourth) segment, but no pale hindmarginal hems to the segments, though the pale fringes exist on the outer thirds of the hindmargins. Belly either as in the male or with a continuous indefinite broad blackish middle stripe.

Legs very similar to those of the male in coloring and in the pubescence of the middle tibiæ, but the hind tibiæ without the remarkable long delicate antero-ventral ciliation.

Wings as in the male. Squamæ more whitish glassy grey. Halteres with reddish brown knobs.

Length about 15 mm.

Var. ♀ *bisignatus* Jaennieke. This variety of the female which is termed melanochroitic by Brauer appears to be very distinct, but I accept Brauer's statement that it is only a variety of *T. tropicus*, as it mainly agrees with the typical form of that species except in the blacker colour of the abdomen and in the more whitish grey colour of the head and its pubescence. Frontal stripe more equal in width from top to bottom in eleven out of twelve specimens in my collection, and with the middle callus more sharply defined as a scarcely widened shining black line extending up from the lower callus; pubescence sometimes with a few whitish hairs intermixed. Pubescence on the jowls and all about and behind the mouth whitish grey, and the postocular ciliation almost whitish grey; frontal triangle without any tinge of yellow. Abdomen with the reddish coloring sometimes quite absent, but when present variable in amount but never conspicuous and usually reduced to a roundish spot near the basal corners of the second segment (on about the upper half of the segment) and a slight indication of red on the adjoining part of the hindmargin of the basal segment, but the second segment bears three whitish grey triangles of pubescence extending up quite two-thirds of the segment, as there is the usual middle one on the hindmargin and two larger right-angled triangles (with the sloping side outwards) which form the usual tabanoid side-flecks; these conspicuous side-flecks are often obscurely rufous all about their upper part and sometimes the whitish grey pubescence on them runs away into the whitish pubescence of the hindmargin, so that it extends right to the sidemargins or even covers all the second segment except a pair of spots which adjoin the middle triangle; in perfect specimens three similar but smaller and less conspicuous triangles exist on the third segment, extending about

half-way up the segment; the blacker hue of the abdomen makes the side tufts of whitish pubescence at the hind corners of the segments more conspicuous. Belly usually unicolorous blackish grey without any trace of ferruginous coloring.

This species, like most of the genus, requires care in identification, but may often be known in the large strong specimens by the considerable amount of blackening on the apical half of the hind tibiæ (though I distrust this character), and by the posterior tarsi being less ferruginous at the base than in any of the succeeding species; both sexes may be distinguished from *T. solstitialis* and *T. distinguendus* by the absence of the conspicuous bright orange abdominal coloring; from *T. montanus* by the larger size, by the tuft of black hairs on the vertex, and by the more pubescent middle tibiæ; from *T. luridus* in both sexes by the normally larger size, and in the male by the less blackish ground colour and by the longer extent of the touching of the eyes, while the female has no sign of any shining black frontal triangle. *T. borealis* is not well known to me, but it should have larger front eye-facets in the male and a broader frons in the female, while I believe both sexes have more conspicuous whitish hindmargins to the abdominal segments. *T. tropicus* varies in many respects, and I have notes that the male may have the outer part of the jowls near the mouth black haired, the pubescence on the palpi mainly pale but with numerous black hairs on the front part and some long ones about the tip of the basal joint, pubescence on the belly much paler as the black hairs are almost limited to the middle of the sixth segment though still conspicuous on the seventh segment, colour of the belly very much more obscured as there are only some obscure yellowish brown markings on the second, third, and fourth segments; it also varies in size, but is always larger than *T. montanus* and *T. luridus*. One specimen (when seen from behind), is even more light greyish on the abdomen so that the light grey coloring occupies most of the second and third segments and forms faint traces of side-flecks on the fourth and fifth segments. The female varies (besides the melanochroitic variety *bisignatus*) in a specimen taken at Worcester on July 3, 1869 (which was returned by Brauer and referred to by him in his monograph as typical *T. tropicus*) in having the thorax narrower and less black, the abdomen narrower and more oblong with the brownish red coloring more extended and more sharply defined on the inner margin to the end of the third segment and altogether more orange red and less blackened towards the sides of the second segment when seen from above, middle tibiæ not so pubescent, frontal triangle apparently less broad, tuft of black vertical hairs less obvious. A still more remarkable female is one which was taken by Colonel Yerbury at Clifford's Castle in Herefordshire on August 13, 1902; some of its peculiarities are probably due to immaturity, but it is so small (12 mm.) that I could not for a long time associate it with *T. tropicus* though I have ultimately come to the opinion that it must belong to that species; the long dense pale brownish grey pubescence on the eyes, the brownish grey frontal stripe on which the pubescence is long and black, the very obvious tuft of black vertical bristles, and the small grey triangles on the dorsal line of the abdomen are characters exactly agreeing with *T. tropicus* and very different from *T. montanus*; the frontal stripe is narrower and parallel-sided on the upper half and has the black pubescence on this part

upturned, while the short black pubescence on the lower part has a few inconspicuous pale hairs intermixed about the lower end of the middle callus, and this middle callus is narrowly lancet-shaped; the back of the head bears a postocular row of tiny black bristles on the lower two-thirds, beginning almost on the jowls but becoming sparse after the middle of the head; thorax browner and with more abundant depressed pale pubescence, but the pubescence on the slightly ferruginous præalar calli and on the scutellum almost wholly black, and the middle part of the mesopleuræ with only a few inconspicuous black hairs; abdomen brownish black, but obscurely ferruginous about the basal corners and the sides of the second and third segments, the middle triangles extending about half-way up each segment but the bright golden pubescence on the triangle extending on the second segment narrowly up to a fairly conspicuous tuft of similar pubescence on the middle of the hindmargin of the basal segment; belly dull yellowish; legs with the tiny black bristles on the tibiæ more conspicuous because of immaturity, and the middle tibiæ with fine but not unusually long pubescence; at a first glance it would seem impossible for this specimen and *T. bisignatus* to be varieties of one species.

T. tropicus in its female form *bisignatus* is not uncommon in Britain, but the type form seems to be comparatively rare; I have records of the type form from Sussex, Kent, Surrey, Essex, Suffolk, Cambridgeshire, Worcestershire, Perth (Aberfoyle), and Sutherland (The Mound), but mostly in solitary specimens; but the form *bisignatus* is common in many Southern woods, such as the New Forest in Hampshire, and Plashet and Abbots Woods in Sussex, while I have records from Kent, Surrey, Essex, Herts, Worcestershire, and Warwickshire, besides the remarkable small specimen from Herefordshire. It is apparently one of the earliest to appear of the large *Tabanidæ* as I have dates extending from May 19 to July 30. It is recorded from North and Middle Europe and from Lake Baikal in Asia, but is not known to occur in South Europe; the var. *bisignatus* is apparently very rare on the Continent (except in France and Denmark), but has occurred in Silesia and Russia.

Synonymy.—Very few of the old records can be trusted. The *T. tropicus* of Walker and other British entomologists was almost certainly *T. distinguendus*, while their *T. signatus* Panz. was probably *T. tropicus* var. *bisignatus*. Several females in Bigot's collection stood under the name of *T. luridus*, and it is practically certain that even Loew included it under his *T. luridus*. Two quite normal females of the type form in the Entomological Club collection were labelled *T. rusticus* with a printed label which had been covered over with a ms. label *montanus*; while four males bore a similar printed label of *luridus* and a ms. label *lateralis*. Villeneuve (Ann. Soc. Ent. Fr., 1905, 306) has stated that the types in Meigen's collection consist of one female (which is *T. apricus*) and three males belonging to two distinct species; I have studied the specimens and agree with Villeneuve, except that I think the third male may belong to the same species as the other two though it appears to be distinct because of the different pose of the head; I do not think however that any of Meigen's specimens belong to the species now described. Villeneuve distinguished the male of *T. bisignatus* in La Feuille des Jeunes Naturalistes, xxxv., 59 (1905), as having the antennæ entirely black, the palpi elongate and cylindrical and fringed with long black hairs, the appearance and shape as in *T. borealis*, and the abdomen colored as in the female; he considered it might be closely allied to *T. nigricornis* Zett. (which was unknown to him), but by no means to *T. tropicus* any more than to *T. luridus*; it is altogether with great reluctance that I sink *T. bisignatus* as a mere variety as I am impressed by its abundance in certain localities where *T. tropicus* appears to be absent, and its unicolorous

blackish grey belly seems to be very distinct; it also appears to me to be rather more oblong in shape, but I must admit that my knowledge of what I call *T. tropicus* is imperfect. In the synonymical note under *Tab. autumnalis* I have endeavoured to prove that *T. paganus* Fabr. is a synonym of *T. tropicus*.

3. ***T. montanus*** Meigen. Tibiæ mainly tawny, including almost the whole of the hind pair. Vertex without any tuft of black hairs. Abdomen with brownish red (not orange-red) lateral markings extending in the male over the four basal segments. Wings without obviously clouded cross-veins. Frontal triangle of the female light grey. A rather small species.

Distinguished from most species by the absence of any tuft of black hairs at the back of the vertex.

♂. Head not remarkably large in comparison with the thorax and abdomen. Frons, face, jowls, and back of the head covered with dull yellow (or sometimes whitish on at least the frons) dust, though inconspicuous rather dark bands may extend from the eyes to the lower part of the antennæ or the sides may be obscurely darkened just where the frons narrows to its sharp upper point; face and frons forming a triangle of which the base is rather longer than the sides and of which the apex is produced into a long point between the eyes; face and jowls with rather long and abundant pubescence, which is black on all the side-cheeks and which extends but very little beneath the eyes so that it reaches (as long pubescence) only about half-way under the eyes towards the back of the head; but on all the middle of the face, on the back of the jowls, and all about the mouth, the long pubescence is dull pale yellow, and extends (though much shorter) up the lower part of the back of the head well away from the eyes; face in profile not produced at all beyond the eyes, but slightly produced at the front part of the jowls; jowls moderate in size; lower half of the back of the head only just inflated, while the upper part is hollowed back from the eyes and leaves only a submerged rim which enables a short inconspicuous almost equal brownish yellow fringe to extend all the way up the back of the head just behind the eyes, and this fringe grows no longer as it reaches the vertex, while on and about the very small dark brown slightly elevated vertex there is no sign of any longer or darker hairs; frons quite bare, when seen from above appearing whitish or yellowish, in profile slightly produced to an antennal prominence. Palpi with the last joint elongate ovate, being nearly two and a half times longer than broad and hardly wider at the middle than at the base, and ending in a rather blunt tip, dull yellowish and with rather long almost entirely black hairs on the outside but bare and yellower on the inside; pubescence on the upper part of this last joint about its base, and on the basal joint, long and very nearly all dull yellowish. Eyes touching for a very long space, and densely clothed with brownish grey or (in some lights) light grey pubescence; facets not quite equal, because those on the prominent front part are rather larger than the others though but very slightly so when compared with those about the part where the eyes touch, but when viewed sideways the facets for a large space on the lower part are very obviously smaller than those about the middle and the front parts, but all changes in the size of the facets are gradual; in life (according to Brauer) the eyes are green with three purple bands and a reddish lower margin against the jowls. Antennæ greyish black with the base of the third joint more or less reddish; basal joint hardly dilated and bearing comparatively short rather dense pubescence which is black above but partly pale beneath; second joint sometimes with a slight reddish tinge, and with inconspicuous short black pubescence; third joint with about the basal half of its large first segment reddish, and often brownish red on the rest of that segment, and with a comparatively slight bare or almost bare dorsal hump near the base.

Thorax and scutellum brownish black, only moderately shining, and with the large præalar calli obscurely chestnut; pubescence on the disc dense, erect, and black, but scattered in and out amongst it are some thin light grey hairs which are only about half as long as the black hairs and which are very inconspicuous except on the extreme front part where no long black hairs occur and sometimes (as mentioned below) on the sides of the disc; mesopleuræ usually almost entirely clothed with dense black hairs but with pale hairs on the back and upper parts, though sometimes the black hairs on the mesopleuræ are restricted to the middle part, and the rest of the pleuræ bear dense long shaggy brownish yellow pubescence.

Abdomen brownish orange and blackish; the brownish orange part occupying most of the four basal segments except on the fairly broad blackish dorsal line; this blackish dorsal line extending all across the base of the first segment but narrowing down to less than the middle third of the hindmargin, and on the second segment forming a large quadrate spot occupying less than the middle quarter of the segment, and the middle part of the blackish space rather greyish or greyish orange while the spot itself may widen somewhat near the hindmargin but usually contracts at the hindmargin itself; on the third segment the blackish dorsal marking is similar to that on the second segment but slightly narrower; on the fourth segment it becomes again a little broader and is less sharply defined and becomes wider towards the hindmargin, and very frequently the brownish red marking on this segment is reduced to a pair of moderate-sized spots but never to less than that; near the sides of the second, third, and fourth segments there is an obscure dark line which usually begins very faintly but gradually becomes more distinct and diverges from the sides until it considerably darkens the sides of the fourth segment when viewed from above, and it is in such cases that an enlargement of the dorsal line reduces the brownish red colour to a pair of moderate-sized spots with usually the actual sidemargins also brownish red; the hindmargins of the second to sixth segments and the extreme hind corner of the first segment bear a fairly conspicuous yellow fringe, which can hardly be said to widen into shallow triangles about the middle even though it is more persistent and conspicuous there, though I have seen a specimen in which it almost formed shallow triangles on the second and third hindmargins; the fifth and subsequent segments are blackish, but the fifth and sixth are slightly and obscurely reddish at just the sides, and the seventh segment is so short that its sides are concealed beneath the sixth; remaining pubescence on the upper side of the abdomen usually black, rather dense and outstanding at the sides, and fairly equal all down the sides, but sometimes on the disc with pale hairs on the second, third, and fourth segments just where pale grey flecks occur in other species. Belly slightly paler, being more brownish orange up to (or near to) the end of the fourth segment, but the basal segment obscurely blackish on at least the middle part, and the second segment with a rather large but sometimes badly defined middle black spot; the fifth to seventh segments blackish; the second to sixth hindmargins bearing a rather conspicuous yellow hem and fringe and the edges of the fringe at the dorsal hind corners of the basal segment overlap, and these fringes are most conspicuous about the middle of each hindmargin; remaining pubescence usually all black and short, but sometimes pale hairs occur on the disc and occasionally almost exclusively. Genitalia when protruded showing a pair of two-jointed large brownish orange upper lamellæ, of which the second joint is nearly as broad as long and bears black hairs on the sides but has a fringe of incurved pale hairs at the end, and beneath these is a pair of long two-jointed under lamellæ (=claspers?), of which the second joint is long narrow bare and horny.

Legs black but dusted with grey, and the extreme tips of all the femora dull reddish orange, and all the tibiæ obscurely reddish orange except that the front tibiæ are blackish all down the underside and obscurely blackish on all the apical quarter or even half, while rarely just the tips of the posterior tibiæ are also blackish; posterior tarsi obscurely reddish orange except at the tips of the joints; bare space beneath the front femora conspicuously black in contrast to the grey dusted sides, and the row of tiny

bristly hairs on its anterior margin shorter than usual. Pubescence on the front coxæ long and brownish yellow; that on the femora usually blackish, fairly long and abundant behind the front pair and beneath the middle pair, but rather more abundant and conspicuous beneath the hind pair, but that on the middle pair sometimes and that on the front pair rarely mainly pale; middle tibiæ ciliate but not very conspicuously so; hind tibiæ with a rather coarse and rather dense dorsal ciliation, and with a more dense though less coarse ciliation beneath, but with no specially long antero-ventral ciliation as in *T. tropicus*; there are some "touch-hairs" beneath the basal joint of the front tarsi and at the tips of the next three joints, and also some at the tip and two or three scattered ones on the underside of the apical third of the front tibiæ. Pulvilli brownish orange; claws obscurely brownish red at the base but black at the tip.

Wings slightly greyish, rather darkened along the subcostal vein and this darkening widens out about its tip so as to form a long narrow inconspicuous stigma. Squamæ glassy pale brownish orange, with thick and browner margins, and with pale almost microscopical fringes except for the fairly conspicuous yellow tuft at the frenal angle of the alar pair. Halteres dull blackish with the top of the knob brown, or brown with the top of the knob brownish orange.

♀. Greyer than the male, and usually without any brownish orange markings on the quadrately ended abdomen.

Frontal stripe yellowish ashy grey or pale brownish grey, only slightly contracted below as it is almost parallel-sided and hardly four times as long as its width at narrowest part; lower callus shining black, rather transverse and extended quite to the eyes, and almost always connected not narrowly to an elongate ovate shining black middle callus; upper part of frons indistinctly darkened round the ocellar space; ocellar space only slightly elevated, brownish red; pubescence on the frons (when seen sideways) only short and slight, yellowish all down the sides and front part but black on the upper middle part right up to the ocelli; above the ocelli there are very few curved short black hairs but no obviously longer hairs there or anywhere about the vertex; side-cheeks with shorter less dense mainly yellowish white pubescence, but with a few black hairs on the upper part and some indistinct (sometimes very indistinct) short ones down the sides near the eyes, and these short hairs indistinctly extend all along under the eyes to just the lower part of the back of the head; pubescence on the lower part of the jowls and all about the mouth yellowish white; back of the eyes with a distinct equal narrow bare light grey rim, and behind this rim with a short blackish yellow ciliation which becomes a little longer and rather less blackish on the upper half but does not become in any way evidently longer about the vertex; frontal triangle (separated by a furrow from the cheeks) with apparently a blackish ground colour but obscured by light grey or yellowish grey dust; antennal pits dusty orange. Palpi with the second joint dull yellow or pale yellow, rarely orange, with numerous short black bristles which are often absent about the base and which are usually longer and not so dense as in *T. distinguendus* and not at all obscuring the ground colour, but in some specimens of apparently this species these black bristles are more numerous and are shorter; this second joint is bare on its inner side, and is moderately dilated soon after its base and then gradually tapers to a rather blunt point, and is nearly four times as long as its width at its broadest part; basal joint also yellow and bearing long pale pubescence though sometimes with some still longer pale hairs beneath about the tip. Eyes clothed with short pale pubescence on the front part, but the pubescence not extending to the upper or hind parts and becoming very sparse on the lower part; Colonel Yerbury made notes of the colour of the eyes in three females taken at Nethy Bridge on July 9, 1905, the first specimen had two bands across the eyes of which the lower one was very indistinct, the second specimen had one band, and the third specimen two distinct bands, but Brauer described the eyes as emerald green with three linear carmine red bands, of which the middle one often failed to reach the hindmargin, and with the upper and lower margins emerald green. Antennæ almost as in the male, there being no long pubescence

on the basal joint (as in *T. distinguendus*), but the second and third joints much darker, the third being usually obscurely dull reddish about the base though sometimes very slightly so, while the basal segment of this joint is nearly twice as long as its depth at the hump.

Thorax greyish black, sometimes with two widely separated indistinct lighter grey stripes on the front part; præalar calli sometimes dark ferruginous; the erect black pubescence shorter, and with a few depressed thin pale hairs interspersed, and the pale hairs becoming conspicuous and more erect about the front part, on the back part near the scutellum, and near the wing-base; pleuræ dusted ashy grey with mainly long pale yellowish grey pubescence, but with blackish grey hairs intermixed but not dense on the disc of the mesopleuræ, though the extreme back part of the mesopleuræ bears a more or less conspicuous dense pale tuft.

Abdomen brownish black, glistening, with the hind corners of the first segment (extending considerably along the hindmargin) and the front corners of the second segment (extending out considerably on to the disc), rather obscurely brownish red; this brownish red colour however varies considerably in extent, as it is sometimes quite inconspicuous while it may occasionally be broad and conspicuous at the sides of the two basal and on most of the third segments, or there may be only two small brownish red spots on the third segment in addition to the brownish red sides of the two basal segments; pubescence forming rather conspicuous grey triangles (diminishing in size) on the middle of the second to fifth hindmargins and extending almost to the foremargins at their points, and the grey pubescence about the hind corners of the second segment and about the sides of the third to fifth segments almost forming the usual rows of grey side-flecks so frequent in the *Tabanidæ*, and to confirm this there are (when seen from behind) faint indications of a middle and two side rows of rather large brownish spots, while on each side of the middle triangle of grey pubescence the abdomen is blackish; hindmargins of the fifth to seventh segments rather ferruginous (especially towards the sides) though any pale hindmarginal fringes are very indistinct; sidemarginal pubescence mainly pale but including a few black hairs on the basal part of the segments. Belly sometimes all greyish black, or at other times with the upper reddish markings showing through but varying on until the sides are extensively dull brownish red, while in extreme cases only the large basal spot is blackish with the tip and the broad middle stripe (nearly one-third of belly) greyish black, and in one case even this middle stripe is absent; second to seventh hindmargins narrowly greyish white; pubescence short depressed and pale, though a few inconspicuous black hairs occur down the middle which are more noticeable on the two or three terminal segments; there is no special tuft about the middle of the base and there are no obvious hindmarginal fringes.

Legs with the front coxæ ashy grey and bearing long brownish grey pubescence; femora all greyish black with a slight yellowish tinge and bearing comparatively short pale fringes behind, but the bare subfemoral space on the front femora contrastedly black; middle tibiæ with scarcely any longer ciliation; hind tibiæ with a slight coarse black dorsal ciliation.

Wings and halteres as in the male, but the disc of the squamæ rather paler.

Length about 13 mm., but varying from 11 mm. to 15 mm.

This species may be distinguished from most of its British allies by the absence in both sexes of any tuft of longish black hairs on the upper part of the vertex; from *T. tropicus* it may also be distinguished by its smaller size, paler hind tibiæ, shorter pubescence on the basal joint of the antennæ, and much less pubescent posterior tibiæ; *T. luridus* is a blacker species and has the frontal triangle of the female brightly shining, the eyes with longer darker pubescence in both sexes, and the eyes of the male actually touching for a much shorter distance; *T. distinguendus* and *T. solstitialis* are rather larger and have the abdomen both dorsally and ventrally much more conspicuously orange-red in both sexes, while *T.*

distinguendus has the fine downy pale pubescence on the abdomen of the female extended on to the fifth segment, the frontal stripe with longer and blacker pubescence, the antennæ redder and deeper at the hump, and the palpi larger; *T. solstitialis* has the middle tibiæ with more pubescence, the eyes with longer and more dense pubescence and those of the male with much larger front facets, and the antennæ redder. The continental *T. nigricornis* is somewhat unsatisfactorily distinguished, but has the antennæ blacker with the dorsal hump on the third joint very slightly indicated so that the basal segment of that joint appears to be longer and much thinner; it also has the eyes blackish haired, the tibiæ darker, and the abdomen with a broader black dorsal stripe on the three basal segments, with more distinctly three rows of narrower grey flecks, and not at all reddish either dorsally or ventrally. *T. borealis* is also allied, but the female has conspicuous pale hindmargins on the abdominal segments both dorsally and ventrally, and I think the male also possesses this character to a certain extent; the eyes of the male are said to have larger facets, and the antennæ are more as in *T. nigricornis*; the frontal stripe of the female broader at its lower end and consequently the lower callus wider; the palpi of the female thinner about the base, and the general tint of colour more bluish with inconspicuous grey (instead of conspicuous yellow) pubescence, and the dorsal abdominal triangles grey and inconspicuous. Other characters of *T. montanus* lie in the short pubescence of the eyes in both sexes, and the short pubescence on the frontal stripe of the female; it varies considerably in size in both sexes but is ordinarily distinctly smaller than *T. tropicus*, *T. distinguendus*, and *T. solstitialis*; the female also varies conspicuously in the amount of brownish red coloring on the abdomen both dorsally and ventrally, and to a certain extent in the distinctness of any ferruginous tint on the præalar calli. Some males from Loo Bridge seem to be very near *T. nigricornis*, as the hump above the third joint of the antennæ is not very pronounced, while the antennæ seem to be long and not much reddish about the base of the third joint, and the belly has a broad blackish somewhat interrupted middle stripe right through from base to tip; the fourth abdominal segment dorsally has only a small reddish spot. Large specimens seem to have the palpi with a more pointed pendulous tip and with more pale hairs, the thorax slightly striped with the three middle stripes well apart and inclined to curve over and unite in front, while sometimes there are distinct side stripes after the suture; the scutellum almost covered with greyish yellow dust when seen from behind; the basal segment of the abdomen with a patch of pale pubescence on each side of the scutellum. Notes on other specimens refer to the presence of fairly conspicuous pale pubescence just above the base of the wings, on the postalar calli, and on the reddish præalar calli, while the antennæ sometimes appear to be slightly longer. A rather large male from Kenmare (June 7, 1901) has the sides of the fourth abdominal segment more obviously black and the black dorsal spot longer and wider especially at the hindmargin, so that very little more reddish orange coloring is left than a pair of large spots, while the middle of the large dorsal spot on the second segment is widely greyish orange and the spot is not well extended to the hindmargin, and the middle of the fringe on the second and third hindmargins is more conspicuous and almost forms a shallow triangle. A large specimen from Kingussie (July 20, 1898) has a con-

siderable amount of pale pubescence on the disc of the second, third, and fourth abdominal segments where the ordinary grey flecks appear, and also has the apical half of the front tibiæ blackish, the pubescence behind the middle femora mainly pale, the belly with more pale pubescence on the disc and the hindmarginal fringes wider and more conspicuous while the middle of the hindmargin of the fourth segment is blackish. Another specimen (Loo Bridge, July 8, 1901) has the pubescence behind the front femora to a considerable extent pale, and the pubescence on the belly nearly all pale. I think the eye-facets of the male vary a little in size, and that in some specimens the enlarged facets are rather larger than in others, and that the contrast between the large and small facets is sometimes more defined, while the facets against the eye-touching part are not smaller than those on the middle of the eye.

T. montanus is abundant in some mountainous districts and has been taken by Colonel Yerbury in large numbers at Rannoch, Aviemore, Brodie, Nethy Bridge, and other Scotch localities, and in Ireland at Loo Bridge, Kenmare, Glengariff, etc. I have other records from Loch Duich, Braemar, Invershin, Glen Affrick, Kingussie, and Shiel House in Ross-shire, but I have no Lowland or English records. It is rather remarkable that Colonel Yerbury at Loo Bridge on July 6, 1901, and Mr W. A. Vice at Shiel House in Ross-shire were both impressed by the number of males being about equal to that of the females, as male *Tabanidæ* are usually but little seen. The dates known to me only extend from July 6 to August 6, though I believe Mr Vice took it in June. It is recorded from extreme North Europe to Austria.

Synonymy.—A male under the name of *T. montanus* in Kowarz's collection from Asch in Bohemia taken in May 1868 agrees very well with the smaller British forms, but is slightly larger and has redder antennæ than any British form. A worn female sent by me to Loew about 1874 was returned as *T. borealis*, but I have no doubt that this was a mistake caused by its bad condition. Two females of the form with the largest amount of reddish coloring on the abdomen stood in the Entomological Club collection under the label of *tropicus*. Villeneuve has suggested (Ann. Soc. Ent. Fr., 1905, 307) that *T. fulvicornis* Meig. is a variety of *T. montanus*, but I have examined the specimens in Meigen's collection and consider them quite distinct as they have a conspicuous black tuft of hairs at the top of the vertex; the specimens however belong to *Therioptectes* and consequently are not *T. græcus*, but there is a strong probability that they do not represent the species described by Meigen as he does not seem to have known that himself.

T. borealis Meig. was recorded as British by Mr E. E. Austen in British Blood-sucking Flies, p. 38 (1906) from a male taken by Mr W. R. O. Grant at Glen Avon in Banffshire on June 8, 1893. I have closely studied this specimen and am unable to distinguish it specifically from several of my specimens of *T. montanus*; unfortunately I do not possess a continental male of *T. borealis*, though I possess some females which are abundantly distinct from *T. montanus*. The facets on the upper two-thirds of the eyes are certainly larger than those on the lower part, but not more so than in some of my males of *T. montanus*, and I do not notice in these latter that the facets become smaller against the touching part of the eyes (as Brauer says they do); moreover I do not consider the change from large to small facets at all abrupt in the Glen Avon specimen. The palpi seem to have a darker ground colour; the antennæ are only reddish near the base of the third joint (as is frequently the case in *T. montanus*); the abdomen has the reddish side-markings on the second and third segments rather dull and not extending to the fourth segment, while there is no light coloring on the hindmargins except such as is caused by pale pubescence; the belly has a broad continuous black middle stripe, while Brauer

describes the stripe as considerably interrupted in *T. borealis* (though I do not place much value on that character). The specimen is rather large for *T. montanus*, but that species varies considerably in size. The points that weigh the most with me (in not considering the specimen to be *T. borealis*) are the entire absence of any pale hindmargins to the abdominal segments (the presence of which is one of the chief characters of *T. borealis*) and the extreme improbability of an otherwise unrecorded British species being first taken in the male sex only. I also consider Brauer's distinctions between many species of *Theriopectes* far too vague.

4. **T. luridus** Fallén. Tibiæ mainly tawny. Vertex without any tuft of black hairs. Abdomen with brownish red (not orange-red) lateral markings extending in the male to the second and third segments only. Wings with obviously clouded cross-veins. Frontal triangle of the female shining black.

A rather small species, easily distinguished in the female by the shining black frontal triangle.

♂. Head not specially large in comparison with the thorax and abdomen nor broader than in the female, but much flatter than in any other British species because the undersides of the eyes (when seen from in front) spread out at a much wider angle; frontal triangle glistening grey, almost silvery, but with a slight indistinct blackish streak from the antennæ to the eyes; face and broad jowls entirely pale grey, and the frons and face forming a broad shallow triangle which is twice as wide as high except that the frons extends upwards rather narrowly to a point between the eyes; face and jowls clothed with abundant long pubescence which is greyish white on the middle part but widely black all down the sides and under the eyes; back of the head very shallow but with a narrow bare glistening pale greyish yellow rim, behind which (especially on the lower part) is some minute black pubescence, and behind that again some soft pale pubescence, but the minute black pubescence dies out on the upper third of the head and leaves a rather longer inconspicuous pale postocular pubescence which again becomes slightly longer though still inconspicuous on each side of the ocellar space, and on that part there is no sign of any black hairs; frons in profile slightly produced from the eyes; lower part of the back of the head hardly inflated but the upper part retreating to the hollowed out actual back of head. Palpi greyish yellow or greyish brownish yellow; last joint broad and stout, forming a broad blunt oval which is about one and a half times broader than long, and is clothed with hardly dense longish hairs which are almost equally mixed black and whitish; basal joint clothed with longer nearly all black hairs. Eyes apparently touching for a long space but (as mentioned before) the frons extends a considerable distance upwards and the vertex extends (though very narrowly) downwards so that the actual touching part is only about one-third of the space between the occiput and the antennæ; the eyes are clothed with very dense long blackish brown pubescence, which however appears in certain lights to be brownish yellow, and the pubescence becomes sparse on the hindmargin; facets all almost equal in size; in life (according to Brauer) the eyes are green with three purple bands and a reddish lower margin. Antennæ blackish brown, but the basal joints (especially the basal one) obscured by light grey dust, and the third joint rather reddish about its base; basal joint large and bearing abundant long black pubescence (much longer than in *T. montanus*); second joint with short black pubescence, and neither of the basal joints extended forwards cap-like at its top end; third joint with a moderate but distinct dorsal hump close to the base.

Thorax and scutellum shining black, but the thorax with traces of widely separated faint grey stripes; prealar calli not at all ferruginous. Pubescence abundant, rather long and erect, mainly black but quite in front with only light grey pubescence which is composed of thinner hairs, while shorter thin light grey hairs are scattered sparsely nearly all over the disc and are rather

abundant near the wing-base; pleuræ clothed with dense long pubescence in which the grey hairs predominate except on the middle of the mesopleuræ. Scutellum with rather longer black pubescence than that on the disc of the thorax and with no thin pale grey hairs intermixed.

Abdomen shining black (much more shining than in the other species) with the sides of the second and third segments bright reddish orange, and the broad black dorsal line widest on the basal third of the second segment; the sidemargins of the second and third segments (when seen from above) appear to be obscurely blackish but this is caused by the dense erect black pubescence. Pubescence rather dense and mainly black, but there is a distinct small greyish white tuft on the middle of the hindmargin of each segment and the outer thirds of the hindmargins of the second and third segments bear obvious whitish grey fringes, while the hind corners of the basal segment are broadly clothed with pale hairs, and just the hind corners of the fourth, fifth, and sixth segments have a tuft of whitish pubescence, and the protruding genitalia bear whitish hairs. Belly mainly reddish orange, but the basal segment mainly, the second segment usually, with a dorsal line and two oblique streaks, the end part of the fourth segment, and the whole of the succeeding three segments, blackish; the segments have narrow whitish hindmargins which bear whitish fringes, and these fringes are rather conspicuous on the second, third, fourth, and sometimes fifth hindmargins; pubescence on the rest of the belly black but not short on the middle of the segments and rather tuft-like on the middle of the hindmargin of the basal segment, but the side flanges which overhang the basal segment bear pale hairs; the usual black bristly hairs on the seventh ventral segment are present but are not very conspicuous. Genitalia with two long blackish lamellæ protruding from the middle third of the hindmargin of apparently the sixth dorsal segment because the true sixth segment is very small.

Legs mainly black, but the tibiæ extensively dark brownish orange on about the basal half of the front pair, on all the middle pair except the tip, and on all the underside of the hind pair except at the tip, while the upper side of the hind pair is usually blackish brown, and just the base of the posterior tarsi is brownish orange. Pubescence all black, rather abundant on the femora; front tibiæ with a slight ciliation behind; middle tibiæ with very long and abundant ciliation on the upper side, and with a rather shorter and less abundant ciliation on the underside; hind tibiæ with a coarse dense ciliation on the upper side, and a shorter and finer but equally dense ciliation on the underside, and with a few long thin hairs there; front tibiæ about the tip and the front tarsi with rather numerous "touch-hairs." Pulvilli dark yellowish brown; claws black but indistinctly brown about the base.

Wings rather smoky brownish; costal and subcostal cells brownish yellow; stigma conspicuously blackish with a brownish surrounding, while all the cross-veins near the base of the discal cell and the base of the cubital fork are obviously blackish brown, as is also usually the upper cross-vein closing the discal cell. Squamæ blackish glassy with a slight yellowish brown tinge, and with the usual yellowish tuft at the angle. Halteres brownish black.

- ♀. Very similar to the male. Frontal stripe greyish yellowish brown or dark ashy grey, not three times as long as its broadest part (top) and very gradually diminishing in width from the vertex to the frontal triangle; lower callus shining black and bare, slightly broader than high and usually rather rounded above so that it does not extend to the eyes except at its lower edge, and it amalgamates in colour with the shining black frontal triangle and is only separated from that by the transverse line which bounds the lower callus against the slightly inflated frontal triangle; lower callus united by a black middle line (varying in breadth and distinctness) with the unusually large elongate oval or peg-shaped dull black middle callus, and this middle callus is not very sharply defined but occupies about the middle third of the frontal stripe without ever extending outwards to the eye-margins and is sometimes connected indistinctly by a line with the upper callus which is rather triangular in shape and includes the shining black or chestnut ocellar space; pubescence of the frontal stripe unusually long and comparatively abundant, often almost all black but usually with obvious

greyish white hairs on the space between the middle and lower calli, and usually with numerous pale grey hairs interspersed among the black hairs; most of this pubescence slopes forwards but the usually exclusively black less dense hairs on the top third are distinctly longer and more erect and practically form a tuft behind the ocelli; *frontal triangle* polished *shining black*, sometimes shining chestnut on its middle part, but with a yellowish grey marginal front line undulating above the antennal pits; face and side-cheeks whitish grey, though the upper part of the side-cheeks is usually more yellowish grey, and clothed with abundant long pubescence which is white all over except on the upper part of the side-cheeks where there is a largish patch of black hairs (very rarely quite absent); jowls and just the lower part of the back of the head also clothed with similar whitish pubescence of which the yellower pubescence of the prothorax seems to form a part; postocular rim bare and whitish, while just behind it is a greyish white rather short ciliation which becomes rather longer on the upper quarter, and slightly longer still (though inconspicuous) behind the black hairs of the vertex; actual back of the head greyish white; ocellar tubercle obvious. Palpi yellowish with a faint brownish tinge, bearing numerous short depressed black bristles on about the apical half, but with more abundant depressed short thin white hairs intermingled with the black bristles on the rest and with much longer whitish pubescence beneath near the base; basal joint with long whitish pubescence; second joint about three times as long as its broadest part, fairly stout near the base, but equally tapering thence to a sharp point, though from other points of view the inner side curves sharply inwards just after the middle. Eyes with very dense dark brown pubescence, longer than in the allied species but shorter than in the male and becoming sparse towards the hindmargin; even in dried specimens three purple bars not wide apart of which the middle one is level with the lower part of the lower callus can sometimes be traced. Antennæ almost as in the male, but the pubescence on the basal joint much shorter, and the short bristles on the upper side all black, though the longer hairs are considerably or nearly all whitish; basal joint almost covered with conspicuous pale grey dust; third joint more stoutly built and its dorsal hump more pronounced, but varying in colour from practically all blackish to all (except the stout jointed style) dull reddish.

Thorax similar to that of the male but slightly greyer and with four faint grey stripes; præalar calli inclined to be brownish; pubescence including more pale grey hairs, which form a tuft above the wing-base and on the back part of the postalar calli. Scutellum with rather notable long pale pubescence about the margin.

Abdomen also conspicuously shining but broader and more ovate than in the male, and with the reddish orange side-markings usually more restricted, and with traces of steeply sloping side-flecks; ground colour more greyish black, and in the specimens which have the most extended reddish orange coloring the outer thirds of the second and third segments are reddish orange except for a rather large blackish indefinite spot on each side of the third segment which extends triangularly nearly half-way inwards across the reddish coloring, and for the trace of a dark spot on each side of the second segment; the more usual extent of the reddish orange or dull ferruginous coloring includes the outer thirds of the second segment except that the middle part of the sides is blackish, while the inner margin of each ferruginous part runs out on to the dorsal black stripe as a pale greyside-fleck which slopes outwards to the hindmargin and is rendered more conspicuous through the pale grey pubescence on it, and the second segment has the ferruginous coloring limited to an arc on the foremargin near each side and a spot nearer the middle of the segment (well remote from fore or hind margin) from which a fainter sloping side-fleck is indicated by less conspicuous pale grey pubescence; and in the darkest specimens the ferruginous coloring is reduced to the basal corners of the second segment and to two spots which indicate the ends of the side-flecks, and I have seen a specimen in which even these markings are very faint; hindmargins of segments grey with a slight ferruginous tint at the actual margin, and with a small triangular patch of pale pubescence on the middle of each which may rest on a slightly grey

ground colour (occupying only about one-fifth the length of the segment). Pubescence pale grey (as mentioned before) on the side-flecks on the second and third segments and on the small dorsal triangles, and also on the sides of the hindmargins from the second segment onwards, while the pubescence on the sides of the two basal segments is rather dense and pale but not very short, and that on the other parts of the abdomen is very short, sloping and black, though slight indications of side-flecks on the fourth and fifth segments are caused by scattered pale hairs on those parts. Belly greyer than in the male and with the ferruginous part restricted to parts of the outer thirds of the second segment and most of the third segment except the sides and middle of hindmargin, though in dark specimens scarcely any ferruginous coloring exists; pubescence ubiquitous and rather conspicuous, pale and sloping, and with scarcely any trace of erect black hairs on the last segment.

Legs dull black, but the tibiæ conspicuously orange-red except at just the tip of the posterior pairs and on about the apical half of the front pair, posterior tarsi more reddish orange at the base and the middle pair extensively so on the underside. Pubescence on the front femora abundant and mostly black, but on the posterior femora nearly all conspicuously greyish white though black about the base of the middle pair; posterior tibiæ with much shorter and less conspicuous pubescence than in the male, though the coarse black dorsal ciliation on the hind tibiæ is conspicuous.

Wings, squamæ, and halteres as in the male.

Length about 13 mm.

This species varies but little in the male beyond what has been mentioned in the description, but there is occasionally a slight trace of reddish orange on the fourth abdominal segment adjoining the spot on the third segment near its inner margin; while the variation in the amount of reddish marking on the abdomen of the female is considerable but has been also given in the description. It is an easily recognised species in the female as it may be immediately distinguished from all its allies by the shining black frontal triangle as well as by numerous other characters, such as the broader more hairy frontal stripe, the longer darker haired eyes, the larger longer haired basal antennal joint, the less drooping less tapering and less black-bristled palpi, etc., but the male requires closer examination as at first glance it resembles *T. montanus*. The male of *T. montanus* has longer and more pointed palpi, smaller basal joint of the antennæ which bears much shorter hairs, eyes with shorter paler pubescence and less equal facets and actually touching for a much longer space, duller thorax and abdomen, browner posthumeral calli, much narrower black dorsal stripe on the abdomen, and usually more extended reddish coloring on the first and fourth segments and the dorsal grey spots broader, legs with paler less pubescent tibiæ and paler haired femora, and wings without any clouded cross-veins. No other continental species can be confounded with the female. Both sexes are easily known from their allies by their brightly shining appearance.

T. luridus was first recorded with certainty as British from a number of females taken by Colonel Yerbury at Nethy Bridge in Inverness in June 1900, and it was again taken by him in considerable numbers in June and July 1905 at both Nethy Bridge and Brodie, while on June 9 and 10 he took four males at Brodie. His dates range from June 5 to July 1, though in writing to Mr Austen he said, "In May 1905 it was met with "in numbers near Nairn, when both sexes were found sitting on a sandy "road leading to Maviston Sand Hills," and he states that it appears to be an earlier species than *T. montanus*. Previous records exist but probably refer to some other species, though Duncan's record (1837) of "Sutherland-

“shire and vicinity of Jardine Hall, Dumfriesshire, *Sir William Jardine*, “*Bart.*,” may be correct; Stephens recorded it as occurring near London, and Walker says “Generally distributed (E. S.),” but both records are probably incorrect. It is said to occur from Lapland to Middle Europe.

Synonymy.—Schiner apparently mixed up *T. luridus* with *T. tropicus*, and Loew's *T. luridus* is also mainly founded upon *T. tropicus*. Six females in Bigot's collection under the label of *T. luridus* were in my opinion three *T. tropicus* and three *T. solstitialis*.

5. **T. distinguendus** Verrall. Tibiæ mainly tawny. Abdomen very extensively bright brownish orange even to the fourth segment in both sexes. Eyes of the male with rather large front facets which are not very abruptly contrasted with the smaller facets, and with dense short brownish pubescence.

A rather large species, with the abdomen very extensively bright brownish orange except for the narrow black dorsal line and tip; exceedingly closely allied to the next species.

♂. Head rather large; frons greyish white, glistening when seen from above but blackish brown when seen from below; face ashy grey with broad dark grey side-cheeks, and with an indefinite paler grey eyemargin extending from the antennæ down the sides of the face right round until half-way up the back of the head; the dark grey cheeks beset with rather dense and rather long (though less conspicuous than in *T. tropicus*) black hairs (bleached at their tips) which extend right round beneath the eyes but become rather shorter and stiffer as they approach the lower part of the back of the head; just the inner sides of the cheeks with pale greyish yellow hairs which overhang the sunken bare epistoma; mouthmargin rather narrowly and the back of the mouth wholly and extensively clothed with longer shaggier yellowish grey hairs, which extend up quite at the back of the head and mingle with the similar pubescence on the prothorax, but the hollowed-out back of the head bears some shorter thin greyish hairs; in profile the frons and face scarcely produced, but the jowls more distinctly so, and the part beneath the back of the eyes and up the lower third of the back of the head only very slightly puffed out, while the upper two-thirds of the back of the head are hollowed out behind the eyes; the lower third of the back of the head bears a very short almost imperceptible black postocular ciliation, but above that a rather close more erect pale postocular ciliation can be seen which is still very short for the middle third, but which grows slightly longer though still short about the top third, nor does it become perceptibly longer behind the vertex except for a slight fringe at the actual corner of the eye, but there are a few (two to six) rather longer blackish hairs behind the ocelli which bend slightly forward; vertical space small, distinctly elevated, shining chestnut; frons quite bare, grey but when viewed from in front with large obscure splashes about the angles of the eyes and with a slight darkening between the antennæ and the eyes. Palpi (fig. 227) with the end-joint broadly oval, not twice as long as broad, ending bluntly or in an inconspicuous point on which is sometimes a slight clump of short black bristles though more commonly these bristles merge into those near; this end-joint may be all blackish grey except for the obscurely orange tip and inner side, or may be dull orange with a slight blackish grey tinge on about the basal half and with a whitish grey tinge beneath; sometimes the pubescence may be almost all pale, though more commonly the rather short and rather numerous hairs on the middle part and up to the tip are black, but with a longer pale yellow fringe all along the lower side and with numerous longer pale yellow hairs about the upper side and base, though the hairs near the base are not so long as those on the upper side; basal joint of the palpi blackish grey, and clothed with

mixed black and pale yellow long dense pubescence. Eyes clothed with rather short very dense brownish pubescence (dark brown when viewed from above) which becomes shorter towards the hindmargin, and only in some lights appears paler on the lower part; eyes touching for quite twice the length of the frons; facets (fig. 230) on all the prominent middle and front part rather large, including all those against the junction of the eyes, and only slightly diminishing on the front margin down to the level of the antennæ, but becoming distinctly smaller on the lower third of the eyes and on a rather narrow zone running all up the hindmargin to almost the top, but the

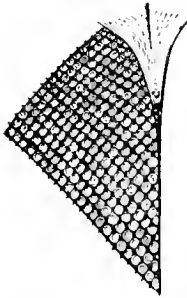


FIG. 230.—*Therioplectes distinguendus*, ♂ eye-facets. $\times 22$.

change in size nowhere abrupt and the diameter of the largest facets less than twice that of the smallest; in life the eyes have a narrow dark (almost black) band running straight across from about the middle of the frons to almost the hindmargin, and well below this is a broader vaguer band starting very slightly below the antennæ and turning upwards as it approaches the hindmargin; facets above and between these bands more reddish brown than the darker brown ordinary facets; the lower band is in some lights a rich red brown, being darker than the facets above and below it. Antennæ mainly reddish orange, but the basal joint and the end half of the third joint darkened; basal joint light greyish black, but rather obscurely reddish beneath, and bearing dorsally several long black hairs and numerous short ones, but on the sides and

beneath with some moderate black hairs about the tip, and on the rest shorter hairs as on the upper side; the basal joint barely extends cap-like over the second joint; second joint reddish (sometimes obscurely) with a rather dense circle of short black bristly hairs round the tip, which are longer below than above; third joint reddish orange (sometimes blackish dorsally and about the tip) but all the annulations after the basal one rather dark brown; dorsal hump near the base distinct but hardly pointed or hooked and bearing some tiny black bristles, while usually there are some tiny black bristles on the outer side of the segment near but not close to the base.

Thorax black, slightly shining, with very faint grey stripes and front part; the stripes are best detected when seen from behind, when they can be traced on the front part as two rather narrow stripes very wide apart with perhaps a middle stripe between, but the outer stripes are inclined to curve round in front so as to join the broader grey humeri and side stripes, and the thorax grows greyish about the suture; the large præalar calli obviously though rather inconspicuously ferruginous. Pubescence composed of fairly abundant erect black hairs which do not extend quite to the front part (where the hollowed-out head fits on), but intermixed with these are scattered sparse very depressed (almost flattened) thin greyish hairs which become dense and more erect on the front part where there are no black hairs and there are some long more erect rather shaggy pale hairs on the humeri and also some others near the mesopleural suture, but all these hardly obscure the ground colour; pleuræ with dark sometimes almost black pubescence on most of the mesopleuræ, but with more conspicuous large tufts of yellow or grey hairs on the pteropleuræ and especially on the metapleuræ, while the intermediate space bears greyish yellow hairs. Scutellum black, slightly shining, but greyish on the disc, and with pubescence similar to that on the thorax but with several longer yellowish hairs intermixed with the black hairs towards the tip.

Abdomen mainly bright brownish orange with a narrow interrupted dorsal line and the tip black; basal segment black at the base but with the black colour narrowing to about one-third of the hindmargin, and with the extreme sides black; second segment with the middle eighth (or less) black but not quite to the hindmargin; third segment with the middle tenth (or only a narrow line) black but also hardly to the hindmargin, and with its sides slightly blackened; fourth segment normally with the middle quarter (or thereabouts) and the sides more extensively blackened, and often the intermediate space darker brownish orange; fifth and sixth segments black; there are small not very con-

spicuous nor well defined shallow triangles of whitish yellow hairs at the middle of the second, third, and fourth hindmargins, and after an interval the rest of each of those hindmargins has an orange fringe, and this fringe grows a little longer at the hind corners of the fourth segment; fifth hindmargin with the yellow fringe longer and more restricted to the side quarters; sixth segment with longer yellow hairs on just the sidemargins; genitalia with distinctly longer pale yellow hairs at the sides; the remaining pubescence on the abdomen very short, dense, inconspicuous, and to a large extent black, but large triangular patches of tiny yellow hairs exist on the parts of the second and third segments where the usual grey side-flecks occur in *Tabanus*, and sometimes these flecks can be traced on the fourth segment, while the basal segment may have similar yellow hairs on the orange part; sidemarginal pubescence black, except narrowly at the ends of the segments and on the sides of the sixth segment, and (when viewed from above) the short black pubescence darkens the sides of the second, third, and fourth segments. Belly orange on the four basal segments except for a small black spot at the middle of the base, but the end segments all blackish; pubescence short, dense, and pale yellow, but longer and all black on the basal black spot; sometimes the fifth and sixth (or even slightly the extreme base of the fourth) segments have a few black hairs about the middle near the base; seventh segment with several longer stiffer black hairs all about the middle. Genitalia with a large lateral and ventral plate which has rather obscure orange margins; near the upper part is a pair of greyish brown or brownish black two-jointed lamellæ the basal joint of which is orange beneath and of which the subquadrate widened end-joint has an orange end or is wholly orange, and below these are two long narrow bare shining chestnut lamellæ.

Legs black, but the extreme tip of the femora and almost all the tibiæ brownish red; front tibiæ growing blackish on the apical half, and the extreme tip of the posterior tibiæ darkened; posterior tarsi with the basal joint brownish red except at the tip, and the other joints brownish red about the base and on the short terminal spines, while the front tarsi usually have the junctions of the joints reddish orange. Pubescence on the front coxæ long and pale grey in front but partly black behind, and rather shorter and black though still abundant at the front and sides of the apical part; front femora with a rather dense not very long black pubescence behind; middle femora with similar but shorter pubescence which is however greyish on the apical part, and with longer less dense black pubescence beneath; hind femora with still longer but not dense black pubescence beneath, and with some dorsal pale hairs near the base; front tibiæ with only slight ciliation; middle tibiæ with long delicate not dense black pubescence all over, but especially beneath and behind (though not so conspicuous as in *T. tropicus*); hind tibiæ with a conspicuous coarse black rather antero-dorsal ciliation all the length except at just the base, and with a finer less conspicuous partly pale ciliation beneath (except on the apical quarter), and with a not very conspicuous thin sparse longer almost antero-ventral ciliation; the tiny postero-dorsal and dorsal bristles on the hind tibiæ are mostly yellow on the basal two-thirds with only scattered black ones intermixed, but on the last third they are all black.

Wings slightly smoky, with a more distinct smoky tinge on the front part and the foremargin above the subcostal vein tinged with orange; the base, and the upper margin of the stem of the postical vein, also tinged with orange; stigma composed of only the dark thickened end of the subcostal vein; mediastinal, basal half of radial, and stem of postical, veins rather orange; subcostal vein with abundant minute black bristles from the humeral cross-vein to the tip. Squamæ glassy blackish or brownish tinged, with the margin of the alar pair blackish; thoracal pair more smoky brownish, with a scarcely darkened margin; fringes slight, except for the usual dull yellow tuft at the angle. Halteres dark brown.

♀. Very much like the male, but the thorax more greyish black and the abdomen still more extensively orange.

Frontal stripe (when seen from behind) brownish above but becoming more brownish orange about the middle and more yellowish just above the lower

callus, or (when seen from in front) all more equally pale brownish orange, slightly contracting from the upper part down to the front eye-angles, and nearly four times as long as its widest part or six times as long as its narrowest part; lower callus shining black and almost quadrate or even higher than broad and in perfect specimens not absolutely touching the eyes at any part, and connected by a narrow black line with the long narrow black middle callus; ocellar tubercle conspicuous, shining dark chestnut; pubescence of the frontal stripe (when seen in profile) rather dense, rather short, mixed black and yellow with the yellow hairs thinner but rather predominant, and usually with some hairs sloping forwards and some backwards, while above the ocelli the pubescence is rather longer, curved forward, and all black except for sometimes a few pale hairs close against the occiput; side-cheeks and jowls with mainly pale yellow silky hairs, which are not so dense or long on the cheeks as is the black bushy pubescence of the male; there are sometimes a few shorter inconspicuous black hairs near the eyemargin on the upper half (or sometimes more) of the face and sometimes a few inconspicuous black hairs on the upper middle part of the face; pubescence on the lower part of the jowls and all about the back of the mouth longer and pale yellow, rather dense and conspicuous; all along below the eyes and up all the back of the head to the vertex is a narrow dull pale yellow bare rim, behind which is a rather short though rather crowded ciliation of brownish yellow hairs which only extends to the upper eye-angle; back of the head all light grey and bearing below the vertex some long pale hairs; frontal triangle bright ashy grey, quite bare but with a distinct middle furrow; antennal pits rather orange. Palpi (fig. 227) rather pale dull luteous but varying to orange, usually almost obscured by the short dense depressed black bristles amongst which on the basal part (especially above) are some less distinct thin smaller pale yellow bristles intermixed, but sometimes the numerous short black bristles are almost confined to the apical two-thirds and occur only sparsely before the middle, while the basal part has only the smaller thin inconspicuous pale yellow bristles; palpi nearly four times as long as their broadest part, rather broad from the base up to about the middle, after which they droop and gradually diminish to a moderate point, quite bare on all the inner side but with a few longer pale hairs beneath about the base, basal joint blackish grey but covered with greyish orange dust and bearing long pale pubescence, though occasionally with one or two black hairs on the outer side near the tip. Eyes clothed with short dense dark brownish pubescence, which becomes very sparse or even absent on and near the hind and upper margins, and which in some lights appears paler on the lower part; the eyes in life green with a strong brownish coppery tinge, and bearing three rather narrow dark purple bands, of which the middle one is level with the lowest part of the frontal callus but does not quite reach the hind-margin, while the upper and lower bands are equidistant from the middle band and somewhat approach each other at the back after the middle band has ceased, lower margin of the eyes not purplish though apparently darkened in some lights. Antennæ with the basal joint covered with greyish orange dust on apparently a blackish orange ground colour and bearing numerous long thin pale hairs (most obvious on the underside) and several short black bristles above on the apical half which vary considerably in quantity; this basal joint extends rather cap-like over the short obscure reddish orange second joint and this second joint bears a circle of short black bristles around the tip which are rather longer on the underside, and of which sometimes only those on the underside are visible; third joint reddish, but darkened dorsally after the hump and with the annulations darkened; hump distinct and bearing tiny black bristles, the depth of the segment at the hump being fully two-thirds its length.

Thorax tinged more greyish brown or blackish through the orange pubescence and more obviously striped, there being (when viewed from behind) three greyish stripes down the disc, of which the middle one is rather narrow and the side ones (not far away) wider but only distinct in front and just below the suture, while on the broadest front part they have a tendency to curve over to the vague grey side-stripes which extend back to the wing-base, and the grey part just below the suture has a tendency to unite with other vague grey stripes

which lie about half-way between them and the wing-base; præalar calli sometimes only indistinctly ferruginous. Pubescence shorter and less dense than in the male, but much more composed of pale yellow hairs along the sidemargins, while on the disc there are more depressed thin short pale hairs; pubescence on the pleuræ, especially on the back part, paler brownish yellow and more conspicuous. Scutellum greyish black, with mainly pale pubescence about the tip.

Abdomen more quadrate than in the male because the fifth and sixth segments are practically as wide as the fourth, and with slightly more extended paler orange coloring because the black dorsal line (though broader) is less defined and becomes vaguer on the hind half of each segment through the greater extent of the rather vague triangles of pale yellow pubescence, and the whole abdomen appears to be more pale orange because of the universal short dense depressed orange pubescence on the whole of four basal segments (except on the black dorsal part), while the hindmargins of all seven segments have pale orange fringes, and there is a small amount of scattered depressed pale pubescence on the fifth and sixth segments (where the usual *Tabanus*-like side-flecks should be), as well as on the sidemargins; otherwise the fifth and sixth segments bear rather longer more erect black pubescence, and the small seventh segment also bears some longer erect black hairs; the triangle of pale hairs at the middle of the hindmargin of each segment rests on a slightly grey piece of ground colour and extends more than half-way up the segment; lateral margins of the dorsal plate beginning with a blackish grey metathoracic plate, then with a fair-sized blackish grey spot on the first segment, followed by a dark line on the second segment, while the brownish colour on the third and fourth segments is widely spread and merges into the blackish colour of the fifth and sixth segments. Belly orange with a small blackish spot at the middle of the base but becoming mainly brown on and after the fourth segment; clothed all over with dense short depressed pale yellow pubescence, but the seventh segment with some longer erect black hairs.

Legs colored as in the male, but the pubescence shorter and less conspicuous and decidedly more pale on the hind femora and tibiæ; front coxæ with more conspicuous all pale yellow pubescence; the tiny pubescence on the front tibiæ mainly pale yellow on the basal two-fifths, and on the middle tibiæ on the basal three-quarters, and the middle tibiæ do not bear the long delicate black pubescence which is conspicuous in the male but have a shorter sparser rather inconspicuous mainly pale dorsal pubescence (much less abundant and less evident than in the female of *T. solstitialis*) and a slight short ciliation on the underside (though an isolated black hair or two may be intermixed) and the apical quarter bears only shorter black bristly hairs though sometimes the black hairs predominate on the upper side; hind tibiæ with short pale pubescence on the basal three-fifths, and with the dorsal ciliation less strong and coarse and conspicuously pale on usually more (though sometimes less) than the basal half, though this pubescence becomes rather coarse and black on the apical third, but on the underside the pubescence is all slight short and pale except at the tip.

Wings, squamæ, and halteres as in the male.

Length about 14.5 mm., but varying from 13 mm. to 15.5 mm.

This species varies but very little; the dorsal black line down the abdomen may vary a little in width and in intensity, and sometimes in the male the middle quarter of the abdomen may be darkened by a parallel-sided dorsal stripe to the end of the fourth segment, though the usual reddish markings are still quite traceable, and this makes the whitish triangles more distinct, even on the fifth segment; the palpi of the male vary from dull orange to blackish grey, and the short black bristles on them vary in amount in both sexes; the antennæ are always mainly reddish, but the basal joint is often darkened, and the amount of dorsal darkening on the third joint after the hump and of black hairs or

bristles on the two basal joints varies; the amount of black pubescence on the tibiæ varies a little; and the belly is sometimes rather obscured on the orange part. Some of the Nethy Bridge specimens of the female have a tendency to be larger, with the third and fourth segments of the abdomen rather darker at the sides and more inclined to black pubescence, while the fifth segment shows very little soft yellow pubescence, and the bright coloring of the abdomen is a little more rufous. A female from Spey Bridge shows the reddish colour on the fourth abdominal segment only by the reddish pubescence. A female taken by Colonel Yerbury at Golspie on June 21, 1904, has the third veinlet from the discal cell (which should separate the third and fourth posterior cells) missing in one wing and very imperfect in the other.

This species is very closely allied to *T. solstitialis* (as I interpret that) but the male may be distinguished by the merely comparatively large indistinctly contrasted front eye-facets, by the shorter browner pubescence of the eyes, by the absence of obvious pale postocular pubescence on the upper part of the back of the head, by the larger size and by the less sharply margined orange markings on the abdomen; while the female is distinguished by the reddish colour on the abdomen extending to the fourth segment, by the darker colored more black-bristled palpi which are thicker at the conspicuous knee-like bend, by the shorter pubescence on the middle tibiæ, by the rather larger size, and from all species by the ubiquitous soft yellow pubescence on the four basal segments of the abdomen. From even the reddest forms of *T. tropicus* it may be distinguished by its still more reddish abdomen, shorter haired middle tibiæ, less blackened hind tibiæ and tarsi, and the less black pubescence and tiny bristles on all the tibiæ, and its larger less black-bristled palpi, and from all other species it may be distinguished by the predominating bright brownish orange coloring on the abdomen. The North American *T. affinis* is exceedingly closely allied, but has a wider and more equally wide frontal stripe in the female on which is a wider middle callus, and has longer darker antennæ, longer rather more equally thick palpi, browner wings, and a more dull orange belly on which the fifth segment and the last two hindmargins are more inclined to be orange; further distinctive notes are given below in the synonymy.

T. distinguendus is one of the commonest British species of the genus *Tabanus* (in the widest sense) and I have records from Cornwall (Bude), Devon (Torcross, Avon Valley, Stowford Cleeve, and Sidmouth), Dorset (Studland), Hampshire (New Forest), Sussex (Bedgebury Park), Cambridgeshire (Chippenham Fen, common), Suffolk (several localities *t. C. Morley*), Norfolk (Mundesley), Berkshire (Tubney Wood), Herefordshire (Tarrington), Warwickshire (Sutton Coldfield), Cumberland (Ullswater), Merioneth (Barmouth), Glamorgan (Porthcawl and Crymlyn Bog), and in Scotland Colonel Yerbury has taken it at Nethy Bridge, The Mound, Nairn, Brodie, Rannoch, and Aviemore, while other records include Argyllshire and Arran; I suspect also that Colonel Yerbury's Kenmare specimens belong to this species; I can vouch for almost all these records as I have seen the specimens. The dates extend from June 14 to September 2, and it is curious that one of the earliest dates (June 15) is from Nethy Bridge, while the latest (September 2) is from Torcross. Colonel Yerbury has seen the males hovering over roads through woods, and he has stated that

the bite of the female although not painful is very severe and draws blood more often than that of any other species.

Synonymy.—It is with considerable misgiving that I propose a new name for this common species, but after prolonged study I am unable to identify it with any named species; Pandellé found the same difficulty in reconciling his Pyrenean specimens with Brauer's description, and therefore it is most probable that he had *T. distinguendus* before him. It is exceedingly close to the two species described as *T. solstitialis* and *T. Muhlfeldi* by Brauer, but Brauer's *T. solstitialis* has the eye-facets of the male very much enlarged on all the front and upper part of the eyes and strongly contrasted with the small facets on the lower part, and this is confirmed by three males in Kowarz's collection from Franzensbad in Bohemia. A female of this species which was taken at Braemar on July 21, 1873, was sent to Brauer before his monograph was published, and was returned by him as *T. solstitialis*; it was a specimen which had the basal side-corners of the third and fourth abdominal segments rather obviously blackened and black haired, but the fourth segment otherwise very strongly red, and the pubescence on the middle tibiae rather conspicuous. Another female sent to Brauer at the same time, taken at Lyndhurst on June 30, 1874, was certainly one of the next species, so that it is obvious that Brauer had not a very definite opinion about these closely allied species. Some females in Kowarz's collection under the name of *T. solstitialis* (one from Mannhartsberg in Lower Austria, one from Herculesbad, and one from Marienbad) are very close to *T. distinguendus* but are I consider not quite conspecific; they have the frontal stripe almost wholly black haired, the middle callus rather broad and not always connected with the front callus; frontal triangle more yellowish; upper part of the side-cheeks with more black hairs; palpi less dilated at their thickest part and then abruptly bent downwards, long and blunt-tipped, with black bristles predominating but with pale ones intermixed right up to the tip; basal joint of the antennae with fewer long hairs beneath, and the third joint with its basal segment brighter red and not darkened dorsally; thorax more distinctly striped and with more obvious brownish yellow pubescence intermixed with the erect black hairs; præalar calli hardly ferruginous and mainly black haired; abdomen with the black dorsal stripe much broader at its narrowest part (almost one-third the segment) and the orange part more reddish and not extending to the fourth segment, though that segment may be reddish along the sides of the hind-margin; sidemarginal pubescence all pale even to the end of the sixth segment, and the general pubescence all reddish orange without being soft and ubiquitous; hind-marginal hems narrowly whitish, especially against the dorsal triangles of the second, third, and fourth segments. A male from Greece (Sir S. S. Saunders) is almost identical with *T. distinguendus* but is smaller, and has a ciliation of short inconspicuous postocular black bristles all the way up the back of the head (a not very trustworthy character), and also has the narrow part of the abdominal black dorsal stripe interrupted at the hindmargins of the second and third segments. One or two details in Schiner's description of *T. solstitialis* would appear to indicate *T. distinguendus*, for instance such as his emphasising the orange præalar calli and the large extent of the orange abdominal coloring, but it cannot be doubted that Brauer fully understood Schiner's very common species. Two males and several females in Bigot's collection under the label of *T. solstitialis* belonged to *T. distinguendus*, and Walker's *T. tropicus* must also refer to this species because he speaks of it as being "generally distributed." In Meigen's collection at Paris there is a solitary female representative of *T. solstitialis*, which clearly belongs to the next species.

Since writing the above, Lundbeck has considered the males of this species as conspecific with *T. Muhlfeldi* Brauer, but he has only doubtfully identified the female; he has had Brauer's original type of the male before him and may be correct, but in view of the other closely allied species to which I have referred I leave my description and name intact.

6. *T. solstitialis* Meigen. Tibiæ mainly tawny. Abdomen very extensively bright orange, but with no orange markings in the female on the fourth segment. Eyes of the male with the front facets very con-

siderably larger than the lower ones, and with dense rather long pale brownish pubescence.

Extremely closely allied to *T. distinguendus*, but slightly smaller.

♂. Compared with *T. distinguendus* the postocular fringe near the vertex is slightly longer but sparse, and there is a row of short black bristles against its front margin. Palpi with the basal joint bearing only a few long black hairs (among the pale ones) on the underside near the tip. Eyes clothed with distinctly longer and paler brownish yellow pubescence which is also more extended to the hinder part of the eyes, where however it becomes shorter; facets (fig. 231) considerably larger than in *T. distinguendus* on the prominent front part, being about three times as large as the small facets, and the large facets extending up to the touching part of the eyes but not sharply contrasted with the small facets anywhere. Antennæ as dark as the darkest forms of *T. distinguendus*.

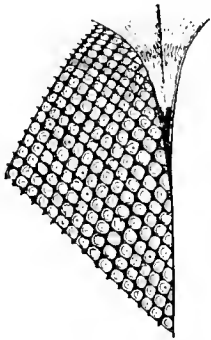


FIG. 231.—*Therioplectes solstitialis*,
♂ eye-facets. × 22.

Thorax and scutellum blacker, and with more depressed thin pale grey pubescence on the thorax especially on the back part, above the wing-base, and on the postalar calli; præalar calli less extensively reddish; pleuræ with very few and indistinct black hairs.

Abdomen narrower, more shining, more tubular, and more acuminate than in *T. distinguendus*, with the orange markings forming a more defined yellower spot on each side, and when viewed from behind with a much more whitish gleam almost as in *T. tropicus*; the dorsal black stripe occupying nearly the middle quarter of the second segment, but only about half as wide on the third segment though widening a little towards the hindmargin; fourth segment all black except for two sharply defined reddish orange spots against the foremargin placed about half-way between the middle and the sides and extending rather more than half-way down the segment; side-marginal pubescence all distinctly longer. Belly with no tufts of pubescence, but with the pubescence mainly black on the fourth and fifth segments.

Legs with the front tibiæ less blackened, the middle tibiæ yellower, and the hind tarsi more reddish orange about the base; front coxæ with more pale pubescence especially on the back part; femora with rather paler posterior pubescence; middle tibiæ with possibly rather longer ciliation, and the hind tibiæ with a slightly longer and more conspicuous black antero-dorsal fringe.

♀. Very much like the female of *T. distinguendus* but rather smaller, and the fourth abdominal segment without any reddish coloring. Frontal stripe with the general tomentum greyer, and with distinctly longer more black pubescence, the shorter thinner pale pubescence being less conspicuous; frontal stripe narrower at its lower end, and the middle callus more linear; face, chin, and jowls with the pubescence more greyish white, and the bare rim against the eyes greyish white and less conspicuous. Palpi with the end-joint pale yellow and dilated on the basal third, but after that drooping a little and gradually diminishing to a rather blunt tip, the small black bristles confined to about the apical half and not at all dense, or even limited to a few on the underside near the tip; basal joint covered with light grey dust and bearing long pale pubescence. Eyes rounder than in *T. distinguendus* and bearing longer paler more abundant pubescence. Antennæ almost as in *T. distinguendus* but sometimes many of the long hairs beneath the basal joint are black, as are sometimes most of the short bristly hairs on the upper side, though sometimes these black bristly hairs are confined to just the tip; second joint with the circlet of apical black bristles longer and more hair-like beneath.

Thorax blacker than in *T. distinguendus* and with pale grey instead of brownish yellow pubescence; outstanding black pubescence between the humeri and the wing-base more conspicuous; præalar calli not at all ferruginous; pleuræ with apparently all whitish grey pubescence, the few sparse black hairs intermingled on the mesopleuræ being very inconspicuous.

Abdomen with no reddish coloring on the fourth segment and without the ubiquitous soft-tinted yellow pubescence of *T. distinguendus*, but with a few black hairs on the foremargin of the second segment not far from the basal corners, and with a large number of black hairs near the sides of the third segment; the pale hindmarginal fringes less continuous and less conspicuous and the middle triangles smaller; the black dorsal line more broadly and determinately black and widening out a little on the hindmargin of the third segment; when viewed laterally the fourth segment is all blackish except for a very indistinct ferruginous sidemargin. Belly with usually the fourth and sometimes the third segment considerably obscured, and often with a few longer erect black hairs on the middle part of the fifth and sixth segments though not nearly so many nor so conspicuous as on the seventh segment.

Legs almost as in the female of *T. distinguendus*, but with longer pubescence on the middle tibiæ which forms a rather long delicate dorsal ciliation much more conspicuous than in *T. distinguendus* but not quite so conspicuous as in *T. tropicus*.

Wings and halteres as in *T. distinguendus*, but the squamæ more whitish.

Length about 14 mm.

This species is very closely allied to *T. distinguendus*, and also in many ways to *T. tropicus*; it is however in both sexes a slightly smaller and more sharply marked species than either of them. The male may be known from *T. distinguendus* by the larger front eye-facets, the longer paler pubescence on the eyes, the longer sidemarginal pubescence on the abdomen, and the presence of black pubescence on the fourth and fifth ventral segments. The female has no reddish orange markings on the fourth abdominal segment, and has some black pubescence on the third segment in contrast to the ubiquitous soft yellow pubescence of *T. distinguendus*. *T. tropicus* is a larger broader insect with far less orange abdominal markings, and with longer and more abundant ciliation on the middle tibiæ. The female of *T. solstitialis* has long been known to me, but I had not seen a satisfactory English male until Dr J. H. Wood sent me a male and a female in October 1907 which had been taken at the Leech Pool in Herefordshire on July 31, 1901; the male seems to differ from an old (probably) English specimen which I previously possessed and which agrees with continental specimens in having the large facets on the eyes even larger still and more abruptly contrasted with the small facets, the black dorsal stripe on the abdomen occupying only a twelfth of the second segment and still less on the third segment until it widens out to the dorsal stripe on the fourth segment which becomes as much as a third of the segment against the hindmargin, and in having no tiny black postocular bristles. The female taken by Dr J. H. Wood in company with the male has the frons with but little black pubescence (rubbed?) and slightly narrower than most of my specimens at the vertex, the palpi dull orange and less dilated at the base and more equal in size and much more extensively black-bristled even almost to the base, the black hairs on the second antennal joint not longer or more hair-like on the underside, the præalar calli more ferruginous, the grey abdominal triangles larger, the belly without black hairs and the third and fourth segments not obscured, the black bristles on the seventh ventral segment

inconspicuous, and the legs with scarcely any long ciliation on the middle tibiæ, but I do not in the least doubt its identity with the species well known to me. There are however some females which were taken by Colonel Yerbury at Kenmare and Glengariff, Co. Kerry, which are rather intermediate between *T. solstitialis* and *T. distinguendus*; they agree exactly in abdominal coloring with *T. solstitialis*, but have thinner and more pointed palpi (like Dr Wood's specimen), long haired basal antennal joints, coarse black antero-dorsal ciliation on the hind tibiæ almost up to the base, blackish pubescence behind the front femora and posterior tibiæ except for the tiny bristles beneath the basal half of the hind tibiæ, and the hind tibiæ scarcely darkened until the extreme tip; they also agree with Dr Wood's specimen in being smaller than most of my specimens, and in having the abdomen narrower but more oblong.

T. solstitialis (as understood by me) is by no means so common as *T. distinguendus*, but has occurred as mentioned above and also in Hampshire (Lyndhurst) and Cambridgeshire (Chippenham Fen) from June 24 to July 8. Brauer records his *T. solstitialis* from England to Asia Minor and North Asia, but not from South or North Europe.

Synonymy.—I do not suppose that the species I have now described is the same as most authors have recorded as *T. solstitialis*, but I am convinced that it is the same as the (apparently) type specimen of the female in Meigen's collection at Paris. I have dealt at greater length with the synonymy under *T. distinguendus*.

ATYLOTUS.

(Subgenus of *Tabanus*.)

Atylotus Osten Sacken, Mem. Bost. Soc., ii., 426 (1876).

A convenient subdivision of the gigantic genus *Tabanus*.

“Eyes pubescent, with a simple narrow purple cross-band in the middle, or unicolorous (?); no vestige of an ocellar tubercle; frontal callosity either entirely wanting or imperfect. Head rather large, very convex anteriorly and concave posteriorly. In the male, the difference in size between the large and small facets is considerable, the line of division between them distinct; palpi (♀) stout at base; third joint of the antennæ rather broad, with a comparatively short, stout, annulate portion; upper branch of the third vein knee-shaped at base, with a tendency to emit a stump of a vein; first posterior cell broadly open.”

The above quoted words are those used by Osten Sacken in his last definition of this subgenus (*Western Diptera*, 215, 1877) and are only a slight modification of his original characters. His original description said “coloration of the eyes uniform (sometimes a single indistinct stripe). The coloring of the eyes I quote after European authors; I do not know that of the American species but have little doubt, from the appearance of the dry specimens, that it is the same as in the others.” Whether he subsequently knew more about the eyes I do not know, but he had been misled as I have noted below.

I do not intend to deal in this work with the limitations of the subgenus *Atylotus*, mainly because there can be no doubt about our British species but also because we have so few species; I know however that

Osten Sacken did not admit that Brauer had properly interpreted his subgenus, and I know that Bigot had not the most elementary conception of it. Osten Sacken had however been misinformed about the coloration of the eyes in the female, as in all the living specimens (*A. fulvus* and *A. latistriatus*) I have been able to examine the opalescent eyes show a few irregular shifting spots (according to the point of view) of a very distinct nature from any others of our inclusive genus *Tabanus* (figs. 233, 234); there is however a single slight cross-band in *A. latistriatus*, but certainly not always in *A. fulvus*.

The British species may be easily distinguished from any others of the inclusive genus *Tabanus* by their mealy appearance, total absence of ocelli, bright orange antennæ, and by the recurrent veinlet near the base of the upper branch of the cubital fork, though this last character is said to be occasionally absent.

Table of Species.

- 1 (2) Abdomen brownish orange with a broad blackish dorsal stripe.

Femora in the male on at least the posterior pairs orange on at least the apical half, and in the female orange with only the base grey. A brilliant golden-hued species in life.

7 *fulvus*.

- 2 (1) Abdomen greyish brown (or partly fulvous) with two blackish dorsal stripes separated by a rather broad ashy-grey stripe.

Greyish brown species in life.

- 3 (4) Abdominal blackish stripes bowed out.

Femora with only just the tip yellow. Frontal stripe of the female narrow and parallel-sided.

8 *rusticus*.

- 4 (3) Abdominal blackish stripes not bowed out.

Femora with almost the apical half yellowish. Frontal stripe of the female rather broad and not parallel-sided.

9 *latistriatus*.

The two latter species are very closely allied, and are now for the first time closely compared. *A. plebeius* will probably occur in Britain, as it has been found in France and Denmark, and may easily be distinguished by its smaller size, long postocular pubescence, and general pilosity.

7. **A. fulvus** Meigen. Golden-hued species. Femora orange on the apical half in the male, or almost to the base in the female. Abdomen mainly ferruginous.

A very handsome golden-tinted fly when alive, very distinct from any other British species.

- ♂. Head very much arched, considerably wider than the thorax, and larger (though often only a little) than in the female. Face, including the side-cheeks, pale greyish yellow with a tinge of green, bearing short dense yellow pubescence which becomes longer about the mouth and jowls; back of the head deeply hollowed out behind the eyes and with only a microscopical brownish yellow postocular fringe; vertex greyish yellow with its point blackish, small but distinct, and with some distinct though short brownish yellow pubescence on and just behind it; frons pale greyish yellow, quite bare, depressed for a

large central space. Palpi long; end-joint elongate elliptical and barely pointed, yellow, and clothed with numerous short black bristles on all the outer side except towards the upper part but with longer pale yellow hairs about its base; basal joint also with long pale yellow hairs. Eyes clothed with dense short brownish hairs, touching for a very long space (=two-thirds the distance from the occiput to the antennæ); facets anteriorly and on almost the upper three-quarters much larger than those on about the lower quarter and on a rather broad zone which extends all up the hindmargin to the vertex, the transverse dividing line between the facets being sharply defined and sloping down from the front part until it curves round to the hindmarginal zone; in life the eyes are beautifully opalescent green and (according to Brauer usually) without any dark transverse band. Antennæ orange; two basal joints with short black dorsal bristles, but on the outside of and beneath the basal joint there are longer yellowish bristly hairs; third joint moderately long, with the dorsal hump obvious and occurring much nearer the base than the middle and with some minute black bristles on it; style-like portion rather shorter than the basal segment of the third joint, with its last segment conical and not very thin and with microscopical apical bristles.

Thorax and scutellum brownish black but rather grey on the front part, clothed with dense brownish yellow sloping and tangled pubescence, and with numerous but inconspicuous erect black hairs all over except on the front part; pleuræ ashy grey with long dense brownish yellow pubescence on the upper hind part of the mesopleuræ and on the upper and hind parts of the metapleuræ (close to the tuft on the squamæ), but more sparsely pubescent elsewhere.

Abdomen not at all conical, conspicuously brownish orange with a more or less broad (about one-third the width of the abdomen) blackish dorsal stripe and with the tip blackish, but with all the actual sidemargins orange; this dorsal stripe begins on the whole breadth of the basal segment and contracts to about the middle third of the hindmargin of that segment, and then gradually narrows to the end of the third segment, the fourth and subsequent segments being almost entirely blackish, though the orange hue may extend somewhat down the sides of the dorsal stripe on the fourth segment, and the blackish sides of the fourth segment may extend faintly upwards near the sides of the third segment, and there may be a small round isolated blackish spot near each side of the second segment right in the middle of the orange part. Pubescence all over composed of moderately dense sloping glistening orange thin hairs, amongst which abundant though inconspicuous more bristly black hairs occur which are longer (and when viewed sideways conspicuous) and erect on all the middle part of the disc of the second segment and on the basal segment; sidemarginal pubescence rather conspicuous, outspread, and orange except for the blackish hairs at the sides of the basal segment; the dense orange pubescence and dust sometimes obscure the black dorsal stripe and tip. Belly orange with a broad continuous middle stripe, which however may only extend to the third segment or to a point on the fourth segment, the remaining segments being then wholly orange on to the sixth segment but leaving the tip blackish; sometimes the black middle stripe widens out on the second segment towards the sides, and sometimes the sides are blackish; pubescence short dense and pale yellow, but the usual black bristly hairs beneath the seventh segment fairly conspicuous.

Legs mainly orange, but blackish on the coxæ, on nearly the basal half of the front femora, on quite the basal half of the middle pair, on more than the basal half of the hind femora, on about the apical half of the front tibiæ, and on the tip of the posterior tarsi (beginning to darken soon after the basal joint), while the front tarsi are deep black; trochanters brownish. Pubescence on the anterior femora rather long and dense behind, greyish yellow about the base but growing blackish about the tip, and the bare subfemoral space rather narrow and inconspicuous with the tiny bristles on its anterior margin very small and inconspicuous; pubescence on the hind femora less dense but longer and more extended to the underside, and with only a few black hairs about the tip; front tibiæ with a few longer black hairs postero-dorsally, but otherwise covered almost all over with short depressed

black bristles; there are a few scattered "touch-hairs" near the tip of the front tibiæ and on the front tarsi; middle tibiæ with a slight fringe of longer hairs postero-dorsally and with the small depressed black bristles more scattered and with still smaller glistening yellow ones intermixed, spurs orange at the base; hind tibiæ with a conspicuous even black dorsal fringe, and with a shorter finer mainly pale ciliation beneath, and with the tiny bristles black on the front part but glistening yellow on the back part; tarsi with tiny black bristles, but with orange bristles on the soles of the posterior pairs. Pulvilli light brown; claws black.

Wings hyaline, but the base and the costal and subcostal cells yellowish; veins yellow, but the costal vein and all the thin veins after about the middle of the wings blackish brown; upper branch of the cubital fork almost always with a recurrent veinlet (fig. 215). Squamæ light brownish glassy with a dull brownish yellow margin on which is a minute pale fringe, and the usual tuft about the angle hardly so conspicuous or large as usual. Halteres pale orange.

- ♀. Altogether more orange than the male; frontal stripe yellowish brown, and bearing (when viewed from in front) rather abundant golden orange short depressed bristly hairs or (when viewed sideways) with abundant similar black bristles, and this pubescence extending (though less abundant) down to the frontal triangle; this frontal stripe is very nearly parallel-sided and is about four times longer than broad, and the calli (especially the middle one) are often almost hidden by the yellow dust, but usually the lower and middle calli exist as shining black small roundish dots, with a narrow furrow connecting them; vertical space somewhat blackened; frontal triangle covered with golden dust; cheeks sometimes deeper yellow, and the pubescence on the cheeks, jowls, mouth, etc., sometimes brownish yellow or orange; back of the head less hollowed out than in the male, and leaving a narrow rim behind the eyes on which is a very short but very dense brownish postocular fringe, and this fringe is almost as short on the upper part as on the lower; back of the vertex with several short (though longer than the postocular fringe) black hairs. Palpi yellow; second joint long and hanging straight downwards, peg-shaped, thickened on the basal three-fifths but afterwards diminishing to a thin conical point; this second joint bears numerous though not dense short black adpressed bristles with some shorter glistening golden ones intermixed except about the tip, while some longer thin golden hairs occur on the underside; basal joint with denser longer yellow hairs with a few black hairs intermixed on the upper part. Eyes large and apparently bare; facets all equally small; in life the eyes are beautifully opalescent green without any band but with darkened reflections which shift in varying lights. Antennæ as in the male, but the third joint larger, and sometimes the small black dorsal bristles on the basal joints almost absent.

Thorax greyer than in the male, but with more golden orange fading to brownish yellow pubescence on the disc, and with greyish yellow pubescence on the pleuræ.

Abdomen with the orange markings almost as in the male but usually obscured (unless rubbed) by the universal short depressed golden reddish orange pubescence, though the black dorsal stripe is rather broader, and the short black hairs are very numerous (as may be seen when the abdomen is examined from behind) but very inconspicuous and rather depressed; the sidemarginal pubescence is all orange except for a slight blackish tuft at each side of the basal segment. Belly greyish black but thickly covered with brownish yellow dust and with the hindmargins narrowly but obviously yellow, clothed all over with very short adpressed yellow pubescence except about the base where the pubescence is longer and not adpressed; usually the sides of the belly are dull orange on the three basal segments though separated from the sidemargins of the second and third segments by large or small blackish side-spots; the longer black hairs beneath the flattened seventh segment are inconspicuous.

Legs reddish orange, with the coxæ, trochanters, and usually just the base of the front femora black, as well as the basal third of the middle femora and the basal half of the hind femora, the front tibiæ are also blackish on the

apical half though with a more brownish orange tinge than in the male except at the tip, but sometimes even the front trochanters and all the front femora even to the base are reddish orange, while the posterior femora may be only indefinitely greyish black about the base, and on the other hand the posterior femora are sometimes more than half blackish. Pubescence on the front femora sometimes almost all black, less obvious on the tibiæ, but the black dorsal fringe all down the hind tibiæ fairly conspicuous.

Wings, squamæ, and halteres as in the male.

Length about 13 mm.

This species varies but little in the British specimens I have seen, but apparently continental specimens vary in the amount of orange coloring on the abdomen and to a small extent in the practical absence of any blackish coloring at the base of all the femora. It is easily distinguished from *A. rusticus* and *A. latistriatus* by its gold-tinted appearance and its paler femora.

A. fulvus is not uncommon in the New Forest, and I have records from North Devon (Bideford), Essex (Colchester), Norfolk (Norwich), and Berkshire (Tubney Wood), from June 14 to August 17. In Scotland it has occurred at Aberfoyle and Banchoy, and in Ireland Colonel Yerbury has taken it at Glengariff, Kenmare, and Loo Bridge. It is recorded from Scandinavia to Southern Europe (including Spain) and Asia Minor.

Synonymy.—Walker professed to recognise in this species the *Tabanus alpinus* of Schrank, Fauna Boica, iii., 2534 (1798), but his interpretation has not been accepted by others. There is a mistake in Bezzi's Katalog in referring the name *alpinus* to Panzer, as Panzer correctly named and described *A. rusticus* in his Faun. germ., xiii., 21. There are possibly other older names for this species, such as *Tab. ferus* by Scopoli (1763) or *T. sanguisorba* by Moses Harris (1776), but the descriptions are too vague for recognition.

8. **A. rusticus** Fabricius. Greyish brown species, with two dark bowed stripes down the abdomen which are not indentate at the fore-margins of the segments. Femora in both sexes greyish black with only just the tip orange.

A rather small species, easily distinguished (except from *A. latistriatus*) by the two dark stripes down the abdomen which are separated by an equal broad uninterrupted grey stripe.

This description of the male is drawn up from one possibly worn specimen.

- ♂. Rather like *A. fulvus*, but greyish brown instead of golden hued. Head large, forming just a semicircle anteriorly (when seen from above) with the hindmargin slightly concave, broader than the thorax, and always longer and usually wider than in the female, but the head of the female varying much in size; face and side-cheeks whitish yellow with a faint tinge of greenish grey, bearing fine short whitish yellow pubescence which becomes longer on the jowls and about the mouth; back of the head pale ashy grey and deeply hollowed out behind the eyes, and with only a microscopical greyish yellow postocular fringe which however grows slightly longer on the upper part; ocellar space exceedingly small, pale brownish yellow, and bearing on the back part some short pale brownish yellow pubescence; frontal triangle large, whitish with a grey tinge, and depressed on the middle part. Palpi

yellow ; second joint elongate elliptical, hardly pointed, bearing a few short black bristles on the outside and some longer ones towards the tip as well as some long pale yellow hairs above and (conspicuously so) beneath about the base ; basal joint bearing long yellow hairs. Eyes clothed with short dense pale grey pubescence, touching from the very small vertex for fully two-thirds of the distance to the antennæ ; facets on the upper and middle parts much larger than those on the rest, so that the small facets extend over the lower third of the front and outer parts and continue as a zone (narrowest at the lower hind corner of the eye) all round the hindmargin up to the vertex ; dividing line of the facets sharply defined and (according to Brauer) bearing a colored or dark cross-band. Antennæ orange ; basal joint with only a few short black bristles on the upper side and some longer pale yellow bristly hairs on the rest ; second joint with a terminal circlet of short black bristles which are longest on the underside ; third joint rather short, widened at the base and with an obvious fairly prominent dorsal hump at the middle of its basal segment, and with some minute black bristles on the hump ; style-like portion of the third joint slightly darkened, quite as long as the basal segment, and with its last articulation long and narrowly conical.

Thorax and scutellum dull greyish black ; præalar calli grey ; the greyish tints caused by abundant pale ashy grey dust ; pubescence composed of fine not short sloping greyish yellow hairs, which develop into patches of longer pale grey hairs above the wing-bases and on the postalar calli, but persistent long suberect stiff black hairs also occur all over the disc. Pleuræ clothed with dense light greyish yellow pubescence (amongst which no black hairs are to be found) which becomes almost whitish yellow on the metapleuræ.

Abdomen greyish brown with the basal corners rather fulvous, and with a broad greyish brown middle stripe (when seen from above) which has almost straight sidemargins, but when seen from behind this broad stripe has a broad equal light yellowish grey middle dorsal stripe (no row of pale middle triangles) outside of which are grey-brown stripes rather darker than the space outside them but rendered rather conspicuous through the absence of pale pubescence, but all stripes become very vague after the third segment ; when viewed from above the dull brownish orange or fulvous colour occupies the outer quarters of the hind half of the basal segment, the whole outer thirds of the second segment except a small blackish spot near each hind corner, and a spot on the foremargin on each side of the dark dorsal stripe on the third segment ; sidemargins after the basal segment all yellow. Pubescence on the two dark stripes short, black, and inconspicuous, but on the lighter middle stripe less short, depressed, whitish, and less abundant (abraded ?), but more abundant and conspicuous outside the two dark stripes and about the tip, and less obviously blackish about the sides of the basal segment than in *A. fulvus*. Belly greyish black, but ferruginous on the hind corners of the basal segment, on the outer thirds of the second segment, and on a spot on each side of the middle stripe on the third segment, thus leaving a broad almost equal greyish black middle stripe ; pubescence rather abundant and pale, especially forming fringes on the hindmargin of the second and subsequent segments, but some of the short inconspicuous hairs on the middle stripe are black and also some on the ferruginous parts of the second segment and on similar parts of the basal segment, while the basal segment has a small rather dense clump of black hairs on each side of the middle of the hindmargin ; seventh segment with numerous hardly curved black bristly hairs.

Legs blackish grey and orange ; all the femora grey dusted and orange at just the tip, and the orange or fulvous colour extends on the underside of the front femora to the apical half, so that the bare channel on the underside is deep black on the basal half (in strong contrast to the greyish sides), and is fulvous on the apical half but margined there with deep black, while the tiny bristles on its anterior margin are very small ; front tibiæ orange on the basal half, though the blackish colour extends much nearer to the base on the underside, and the posterior tibiæ wholly orange except at just the brownish tip ; posterior tarsi yellowish brown on the basal joint except at its tip, but the front tarsi deep black. Pubescence pale yellow on the femora, but black about the tip of the front pair.

Wings less yellowish about the base and fore part than in *A. fulvus*. Squamæ greyish white with a darker margin to the alar pair and a whitish margin to the thoracal pair, and with the usual tuft near the angle whitish in accord with the tuft on the upper part of the metapleuræ. Halteres pale yellow.

- ♀. Similar to the male, but the abdomen less fulvous and its two dark stripes more obviously bowed. Frontal stripe parallel-sided, nearly five times higher than broad, dark ashy grey with a slight yellowish tinge, and bearing short sparse depressed whitish yellow hairs all over and stronger longer (but still short) curved black hairs, but the black hairs do not extend to the part between the middle callus and the frontal triangle; lower and middle calli usually shining black though almost dot-like, but sometimes practically hidden by grey dust; ocellar space dusted all over so that no upper callus is visible; frontal triangle pale yellowish grey; side-cheeks whitish grey with unusually short whitish yellow pubescence, but on the jowls and near them the pubescence is longer, more dense, and pale yellow; back of the head less hollowed out than in the male, whitish ashy grey, and leaving a very short glistening pale yellow postocular fringe on all the upper part, behind which is an inconspicuous short pale yellow pubescence; the slightly longer hairs about the back of the vertex mainly black. Palpi pale yellow; second joint long and thin, dropping almost straight downwards and but little bent, moderately inflated on the basal half and then tapering to almost a point, and this joint bears a moderate number of short black adherent bristles on the upper part and about the tip, but outside mainly only similar but pale yellow bristles, and on the underside (especially near the base) some longer pale yellow hairs; basal joint also yellow and bearing long pale yellow pubescence. Eyes bearing very short sparse pale pubescence, sometimes so slight as to be almost imperceptible; in life (according to Brauer) sometimes showing a slight cross-band. Antennæ dull orange, style sometimes brown; basal joint bearing dorsally near the tip only short black bristles which sometimes extend slightly on the outer side; second joint with scarcely more than an apical circlet of tiny black bristles; dorsal hump practically at the middle of the basal segment of the third joint.

Thorax blackish grey, hardly at all shining and not at all striped; pubescence composed of rather abundant but not dense short depressed pale grey hairs which become longer and conspicuous above the wing-bases and on the postalar calli down to the scutellum, and intermixed all over are rather abundant suberect longer stiffer black hairs which are inconspicuous on the disc (unless viewed sideways), but which stand out long and conspicuous between the humeri and the wing-base; pleuræ dusted pale grey and bearing whitish grey pubescence. Scutellum similar to the thorax in colour and clothing, but the pale grey pubescence fairly long and conspicuous round the margin.

Abdomen blackish grey with two bowed blackish stripes and scarcely any fulvous coloring; hind corners of the basal segment and the fore corners of the second segment obscurely fulvous, and the extreme sidemargins of all the segments also obscurely fulvous; rather densely clothed with short adpressed pale greyish yellow pubescence except on the two blackish brown stripes; the blackish stripes leave an intermediate fairly broad slightly grey dorsal space, and about half-way between the blackish stripes and the side-margins are faint traces of two other blackish stripes (especially about the base of each segment) which extend inwards about the base of the second segment and become obvious through the absence of grey pubescence and through the presence of numerous inconspicuous short black hairs, so that (when viewed from behind) the abdomen shows traces of the usual Tabanoid three rows of grey flecks of which the outer ones on the second segment have almost the usual triangular shape; on the four blackish stripes there is a fair amount of short sloping black bristly pubescence; the outer margins of the two middle blackish stripes are hardly dentate even though the dark colour widens out slightly at the hindmargins of the second and third segments; all the stripes become indistinct on the sixth and seventh

segments; sidemarginal pubescence all greyish white but slightly brownish, longer, and more outspread on the basal segment; seventh segment both dorsally and ventrally with fairly conspicuous rigid black bristly hairs, of which there are traces (especially dorsally) on the sixth segment. Belly ashy grey with any ferruginous coloring near the basal corners shining through, and the hindmargins of segments narrowly whitish on their outer quarters; pubescence rather dense all over, short, greyish yellow, and mainly adpressed.

Legs dull blackish brown and orange, but the femora rendered grey by abundant dust; trochanters brownish orange; just the tip of all the femora, the basal third or half of the front tibiae, all the posterior tibiae except the distinctly darkened tip, and the base and underside of the posterior tarsi, orange; front tarsi deep black; bare space beneath the front femora shining black with a slight tinge of brown (especially just after the middle) and the very dense row of tiny black bristles on its anterior margin inconspicuous. Pubescence greyish white, short and inconspicuous on the tibiae, and even the dorsal fringe on the hind tibiae inconspicuous and only partly black.

Wings as in the male. Squamæ (alar) distinctly smoky with a blackish margin; thoracal pair yellowish white with an almost white margin; the short fringes and the long angle-tuft pale yellow. Halteres whitish yellow.

Length about 12.5 mm.

This species apparently varies considerably in the colour of the abdomen both dorsally and ventrally as continental specimens are frequently much more ferruginous, but I have seen but little variation in the few British specimens I have examined. It is easily distinguished from *A. fulvus* by the absence of the conspicuous golden or orange hue which is so characteristic of that species (especially in life), but is very closely allied to *A. latistriatus* and special attention must be given to the bowed dark abdominal stripes, the narrow parallel-sided frontal stripe of the female, and the almost entirely greyish black femora, while more exact distinctions are given in my description of *A. latistriatus*. The male specimens in Kowarz's collection seem at first glance very distinct, but that is only because they are in extremely perfect condition and consequently have the disc of the thorax covered with dense almost felt-like pale grey pubescence amongst which it is difficult to detect any black hairs, while on the abdomen the dark middle stripe (= the two blackish stripes and the intermediate space) is only faintly discernible; the palpi are pale yellow and in some cases bear nothing but long pale pubescence; in the female specimens the abdominal stripes are faint and apparently parallel. In some specimens in Bigot's collection the side-cheeks bear some black hairs on the upper part, and in one female the apical half of the femora is orange, while in both Kowarz's and Bigot's collection a specimen or two may have the abdomen rather acuminate. I am also inclined to think that a distinct continental species exists in which the enlarged facets on the eyes of the male are still more enlarged, the pubescence more tawny, the palpi shorter and more black haired, and the hump on the third joint of the antennæ nearer the base of the joint, and perhaps the præalar calli ferruginous.

A. rusticus is uncommon in Britain, and all my specimens were taken in Sussex; Mr J. H. A. Jenner took one male and four females near Lewes in 1882 and 1883, the females having been taken on July 16 and 17 and the male on September 6, and I have a female which was taken near Eastbourne in July 1900. The Cambridge Museum possesses two females which were taken by Mr C. C. Babington (the celebrated botanist) at Monk's Wood, Hunts, on June 9, 1828, and there are two specimens in the

old collection of J. F. Stephens in the British Museum. Duncan (1837) stated that it was scarce in Scotland but common in Cambridgeshire. It is recorded from Middle and Southern Europe and probably from North Africa.

Synonymy.—I can add but little to this except to say that the old records must be accepted with doubt as the specific distinctions were not sufficiently known. Six female specimens under the name of *T. Roussellii* Macq. in Bigot's collection (three from Biskra) are in bad condition and can only be referred with doubt to this species, as I think they have the frontal calli larger.

9. *A. latistriatus* Brauer. Very much like *A. rusticus* but the two dark stripes down the abdomen are not bowed out and are indented on the outside at the foremargins of the segments. Femora in both sexes with almost the apical half obscurely orange or brownish. Frontal stripe of the female broader.

Very easily mistaken for *A. rusticus*, but altogether of a more blackish hue.

♂. Very much like *A. rusticus*, but frons, face, and jowls with a slightly darker grey tinge and with slightly yellower pubescence; back of the head more blackish ashy grey, and the postocular fringe brownish yellow; ocellar space darker brown, and with the pubescence more brownish; frontal triangle slightly more greyish yellow. Palpi (fig. 232) yellow with a blackish tinge, rather narrower, and bearing rather dense short black bristles on the outside and some longer but sparser black bristles dorsally and towards the tip, and with some inconspicuous pale yellow hairs beneath; basal joint with some long but not very conspicuous pale hairs on the under-

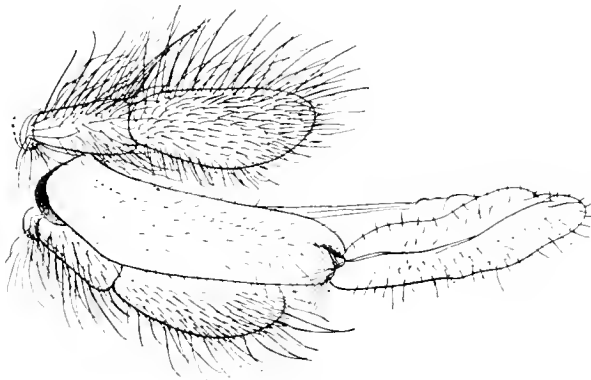


FIG. 232.—*Atylotus latistriatus* ♂. × 22.
Palpi and proboscis seen almost from beneath.

side. Eyes clothed with darker grey pubescence. Antennæ dull luteous, with the style and sometimes the apical third of the basal segment of the third joint brown; basal joint bearing numerous short black bristles on the whole of the upper and outer sides and a few short pale hairs beneath; second joint short and bearing short black bristles which extend over more than the dense apical cirlet; third joint with the dorsal hump much less prominent and placed well before the middle of the basal segment.

Thorax and scutellum rather *shining* blackish brown (not dull slaty blackish grey as in *A. rusticus*) and in some lights with some vague paler stripes; the slight brownish tinge is caused by a little brownish grey dust; pubescence composed of inconspicuous (unless viewed from in front) short brownish yellow hairs all over the disc, which develop into conspicuous patches of longer hairs on the postalar calli, but longer suberect stiffer black hairs also occur all over the disc. Pleuræ clothed with brownish yellow pubescence, which becomes paler on the metapleuræ.

Abdomen narrower and distinctly more acuminate, grey with the basal corners more fulvous than in *A. rusticus*; when seen from above there is a broad blackish middle stripe which has dentate sidemargins because the fulvous colour extends inwards at the incisures, but when seen from behind there is a broad equal brownish yellow middle dorsal stripe (no row of pale middle triangles) outside of which are dark grey stripes, succeeded by

indefinite though obvious brownish orange stripes (slightly darker than the middle stripe), and again outside these on the third and fourth segments are dark brownish stripes, but all stripes except the middle one become very vague on the fifth and sixth segments; the two dark stripes are narrower than the others; when viewed from above the dull brownish orange or fulvous colour occupies the outer thirds of the hind half of the basal segment, the whole outer thirds of the second segment except a small blackish spot near each hind corner, a similar portion of the third segment but extending more on to the foremargin and with a larger dark spot near each hind corner, and a spot on each side of the blackish stripes on the fourth segment against the foremargin; sidemargins after the basal segment all orange except for a dark discoloration on the middle of the second segment. Pubescence on the dark parts short, black, and inconspicuous, but on the pale parts pale yellow, and the blackish pubescence about the sides of the basal segment less obvious than in *A. fulvus*. Belly luteous, with the middle quarter of the two basal segments black, and the sides and a rather narrow middle stripe indistinctly darkened; pubescence rather abundant and pale, but the seventh segment with the usual black bristly hairs.

Legs blackish grey and orange; all the femora grey dusted, and more or less distinctly orange or brown on the apical half; the orange or fulvous colour extends on the underside of the front femora to the apical three-fifths, but extends less distinctly up the front and hind surfaces (though hardly so at the tip) until the actual dorsal surface has only a very slight trace of fulvous colour; on the middle femora the apical half is more distinctly and equally fulvous with just the tip bright orange; and on the hind femora the fulvous colour is indistinct on the apical half but may be just traced though very different from the bright orange tip; the bare channel beneath the front femora is deep black on the basal two-fifths but rufous on the apical three-fifths and is not distinctly contrasted with the colour of the sides; rest of the legs colored as in *A. rusticus*. Pubescence all blacker than in *A. rusticus*, so that the tibiae appear darker, and the dorsal fringe on the hind tibiae stands out more conspicuously.

Wings as in *A. rusticus*, but rather browner on the fore part. Squamæ pale smoky yellowish with a dark margin to the alar pair and a whitish yellow margin to the thoracal pair, and with the usual tuft near the angle whitish yellow in accord with the tuft on the upper part of the metapleuræ. Halteres yellow, with the knob more or less blackish about the base.

♀. Similar to the female of *A. rusticus*, but the pair of almost parallel dark stripes down the abdomen have a dentate outer margin. Frontal stripe slightly contracting at its lower end, about three and a half times higher than

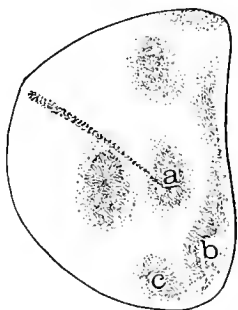


FIG. 233.—*Atylotus latistriatus* ♀.
Left eye, side view.

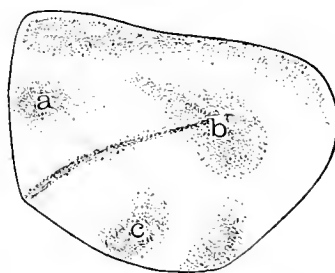


FIG. 234.—*Atylotus latistriatus* ♀.
Left eye from above in front.

broad, yellowish brownish grey but rather blackened on the vertical part, and bearing pubescence similar to that in *A. rusticus* but the pale hairs more brownish yellow; side-cheeks pale yellowish grey and bearing pale yellow pubescence; back of the head more blackish ashy grey, with a brownish yellow postocular fringe which is fairly distinct on the upper third of the head (and in front of which in the Arne specimen is a row of tiny

black bristles); at the back part of the vertex some distinctly longer black hairs have their tips bent forwards. Palpi dull orange, bearing moderately numerous or even dense stronger black bristles all over except about the base of the underside where only longer thin pale hairs occur, stouter about the base, shorter and less suddenly attenuated to the end. Eyes almost bare; in life (figs. 233, 234) opalescent green with peculiar shifting spots according to the point of view, and these spots are rather few in number and are not arranged in rows, but there is also a slight cross-band. Antennæ slightly redder orange, with the style brown; basal joint bearing more numerous and more extended tiny black bristles, which sometimes extend all over the joint but sometimes not to the exclusion of a few glistening pale yellow tiny bristles; dorsal hump on the basal segment of the third joint less prominent and placed distinctly before the middle of the segment.

Thorax blackish brown, moderately shining but with the præalar calli entirely dulled by grey dust, bearing short depressed brownish yellow pubescence which becomes longer and denser above the wing-base and thence over the postalar calli to the edge of the scutellum, while intermixed with the pale pubescence are abundant suberect longer black hairs which are inconspicuous unless viewed sideways and which are not so dense or long or conspicuous between the humeri and the wing-base as in *A. rusticus*; pleuræ light grey dusted and bearing brownish yellow pubescence which becomes paler on the metapleuræ. Scutellum similar to the thorax in colour and clothing.

Abdomen extensively pale brown or brownish grey with a pair of parallel outwardly dentate blackish dorsal stripes and with the fore corners fulvous; basal segment fulvous on the hind half of the sidemargin extending inwards for more than a third of the segment on each side; second segment fulvous on the outer thirds except for a small blackish spot at each hind corner; third segment fulvous on just the front basal corners and more or less obscurely on the flecks on the disc, and the remainder of the sidemargins obscurely fulvous and extending a little on to the disc at the hind corners of each segment, but all the fulvous coloring may be much less extensive; the two blackish stripes have their margins (especially the outer margin) conspicuously dentate because the dark spots on the second, third, and fourth segments slope outwards so that they extend outwards at each hindmargin and usually inwards at each base to about half their own width. Pubescence brownish yellow, short, recumbent, and rather dense, except on the two blackish stripes and towards the sides of the segments, so that there appear to be three rather broad stripes of glistening brownish yellow pubescence of which the side-stripes may be interrupted at the hindmargins of the segments, but all the stripes fade out by about the fifth segment, though the brownish yellow pubescence occurs on almost the whole sides of the two basal segments and on the base of the third; when viewed from behind (the most characteristic view) the abdomen is brownish yellow with two dark brown stripes which form triangles on the five basal segments (faint on the fifth segment and hardly a triangle on the basal segment); pubescence on all the blackened parts short black sloping and rather bristly; sidemarginal pubescence pale brownish yellow; sixth segment bearing short stiff black pubescence dorsally, and the seventh segment both dorsally and ventrally though the numerous black bristly hairs on the ventral side are scarcely so strong or conspicuous as usual. Belly yellowish ashy grey with usually the greater part of the second and third segments ferruginous but leaving the middle of the second segment greyish black, and with a little ferruginous coloring at the base of the fourth segment, but the sides of the second and third segments and the middle of the hindmargin of the third may be broadly but vaguely blackish, and in some specimens the ferruginous coloring may be very slight.

Legs blackish grey; trochanters slightly brownish; all the femora distinctly orange at the tip, and the front femora nearly all reddish orange with just the base (at least posteriorly) black and with an indefinite blackish ring just before the tip, but dorsally and sometimes posteriorly the front femora are more greyish black with rather more than the middle third dull reddish yellow; middle femora with the outer three-fifths brownish red (sometimes rather obscurely); hind femora with very faint traces of similar coloration which is most visible antero-dorsally; tibiæ and tarsi colored as in

A. rusticus; front coxæ clothed with rather abundant long pale yellow pubescence; bare space beneath the front femora shining reddish orange and the dense fringe of short black bristles on its anterior margin inconspicuous. Pubescence on the front femora mainly black posteriorly except sometimes about the base, but on the rest of all femora pale greyish yellow, though sometimes there is a little black pubescence about the tip of the middle pair; the short bristly pubescence on the tibiæ and tarsi mainly black, and the rather conspicuous dorsal fringe on the hind tibiæ almost entirely so.

Wings as in the male. Squamæ (alar) smoky with a brown margin; thoracal pair pale brownish yellow with a yellow margin. Halteres brownish yellow, but brownish on the inner side of the base of the knob.

Length about 13 mm.

This species has probably been very much confused with *A. rusticus*, but when placed side by side the two species appear quite distinct, and my description has mainly referred to the distinctions, which chiefly lie in the colour of the femora, in the form of the two dark abdominal stripes, in the colour of the tiny bristles on the palpi and the basal joint of the antennæ, and in the width of the frontal stripe in the female. *A. latistriatus* varies in the amount of fulvous coloration on the abdomen, and I have endeavoured to give an accurate description from British specimens (3♂ 7♀), because Brauer's description is not very elaborate and as far as the male is concerned is either inaccurate or inapplicable to the male of this species.

A. latistriatus was taken in Britain by Colonel Yerbury at Arne in Dorset on August 26, 1906, but the specimen (a female) was naturally mistaken for *A. rusticus*; in August 1907 however he caught several specimens, including three males, at Walton-on-Naze in Essex, and again they were mistaken for *A. rusticus*, but when writing my detailed description from them for this work I detected the difference. They occurred on the salt marshes near the town from August 8 to 22, and upon one occasion Colonel Yerbury saw them in some numbers amongst sheep; the males were obtained by sweeping the herbage. Brauer described the species from specimens taken in Spain, Corfu, Dalmatia, and Ragusa, while Villeneuve has stated that *T. nigrifacies* Gobert from Bordeaux is a synonym.

Synonymy.—I cannot doubt the identification of the female of this species, nor have I the slightest doubt about the males belonging to the same species; if however the male as described by Brauer belongs to this species (concerning which he himself was in doubt) it was incorrect to say "Vorderbeine ganz schwarzbraun." Villeneuve has stated that *Tab. nigrifacies* Gobert is a synonym, and it is not unlikely that it is the *Tabanus ruralis* of Zetterstedt.

TABANUS.

(*Sensu stricto*.)

Tabanus Zeller, Isis, 1840, 814; Osten Sacken, Mem. Bost. Soc., ii., 425.

The characters of this subgenus are the same as those of the comprehensive genus (page 347) with the following limitations.

Eyes bare. Vertex without any ocelligerous tubercle.

Even these two characters are not absolute, as some species have an almost microscopical sparse pubescence on the eyes, and some have faint

traces of an ocelligerous tubercle; the distinctions are however sufficient to clearly locate our British species.

This is still an enormous subgenus, even after separating off *Therio-plectes* and *Atylotus*, and many species are exceedingly difficult to distinguish. Even the very large species, *T. bovinus*, has been separated into two species which had been confounded for more than eighty years, and in this work I have recorded specimens which do not clearly answer to either of those two.

Table of the MALES.

- 1 (4) Very large species (20 mm. or more). Abdomen with only a middle row of pale dorsal spots.
- 2 (3) Eye-facets all about equal. Abdomen obviously tawny about the base. 10 *bovinus*.
- 3 (2) Eye-facets enlarged on the front part. Abdomen not obviously tawny about the base. 11 *sulcticus*.
- 4 (1) Large (17 mm.), or moderately large (12-15 mm.) species. Abdomen with three rows of light grey dorsal spots or flecks.
- 5 (10) Occiput with no long postocular fringe.
- 6 (7) Large species (17 mm.). Eyes in life without any band. 12 *autumnalis*.
- 7 (6) Moderately large species (12-15 mm.). Eyes in life with one band.
- 8 (9) Abdomen considerably reddish. 13 *glaucus*.
- 9 (8) Abdomen scarcely at all reddish. 14 *bromius*.
- 10 (5) Occiput with a long postocular fringe. Moderate sized or rather small species.
- 11 (14) Frontal triangle grey, not at all shining (unless rubbed). Eyes in life with one or no band.
- 12 (13) Antennæ mainly ochreous. Palpi elongate oval. 15 *maculicornis*.
- 13 (12) Antennæ blackish. Palpi almost globular. Frons with an obvious brown cross-band at the level of the antennæ. 16 *cordiger*.
- 14 (11) Frontal triangle mainly shining. Eyes in life with three bands. Palpi elongate. 17 *glaucopis*.

Table of the FEMALES.

- 1 (4) Very large species (21 mm. or more). Abdomen with only a middle row of pale dorsal spots.
- 2 (3) Abdomen obviously tawny; belly considerably orange. 10 *bovinus*.
- 3 (2) Abdomen scarcely at all tawny; belly mainly black and grey. 11 *sulcticus*.
- 4 (1) Large (18 mm.) or moderately large (13-16 mm.) species. Abdomen with three rows of light grey dorsal spots or flecks.

- 5 (6) Large species (18 mm.). Eyes in life without any band.
12 *autumnalis*.
- 6 (5) Moderately large species (13-16 mm.). Eyes in life with one or three bands except in *T. cordiger*.
- 7 (12) Upper black frontal callus almost linear (fig. 237) (unless rubbed) and connected with the lower callus. Eyes in life with one band. Frontal triangle light grey (unless rubbed).
- 8 (9) Abdomen considerably reddish. 13 *glaucus*.
- 9 (8) Abdomen scarcely at all reddish.
- 10 (11) Occiput very shallow, forming an almost linear band behind the eyes. Yellowish brown species. 14 *bromius*.
- 11 (10) Occiput distinctly puffed out behind the eyes. Antennæ mainly ochreous. Greyish species. 15 *maculicornis*.
- 12 (7) Upper frontal callus quadrate or heart-shaped, isolated (fig. 235).
- 13 (14) Frontal triangle all grey. Eyes in life with scarcely even one band. Frons with a dark cross-band level with the antennæ. Antennæ mainly black.
16 *cordiger*.
- 14 (13) Frontal triangle mainly shining black. Eyes in life with three bands. Antennæ mainly ochreous. 17 *glaucoptis*.

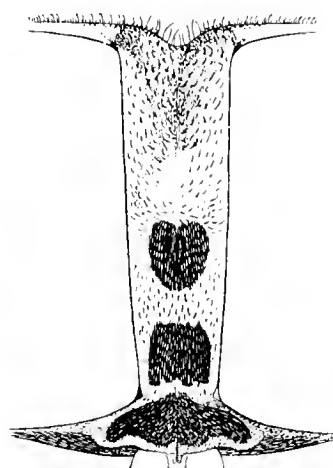


FIG. 235.—*Tabanus glaucoptis* ♀.
× 14.

The collector will not find the species of *Tabanus* (*sensu stricto*) much more easy to name than those of *Therioptectes*; of course the two very large species are easily distinguished from the rest but not from each other, and it is not easy to convey the distinction between them in words. *T. autumnalis* is also fairly distinct, but the five smaller species are easily confounded with each other and also with specimens of some species of *Therioptectes* such as *T. montanus*. *T. montanus* is not likely to be found south of Scotland and a little care will detect its hairy eyes even in the female; by far the commonest species in the south is *T. bromius*, though *T. maculicornis* is not uncommon and these two and *T. glaucus* are most commonly confused; the rather yellowish brown hue of *T. bromius* affords a handy distinction and usually *T. maculicornis* has more reddish orange antennæ, while *T. glaucus* is rather larger and has the abdomen with more extensive reddish coloring; *T. cordiger* is a darker insect with smaller spots or flecks on the abdomen and usually all black antennæ, or when the third joint of the antennæ is partly reddish the two basal joints still remain black; the female of *T. cordiger* may also be known by the broad usually heart-shaped (whence its name) callus on the middle of the frontal stripe. *T. glaucoptis* also has a broad callus on the middle of the frontal stripe of the female, and may be known in both sexes by its shining frontal triangle, and it is also a rather larger more yellowish brown species.

10. **T. bovinus** Linné. Eyes bare and unicolorous, with the facets all small in both sexes. Abdomen ferruginous about the base, and with only one row of pale dorsal spots. Very large species.

A very large fly, being in bulk only slightly inferior to *T. sudeticus*, which is the bulkiest British fly.

- ♂. Frontal triangle bare, greyish yellow with the upper angle darkened and prolonged narrowly a short distance between the eyes; face and jowls greyish yellow, clothed with dense but rather short yellowish grey pubescence which is rather longer on the jowls; back of the head very shallow on the lower part and hollowed out behind the eyes on the upper part, yellowish grey against the eyes, and bearing a very short ciliation which is yellowish below but becomes darkened on the upper part; ocellar tubercle blackish brown and bearing very short pubescence. Palpi dull orange; end-joint moderately short being about twice as long as the breadth of its middle part, with a bluntly rounded end and even sometimes with a very slightly depressed conical tip, bearing numerous depressed black bristles on the outside with a few yellow ones usually intermixed, and with sparser yellowish grey hairs inside and beneath. Eyes bare, unicolorous green in life; facets all practically equally small. Antennæ blackish brown at the base but usually to a certain extent obscurely reddish brown about the base and especially about the base of the third joint; basal joint with the tip above somewhat hooked over the base of the second joint and bearing dense short black bristles on its inner side and above, but on the outer side and beneath with mainly thinner (but almost equally short) pale hairs; second joint with its tip above prolonged over the base of the third joint, and also clothed with short black bristles; third joint strongly humped dorsally near its base and then excavated at a rather prominent angle, its basal segment less than one and a half times as long as its depth at the hump and with a few very inconspicuous tiny black bristles on the top of its hump and about the middle of its underside; style-like portion nearly as long as the basal segment of the third joint and with indistinct annulations, but with its three basal segments about equal and the fourth one about as long as the other three together and hardly pointed, while all the segments bear minute very sparse bristles.

Thorax dull greyish black with a glaucous hue when seen from behind, faintly shining on the disc, with five indistinct greyish yellow stripes; præalar calli rather brownish. Pubescence short, mainly composed of nearly erect rather dense black hairs, on especially the præalar calli, but with thin light grey hairs intermixed on the disc and with mainly pale brownish hairs in front of the præalar calli, and with depressed yellowish patches above the wing-bases and after the postalar calli; pleuræ with longer light brownish grey pubescence, and with a yellow tuft beneath the wing-base and sometimes with a slight clump of black hairs just in front of this tuft. Scutellum greyish black, with similar pubescence to that on the disc of the thorax but with more obvious pale pubescence around the margin.

Abdomen brownish orange or dull tawny on the basal segments, but with a black dorsal stripe and with the tip darkened or even blackish, and with darkened reflections on the basal half of the second and third segments, but with a row of triangular whitish spots on the black dorsal stripe which are placed on the middle of the hindmargin of each of the five basal segments, and these whitish spots do not quite or barely extend up to the middle of each segment; the second to fourth segments have brownish yellow hindmargins which bear bands of short fine whitish or yellow pubescence, but these bands are rather interrupted on each side of the triangular middle spots; third to last segments becoming gradually darker brown to black and then their conspicuously pale hindmargins standing out all the more obvious. Pubescence all very short, conspicuous and yellowish as bands on the hindmargins and on the pale middle spots and on most of the basal segment, but minute and black on the other parts of the disc; sidemarginal pubescence yellow except at the basal corners of the segments. Belly luteous, but with a broad middle stripe (rather interrupted at the hindmargins of segments) and with the last three segments blackish brown to shining black though sometimes entirely dusted with greyish yellow; hindmargins of segments yellow; sidemargins of the dorsal plates unicolorous yellowish when viewed from the belly side; pubescence very short; the usual longer erect black hairs beneath the seventh segment rather inconspicuous. Genitalia two-jointed, small, mainly dull blackish but orange on the upper margin of the second joint, and mainly black haired on the basal joint; small inner lamellæ yellow.

Legs blackish brown, with the tibiae brownish orange except on about the last third of the front pair and at the vaguely darkened tips of the posterior pairs; posterior tarsi pitchy brown, but the front pair deep black; front coxae long, greyish black, and bearing abundant long yellow pubescence. Pubescence behind the grey-dusted front femora dull yellowish brown and dense but rather short, while there are very numerous (say one hundred) short bristles in a row on the anterior margin of the broad shining deep black bare transversely striate space on the underside, of which all are black except the apical ten or twelve; front tibiae with depressed short golden bristles behind, with a yellow fur beneath, and with tiny black bristles on the rest; middle femora with similar pubescence to that on the front pair, but with rather longer blackish pubescence beneath; middle tibiae with the tiny adpressed bristles mainly glistening yellow but black on the upper side and tip; hind femora with still longer blackish pubescence beneath; hind tibiae with conspicuous coarse dorsal ciliation which is mainly black but with a few intermingled yellow hairs, but the black hairs usually predominate about the tip, and the short fringe beneath is all yellow except about the tip, while the other pubescence is mainly short depressed glistening yellow, and sometimes the black hairs are much less numerous; "touch-hairs" beneath the front tarsi very small and inconspicuous.

Wings with a brownish yellow tinge, especially towards the costa; anterior veins distinctly yellowish brown, but the subcostal vein darker. Alar squamae smoky blackish with a blackish margin and a very short orange fringe; thoracal pair more brownish with a brown margin, and with the usual longer tuft near the angle orange but not very conspicuous. Halteres small, blackish brown with the stem and the top of the knob yellow to brownish orange.

♀. Very much like the male. Frontal stripe greyish yellow, narrow and very slightly (if at all) contracted, about four times as long as its widest part; lower callus shining black and rather long, rifle bullet shaped or triangular, blunted below or often notched there, not extended outwards to the eyes but extending upwards in a narrow line (the continuation of which forms the middle callus) to beyond the middle of the frontal stripe; just below the blunted end of the callus indefinite darkened cross-lines from the eyes often occur; pubescence very short depressed and inconspicuous, black down the middle but glistening yellow down the sides and across the lower part, and without any trace of longer hairs about the vertex; frontal triangle pale greyish yellow and quite bare. Face and jowls all pale greyish yellow, clothed on the cheeks with fairly dense but not long pale yellowish pubescence; jowls with rather longer similar pubescence; middle part of the face bare; back of the head hollowed out but with a narrow equal bare rim against the eyes which is yellowish grey and behind which is an obvious though short dull yellow ciliation, but this ciliation is interrupted at the vertex where there are some shorter black and yellow hairs; absolute back of the head with soft yellowish white pubescence; ocellar tubercle absent, and its place on the vertex not even darkened. Palpi with the second joint elongate yellow or brownish yellow, abruptly bent soon after its base and thickest at the bend, after which the joint only gradually tapers to a rounded tip, almost five times as long as its broadest part and bearing sometimes all black short depressed bristles on the outside, but varying in amount down to comparatively few of the bristles being black on the lower part of the outside and the rest silky yellow, while practically no longer yellow hairs occur beneath about the base; basal joint dark grey, almost covered with yellow dust and bearing abundant long yellow pubescence. Eyes unicolorous, in life bright coppery green, quite bare; facets all equally small. Antennae sometimes as black as in the male, but usually considerably reddish except on the style-like portion; third joint with only minute black bristles on the top of the hump.

Thorax almost as in the male but brighter, and the grey stripes more obvious especially when viewed from behind; pubescence shorter, and the depressed thin grey hairs more obvious (unless rubbed off); the black tufts of pubescence on the ferruginous præalar calli and the yellow depressed patches above the wing-base and outside the postalar calli rather conspicuous; pleurae with all greyish yellow pubescence. Scutellum with

pubescence similar to that on the disc of the thorax, and sometimes with the margin slightly ferruginous.

Abdomen similar to that of the male but flatter, longer than broad and more equally broad, and more rounded at the tip; coloration and markings almost as in the male, but the whitish triangles down the dorsal line more conspicuous and nearly reaching the foremargins of the segments; or the abdomen may be better described as brownish tawny on the two basal segments, and thence blackish with broad (more than a third the segment) tawny hindmargins to the segments and with one dorsal row of rather elongate triangular yellowish white spots on the second to sixth segments, and the tawny hindmargins just separated from the triangular spots by a small interval. Pubescence conspicuously following the ground colour, but all golden brownish on the basal segment; sidemarginal pubescence all yellow, but black pubescence reaching very near to the corners of the second to fourth segments. Belly usually less ferruginous than in the male, but more greyish with broad greyish yellow hindmargins and an interrupted broad blackish middle stripe and blackish tip; it is however more ferruginous than in ordinary *T. sudeticus*.

Legs with all pale pubescence, even including the slight but obvious dorsal ciliation on the hind tibiæ; front tibiæ orange brown on the basal two-thirds; "touch-hairs" beneath the front tarsi very slight and inconspicuous.

Wings and squamæ almost as in the male. Halteres with a blackish stem, and with the tip of the knob yellow.

Length about 20 mm. (♂) or 21 mm. (♀).

This species does not appear to vary much but is very closely allied to *T. sudeticus*, while some varieties of the female of the latter are very difficult to distinguish; both sexes of *T. bovinus* are altogether tawnier than *T. sudeticus* and are rather smaller, while the male of *T. sudeticus* may be distinguished with certainty by its enlarged front and upper eye-facets. The female of *T. bovinus* has the pale hindmargins of the abdominal segments more merged into the ferruginous coloring of the segments, and has the triangular pale spots longer so that they almost or quite reach the foremargins of the segments, the blunt lower margin of the frontal callus less dentate, and as far as my experience goes the frontal callus itself longer (though Brauer's figures give it shorter), the frontal stripe slightly narrower, the sidemarginal pubescence of the abdomen almost or quite all yellowish, and I should have said that an easy distinction occurs in the manifestly greyer more distinctly striped thorax were it not for a number of specimens which I mention later on under *T. sudeticus*. *T. bovinus* appears to occur earlier (end of June and first half of July) than *T. sudeticus*, and Brauer states that the eyes in life of *T. bovinus* are coppery pale green while those of *T. sudeticus* are coppery blackish brown. The only other British species at all approaching in size is *T. autumnalis*, which has three obvious rows of abdominal spots or flecks.

T. bovinus cannot be considered a common British species, but in the New Forest its ominous "buzz" is not uncommon, and it is not pleasant to hear several of these grand flies around one in the sequestered glades of the Forest, especially when the sudden cessation of the "buzz" indicates that they have settled somewhere! I have seen specimens from Weybridge, Woking, and Reading, all of which may be continuations of the New Forest district (though I believe that *T. sudeticus* also occurs in the New Forest); I have also caught it in Abbots Wood in Sussex, but at present I distrust other records as they probably refer to *T. sudeticus*; I can however accept Austen's records of Oxshott and Farnham in Surrey and Ivybridge in South Devon. Duncan's old Scotch and Irish localities almost certainly

referred to *T. sudeticus* or to the Irish variety I mention later on, but he also recorded "Monk's Wood, Hunts," and said it was not uncommon in Cambridgeshire; Jenyns also recorded it from near Swaffham Bulbeck in Cambridgeshire on June 30, and from the date I should imagine that the species was correctly named but I have not been able to find it myself in this neighborhood. My dates are mainly from June 16 to July 15, but I believe I have a record as late as August 7, and Mr H. W. Andrews gave me a record of August 17. The males are said to hover in forest clearings and on somewhat high meadow pastures (but not on mountain tops), especially early in the morning on sultry days when the sun is shining after violent showers. It is recorded from practically all Europe (including Siberia and North Africa, but excluding Greece and Spain) and from Caffraria.

Synonymy.—All old British records are a mixture of this species and *T. sudeticus*. It has been contended that Linné's species must be *T. sudeticus* because he said "In genere suo hic maximus est," but in answer to that it is only certain that the conglomerate was the largest species known to Linné, and it was not until the two species were separated that *T. sudeticus* could claim to be the largest; also Linné said "oculis virescentibus" and (as Zeller himself pointed out) "*Dorsum abdominis sub alis magis flavescit, extra eas magis fuscum*," which seems to prove his species to have a more yellowish abdomen than *T. sudeticus*, so we can safely continue to accept Linné's name for the tawny species without any misgivings.

11. ***T. sudeticus*** Zeller. Eyes unicolorous, with the facets unequal in size in the male. Abdomen of both sexes but little ferruginous and with only one row of dorsal spots. Very large species.

The largest British fly, as far as bulk is concerned; less fulvous than *T. bovinus*.

♂. Frontal triangle and face rather darker than in *T. bovinus*; pubescence on the cheeks usually but not always darkish brown or even blackish, on the jowls longer and brownish yellow; back of the head and vertex almost as in *T. bovinus*; ocellar tubercle less blackish, and at the back part with very short pubescence which is usually dull orange but sometimes partially black. Palpi dull orange to brownish orange, not quite so long as in *T. bovinus*, and with the numerous bristly hairs sometimes all black except on the underside but sometimes extensively yellow; basal joint with long orange pubescence and with a few black hairs about the tip. Eyes in life (according to Brauer) almost unicolorous coppery blackish, but when dry the large facets become greyish and the small ones more reddish; facets unequal, those on the upper three-fifths being distinctly larger than those on the lower two-fifths, and the boundary line between them rather sharply defined across the eye and beginning in front at about the middle of the frontal triangle and curving down and round to the back and then upwards so that a narrow strip of small facets extends about half-way up the hindmargin. Antennæ reddish brown from the base to just after the hump on the third joint; basal joints bearing tiny almost exclusively black bristles without any longer pale hairs; third joint much longer and thinner than in *T. bovinus* and, although the hump stands out high on the basal quarter, twice as long as deep.

Thorax moderately shining brownish black (as contrasted with the dull greyish black of *T. bovinus*) with scarcely any glaucous hue and with scarcely any trace of paler stripes. Pubescence more dense than in *T. bovinus*, because the more numerous intermixed depressed thin pale hairs and the pale tuft on the front part of the postalar calli are longer and more conspicuous; pleuræ with brownish yellow rather than pale grey or pale brownish yellow pubescence, and with a very large conspicuous patch of black hairs on the

mesopleuræ. Scutellum with more conspicuously black pubescence, but with brownish yellow hairs about the margin.

Abdomen longer and broader with usually a less acuminate tip, mainly rather dull black, with tawny hindmargins on the second to sixth segments (with a trace on the basal segment) which are interrupted at each side of the pale middle spot, and these hindmarginal lines occupy nearly a third of each segment, and sometimes the blackish part of the second segment bears traces of dark chestnut, or as mentioned below (unless that specimen belongs to a distinct species) the whole abdomen may vary to a tawny hue; there is also a dorsal row of gradually decreasing small whitish yellow triangles on the middle of the first six hindmargins, and these triangles do not extend more than half-way up each segment; the pale hindmargins and triangular spots much more conspicuous and determinate than in *T. bovinus*. Pubescence forming pale bands on the hindmargins of the segments much as in *T. bovinus*, but more conspicuous because the dark part of each segment next to the pale hindmargin contrasts with the pale hairs on it more than the ferruginous coloring of the same part does in *T. bovinus*; when seen from above these pale bands of pubescence appear to widen towards the sides, and from the fourth segment to the tip the pale pubescence is more extended on to the disc of each segment; sidemarginal pubescence mainly black, but with rather narrow yellow patches at the hind corners. Belly brownish black with conspicuous broad whitish yellow hindmargins (narrowed about the middle) which are continuations of the dorsal hindmargins though only narrowly connected on the sidemargins; the extreme margin of the dorsal plates (when seen from below) is blackish with broad yellow hindmargins to the segments. Genitalia two-jointed; basal joint all black bristled, second joint also black bristled but tawny and with yellow hairs on the upper part, and I think this second joint is deeper than in *T. bovinus*.

Legs dull black with the orange parts rather darker than in *T. bovinus*, the contrast between the shining broad bare black stripe beneath the front femora and the sides is less conspicuous, because the femora are hardly at all grey dusted and the row of tiny bristles on the anterior margin of the stripe is less regular. Pubescence on the front coxæ darker and that behind and beneath the anterior femora rather dense and mainly black; hind tibiæ with a dense almost entirely brownish yellow ciliation outside, and in fact all the tiny pubescence on all the tibiæ mainly brownish yellow except just about the tip.

Wings with a blacker tinge on the veins. Squamæ more blackish smoky. Halteres blacker.

- ♀. Larger and stouter than *T. bovinus* and without the tawny or ferruginous coloring of that species. Frontal stripe slightly broader, pale ashy greyish to dull orange with sometimes the raised margins against the eyes on the upper two-thirds blackish grey and the slightly depressed channels on the sides of the calli orange grey, but this character cannot be trusted; lower black callus wider but more narrowed upwards than in *T. bovinus* (Brauer's figures are misleading) and more gradually extended into a wider and longer black middle line, but hardly notched on its front margin; pubescence on the frontal stripe very slight and short, the depressed pubescence being glistening yellow but the more erect hairs black; frontal triangle pale greyish yellow and wider than in *T. bovinus*. Face altogether larger and wider than in *T. bovinus*, and the face and jowls pale ashy grey rather than yellowish with their pubescence pale greyish white rather than yellow, while the sutures between the cheeks and the middle part of the face are less conspicuous especially in the hollow at the lower end; middle part of the face much broader and more uneven and bearing a slight pubescence on its upper part; back of the head ashy grey with a very short yellowish (almost whitish) ciliation close to the eyemargin; ocellar space indefinitely blackish, and a very short black pubescence occurs just behind the vertex; Eyes in life (according to Brauer) unicolorous blackish brown with coppery reflections; facets all equally small. Palpi with the last joint long, brownish orange, not much bent about the base and thence tapering almost to a point, with the tiny bristles above and outside usually black

with a few yellow bristles intermixed, but sometimes the black bristles are restricted to the lower part of the outside or even reduced to a few black bristles on the underside, and the joint is bare inside except near the tip; basal joint more blackish hued, with long dull yellow pubescence and near the tip with numerous black hairs. Antennæ as in the male, but sometimes quite as dark as in *T. bovinus* and with the dorsal hump near the base of the third joint more pronounced.

Thorax almost as in the male, being usually blackish and hardly at all striped, but a variety mentioned below has the thorax greyish and striped as in *T. bovinus*; pubescence in front of the postalar calli black and the pale tuft on their outer side conspicuous.

Abdomen broader and more rounded at the tip than in the male and a little broader than in *T. bovinus*, but the ordinary coloration of both sexes very similar; the tawny or yellow hindmargins of the segments usually broader and less connected with the greyish white middle triangular spots, and these hindmargins more sharply defined than in *T. bovinus* because there is no ferruginous coloring into which they can merge, and towards the tip of the abdomen they become more whitish; pubescence pale and more conspicuous on the hindmargins, and apparently more extended on to the darker parts adjoining; the greyish white triangular middle spots scarcely extending higher up than the middle of each segment; sidemarginal pubescence mainly following the ground colour, and consequently black on the basal segment, on the basal three-fifths of the second segment, on the basal two-fifths or half of the third segment, and on just the base of the fourth segment. Belly so much more pale yellowish grey than in the male that the blackish coloring is usually reduced to a middle stripe of large blackish semicircular spots which are just separated at each hindmargin.

Wings almost as in the male. Squamæ more blackish than in *T. bovinus*. Halteres with the dark parts blacker.

Length about 22 mm. ♂, 23 mm. ♀.

Var.? ♂. Rather smaller, and generally resembling *T. bovinus* but distinguished from that by the enlarged eye-facets. Pubescence all down the cheeks mainly black; palpi with all the tiny bristles on the outside black. Abdomen rather broader, shorter, and less pointed, with the second segment nearly all rich dark brownish tawny with a blackish dorsal spot which is cut into by the whitish triangular spot and which does not extend over the well-defined brownish yellow hindmargin; this tawny colour extends upwards considerably on to the first segment, while even the third segment shows traces of it between the middle and the sides just before the paler hindmargin; pale triangular spots not reaching up to the middle of the segments; sidemargins as in normal *T. sudeticus*. Belly black, with whitish hindmargins which are rather narrowed at their middle. Genital lamellæ mainly pale haired. Hind tibiæ entirely pale fringed.

I possess one male of this distinct-looking form, which came from the late W. Wilson Saunders' British collection and which is set in exactly the same fashion as the specimens of *T. bovinus* which were in that collection. If an unrecognised very closely allied species exist, it is possible that this specimen may be the male of the following female form.

Var.? **perplexus** ♀. Resembling normal *T. sudeticus* in size and abdominal markings, except that the abdomen has a tendency to a more tawny colour both above and beneath, while the middle triangles are longer and more like those of *T. bovinus*. Front tibiæ often with quite the apical third blackish. Belly grey or even almost tawny on the hindmargins and sides so that only a middle row is left of more sharply defined blackish semicircular spots than in true *T. sudeticus*. Thorax greyish, with the

glaucous hue and the grey stripes quite as conspicuous as in *T. bovinus*. Frontal calli (fig. 236) more like those of *T. bovinus* than of *T. sudeticus*.

I have seen twenty-five specimens of this form which were taken by Colonel Yerbury in Ireland in 1901 in various localities in Kerry, from

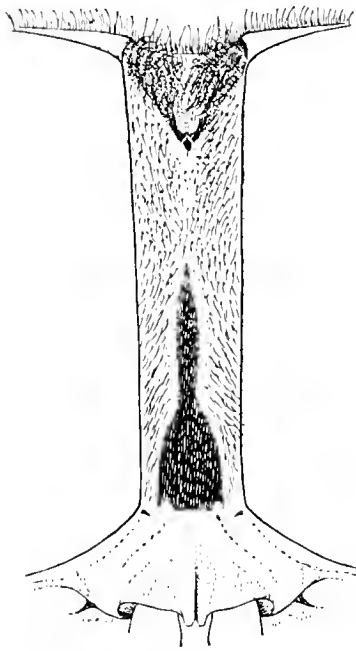


FIG. 236.—*Tabanus sudeticus*,
var. *perplexus* ♀. × 14.

June 30 to August 16, and it was then so common that he had eighteen specimens in his cyanide bottle at one time on July 7 near Killowen Church; he also took a similar female in Woolmer Forest on July 12, 1903, and I possess one which was taken in the New Forest by Mr E. A. Waterhouse in July 1882. Brauer records the occurrence of a number of similar specimens from Upper Styria and Upper Austria, so that it appears to have a wide range. The form is remarkably intermediate between *T. bovinus* and *T. sudeticus* but in general appearance is nearest *T. sudeticus*, while Brauer states that his specimens had in life the dark eyes of that species.

This species is the largest British fly, as far as bulk is concerned, and is only approached by its close ally *T. bovinus*, from which its less tawny coloration in both sexes and the enlarged facets on the front part of the eyes in the male distinguish it, but as may be seen from my descriptions it is difficult to distinguish dark females of

T. bovinus, from light-colored specimens of *T. sudeticus*; perhaps the bulk and the more conspicuously contrasted hindmargins of the abdominal segments in *T. sudeticus* give the readiest characters for distinction. Two more European species, *T. spodopterus* (with quite black antennæ) and *T. intermedius* are also very closely allied, but have not been recorded nearer than from Germany (*T. spodopterus*) and South France (*T. intermedius*).

T. sudeticus is apparently not uncommon in Scotland as I have records from Nethy Bridge, Aviemore, Carn Ban, Nairn, Brodie, Solway District, Argyllshire, and Aberfoyle, while in England I have seen specimens from Cumberland (Derwentwater), and Gloucestershire (Forest of Dean), and I am almost certain that it occurs in the New Forest in company with *T. bovinus*; Austen gives such localities as Budshead Wood and Walkham Valley in South Devon, and I have records from Shropshire (Wyre Forest) and Essex, while I have seen a Welsh male from Merioneth (Barmouth). The var. *perplexus* occurs in numerous Irish and other localities as mentioned above. My dates for normal *T. sudeticus* extend from July 5 (♂) and 16 (♀) to August 18 so that Brauer's statement that it is a later insect than *T. bovinus* seems to hold good in Britain; the var. *perplexus* is recorded from June 30 to August 16. *T. sudeticus* was first recognised as a British species by myself from a specimen given me by the late H. T. Stainton, and upon my pointing out its distinctness in the old Entomological Club collection to the late Edward Newman he at once recorded it as new to Britain in the *Entomologist* for February 1869, but he reversed the species both in his record and in the collection as he stated that *T. sudeticus* might be

distinguished from *T. bovinus* at a glance by the testaceous colour of its abdomen! It is recorded from Kiel through all Western and Middle Europe to the Ural. The males are said to hover and swarm in the highest mountain tops before sunrise.

Synonymy.—Probably all the old Scotch records of *T. bovinus* referred to this species. I do not agree with the suggestion that this is the true *T. bovinus* of Linné and have given my reasons in my synonymical notes upon that species.

12. ***T. autumnalis*** Linné. Eyes unicolorous, with the front facets much enlarged in the male. Abdomen with three rows of dorsal spots. Large species.

A very large conspicuous fly, but not so large as *T. bovinus* or *T. sudeticus* and easily distinguished from them by the three rows of dorsal abdominal spots.

♂. Frontal triangle pale greyish yellow, obscurely darkened in the top point and usually with a slightly darkened band just before that; face also pale greyish yellow, with rather short fine indistinctly but mainly blackish pubescence on the side-cheeks and with light yellow pubescence on the middle part and also (though longer) on the jowls; back of the head pale greyish yellow, shallow on the lower part but hollowed out on the upper part, and with a minute pale postocular ciliation, but the longish pubescence behind the extreme lower part similar to that on the jowls; ocellar triangle very small, obscurely brownish, and the postvertical pubescence pale and short. Palpi light yellow, bare on the inner side but extensively clothed about the tip with numerous black bristles and bristly hairs and with yellow hairs on the rest; end-joint elongate ovate, more than twice as long as deep, with a rather pointed tip and a not quite even underside; basal joint dull pale yellow with long abundant pale yellow pubescence. Eyes bare, and in life without any band; facets very much enlarged on all the central portion of the combined eyes and in dead specimens brownish there, while the abruptly smaller facets appear blackish and occupy nearly the lower half of the eyes and extend in a broad band (about one-fifth the width of the eye) up the back margin quite to the vertex, so that the small facets occupy considerably the major portion of the eyes; in certain lights there is a greenish tinge on the small facets and even an evasive dark band may occur along their upper margin. Antennæ mainly dull blackish brown, but sometimes yellowish brown on the inside of the basal joints and even beneath the base of the third joint; basal joint greyish with the upper side blackish, produced at the tip, and bearing short black bristles on the upper and inner sides, but with pale hairs on the outer and lower sides; second joint short, rather produced at the tip above, and bearing very short dense black bristles; third joint with a conspicuous rather pointed dorsal hump near the base, and with its basal segment about one and a half times as long as the style-like portion and nearly twice as long as its own depth (including the hump); style-like portion with three short nearly equal rings and a moderately pointed longer terminal segment; crown of the hump with some very short black bristles.

Thorax brownish black, slightly shining, and with traces of five lighter grey dull lines; præalar calli obscurely brownish orange; pubescence fairly abundant on the disc, composed of dense fine sloping whitish grey or brownish yellow pubescence (easily worn off) mixed with numerous more conspicuous erect black hairs, but in front and on the sides the pubescence is greyish white or brownish grey, becoming conspicuous and rather yellowish on the tuft outside the postalar calli; pleuræ with longer light greyish pubescence but with numerous black hairs intermixed on nearly all the disc of the mesopleuræ, and with a patch of longer crowded

pale greyish yellow hairs beneath the wing-base. Scutellum greyish black, with suberect black pubescence similar to that on the disc of the thorax and with pale greyish yellow hairs round the margin.

Abdomen rather tapering to a point, usually conspicuously ferruginous on the sides of the four basal segments for about the outer third of each segment (or rather more on the second segment), but sometimes the ferruginous coloring may be entirely absent, and in all cases large darkened spaces exist near the front corners of the segments, and also in all cases a blackish dorsal stripe on the middle third (or less) of the four basal segments which widens out on the basal segment (spreading to all the base of that segment), while all the segments after the fourth are blackish, but at the middle of the hindmargin of each of the five basal segments there is a conspicuous greyish yellow triangular spot which does not extend much above the middle of the segment, and the second to fifth segments bear (out on the ferruginous coloring when present) a decreasing yellowish fleck on each side which slopes from the front margin near the blackish dorsal stripe to the hindmargin, but the outward slope decreases on each segment just as the size of the fleck decreases, and on the fifth segment (if visible at all) is little more than a faint upright yellow line; when viewed from behind, the three rows of flecks appear whitish and the side ones extend outwards along the hindmargins to the sidemargins. Pubescence short and fairly dense, never long even at the basal corners, mainly black but conspicuously yellow on the three rows of yellowish flecks and on the sides of the hindmargins and to a large extent about the hind corners of the sidemargins of the segments. Belly obscurely light greyish orange about the sides of the four basal segments and with a broad more or less blackish middle stripe down them, and with the hindmargins of segments narrowly whitish; pubescence very short, following the ground colour. Genitalia greyish black, but ferruginous at the tip.

Legs dull black, but the front tibiæ obscurely ferruginous on about the basal third, while all the femora at the extreme tip and all the posterior tibiæ are conspicuously brownish orange (except for an ill-defined black tip to the tibiæ), and the posterior tarsi are slightly ferruginous about the base. Pubescence fairly obvious and long, greyish white on the greyish black front coxæ, and mainly pale on all femora and tibiæ but with many black hairs behind and beneath, and with a dense row of very short black bristles on the anterior margin of the shining black bare space beneath the grey-dusted front femora, while the middle tibiæ bear short black hairs on their upper side intermixed amongst which are a few pale hairs; the two spurs black; hind tibiæ with a long coarse antero-dorsal ciliation and a shorter finer postero-ventral ciliation in which the hairs are pale on the basal portion but become more and more intermixed with black hairs until at the tip all the hairs are black, the antero-dorsal ciliation containing more black hairs than the postero-ventral one; front tibiæ towards the tip, and front tarsi with a few scattered "touch-hairs."

Wings slightly brownish, with the usual anterior veins brownish orange and the subcostal vein notably dark. Squamæ (thoracal) blackish or dark brownish glassy, with conspicuous dark thick margins and with very short pale fringes; alar pair more pellucid, with the margin narrower and darker, and with the usual peculiar long yellow tuft near the angle. Halteres whitish yellow to brownish orange on the knob, but darker on the stem.

- ♀. Rather like the male, and distinguished from the two very large species by the three obvious rows of light grey abdominal spots. Frontal stripe yellowish grey; lower callus shining black, moderately large ovate, distinctly not extending out to the eyes and hardly resting on the frontal triangle, but well defined and continued upwards as a narrow neck to the narrowly elongate middle callus; ocellar space slightly darkened; pubescence short and mainly black on the upper part of the frontal stripe, becoming conspicuous about the vertex because of its density, but mainly pale and depressed on the greyish yellow sides of the lower part; frontal stripe almost parallel-sided, about four times as long as its broadest part; frontal triangle pale greyish yellow, quite bare. Face and jowls pale greyish yellow and clothed with abundant yellowish white pubescence, but occasionally the pubescence on the upper

part of the side-cheeks is mainly blackish ; back of the head greyish white, very shallow so that there is only an equal narrow rim behind the eyes, and behind this with a dull greyish white ciliation which is short on the lower part but longer whiter and more outstanding on the upper part, though the interval between the eyes at the back of the vertex bears only black hairs. Palpi with the end-joint long and whitish yellow, bent at about one-third from the base and thence steadily tapering to almost a point, sometimes with very few adpressed small black bristles before the bend, but almost always with numerous such bristles after the bend right on to the tip, though very rarely without such bristles, and with tiny glistening pale bristles above the knee of the bend ; this end-joint is bare on the inside, and any longer pale pubescence beneath about the base is very slight ; basal joint small, pale yellow, and bearing long whitish yellow pubescence. Eyes unicolorous purple brown with greenish reflections ; facets all equally small. Antennæ almost as in the male.

Thorax rather greyer than in the male, and sometimes more distinctly striped ; pubescence shorter and apparently less dense, but with the pale hairs more obvious.

Abdomen broader and more ovate than in the male, and without any (or occasionally with a little) ferruginous coloring so that the light grey well-defined triangles and side-flecks stand out sharply against the moderately shining blackish ground colour, and the middle triangles longer than in the male but hardly reaching the foremargins of the segments until the fourth and subsequent segments. Pubescence shorter, more extensively pale, but more inconspicuous. Belly light grey, with a conspicuous broad middle black stripe which extends the whole length except on the basal segment.

Legs with shorter paler pubescence.

Wings rather paler. Thoracal squamæ paler and with the margin hardly darkened. Halteres with the knob whitish or yellowish.

Length about 17 mm.

This species varies in the male by the occasional almost entire absence of ferruginous coloring on the abdomen, but can then be easily distinguished from its allies by the three rows of abdominal spots ; on the other hand the female sometimes does have a little ferruginous coloring ; I have seen a specimen in which the pubescence on the side-cheeks was mainly blackish, but usually there is not a single black hair there. No European species is very closely allied.

T. autumnalis is not uncommon in the southern half of England, as I have records from Devon, Dorset, Somerset, Hampshire, Sussex, Kent, Surrey, Essex, Suffolk, Middlesex, Herts, Hereford, Cambridgeshire, and Merioneth (Barmouth), from June 22 to August 29. It is known to occur over all Middle and Southern Europe and up to South Sweden, and probably to Asia Minor and Northern Africa.

Synonymy.—Moses Harris (1780) thought that he recognised Linné's *T. bovinus* in this species, as he does not seem to have known either of our very large species. Fabricius in 1775 (Syst. Ent. 789) described a *T. paganus* from England "capt. d. 28. Jun. prope Henly," and in 1781 (Spec. Ins., ii., 458) he gave Harris' *T. bovinus* as a synonym, a fact which seems to have been overlooked ever since, and Fabricius' species has remained a stumbling block. It is however obvious that Fabricius jumped to the conclusion that *T. bovinus* of Harris was a synonym of his *T. paganus* simply because both occurred in England, and there can be no doubt about Harris' species being *T. autumnalis*, while a reference to Fabricius' earlier description (omitted by Bezzi from Kertész's Katalog) shows that *T. paganus* has "Oculi . . . fasciis tribus fulvis, quarum inferior oculum terminat. Margo posticus fuscus" and "abdomine utrinque ferrugineo-maculato ;" these characters can only apply to *T. tropicus*, *T. montanus*, or *T. glaucopsis*, and of these three *T. montanus* is not recorded with certainty from England, while *T. glaucopsis* appears to be very rare. It seems therefore probable that *T. paganus* Fabr. is the species which we now recog-

nise as *T. tropicus* L., and that *T. tropicus* of Fabricius (of which he gave *T. sanguisorba* Harris as a synonym) is our *T. solstitialis* or *T. distinguendus*. The opportunity may be taken here of trying to fix the date of Harris' Exposition of English Insects. It is certain that one edition was prior to Fabricius' Species Insectorum (1781), and it is also certain that there could not have been any edition prior to 1780 because Plate xxvi. of the copy of the first edition in the British Museum bears the date of 1780; the date may therefore be taken as 1780 or early in 1781. I believe all the supposed three editions have identical plates, and in my copy (which bears the date of 1782) I find on Plate iii. "Mos. Harris ad Vivum, May 1, 1766," on Plate xxii. "Mos. Harris Delt. et Sculpt. Dec. 24, 1779," on Plate xxiii. "Mos. Harris Dellt. et Sculpt., Dec. 1779" (in very different writing from that on Plate xxii.), on Plate xxv. "Mos. Harris, 1780," and on Plate xxvi. "Mos. Harris, Dell. et Sculpt., 1780." If the date of publication be taken as 1781 it still holds priority over the second volume of Fabricius' Species Insectorum as is proved by Fabricius referring to it in that work.

13. ***T. glaucus*** Meigen. Allied to *T. bromius* but larger, and with the abdomen almost as rufescent as in *T. tergestinus*.

An unsatisfactory species, which may be only a very distinct looking variety of *T. bromius*.

♂. Head possibly slightly shorter and broader than in *T. bromius*. Face with a more fulvous tinge; side-cheeks more extensively black haired on the upper part; vertex almost exactly as in *T. bromius*, as there is a clump of short pale yellow hairs on the vertical triangle which somewhat contrast with the rather shorter tawnier postocular ciliation in the depression which slopes down to the vertex. Eye-facets almost as in *T. bromius*, the upper and front facets being quite four times as large as the lower ones and sharply contrasted; colour of the eyes in life not noted. Antennæ with the basal segment of the third joint rather long and thin, and the hump small and placed before its middle, and (in the specimen described) with its dull reddish colour merging into the dark brown style.

Thorax and scutellum as in *T. bromius*.

Abdomen longer and narrower, conspicuously dull reddish on the side thirds of the second and third segments and on two spots on the fourth segment and also narrowly on the side thirds of the hindmargin of the basal segment; second segment with a small blackish discoloration near each hind corner, and the third segment with this still more marked; sidemargins of the fifth and sixth segments rather narrowly reddish; fourth, fifth, and sixth segments with scarcely any trace (rubbed?) of grey side-flecks or dorsal triangles and consequently the broad blackish dorsal stripe on the abdomen more conspicuous. Belly conspicuously dull reddish on the three basal segments except that the sides are narrowly blackish and that there is a rather broad but rather vague blackish middle stripe.

Legs with rather more blackish pubescence about the tip of the front femora.

Squamæ (thoracal) with rather darker margins.

♀. Head shorter than in *T. bromius*; frontal stripe with the lower callus rather larger and squarer; postocular eymargin rather wider, and (in one specimen) with a front fringe of tolerably long and distinct black hairs (can this specimen be true *T. Mikii*?). Palpi less stout soon after the base of the second joint and with the black bristles not quite extending to the base. Eyes not noted in life. Antennæ reddish brown, or (in the second specimen) more reddish on the basal half.

Abdomen with conspicuous dull reddish coloring on the three basal segments, but with a pair of brownish diagonal stripes on the second and third segments outside the reddish flecks and not nearly reaching the side or hindmargin, and these stripes bear black pubescence which contrasts strongly with the pale pubescence which occurs on the reddish part; the reddish

coloring on the basal segment slightly broader than in the male; side-margins of the fourth, fifth, and sixth segments rather conspicuously reddish; the grey side-flecks and dorsal triangles which are conspicuous in *T. bromius* practically absent in this species. Belly with the four basal segments mainly dull yellowish red, but the basal part of the basal segment and (obscurely) the sides of the third and fourth segments rather blackish grey, and in some lights the fourth segment has a blackish ground colour; a second specimen has the middle part of the second segment of the belly rather blackish.

Legs with a few black hairs behind and about the tip of the front femora.

Squamæ distinctly darker than in *T. bromius*, and with almost blackish margins.

Length about 14.5 mm.

This species has been described from a male taken at Lyndhurst in the New Forest on June 23, 1895, and a female taken there on the next day, but reference is made to another female which was taken in the same neighborhood by Mr H. Donisthorpe at an uncertain date. The most closely allied species is undoubtedly *T. bromius*, of which for a long time I considered it only a variety, but its larger size and much more reddish abdomen (and especially belly) distinguish it. *T. tergestinus* is also a very closely allied species which agrees in size and almost in colour but has the eyes of the male with the upper and front facets merely slightly and inconspicuously enlarged, while some females from Kowarz's collection have the palpi thinner and the third and fourth abdominal segments more rufescent; *T. tergestinus* also has two purple-red bands across the lower third of the eyes in the male and three bands in the female.

T. Mikii has a postocular fringe of long black hairs in the male and no band across the eyes in the female, but the female is so similar to that of *T. tergestinus* that Egger had mixed them together when describing the latter species. It is not improbable that both *T. tergestinus* and *T. Mikii* may occur in the New Forest, and the bands on the eyes should be noted from living specimens.

Synonymy.—*T. glaucus* was described by Meigen in 1820, but as there was an apparently earlier *T. glaucus* of Wiedemann (1819) from Brazil Schiner altered the name of Meigen's species to *T. glaucescens*; it is however impossible to be certain about the dates of periodicals at that time, and as Wiedemann in 1828 deliberately altered the name of his species to *T. cinerarius* it is obvious that he conceded priority to Meigen's name, and consequently that no change was necessary in the name of Meigen's species. Brauer was of opinion that Meigen's *T. glaucus* was only a variety of *T. bromius*, but I do not like sinking the specimens I have described to the rank of a mere variety, and although they are none of them in first rate condition I prefer to retain them as belonging to a distinct species; unfortunately Brauer very seldom gave the comparative distinctions of species, and in the case of *T. bromius*, *T. tergestinus*, and *T. Mikii* merely stated that the three species might easily be confounded while his dichotomic table gave only unsatisfactory distinctions; as to *T. glaucus*, Brauer stated at one page that all the specimens under that name in Winthem's collection were males, but at another page he said that of six specimens in Winthem's collection the males belonged to the pale silver-shimmering form of *T. bromius* in which the abdomen is orange anteriorly, but the females were hardly to be distinguished as even varieties of *T. bromius*; he also stated on the first occasion that the females of *T. glaucus* as distinguished by Schiner and Egger were only rather rubbed specimens of *T. maculicornis*. Walker's *T. glaucus* is only *T. maculicornis*. Pandellé apparently included both *T. glaucus* and *T. Mikii* under his *T. bromius*, and his suggestion that *T. Mikii* is a small clear variety of *T. autumnalis* is absurd. Villeneuve has stated that Meigen's types of *T. glaucus* in the Paris Museum are a male *T. bromius* and a female *T. tergestinus*.

14. **T. bromius** Linné. Eyes one-banded. Frons nowhere shining (unless rubbed) and with no dark cross-band at the level of the antennæ; male without any long postocular fringe; female with the postocular part of the occiput only very slightly inflated, and with the middle frontal callus linear.

A rather small yellowish brown species with scarcely any reddish coloring on the abdomen.

- ♂. Head not conspicuously larger or more arched than in the female, though slightly broader than the thorax; face pale yellowish grey, growing whiter but not silvery on the lower part, bare on quite the middle but with long (though comparatively short) fairly dense and fine greyish yellow pubescence round the bare part and on the inflated side-cheeks and with more or less blackish (though not conspicuous) hairs on the upper part of the side-cheeks; pubescence on the lower part of the cheeks, at the back of the mouth, and on the jowls longer and pale greyish yellow (almost whitish); across the top of the cheeks from the antennæ to the eyes there is a very inconspicuous darkening which would not be noticed unless sought for; the bare rim under the eyes greyish white; back of the head with a very narrow pale bare postocular rim which at the temple region is practically sunk behind the eyes, and behind which is a very short very inconspicuous brownish yellow ciliation which hardly grows longer near the top angle of the eyes (=temple regions) and which has absolutely no long overhanging or outstanding hairs, but in some lights the short ciliation on the temple regions is almost whitish; vertex slightly raised, extending lower down between the eyes than in *T. maculicornis* or *T. cordiger*, blackish grey and clothed with short dense brownish yellow pubescence which is not nearly long enough to constitute a tuft; frontal triangle pale grey with usually a slight yellowish tinge and with the upper point inclined to have a blackish hue. Palpi pale orange; end-joint oblong ovate, bladdery, about twice as long as its thickest part which is a little before its middle, and ending in a rather sudden blunt conical or sometimes evenly rounded tip, and usually with a slight compression beneath just before the tip, widely clothed on its upper part with long soft thin pale yellow pubescence of which there is sometimes some indication on the underside, but the lower half of the outside, sometimes all the underside, and all the tip with numerous (almost dense) not very short black bristly hairs; basal joint short ovate, half as long as the end-joint, with a slight blackish grey tinge except at the tip, and clothed with long thin pale yellow pubescence. Eyes not quite bare but apparently so, as there are only some very short sparse hairs, bronzy green in life with one brownish purple band just below the middle which does not quite extend to the hindmargin, while below that band the eyes are greener than above it; facets on nearly the upper two-thirds very much larger (about six times) than those on the lower part, and the large facets extend upwards to the ocellar knob and downwards to and rather beyond the junction of the eyes, while the small facets do not extend in a zone up along the back margin though the contrast in size is not so conspicuous there. Antennæ dull orange red or rather darker; two basal joints rather obscured with blackish grey but with an orange red tinge visible as a ground colour; style-like portion usually blackish brown; basal joint extended like a hood over the second joint, and bearing on all its upper side dense short black bristles, while on its underside are longer thin pale hairs; second joint with an apical circlet of black bristles which are very short on the upper side but rather longer on the under side; third joint but little widened, and with only a small blunt dorsal hump on the basal quarter and usually with a few tiny black bristles there; style-like portion nearly as long as the basal segment of the third joint.

Thorax brownish grey, with five yellowish grey stripes best visible when seen from behind; middle stripe the most conspicuous and not con-

tinued clearly to the hindmargin but inclined to join the next two stripes soon after the suture, after which these two stripes continue rather more vaguely and spread out all along the hindmargin, and the outer stripes do not quite extend to this hindmargin but bend inwards and end in a point; præalar calli obscurely brownish red. Pubescence composed of fairly numerous but not conspicuous erect black hairs all over except on the front part where they are shorter and denser though pale, and in good specimens numerous sloping or depressed thin greyish yellow hairs occur intermixed among the erect black hairs but are easily abraded and leave only traces of their existence; pleuræ with all brownish yellow pubescence which is dense and woolly except on the lower parts. Scutellum with similar but slightly longer erect black hairs all over the disc, but with a fringe of equally long fine pale hairs about the margin.

Abdomen longish, flat conical, and greyish black with conspicuous brownish ochreous (but not reddish) and grey markings on the second and third segments besides less conspicuous markings on the other segments; the point of the grey middle triangle on the second segment extended to the foremargin, but on the subsequent segments not reaching much above the middle, and there is a rather long yellow hindmarginal fringe on the second and subsequent segments, and a patch of similar pubescence at the middle of the hindmargin of the basal segment; base and the basal corners broadly of the basal segment grey, and conspicuous sloping grey side-flecks of rather undefined shape and margin occur on the second, third, and fourth segments, but do not as grey flecks extend to the foremargins and not widely to the hindmargins, but the whole front corners (varying in amount) of the second segment are brownish ochreous (but not so red as in *T. glaucus*) and often amalgamate with the grey flecks and then extend broadly to the hindmargin, leaving however a lateral black patch at each hind corner of the segment which extends obscurely to the hindmargin; third segment sometimes with considerable brownish ochreous coloring which is not so conspicuous or defined as that on the second segment, and the blackish side patch much larger though also rather indefinite; fourth segment sometimes with a trace of similar ferruginous coloring over about the space occupied by the grey side-flecks; absolute sidemargins of the second to sixth segments distinctly brownish ochreous. Pubescence depressed and yellow on the ferruginous and grey parts and occurring as a fairly continuous fringe on the hindmargins of the second, third, and fourth segments, though black between the middle and the side-flecks and more conspicuous on the outer thirds of all the hindmargins; sidemarginal pubescence rather longer and fairly conspicuous, yellow on the five basal segments but considerably black on the sixth and seventh segments, while some black hairs appear to be intermixed near the hind corners of the basal segment and on the black patch on the second segment, and there are traces of black hairs on the third and fourth segments but close examination shows that they are not on the actual sidemargins; pubescence on the black parts short depressed and black, but more erect on the disc of the two basal segments. Belly blackish grey down the sides and on a more or less interrupted middle line but usually dull ferruginous between; hindmargins narrowly and inconspicuously lighter grey; sixth and seventh segments blackish, and with the usual longer black bristly hairs numerous and fairly conspicuous. Genitalia small but margined with deep orange coloring beneath the seventh segment.

Legs dull greyish black, but dull reddish orange on the extreme tip of the femora, nearly the basal half of the front tibiæ, all the middle tibiæ except the tip, the extreme base of the middle tarsi, and either the extreme base of the hind tibiæ or sometimes all the hind tibiæ except just the tip; front tarsi deep black. Pubescence on the front coxæ long, greyish white, and rather abundant; on the front femora scattered and long, greyish yellow about the base but black about the tip, with the underside conspicuously shining black and bare (for the reception of the folded tibiæ) and with a dense row of minute black bristles on the anterior margin of the bare space; on the middle femora shorter and less conspicuous and dull pale yellowish; on the hind femora dense, longer, and greyish yellow antero-ventrally; tibiæ with short depressed bristles which are mainly yellowish on the under-

side but black dorsally, while the front tibiæ have a slight black fringe behind their basal half, and the middle tibiæ a rather more extended but indistinct similar fringe and a slight pale fringe beneath besides some scattered pale hairs, and the hind tibiæ a more conspicuous longer dense mainly pale antero-dorsal fringe and a finer shorter all pale postero-ventral one; front tibiæ about the tip and the front tarsi with very few "touch-hairs." Pulvilli brownish orange.

Wings greyish hyaline; basal veins yellowish brown; the narrow brownish stigma formed by the swollen end of the subcostal vein. Squamæ glassy whitish or yellowish, with a brown margin, and with a short whitish or yellowish fringe which grows into the usual long tuft about the angle. Halteres dull brown.

- ♀. Almost like the male. Head not much smaller than that of the male; frontal stripe pale brownish yellow, rather narrowed downwards, and quite four times as long as its broadest part; lower callus shining black, nearly quadrate unless the margins near be rubbed, possibly higher than broad and not absolutely extending to the eyemargins, and connected by a short black middle line with the small middle callus; middle callus varying in shape and size, sometimes occupying about one-third the width of the frontal stripe and then only slightly higher than broad or sometimes long and narrow and then occupying only about one-fifth the width of the frontal stripe; vertical space only very faintly darkened; upper half of the frontal stripe (down to about the middle of the middle callus) bearing short mixed black and yellow hairs, of which certainly the black hairs are of a rather bristly nature; frontal triangle covered with yellowish grey dust, which is easily rubbed off so as to cause shining black lunules just above the antennal sockets; face yellowish dusted, slightly darker on the upper part of the side-cheeks and clothed on them with not very conspicuous whitish yellow or yellow pubescence (in which there are no black hairs), while similar but longer pubescence occurs all about the mouth; jowls moderately broad, greyish yellow, and with a bare greyish white postocular rim extending from them up to the top corners of the eyes, and this rim absolutely equal in width for its whole length and when seen from above narrowly visible on the upper part for about as much as one-seventh the width of the vertex; immediately behind this postocular rim a short greyish yellow ciliation exists which slightly increases in width from the lower to the upper part, but so slightly that it is not visible when the head is viewed from in front, though this is partly due to the pubescence sloping backwards rather than upwards, and sometimes three or four small black bristles may occur in this ciliation at about half-way up the head; vertex with no obviously longer hairs. Palpi dull pale orange; second joint fairly stout for about the basal half and thence steadily contracting to a sharp point, about three times as long as its stoutest part, and clothed with numerous short depressed black bristles all over the upper and outer parts except about the base, and with a few thin pale hairs beneath the basal half, though sometimes the little black bristles are distinctly dense and then extend almost to the base, and in such cases the short basal joint may bear a few black hairs though ordinarily it is pale orange with long abundant pale yellow pubescence. Eyes paler or darker green with reddish reflections, and with one purple band just above the middle which slopes upwards from the lowest level of the lower frontal callus; bare or microscopically and sparsely pubescent and rather higher than long (being higher in proportion and less evenly rounded on the front lower quarter than in *T. maculicornis*), and the blunt angle between the inner and lower margins being about 135° the eyes extend rather far down. Antennæ more or less reddish orange with the style-like portion and the black bristled tip of the basal joint blackish, but usually the large basal segment of the third joint is brownish red, and the two basal joints still darker; basal joint drawn out cap-like over the second joint, and with dense short black bristles on that cap, while usually there are short pale hairs on the rest of the basal joint though sometimes many of the hairs on the upper side are black; second joint with a circlet of short black bristles and a few short pale bristly hairs beneath; third joint (without the style-like portion) about one

and a half times longer than deep, the dorsal hump (well before the middle) being strongly defined and usually bearing some tiny black bristles; style-like portion about as long as the basal segment of the third joint.

Thorax greyer than in the male and with shorter pubescence, which causes the grey stripes to become more obvious; the depressed light grey pubescence more generally diffused and more obvious, and the erect black hairs less obvious; pubescence on the pleuræ less abundant. Scutellum greyer, with the erect black pubescence short but rather longer than on the disc of the thorax, and with the depressed light grey pubescence more obvious.

Abdomen greyish black with three rows of light grey flecks, the middle row forming triangular flecks on the hindmargins (largest and most distinct on the second and third segments) with the front point on the second segment almost reaching to the foremargin but on the third segment only about half-way up the segment; side-flecks forming sloping trapeziums which do not quite reach the foremargins but which have their outer edge sloping back to the hind corners, so that there is a distinct interval on the hindmargins between the middle and the side-flecks; these side-flecks are largest and most complete on the second and third segments, though only a little more so than on the fourth segment; basal corners of the basal segment light grey, but those of the second segment rather ochreous and the sidemargins narrowly grey, and the ochreous corners not quite connecting with the side rows of grey flecks; on the fifth segment the three grey flecks small, and on the sixth segment hardly traceable. Pubescence mainly pale yellowish, short and depressed, rather conspicuous on the greyish parts and occurring as a short fringe on the hindmargins, but short and depressed and black on blackish parts (much more inconspicuous than the yellow pubescence); sidemarginal pubescence very short and inconspicuous and pale yellowish, though black hairs occur very near the edge on the fourth and subsequent segments. Belly normally pale ashy grey with a vague darker broad middle stripe and with narrow pale hindmargins of segments and with the adjoining parts of the first and second segments obscurely reddish, but this reddish coloring apparently very variable in extent.

Legs with shorter pubescence than in the male, especially on the tibiæ, and the lateral fringes on the hind tibiæ reduced to an antero-dorsal row.

Wings, squamæ, and halteres as in the male.

Length about 13.5 mm.

This species varies a little in both sexes in the amount of ferruginous or orange coloring at the sides of the second (or third) abdominal segment and on the belly, but it is a common species which is soon easily recognisable except from *T. glaucus*. In size it is rather smaller than *T. glaucus* and compares with only *T. maculicornis* and *T. cordiger*, and the male is distinguished from both of these by the absence of any long postocular ciliation, while the female is distinguished from that of *T. cordiger* by the more linear middle frontal callus, and from both species (or at any rate from *T. cordiger*) by the absence of any darkened space between the antennæ and the eyes; *T. bromius* is larger and is altogether a lighter yellower colored species (whence the name *bromius*, coffee colored), and has the sidemargins of the male abdomen more fringed with pale hairs, and the anterior tibiæ with less obvious pubescence; the female has no blackish pubescence (or very rarely) about the upper part of the cheeks, and has a shorter postocular fringe than *T. maculicornis*. If *T. glaucus* is a distinct species it is larger and has much more reddish coloring on the abdomen both dorsally and especially ventrally, while its grey abdominal markings are indistinct.

T. bromius is the commonest British species of even the comprehensive genus *Tabanus*, though (as in *T. autumnalis*) my records do not extend north of the Midland counties. I have records from Devon, Dorset,

Somerset, Hants, Sussex, Surrey, Kent, Suffolk, Berks, Wilts, Huntingdonshire, Oxfordshire, Gloucestershire, Leicestershire, Worcestershire, and Nottinghamshire, ranging from June 16 to August 23. Colonel Yerbury exhibited at the Entomological Society of London on November 21, 1900, a specimen which had been bred on July 12, 1899, by Mr Holland of the Hope Museum, Oxford, from a pupa found in sand at St Helens in the Isle of Wight. It is recorded from Sweden to Naples.

15. ***T. maculicornis*** Zetterstedt. Eyes one-banded. Frons not at all shining and hardly with a dark cross-band at the level of the antennæ; male with a long postocular ciliation (fig. 237); female with the postocular part of the occiput rather inflated, and the middle frontal callus linear. Antennæ all reddish.

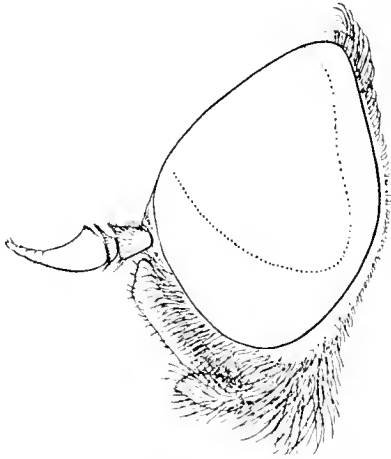


FIG. 237.—*Tabanus maculicornis* ♂.
× 10.

The smallest British species of the genus distinguished by its grey and blackish colour.

♂. Exceedingly like the male of *T. cordiger*, but the frons with scarcely any trace of a brown cross-band from eye to eye at the level of the antennæ, and the antennæ much more reddish.

Head large in proportion to the thorax; face and side-cheeks greyer and less silvery than in *T. cordiger*; side-cheeks with blackish hairs on nearly the upper half extending to the base of the antennæ, and the other pubescence of the face and side-cheeks more greyish white; the long ciliation behind the upper part of the eyes all pale greyish yellow or at any rate with very few (four to five) black hairs intermixed; frons dull black on the ground colour but obscured on the lower half by abundant greyish or greyish yellow dust and with the upper point slightly covered with light grey dust, so that the dark line dividing the facets of the eyes seems to go right across the frons; ocellar tubercle very much sunk in the angle between the eyes. Palpi longer, thinner, and more yellow; end-joint elongate ovate, more than twice as long as broad, and bearing long whitish pubescence with about twenty black bristly hairs on the apical half, and the tip ending in a slightly down-turned short point; basal joint much shorter than the end-joint. Eyes bare, in life brownish green with one conspicuous purplish band along the top of the small facets, and this band is broadest in front and has its top margin level with the top of the dark space on the frontal triangle but its lower margin below the lowest level of that, and gradually narrowing until close to the hindmargin where it curves upwards into the zone of small facets and is less distinctly continued up to the vertex. Facets almost identical in size with those of *T. cordiger*, but with the distinction in size much more contrasted, more continued to the front, and lower down the eye than in *T. bromius*. Antennæ much more reddish, even on the basal joints, or sometimes even reddish orange, and with the hairs beneath the basal joint pale; in shape very much as in *T. cordiger*, but with the three subquadrate basal segments of the style-like portion more distinct.

Thorax slaty black, with five indistinct dull grey stripes; præalar calli dark. Pubescence moderately long and fine, mainly yellowish grey but black across the disc from the suture almost to the hindmargin, and by contrast more pale on the scutellum; pubescence down the disc appearing to be more equal in length both on the front part and on the middle; pleuræ with pale greyish pubescence, which is sometimes slightly tinged with yellow on

the upper part and on the tuft near the root of the wing, but without any black hairs intermixed on the middle of the mesopleuræ.

Abdomen proportionately short, with the four basal segments nearly equal in width and the remaining segments forming a blunt cone, dull black, but with the second to fifth hindmargins obscurely light grey, and with three indistinct rows of flecks of which the middle row is the most distinct and is composed of rather large triangular patches of light grey pubescence at the middle of the hindmargin of each of the five basal segments (but smallest on the basal one) and which barely extend up one-third the length of each segment; side-flecks less distinct after the second or third segment, rather rounded, sometimes ferruginous on the second and third segments, and not reaching the front margins but extending to the hindmargins and connecting there with the dark orange sidemargins; sidemarginal hind corners of the fourth and fifth segments orange and connected with the pale hindmargins; in addition to these markings the second and third segments are usually orange or chestnut brown on the foremargin between the side-flecks and the sidemargins or on the front part of the side-flecks. Pubescence on the disc suberect, fairly long, and black, but pale on the middle triangles and along the sides of the hindmargins, while down the sidemargins it is longer and is black about the basal corners but greyish white elsewhere. Belly dull greyish black, but less dusted with grey than in *T. cordiger*, and with broader yellowish hindmargins of segments; pubescence soft, pale, and fairly long with no (or scarcely any) black hairs on the sixth segment, but with numerous longer curved black bristly hairs on the seventh segment.

Legs dull black, but luteous on the tibiæ except for the black apical half of the front pair, the brown apex of the middle pair, and the blackish apical sixth of the hind pair; the hind tibiæ more luteous than in *T. cordiger*, but with the apical sixth more contrastedly black; pubescence much as in *T. cordiger*, but with fewer long black hairs on the anterior tibiæ and shorter ciliation on the hind tibiæ, and the short pubescence on all the tibiæ much more extensively black so that very little pale pubescence is obvious except towards the underside of the hind pair; the shining black bare underside of the front femora rather conspicuous.

Wings very similar to those of *T. cordiger*, but the veins about the base apparently slightly blacker. Halteres with blackish brown knobs.

- ♀. Head much smaller and less rounded in front than in the male; frontal stripe brownish ashy grey, very slightly narrowing towards the lower part and about four times as long as its broadest part; lower callus shining black, wrinkled, rather higher than broad, subquadrate, notched on the foremargin, and not quite extending to the eyemargins, but extending upwards at the middle and connecting rather narrowly with the elongate shining black middle callus, which is quite three times as long as broad; ocellar space indefinitely blackened but not enough to call it a callus; upper two-thirds of the frontal stripe bearing rather abundant short rather inconspicuous (because depressed) black pubescence but at the sides with a few inconspicuous pale hairs down to the lower callus; face (except on the upper part of the side-cheeks) greyish white and clothed with rather dense white pubescence which is longest about the mouth; frontal triangle bare of pubescence but covered with brownish orange dust (which is easily rubbed off on the middle part and then shows the shining black ground colour as a somewhat lunulate mark) which extends downwards to just below the antennæ and even further in a darker brown hue down the side-cheeks and along the margin of the eyes, and this upper part of the side-cheeks always bears some black pubescence; jowls broad and greyish white, while from them a fairly broad bare conspicuously whitish postocular rim extends right up to the vertical space, which when viewed from above is well puffed out on the upper quarter of the eyes to about one-quarter as much as the breadth of the frons; behind the puffed-out part of that bare rim there is a moderately long pale or brownish yellow ciliation which (when seen from in front) projects a little above the eyes, but below that part there is only a short inconspicuous pale ciliation which is continued downwards until it merges into the long pubescence of the jowls; on the front part of the longer upper postocular ciliation there

are sometimes some black bristly hairs. Palpi dull yellow, only moderately stout on about the basal half but then drooping and gradually diminishing to a blunt point, about four times as long as the width of the stoutest part, clothed with rather dense black bristles all over the upper and outer sides (except at the base) and with a few longer thin pale hairs beneath, especially about the base; basal joint short, blackish grey except at the luteous tip, and bearing long whitish pubescence. Eyes in life brownish purplish green with frequently a coppery shimmer and with one rather indistinct and incomplete purple band across the middle, which slopes slightly upwards from front to back; the angle at the junction of the inner and lower margins of each eye about 120° , and consequently the eyes extending not much below the antennæ; eyes in profile about as high as long. Antennæ orange or brownish orange; basal joint with its dorsal front angle drawn out into a short black bristled point; the two basal joints bearing almost all over short black bristles; third joint a little widened at the base and (without the style-like portion) about twice as long as broad, with the small but obvious dorsal hump placed well before its middle, and the other segments together about two-thirds the length of the basal segment, sometimes all orange or sometimes blackish.

Thorax greyer than in the male and the lighter grey stripes more evident and appearing in very perfect specimens as broad stripes of brownish yellow depressed pubescence; the erect black pubescence on the disc shorter and extending perhaps further above the suture and with more numerous depressed thin pale hairs intermixed, so that any contrast (when viewed sideways) between the black and pale pubescence is less obvious; pubescence on the pleuræ usually all whitish grey, but sometimes the tuft near the wing-base brownish yellow.

Abdomen flatter than in the male, and with three conspicuous rows of light yellowish or whitish grey triangular flecks which extend from the first to the sixth segments, though all the flecks on the second and third segments are more conspicuous than the others because the sloping side-flecks on them extend from near the foremargin right away to the hind corners and merge there into the conspicuous yellowish or whitish grey pubescence along the sides of the hindmargins, but on the fourth and fifth segments the conspicuous sides of the hindmargins mainly form the flecks of the side rows, but only slightly so on the sixth segment; the intervals on the hindmargins between the light pubescence of the middle and that of the sides contrastedly black; upper points of the middle triangles seldom extending much over the lower half of each segment but sometimes touching the foremargins so that the middle row of flecks becomes then continuous, and (according to Brauer) the side rows sometimes confluent; in rubbed specimens the abdominal spots are slaty blue; second segment with an inconspicuous brownish orange spot near each upper side corner, and the hind corners of the second to fourth (and sometimes even fifth) segments brownish orange. Belly lighter grey than in the male, and with only very narrow yellowish hindmargins of segments.

Legs almost as in the male, but with the base of the posterior tarsi occasionally rather more ferruginous.

Wings, squamæ, and halteres almost as in the male.

Length about 12 mm.

This species may be distinguished in the male from any other British one except *T. cordiger* and *T. glaucopis* by the long postocular ciliation, while even in rubbed specimens the frons is not shining as in *T. glaucopis*; from *T. cordiger* the more elongate palpi, black hairs on the upper part of the side-cheeks, and the paler antennæ provide easy distinctions; the female is distinguished from those two species by the more linear middle frontal callus, and from *T. glaucopis* by the absence of any shining space on the frons, and from *T. cordiger* by its narrower shape and slightly smaller size, by the presence of a few black hairs on the upper part of the side-cheeks, by the paler antennæ, by the larger abdominal spots of which the side ones are more spread out towards the hind corners of the

segments, and by the more extended whitish pubescence along the sides of the hindmargins; the female of *T. bromius* may be distinguished by its rather larger size, by its browner grey abdomen which has more continuous yellow pubescence along the hindmargins of the segments, by the more brownish orange posthumeral calli, by the broader lower frontal callus, by the absence of black hairs on the upper part of the side-cheeks, and by the narrower inflation of the upper part of the postocular rim. In fact (though the character is so slight as to require considerable care in detecting) the black hairs on the upper part of the side-cheeks near the base of the antennæ distinguish *T. maculicornis* in both sexes from all its allies. *T. Mikii*, which has occurred in Denmark, is a larger species and has a reddish belly.

T. maculicornis is not an uncommon British species as I have records from Devonshire (Avon Valley, Walkham, Ivybridge, and Lynton), Hampshire (New Forest and its outskirts, Woolmer Forest, and Winchester), Sussex (Plashet Wood), Surrey (Weybridge), Herefordshire (Devereux Pool), Worcestershire (Wyre Forest), Merionethshire (Barmouth), and Perthshire (Rannoch), from June 10 to July 20. *T. maculicornis* and *T. cordiger* were both taken at Barmouth by Colonel Yerbury. It is recorded from Scandinavia to the Tyrol.

Synonymy.—Loew failed to distinguish this species from *T. bromius*, which seems to be very extraordinary. It is almost certainly Walker's *T. glaucus*, and this is confirmed by a female in the Entomological Club collection which is labelled "*glaucus* of Diptera Brit. confirmed by Mr Walker, 26/x/1868"; the specimen is rather small but is otherwise quite normal.

16. **T. cordiger** Wiedemann. Eyes with not more than one band. Frons nowhere shining but with a brown cross-band from eye to eye at the level of the antennæ; female with the middle frontal callus broad. Antennæ blackish on at any rate the basal joints. Male with a long postocular ciliation.

Rather small species, with unusually distinct grey spots on the abdomen.

♂. Head much larger than in the female, being semicircular and distinctly wider than the thorax. Face and side-cheeks silvery white, with fairly dense and fine rather long white hairs, while similar hairs extend all over the jowls but not at all on to the back of the head; back of the head with only a very short pale postocular ciliation behind the narrow whitish grey bare postocular rim (which grows a little wider on the upper part) until the upper third of the head, whence a line of long forwards-curved black hairs extends almost to the vertex, and intermingled with them are some shorter whitish hairs, but behind the vertex these whitish hairs become more dense and conspicuous; ocellar tubercle small, globular, blackish brown; frontal triangle pale yellowish, but with an indefinite blackish cross-band above the middle which is continuous with the blackened part of the eyes, and usually with a brown band across just above the antennæ which always develops into an obvious darker cross-band between the antennæ and the eyes and then extends a little down the sidemargins of the face; this cross-band is an important distinctive character and may be more obvious in some lights than in others. Palpi whitish yellow, short; end-joint thick oval almost globular, being only one and a third times as long as broad, and bearing longish white hairs with a few (about half a dozen) black hairs intermixed towards the tip, and this joint is thickened forwards so as to become rather club-shaped with a

short thick conical tip, and is slightly excavated just below that tip; basal joint as long as the second joint, with a blackish grey tint except about its tip, not inflated but bearing long whitish pubescence. Eyes bare, grey above but green on more than the lower third, with one dark (or rarely purple) band along the top of the small facets; facets on about the upper two-thirds almost four times as large as those on about the lower third and with a conspicuous line of separation except that the small facets extend in a rather narrow zone all up the hindmargin of the eyes to the ocellar tubercle; the dividing line across the eyes is hardly undulating but runs nearly straight across the eye to the zone of small facets. Antennæ always dull black on the two basal joints, but the third joint sometimes reddish brown at the base or possibly all dark reddish brown (I possess a specimen in which it is all dull orange red); basal joint dorsally pointed very cap-like over the second joint, and bearing very short inconspicuous black bristles above and a few short black hairs beneath; second joint short, pointed cap-like over the base of the third joint, and bearing a terminal cirlet of short black bristles which are most distinct on the underside; third joint with its basal segment considerably longer than deep and with an obvious angled dorsal hump, after which it is rather concave on the upper side; style as long as this basal segment, slender and usually bent upwards, with its two basal segments longer than broad and the terminal one longer still and attenuated.

Thorax greyish black with five faint pale grey stripes, and with the præalar calli usually obscurely ferruginous; pubescence fairly abundant, usually mainly black except on the front part, nearly erect and fairly long (especially after the suture and on the scutellum), but on the front part shorter, more depressed, and pale greyish, though the shorter fine and more depressed greyish hairs may extend more on to the disc or especially on to the sides of the disc and when viewed from in front appear to be predominant, or the grey hairs may be even more extended as mentioned later on; pleuræ with dense woolly contrastedly greyish white pubescence, though a few inconspicuous black hairs may be intermixed on the lower part of the mesopleuræ. *T. maculicornis* has the pubescence on the thorax and especially on the scutellum much paler, but with a broad band of black hairs crossing after the suture and the pubescence on the front part of the disc more equal with the rest.

Abdomen blackish grey, or rarely deep black, with three rows of pale grey spots formed by side rows of distinct rather small but well-defined isolated side-flecks and by a middle row of less distinct short flattish triangles on the hindmargins of the second to sixth (or sometimes only to fourth) segments; the side-flecks on the second and third segments sloping from the base outwards and often with a slight yellowish tinge, and isolated as they by no means extend to the hindmargins, and outside the flecks the second segment is indistinctly brown or reddish brown to a greater or less extent but becomes paler towards the basal corners; hind corners of the second segment and thence onwards the sidemargins of the third to sixth segments narrowly yellowish with this colour extending inwards along the hindmargins; the hindmargins otherwise (after the basal one) indistinctly and narrowly greyish; pubescence rather abundant though rather short and depressed, black and bristly on the disc but longer and more erect on the disc of the second segment, while all the sidemargins up to the end of the sixth segment bear longer softer whitish pubescence, though when viewed from above the basal segment shows black hairs (occasionally absent) at the sides of an apparent rather broad black hindmargin, and the second segment appears margined with some black hairs just after its middle, and the third just before its middle (but these black hairs on the second and third segments are not on the absolute sidemargins); also when seen from above pale pubescence is obvious on the three rows of pale spots and along the hindmargins near the sides; the black bristly pubescence on the fifth and sixth segments slightly longer and more erect than that on the preceding segments, and when viewed sideways the erect black bristles beneath the seventh segment long and conspicuous. Belly ashy grey with a shimmering light grey tinge caused by the dense light grey dust and the sloping whitish

pubescence; hindmargins of the first six segments conspicuously and equally pale yellowish; in a variety the belly is blackish with whitish hindmargins to the second to sixth segments. Genitalia hardly conspicuous, but a pair of large brown side plates can be seen.

Legs dull black with a grey tinge caused by abundant dust, but the bare underside of the front femora conspicuously black and shining as usual; in the darkest forms the knees and posterior ankles are orange, and upon close examination more than the basal half of the front tibiæ and all the middle tibiæ except the tip show traces of orange colour, the front tarsi being blacker and slightly broader than the posterior tarsi; but in the lighter forms the front tibiæ are orange on the basal half (never whitish yellow as stated by Brauer), as well as the middle tibiæ except at the tip and the basal joint of the middle tarsi for more than half its length, while the hind tibiæ and the base of the hind tarsi are obscurely orange; between these forms any intermediates may occur, and I have seen a dark form in which the front tibiæ and tarsi were only brown (immature?), but it may be noted that the hind tibiæ are almost always all blackish; front tibiæ a little clavate, but the "touch-hairs" about the tip and on the front tarsi very inconspicuous. Pubescence on the front coxæ dense white and long, behind the front femora whitish except for a few black hairs near the tip, behind the middle femora less abundant and whitish except for a very few black hairs close to the tip, and beneath the hind femora whitish; pubescence on the posterior tibiæ mainly whitish but black and almost bristly above the middle tibiæ, and the anterior tibiæ with some longer black hairs towards the back part (though scarcely as a fringe), while the hind tibiæ have a distinct rather long and coarse continuous antero-dorsal fringe and a short pale postero-ventral one, the antero-dorsal fringe being usually mixed with numerous black hairs; in one specimen the fringe is entirely black and the black hairs on the middle tibiæ and behind the front femora are more numerous. Pulvilli brownish yellow; claws dull black, but rather brownish about the base.

Wings almost hyaline or slightly smoky brownish; veins dark brown but becoming blackish on the outer part of the wing. Squamæ glassy smoky yellowish, with a conspicuous dark margin to the alar pair but a paler brown margin to the thoracal pair; fringe very short and pale, but the usual tuft near the angle long conspicuous and greyish white. Halteres dark brown, with the top of the knob sometimes light brown.

- ♀. Resembling the male but greyer and less pubescent. Head much shorter than in the male but quite as wide, and (when seen from above) with a more regular arch behind. Face white, and there are rather long and dense white hairs all over the face, cheeks, jowls, and underside of head, though the hairs are longest all about the mouth; frontal stripe brownish ashy grey, suddenly but slightly contracted at its lower end and slightly widened above, very broad as it is less than three times as long as its broadest part; lower callus shining black, transverse oblong, resting on the frontal triangle, and only separated from the eyes by narrow grey lines; middle callus broad (not in the least linear) usually heart-shaped (being notched above) and very rarely connected below by a short point with the lower callus; ocellar callus only indicated by a large blackish ashy grey space; frontal triangle dull clear yellowish with a brown cross-band as in the male extending across from eye to eye both above and below the antennæ and continuing somewhat down the side-cheeks against the eyes; postocular margin with a narrow greyish white bare rim, behind which on the middle part of the eye is a single sparse ciliation of bristly black hairs and behind that a more abundant greyish white ciliation which gradually grows a little longer right up to the upper eye-angle; behind the vertex are some slightly longer black hairs which have their tips bent forward, and some longer grey hairs are intermixed on and about the vertex; pubescence on the rest of the frontal stripe almost down to the lower callus shorter black and sloping forward, or sometimes pale on the sides and lower part. Palpi yellowish white (or rarely orange yellow) with whitish silky pubescence beneath the base of the second joint and usually with short black bristles mixed with tiny inconspicuous whitish ones on the upper and outer sides, but a Scotch specimen identified by Brauer has not

one single black bristle on the palpi and another Scotch specimen from Aviemore has no tiny pale bristles on the palpi except for a few above the bend; second joint bent blunt angled and thickened bladder-like on the more horizontal basal third but then bending and narrowing to a fine sharp point, the whole joint being three times as long as its thickest part; basal joint small and mainly with a blackish grey tinge. Eyes bare and without bands. Antennæ almost as in the male, but the less reddish third joint with its basal segment longer and the style shorter, the basal segments (apparently three) of the latter being almost quadrate.

Thorax rather greyer than in the male and with rather shorter less abundant erect black pubescence, and with much more conspicuous pale grey pubescence above the wing-base and along the lower margin of the postalar calli and down the grey stripes of the thorax (especially after the suture). Scutellum with much shorter less abundant erect black pubescence, and with a fairly abundant marginal fringe of pale grey hairs.

Abdomen broader, flatter, and more oblong than in the male; middle row of spots more triangular and often extending in a thin point up to the fore-margins; side rows of spots less lunulate and more sloping from the front outwards, and extending to the hindmargins; the yellowish coloring about the base of the second and third segments usually more restricted; pubescence shorter, especially on the sides and down the sidemargins. Belly as in the male.

Legs more ochreous, and with a silvery shimmer in front of the tibiæ; only the apical half of the front tibiæ blackish and just the tip of the middle tibiæ brown, though the hind tibiæ are still all darker than the anterior pairs, pubescence shorter and paler, there being scarcely any longer black hairs on the middle tibiæ; pulvilli darker.

Wings, squamæ, and halteres almost as in the male.

Length about 14 mm. but varying from 12.5 mm. to 15 mm.

This species is most nearly allied in the male to *T. maculicornis*, from which it may be distinguished by the blacker antennæ (at any rate on the basal joints), by the absence of black hairs on the upper part of the side-cheeks, and by the shorter oval end-joint of the palpi, as well as by many minor distinctions which are given under the description of *T. maculicornis*; while it is distinguished from all allied species by the brown cross-band from eye to eye which includes the base of the antennæ; *T. glaucopsis* is distinguished in both sexes by the shining black space on the frontal triangle. The female may be known from all British species except *T. glaucopsis* by its quadrate or heart-shaped (or at any rate not linear) middle frontal callus, while the bandless eyes and the brown cross-band about the antennæ distinguish it from all other known European species. It varies a little in the intensity of the cross-band which includes the antennæ (but not enough to cause doubt), and in the colour of the third joint of the antennæ which ranges from its normal dull black through more or less reddish brown about its base to (in the male) entirely dark reddish brown or even to reddish orange; other minor variations in the colour of the pubescence, or of the abdomen or legs, are noted in the description, but the variation in the amount of black bristles on the palpi of the female is remarkable, as it may extend from entire absence to almost exclusive predominance. A male from Asch in Bohemia has the pubescence on the thorax more extensively pale grey, and the thoracic stripes more distinct.

T. cordiger appears to be an uncommon British species, and I had little knowledge of it until Colonel Yerbury took a considerable number of both sexes at Aviemore and Nethy Bridge in Inverness-shire in 1899 and 1900. I have however other records from Devonshire (Walkham

and Avon valleys), Hampshire (New Forest), Hereford (The Dowards), Worcester (Wyre Forest), Glamorgan (Porthcawl), and Merioneth (Barmouth) and from several Scotch localities, the dates ranging from June 12th (Austen gives May 27th) to July 29th. It has been recorded from Central Europe and is common in South Europe along the Mediterranean to Asia Minor, but northwards it becomes less common though it extends to Finland.

Synonymy.—Loew and Brauer cleared this up, but previously the North European records have been given under the synonym of *T. atricornis* Meig. A female in the Hope Museum at Oxford bears two labels, one of "New Forest, July 11, 1821," and the other "*Tabanus lunulatus?*"; it is a very brown specimen, with only brownish yellow pubescence behind the eyes and with the long and slightly broad abdominal side-spots extending to the hindmargins and thus when viewed sideways forming a continuous pale line, while the hindmargins bear a pale fringe all across; in fact all the black pubescence is much restricted and appears brownish (bleached?); it has very little reddish hue near the basal corners of the abdomen, and the legs are more ochreous even to the base of the tarsi, while the basal veins of the wings are more brownish orange; it was probably rather immature when caught and in course of time may have bleached. Walker's *T. atricornis* and *T. cordiger* cannot belong to this species according to details of his descriptions, especially as he included *T. cordiger* in his table among the species with hairy eyes.

17. **T. glaucopsis** Meigen. Eyes three-banded, in the male on the region of small facets. Frontal triangle mainly shining blackish in both sexes. Male with a long postocular ciliation. Female with the upper frontal callus broad and isolated. Abdomen with rather inconspicuous ferruginous side-flecks.

Easily distinguished by its shining black frontal triangle.

♂. Described from a continental specimen in Kowarz's collection from Asch in Bohemia.

Head much larger than in the female, being so much more rounded anteriorly that it forms almost a semicircle. Face and side-cheeks forming a small pale ashy grey triangle clothed with dense soft whitish grey fairly long pubescence; jowls also pale ashy grey, small, and bearing longer and more woolly pubescence which extends all about the sides and back of the mouth, but none of this soft pubescence extends up the back of the head; the side-cheeks blend softly into the face and jowls, and the jowls blend into the whitish grey back of the head; back of the head considerably hollowed out, and with practically no postocular rim until close to the upper eye-angles because the eyes bulge over, but with short yellowish postocular pubescence and a few longer black hairs which are rather curved over the eyes; vertical space exceedingly small, but with a little curved pale pubescence; frons shining blackish chestnut with just the tip of the top angle light grey and with a fairly broad pale yellowish (almost whitish) grey line right across in front just above the antennæ which merges at the sides into the grey of the side-cheeks. Palpi with the second joint elongate oval, about three times as long as its breadth at the middle, dull pale yellow, and clothed with soft whitish pubescence in which two or three black stronger hairs are intermixed near the tip; basal joint greyish, long and not dilated. Eyes very large, the front facets being all very much enlarged and strongly contrasted with the small facets on the lower third and on the narrower marginal zone which extends equally right up to the vertical space; the enlarged facets extend undiminished up to the touching part of the eyes; the contrasting line of facets begins at about the top of the shining part of the frons and loops down right across the eyes to the narrow zone,

leaving the widest part of the small facets at about the middle of the head (when viewed sideways); the eyes touch for twice the extreme length of the frons; in life (according to Brauer) they are grey, dark at the margin, green below with a purple shimmer, and on the lowest quarter with three purple bands of which the upper one is cleft towards its inner end. Antennæ clear dull reddish orange; two basal joints obscured by numerous short black bristles on all the upper part of the basal joint and on a circlet round the tip of the second joint, though the bristles on this circlet are pale on the underside, and the underside of the basal joint has some longer (though not long) thin pale hairs; basal joint rather small and extending dorsally only slightly cap-like over the second; third joint with the dorsal hump on its basal segment very slight, so that this segment is almost regularly blunt conical and twice as long as its thickest part, while near its base it bears some tiny black dorsal bristles; the next three segments of the third joint are almost quadrate and are not quite so thick as the tip of the basal segment, while the end segment is thinner and tapering, and about as long as two of the previous annulations.

Thorax shining grey black, with five nearly equidistant light grey stripes which become rather vague soon after the suture, the side stripes being the least defined; præalar calli ferruginous; pubescence fairly abundant, nearly erect, light grey but with a few black hairs inconspicuously intermixed above the wing-bases, and on the præalar calli and even right across and all about the middle of the disc; pleuræ ashy grey, clothed with dense light grey woolly pubescence which is however less dense on the lower part. Scutellum grey, but the disc not so pale as the light grey thoracic stripes; pubescence longer, more erect, paler grey, and perhaps more abundant than on the thorax.

Abdomen small and tapering, about one and a quarter times as long as the thorax and scutellum together, narrower at its base than the thorax and steadily tapering to a point so that certainly the fifth to seventh segments form a conical end; when seen from above greyish black with a broad ashy grey dorsal stripe which on the fourth segment and onwards widens and becomes vague until it dies out on the sixth and seventh segments; this dorsal stripe and the greyish black part occupy about the middle third of the abdomen on the second to fourth segments, but outside them the abdomen is mainly dull ferruginous, though the third and fourth segments have a considerable blackish grey space near each side, so that the ferruginous markings almost form connected flecks of the usual *Tabanus* type; on the fifth to seventh segments as the middle grey part becomes undefined so the grey side-flecks become more apparent on at any rate the fifth and sixth segments; when seen from above no pale triangles are visible on the middle of the hindmargins but the hindmargins themselves are rather broadly ashy grey, and the pale yellowish pubescence on the hindmargins of the four basal segments becomes conspicuous on about the middle third and after a slight gap obvious but less conspicuous on the rest of those hindmargins, but on the fifth and sixth segments the middle quarter of the hindmargins bears less conspicuous pale pubescence; seventh segment rather distinctly transversely rugose; the abdomen when viewed from behind appears mainly very light grey on the broad dorsal stripe but more yellowish towards the sides, and with the hindmargins (especially on the four basal segments) broadly pale yellowish grey, and with numerous vague greyish brown flecks which upon a little tilting indicate a row of brown spots on each side of the broad light grey dorsal stripe and with traces of another fainter row of spots nearer each side; pubescence sloping, mainly blackish and rather short, except for the pale hindmarginal pubescence mentioned before which spreads up a little on to the disc about the middle of each hindmargin and extends on to the ferruginous part and the grey side-flecks, while the pubescence becomes longer and stronger about the end of the seventh segment and on the basal side lamellæ of the genitalia, but leaves the rest of the genitalia almost bare. Belly ashy grey, but obscurely ferruginous on the three or four basal segments except for a large black spot on the middle of the two basal segments, and with the hindmargins (especially of the third, fourth, and fifth segments) pale; pubescence short, depressed, pale (almost whitish), but beneath the seventh

segment and the genitalia with numerous longer stronger curved black hairs. Genitalia (when seen from above) blackish, longer and narrower than the seventh abdominal segment, with a quadrate dorsal plate and two smaller basal corner plates, and between these dorsal and side plates with elongate narrow ridged processes which extend beyond even the dorsal plate, and then between their projecting ends (and projecting beyond them) with a pair of terminal lamellæ whose outer sides slope inwards after the end of the ridged processes.

Legs greyish black ; tibiæ luteous with the apical third or more of the front pair blackish, and just the tip of the posterior pairs blackish or brownish ; posterior tarsi rather ferruginous about the base ; front tibiæ rather thickened towards the tip, and the front tarsi rather dilated and deep black. Pubescence on the front coxæ dense long and greyish white ; behind the front and beneath the hind femora abundant but thin, long, conspicuous and greyish white, being even longer and woollier behind and beneath the middle femora which also bear a few black hairs behind the tip ; front femora with a few black hairs above and behind near the tip, but with the deep black bare stripe on the underside conspicuously contrasted with the grey pruinose sides ; the other pubescence on the posterior femora equal short depressed and pale ; tibiæ with short rather silky pale pubescence except for the stronger black dorsal and apical pubescence and the middle tibiæ with no long pubescence except a little on the upper side, and the hind tibiæ with a delicate pale postero-ventral ciliation and a coarser denser mainly black dorsal one ; tarsi with short black depressed bristly pubescence ; the usual "touch-hairs" about the tip of the front tibiæ, beneath the basal joint of the front tarsi, and at the apical side corners of the other joints.

Wings hyaline ; veins blackish, but pale brown on the strong mediastinal, subcostal, radial, and cubital veins up to nearly opposite the tip of the discal cell, and on the stem and lower branch of the postical vein ; stigma rather pale brown and only formed by the swollen end of the subcostal vein. Squamæ yellowish brown with dark brown margins and the usual large and conspicuous pale tuft of pubescence about the angle. Halteres yellowish brown, with the base of the knob almost blackish.

- ♀. Greyer and broader than the male. Frontal stripe (fig. 235) greyish yellow, sometimes almost parallel-sided but usually rather contracted at its lower end, not quite four times as long as its broadest part ; lower callus quadrate, moderately shining black, rather large, but not touching the eyes at the sides nor extending at all upwards towards the middle callus, and well remote from the frontal triangle ; middle callus black but hardly shining, isolated, nearly as broad as the lower callus, orbiculate but sometimes cleft above and sometimes extending downwards to a point and thereby becoming elongate triangular and nearly twice as long as broad, but never at all linear, widely separated from either lower or upper callus and well away from the eyes ; upper callus often vague, or large but not shining black being more or less obscured by dust, but when distinct nearly as wide as the space between the eyes at the upper eye-angles but quickly sloping inwards from the eyes until it occupies only about half the width of the frons, incurved on its upper margin and divided all the way down by a narrow greyish yellow line ; frontal triangle shining black (or chestnut at its upper angle) all across the upper half, but with the lower half (against the antennæ but hardly extending to the eyes) bright greyish yellow, the extreme edge against the eyes being dusted greyish and connected at about the level of the antennæ with the greyish yellow cross-band, and with a narrow middle furrow down the middle of this cross-band ; pubescence on the frontal stripe extremely short and nearly all black, not scarce, but the lower callus quite bare ; frontal triangle quite bare. Face yellowish grey, but with a broad darker brownish undefined band between the antennæ and the eyes ; face clothed with yellow pubescence, but the lower part of the side-cheeks and the mouth region bearing abundant longer pale yellow pubescence ; back of the eyes with a narrow bare dull yellow postocular rim, which widens a little when quite close to the upper eye-angles, and behind that with a short dense stubby ciliation which may be darker and shorter still below but which becomes brownish orange right up to

but not beyond the upper eye-angles; behind the vertex are some longer thin pale yellow hairs. Palpi dull golden colored; second joint long though thickened for nearly the basal half, but tapering gradually after that to a point, rather drooping and about four times as long as its thickest part, bearing numerous though not dense short black bristles all over the upper and outer sides, but sometimes with these black bristles less numerous on about the basal half and then with numerous shimmering yellow bristles intermixed, and this second joint bears beneath about its base some longer pale yellow pubescence, but is bare on its inner side; basal joint more greyish orange, and bearing long pale yellow pubescence. Eyes bare; facets all equal; in life (according to Brauer) green, but red above towards the vertex and below on the margin, and with three arched yellow-margined purple bands on the disc. Antennæ similar to those of the male, but the circlet of black bristles round the tip of the second joint extending all round the lower part; dorsal hump on the third joint more defined and consequently the basal segment of that joint less than twice as long as its deepest part.

Thorax very similar to that of the male, but with shorter and more inconspicuous pubescence; pleuræ with the pubescence (in English specimens) slightly yellowish.

Abdomen broad and almost oblong, blackish but sometimes with the grey dorsal stripe better defined and then with the blackish stripes next to it also more defined, after which the ferruginous flecks on the second to fifth segments are also more defined but leave the hindmargins widely though obscurely ferruginous grey; outside the ferruginous flecks there is on each side a rather large blackish hind-corner blotch on the third segment, and most of the sides of the fourth and fifth segments (except the hindmargins) are blackish; pubescence more obviously yellow on the ferruginous flecks. Belly as in the male, but more ferruginous and sometimes with more signs of a blackish middle stripe; the black bristly hairs beneath the seventh segment conspicuous, as they stand out longer and more erect than the short depressed pale pubescence on the rest of the belly.

Legs colored as in the male, but the front tibiæ and tarsi rather more dilated; pubescence on the femora shorter and less abundant; ciliation on the hind tibiæ inconspicuous, and all tibiæ with very few dorsal black bristly hairs except about the tip.

Wings slightly more brownish than in the male. Squamæ with lighter brown margins. Halteres more brownish.

Length about 15 mm.

This species is easily distinguished from any other of the restricted genus *Tabanus* by the mainly shining black or blackish chestnut frontal triangle; two species of *Theriopectes* have the frontal triangle shining, but *T. micans* has the legs entirely black, and *T. luridus* has the frontal triangle shining in the female only and has the lower callus connected by a narrow line with the middle one; as far as my specimens indicate there is an almost equal broad light grey dorsal stripe all down the abdomen in place of the usual hindmarginal triangles. I do not know enough of the species to say anything about its variations, but the female given to me by Mr Wormald has the basal segment of the third antennal joint with a remarkably broad blunt tip.

The var. *cognatus* Lw. is considerably darker and has in both sexes the side-spots isolated from the hindmargins. *Theriopectes quatuornotatus* is extremely like *T. glaucopis* in at any rate the female but may be distinguished by its hairy eyes.

T. glaucopis is very little known as a British species. I caught two females on the window of the weighing stand (now pulled down) on Goodwood race-course on July 30, 1884, and a female was given to me previous to 1880 by Mr Wormald. Brauer states that he has met with it

on leaves of Hazel (*Corylus*). It is recorded from almost all Europe, or at least from Central Europe and England to Italy and Greece, but the Scandinavian record seems doubtful.

Synonymy.—Walker said "Eyes bronzed; facets of the fore part very small," which would seem very inapplicable to this species, but I fancy he referred to the lower facets when he said "facets of the fore part," because he used the phrase "very small facets in front" under his *T. atricornis*, and no species of *Tabanus* has the facets of what I call the "fore part" or "front" small, so his statement must surely mean that there is a contrast of facets somewhere; there is also a probability that Walker only knew the species from a female, because there is a single female in the Entomological Club collection to which somebody has attached (apparently more recently) a label of *maculicornis* Zett., but which was probably the specimen from which Walker drew up his description, though it was somewhat absurd to describe the "Antennæ black; first joint testaceous; second dark red; third slender, dark red at the base."

PANGONINÆ.

Hind tibiæ with apical spurs.

Face often produced snout-like. Ocelli usually present. Proboscis sometimes porrect and then sometimes exceedingly long (*Pangonia*); palpi sometimes very long and thin. Eyes in life brilliant liquid green (with purple spots or markings in *Chrysops*); anterior or superior facets in the male often enlarged. Antennæ varying from an absence of a dorsal hump near the base of the third joint to that hump being exaggerated into a long process (*Dicrania*, *Dichelacera*).

Abdomen often with conspicuous orange markings, which are sometimes (*Chrysops*) more extended in the female.

Legs with apical spurs on the hind (as well as the middle) tibiæ. "Touch-hairs" often indistinct, but sometimes dense and almost brush-like.

Wings showing more variation in venation than in the *Tabaninæ*, as the first posterior cell is often closed and sometimes even a long distance before the wing-margin, while the fourth posterior cell is sometimes contracted; small cross-vein sometimes almost absent.

The females are usually blood-suckers, but I believe the species of this subfamily are more attracted by flowers than are those of the *Tabaninæ*.

The only fully recognised character for distinguishing this subfamily lies in the presence of apical spurs on the hind tibiæ. The *Pangoninæ* are however less homogeneous than the *Tabaninæ* and seldom possess the square-built robust figure of the latter, while the frequently very long porrect proboscis is very distinctive. The subfamily may be a rather unnatural one, but is very convenient for dividing the great mass of *Tabanidæ*.

3. CHRYSOPS.

Chrysops Meigen, Illig. Mag., ii., 267 (1803).

Handsome middle-sized rather hairy flies of mainly blackish colour, with usually yellow abdominal markings, and with conspicuously banded wings.

Face (fig. 242) arched under the antennæ, moderately broad but extending only a little under the eyes, and with large shining black facial, oral, and buccal callosities, which sometimes more or less coalesce; below each of the facial calli is a deep pit on the side of the middle part of the face; face with fairly long but not dense pubescence; frons of the male small, triangular, and quite bare, of the female broad and bearing on the fore part a large shining black callus; three ocelli present. Proboscis considerably produced and with rather large sucker-flaps; palpi about half as long as the proboscis and lying against it in the female, or directed rather upward

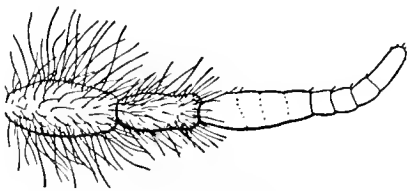


FIG. 238.—*Chrysops cæcutiens* ♂. × 21.

in the male. Eyes touching in the male for about the middle third of the distance between the occiput and the antennæ, bare in all the British species; in life brilliant golden, coppery, or blue green (whence the generic name), with purplish or rich brownish spots and hindmargin, and these markings following distinct arrangements (figs. 241, -3, -5, -7, -9); facets on the upper part enlarged in the male. Antennæ (fig. 238) much longer than the head; basal joint dilated but only a little longer than the second, and both clothed with black hairs; third joint bare and upturned at the tip, rather longer than the two basal ones together, subulate, and with five fairly distinct annulations of which the first is long and is itself faintly annulated, but the last four are short, and the apical one is blunt at the tip and bears no trace of an apical style.

Thorax almost quadrangular with the angles rounded off; pubescence fairly abundant especially towards the sides; pleuræ conspicuously pubescent on the upper

part of the mesopleuræ and on the pteropleuræ and metapleuræ; but there is no trace of bristles or long bristly hairs anywhere on the thorax or scutellum.

Abdomen moderately long, scarcely broader than the thorax but slightly narrowed behind, composed of seven segments which are easily detected on the belly of the female; second segment longest, and the following ones gradually diminishing in length; basal part of the abdomen usually bearing conspicuous orange markings which are very different in the two sexes. Genitalia in both sexes small and inconspicuous.

Legs with two rather unequal spurs on each of the posterior tibiæ; front coxæ considerably lengthened, about two-thirds the length of the femora; femora slightly shorter than the tibiæ. Pubescence fairly abundant on the anterior femora and (in our British species) on the hind tibiæ; hind tibiæ rather thickened. Pulvilli three, very distinct.

Wings with conspicuous blackish markings, which usually form irregular bands across the wings, and which are more extended in the male than in the female; in life the wings are extended half open when at rest. Venation quite in accordance with the usual type of *Tabanidae* (figs. 239, 240); the four posterior cells always wide open, and not even contracted at the tip; anal cell normally closed at the wing-margin, but sometimes slightly open. Squamæ rather large, but with very slight fringes except near the angle on the alar pair. Halteres with the knob rather large and almost globular.

Metamorphoses only recently observed, but Beling (Verh. zool.-bot. Wien, xxxviii., 1, 1888) found the larva and pupa of *C. cæcutiens* in the mud thrown out at the side of a swiftly flowing meadow-brook, while Hart and Hine have noted the egg-laying habits of some American species. The perfect insects occur in the neighborhood of water or wet places, and the females annoy cattle and human beings by their persistent attacks.

This genus is composed of a large number of exceedingly closely allied species which occur in the Palæarctic region and in North America, and it is known to extend all through Africa to the Cape of Good Hope, in Asia through India and Java on to Borneo, in Central and South America, and in Tasmania, but the genus is not yet recorded from New Zealand nor with certainty from Australia. 146 species are enumerated in Kertész's Catalogue of the described species of the whole world published in 1900. About twenty species occur in Europe and about eight more in the Palæarctic region outside of Europe, while about sixty have been described from North America; at present we know four British species, but two of these have been only recently identified, while at least two more are likely to occur.

It is strange that almost all authors have considered *Chrysops* masculine but *Chlorops* feminine.

Table of Species.

- 1 (6) Abdomen with at least some orange markings, even if only at the basal corners. Wings with the outer margin of the middle

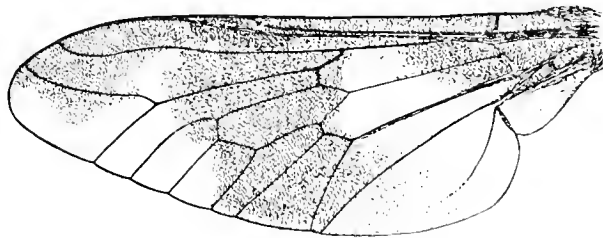


FIG. 239.—*Chrysops cæcutiens* ♀. × 6.

dark band somewhat convex (fig. 239). Face with shining black calli which are separated by pollinose yellow spaces.

- 2 (3) Legs entirely black (unless just the base of the tibiæ be obscurely fulvous). 1 *cæcutiens*.
- 3 (2) Legs brownish yellow on the posterior (or at least middle) tibiæ.
- 4 (5) Second abdominal segment orange, with an almost isolated small black spot in the female (fig. 246), or with a large subquadrate middle black blotch in the male. Hind tibiæ of the male black. 2 *quadrata*.
- 5 (4) Second abdominal segment orange, with a black blotch composed of two blunt-ended triangles which touch on the foremargin but which are directed backwards and outwards in the female (fig. 248), or with these triangles bluntly ended against the hindmargin and the third (and often the fourth) segment with a wider and less distinct double blotch in the male. Posterior tibiæ brownish yellow in both sexes. 3 *relicta*.
- 6 (1) Abdomen and legs entirely black. Wings with the outer margin

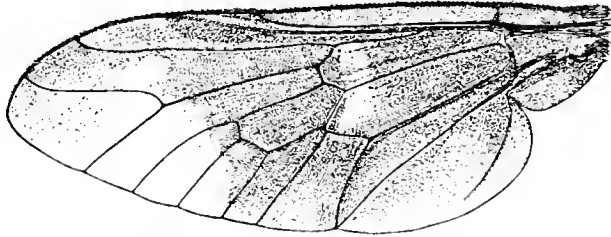


FIG. 240.—*Chrysops sepulcralis* ♂. × 9.

of the middle dark band somewhat concave (fig. 240).* Face almost wholly shining black except on a narrow middle line.

4 *sepulcralis*.

Pandellé was of opinion that these four perfectly distinct species are all varieties of one species !

1. **C. cæcutiens** Linné. Legs almost entirely black. Facial and buccal calli separated. Abdomen of the male with a rather small luteous spot on each side of the second segment, of the female with a complete black fork on an orange ground colour.

A handsome fly, with variegated wings. Closely allied to the other species of the genus.

♂. Face mainly covered by the shining black calli, the two facial calli leaving a narrow intermediate yellowish stripe which widens out at its top just under the antennæ and which also usually widens out a little at its lower end just above the mouth; at the bottom part of each facial callus there is a deep pit, and beneath that a fairly large yellowish patch which usually extends to the eyemargin and consequently separates the facial and buccal calli, but the facial and oral calli are united on each side of the middle yellow line; buccal calli large and indistinctly connected with the oral calli along the mouth-edge; jowls below the buccal calli greyish yellow and extending right across from the lower eye-angles to the

* This character is hardly obvious in the male, but is more distinct in the female.

mouthmargin; pubescence of the face consisting of rather long black hairs, which leave most of the protuberant shining black facial calli bare, as well as the middle portion of the face and the upper mouthmargin, though even on parts of these a very few black hairs exist; on the jowls and right across behind the mouth there are numerous longer yellowish hairs; back of the head black, flush with the eyes but hollowed out behind, and with a very short close black postocular fringe; vertex dull black, elevated, and bearing rather abundant black pubescence; frons small, triangular, quite bare, rather shining black with a greyish brown foremargin which extends all round the base of the antennæ and joins the yellowish middle line of the face, while a yellowish line extends down the extreme eyemargin to the large yellow patch below the facial calli. Proboscis brownish black, shining on the sucker-flaps, and bearing very short pubescence except for a few hairs beneath each sucker-flap; palpi dull black, rather shining, elevated at right angles to the proboscis and bearing rather dense black hairs, about half as long as the proboscis and slightly dilated about the middle. Eyes quite bare, touching for less than the middle third of the distance between the occiput and the antennæ; facets on the larger upper part dilated and purplish brown in death, but on the smaller lower part small and blackish, the dividing line being not sharply defined and running across semicircularly so that the small facets extend a long way up the back part; eyes (fig. 241) in life vivid green, with coppery reflections varying according to the light but most evident about the lower part; the blackish purple middle spot is triangular with a flat upper margin, and between it and the foremargin but slightly higher up is a smaller second subquadrate spot, and on the hindmargin level with that second spot is the point of the usual emargination from the hindmarginal band; below the second spot is the usual lower spot which is moderately large and subquadrate; the first two spots mentioned above have peculiar streaks extending upwards, as directly but considerably above the middle one is a brownish purple spot with a reddish margin which is continued downwards in a rather vague reddish stripe which attenuates but faintly reaches the middle eye-spot, and a similar rather vague reddish stripe exists above the front spot; lower margin of the eye blackish purple and this colour extends up the hindmargin to the place where the usual emargination is conspicuous; the upper slope of the projection above the emargination has a reddish edge. Antennæ (fig. 238) dullish black, basal joint longer and stouter than the second, and both bearing abundant rather long black pubescence, which is, however, slightly longest on the basal joint; third joint subulate, obscurely annulated, longer than the two basal joints together, rather upturned at the tip, and without any trace of an apical style; antennæ nearly twice the length of the head.

Thorax and scutellum black, moderately shining. Pubescence tawny but varying to black, not scarce but not obscuring the ground colour at all on the disc; a patch of rather long black hairs extends on each side from the humeri almost to the wing-base, and the pubescence on the thorax near this patch is more dense and is conspicuously tawny or blackish tawny; on the upper and (especially) back part of the mesopleuræ there is a dense very conspicuous tawny patch of long shaggy hairs, and a similar patch is almost equally conspicuous on the metapleuræ, but below these patches the pleuræ are slaty black and bear only very scattered yellowish hairs.

Abdomen dull black, with the sides of the two basal segments rather narrowly luteous, the luteous coloring on the second segment being the more conspicuous (though still sometimes obscure) on an eighth to a fifth of the segment on each side. Pubescence longest and most dense about the side-margins, mainly black but with some pale hairs on the luteous patches, and some short depressed pale hairs occur on the disc of the last two segments (except at the sides) and on the hind part of the fourth segment and also slightly up the middle of the third and (even of the second) segment though most visible on the second and third segments as pale fringes on the hindmargins. Belly greyish black with the side thirds of the two basal



FIG. 241.—*Chrysops cæcutiens* ♂.
Left eye in life.

segments luteous in full connection with the dorsal side-spots, third segment slightly luteous at the sides; pubescence not scarce but composed of scattered long black and shorter pale hairs, of which the pale hairs mainly form hind-marginal fringes, except about the tip and on the second segment where the whole of the disc bears longer and more abundant pale hairs; side fringes mainly black, but conspicuously pale on the luteous part.

Legs black, moderately shining, with the basal half of the first joint of the posterior tarsi obscurely reddish; front coxæ two-thirds as long as the femora, and bearing mixed pale and black pubescence; front femora with rather abundant pubescence which is nearly all black; middle femora with similar pubescence, but with a patch of pale hairs behind near the base; hind femora with less pubescence, which is mostly black but contains some pale hairs behind near the base; anterior tibiæ almost bare; middle tibiæ with two not quite equal black spurs; hind tibiæ with dense black fringes of which the antero-dorsal one is the longer and coarser, and with two short black spurs; pulvilli yellowish.

Wings mainly blackish or brownish black on the disc and about the tip, but a small oval quite hyaline spot occurs at the first fork of the discal vein and extends slightly down its stem and is sometimes connected with the light colored outer part (not including the tip) of the upper basal cell, and the wings are hyaline (with a brownish tinge) on the fork of the cubital vein, on the adjoining portion of the first submarginal cell so as almost to separate the dark parts, and on the subapical portion from the lower half and margin of the cubital cell to the lower outer corner of the third posterior cell; outer margin of the blackish brown middle portion of the wing irregularly perpendicular; all the axillary cell and the large alula brownish hyaline, but the anal cell darkened; sometimes the fourth and fifth posterior cells have pale kernels. Squamæ rather large, blackish with black margins, and with a very slight dark fringe. Halteres blackish, knobs rather brownish.

♀. Not much like the male, because of the more extensive yellow markings about the base of the abdomen and the generally browner hue.

Frons (fig. 242) nearly one-third the width of the head, flat and flush with the eyes, greyish yellow with the ocellar triangle and its neighborhood broadly black and the black colour extending back to the occiput but not quite to the eyemargins, shining in places, and bearing on the lower part a large transverse frontal callus which occupies more than one-third the length of the frons, and which extends almost from eye to eye but not quite to the antennæ because a doubly arched greyish yellow margin extends across above the antennæ, and that colour extends all round the antennæ and is connected rather broadly with the fairly broad yellowish middle part of the face; this latter space widens just before the large shining black united oral callus, which is seldom widely united with the facial calli; eyemargins narrowly yellowish grey and connected with the broad yellowish band which separates the facial from the buccal calli; buccal calli rather large and shining black but separated from the oral calli by an obscure grey-dusted space. Pubescence on the frons composed of rather abundant pale hairs on the

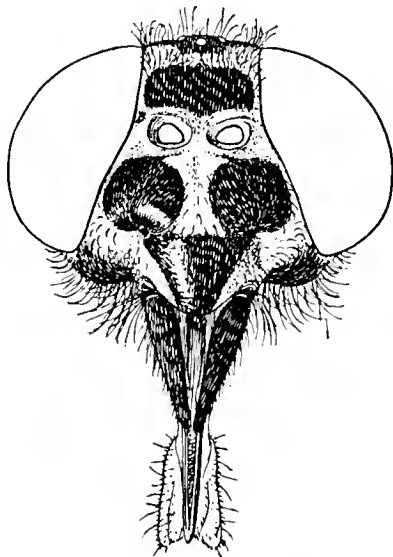


FIG. 242.—*Chrysops coccutiens* ♀.
× 14.

yellowish parts but quite absent near the antennæ; short scattered dark colored and very sparse pubescence occurs on the middle part of the face, but becomes longer and pale towards the sides, and a similar pale pubescence extends on to the jowls; back of the head a little puffed out, yellowish, and bearing a short brownish orange fringe near but not on the eyemargin. Proboscis stouter; palpi longer, lying more against the proboscis and with much less pubescence, which is mainly pale on the sides. Eyes with the

facets all equal; in life (fig. 243) brilliant green, but rather coppery according to varying light; occipital and hind margins with a dark purplish brown border which has a deep indentation (about three-quarters its width) in the middle, and this border is broadest just above the indentation and again at its lower part; rest of the eye with four purplish brown isolated spots, of which the three near the frontal and facial margin are about equidistant from each other; the top spot is transverse (when seen from above) and is the largest of the three; the lowest spot is rather near the bottom part of the occipital band and is notched on its upper margin; the middle spot is the smallest and is irregularly round; the isolated fourth spot near the middle of the eye is triangular with one angle rather near though rather below the outermost part of the projection of the occipital band and is without any sign of a shaft running upwards from it. Antennæ with much shorter black pubescence on the two basal joints; basal joint less stout, dull ferruginous beneath on the basal half.

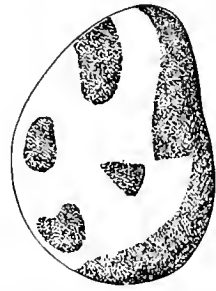


FIG. 243.—*Chrysops cæcutiens*
♀. Left eye in life.

Thorax black, slightly aeneous and moderately shining, with two broad ashy grey stripes on the middle of the front part which are separated by a narrow dark line; humeri rather brownish, with the space behind them dark grey and the ridge along the lateral margins of the thorax yellowish grey on the two-thirds nearest the wing-base; pleuræ ashy grey, with the top hind corner of the mesopleuræ broadly yellowish grey. Pubescence all tawny and sloping, not at all dense on the disc and in fact rather scarce on the front part though fairly conspicuous in good specimens, denser and usually rather darker tawny on the yellowish grey parts of the lateral ridge and on the mesopleuræ and metapleuræ but scarce on the other parts of the pleuræ. Scutellum shining black, and bearing sparse yellow pubescence.

Abdomen (fig. 244) dullish black, but the two basal segments mainly orange yellow; base of the first segment blackish and that colour sloping down to the middle third of the hindmargin; second segment with the blackish colour on the middle quarter of the base extending down to about the middle of the segment but then forking to the hindmargin and sometimes continuing a little outwards along the hindmargin, but leaving a small conspicuous orange yellow triangle on the middle of the hindmargin. Pubescence short, orange yellow, but on the third segment confined to the sides, the hindmargin, and a triangle from the middle of the hindmargin, and on the fourth segment again almost absent on the base, but ubiquitous elsewhere, and longest (though still short) on the sides and hindmargins. Belly orange yellow at the base, but blackish on about the middle third of the basal

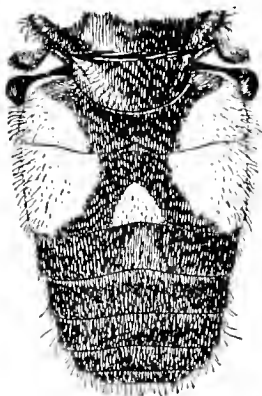


FIG. 244.—*Chrysops cæcutiens*
♀. × 6.

segment, on the middle fifth of the second segment, and on the whole of the remaining five segments, and all these segments bear abundant short yellow pubescence.

Legs all black, unless the base of the tibiæ and the base of the posterior tarsi are obscurely ferruginous.

Wings (fig. 239) with much more conspicuous hyaline spaces than in the male, the black colour about the base and along the costa to the tip extending down to the radial vein, and a broad entire blackish band lies across the middle which occupies more than the length of the discal cell as it is bounded on one side by the base of that cell or a little before it and extends on the other side distinctly beyond that cell; the inner margin of this band curves back rather vaguely and faintly though widely along the hindmargin to the black base of the wing, while the outer margin is irregular and lets the dark band occupy the whole or part of the fourth and fifth posterior cells and half of the third posterior cell though sloping to its lower outer corner; an apical band extends from the costal stripe to nearly half-way across the cubital fork-

cell with a rather vaguely defined semicircular lower margin, but does not include the actual tip or base of that cell; the hyaline space between the middle and apical bands forms at its upper part a well-defined hyaline space extending from the cubital fork upwards almost across the first submarginal cell; the basal black marking extends about half-way along the upper basal cell and only a short distance along the middle basal cell. Squamæ blackish brown with a more obvious golden fringe on the alar pair near the angle.

Length about 9.5 mm.

This species may be easily distinguished from *C. quadrata* and *C. relictæ* by its black tibiæ, while *C. sepulcralis* is a smaller entirely black species in which the facial and buccal calli coalesce, but there are other closely allied European species. The pubescence on the sides of the thorax, on the pleuræ, and elsewhere varies in colour from tawny to a more yellowish colour, and may be almost wholly pale on the face and on some of the hairs about the base of the antennæ; the basal two-thirds of the first joint of the antennæ (and very frequently at least some part of the base) may be orange red, the grey lines on the thorax may have only their outer margins distinct, and the discal cell may sometimes show traces of a pale kernel; a female taken at Lyndhurst on June 22, 1872, has the black coloring on the second abdominal segment very much reduced, there being only a small middle spot on the foremargin from which two narrow brownish lines diverge but do not reach the hindmargin, and at the same time the third segment has a large orange triangle on the hindmargin and a large orange spot on each side which occupies the side third of the segment except indistinctly along the foremargin; other variations are also mentioned below.

C. cæcutiens seems to be rather less common in Britain than *C. relictæ*, but yet is far too common in the southern part of England and especially in the south-west, though I have however records from Cornwall to Nairn. Colonel Yerbury took it at Brodie and Nairn in July 1904, but I believe (as Duncan said in 1837) that it becomes "scarcer as we advance northwards"; Duncan recorded it from "Dumfriesshire, vicinity of Jardine Hall, "common," and mentioned a black variety which had been taken in Sutherlandshire and in the south of Scotland, but this variety may have been *C. sepulcralis*. A male taken by Mr C. J. Wainwright at Wyre Forest on July 22, 1901, might easily have been recorded as *C. sepulcralis*, as it has the face at first glance all black without any brownish orange middle line but with only a dark line, the ground colour of the sides of the face and the mouth hardly ferruginous, and there are a few pale hairs behind the mouth; the thorax and scutellum are fairly shining; the pleuræ have continuous conspicuous brownish orange pubescence (but the pubescence on the disc of the thorax is mainly rubbed off); the abdomen is very much rubbed, but each side of the second segment has a lurid brownish yellow spot which extends quite over the sides but is only slightly visible from above; belly dull brownish black, with the hindmargins not obviously rusty; pubescence of the abdomen considerably pale on the hindmarginal fringes or on the sides of the hindmargins; legs black on the anterior tibiæ and trochanters, and the posterior tarsi black to the very base. Specimens taken at Porthcawl in July 1906 have the dark markings of the wing inky black like specimens of several species of *Beris* taken at the same time. My dates range from June 1 (Austen gives May 24) to August 23. It is

recorded from all Europe and from Siberia, and according to Macquart (but obviously in error) from the eastern coast of Australia.

Synonymy.—At one time I thought that Moses Harris' *Tabanus nubilosus* must refer to *C. relictu* because his figure seems to agree best with that species, but his description of the abdominal markings of the female and above all his statement that "The legs are black" must reduce it to a synonym of *C. cæcutiens*.

2. *C. quadrata* Meigen. Middle (♂) or posterior (♀) tibiæ ferruginous. Abdomen conspicuously orange at the sides of the second segment (♂) or with the second segment entirely orange except for a small black spot (♀).

The male is distinguished by the colour of the tibiæ, and the female by the isolated black spot on the orange base of the abdomen.

♂. Face mainly covered by the shining black calli which leave only a narrow yellow middle line; large greyish yellow patches extend outside the deep pits on the face to the eyemargins separating the facial from the buccal calli, and below the eyes the jowls are again yellowish grey; the facial and oral calli are united on each side of the middle line, and the oral and buccal calli are also united; pubescence on the face consisting of rather numerous black hairs, which are scarce on the middle part and absent on the front mouthmargin; pubescence on the jowls blackish, but behind the mouth-opening a few greyish yellow hairs are intermixed with the black hairs; back of the head black, flush with the eyes but hollowed out behind, and with a tiny black ciliation against only the upper part of the eyes; frons greyish yellow with only the top angle shining black, and the greyish yellow colour extends all round the base of the antennæ to the yellow middle line on the face. Eyes bare, touching for about the middle third of the distance between the occiput and the antennæ; facets on the lower part hardly contrasted in size in comparison with those on the upper part, but in dried specimens blacker in some lights. Antennæ dull black; basal joint rather longer and stouter than the second and with rather longer black pubescence; third joint rather distinctly annulated, slightly longer than the two basal joints together, and slightly thickest soon after its base; antennæ more than twice the length of the head, curved up at the tip.

Thorax and scutellum moderately shining black, with a slight brownish tinge caused by the tawny pubescence, intermixed with which (especially on a broad stripe near each side) are some inconspicuous black hairs; a conspicuous patch of black hairs extends on each side from the humeri all along the margin of the dorso-pleural suture and over all the upper part of the mesopleuræ, while just above this patch the tawny pubescence on the hinder part of the space between the humeri and the wing-base is dense and conspicuous; metapleuræ with a rather small dense black tuft, but the lower pleuræ all slaty grey and bearing sparse pubescence, of which a few hairs on the lower part of the mesopleuræ are black, and some straggling hairs on the sternopleuræ greyish.

Abdomen dull black, with conspicuous orange markings at the sides of the second segment, and inconspicuously orange at the extreme sides of the basal segment; each of the two large conspicuous orange side-spots on the second segment occupies the outer third of the hindmargin and runs back diagonally towards the fore corner of the segment, but sometimes breaks back a little just above its middle; third segment inconspicuously orange at the sides and on the hindmargin, but the orange hindmargin with two arched emarginations near its middle so that it becomes narrow there; fourth segment with similar but much more obscure markings, and faint traces of such markings exist on the fifth and sixth segments. Pubescence on the disc apparently all black, but slight depressed yellow hairs occur on the middle of the hind part of the third, fourth, and fifth segments, and similar but

sparser hairs spread out on the fifth, and still sparser hairs on the sixth segment; the sides of the abdomen bear longer coarser outstanding black pubescence, without any yellow pubescence on the sides of the basal segments. Belly dull black, with the sides of the two basal segments widely but rather obscurely orange; pubescence on the disc obscurely greyish, but the hindmargins of all segments with a fringe of yellow hairs, and the second segment with longer pubescence.

Legs rather shining black, but dull reddish orange on the middle tibiæ (except at the extreme base and tip), and on the basal joint (except at the tip) and the basal half of the second joint of the posterior tarsi; pubescence almost as in *C. cæcutiens*.

Wings blackish brown, but brownish hyaline on the outer third of the upper basal cell and on the adjoining part of the middle basal cell, and the large middle dark band leaves the submarginal cell brownish hyaline above the cubital fork, and this colour extends down in a concave line to the middle of the third posterior cell but leaves the outer part of the submarginal cell and the outer upper part of the cubital fork-cell light brown, while the anal cell (except on its upper margin) and all the hind angle of the wing and the large alula are also brownish hyaline. Squamæ blackish with black margins and with slight dark fringes which are tufted at the angle. Halteres brownish black.

- ♀. Differing from the male as usual in *Chrysops*, the colour being lighter, the wing-markings more contrasted, and the abdomen with more extensive orange markings at the base. Frons, frontal callus, facial calli, antennæ, proboscis, palpi, etc., as in *C. cæcutiens*, but the frontal stripe slightly narrower. Eyes in life (fig. 245) not dissimilar to those of *C. cæcutiens*, but sometimes of a more intense green shading into blue and without any coppery tinge, or varying from brilliant coppery on the upper part to dark bluish green on the lower part, or in another specimen all the spots may be rather small and transverse on an intense blue-green ground, or the spots may be larger and strongly contrasted on an almost coppery yellow ground, and when seen from below the eyes may appear to be pale greenish blue with brown spots; occipital band narrower and less intense than in *C. cæcutiens*, almost fading away towards the vertex; the spots and bands more brownish than purplish and consequently lighter colored, the top spot being larger, the isolated middle spot less triangular, and

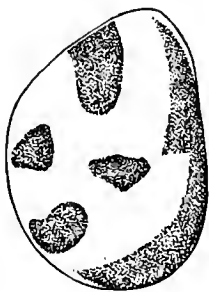


FIG. 245.—*Chrysops quadrata* ♀.
Left eye in life.

the lowest spot larger and more transverse, but it will be seen that the markings vary considerably within a limited degree.

Thorax, pleuræ, and scutellum almost as in *C. cæcutiens*.

Abdomen dullish black with extensive orange and greyish orange markings (fig. 246); the two basal segments wholly bright orange or yellow except on the black middle third of the basal segment (hardly extended to the hindmargin) and on a small black spot (varying a little in shape) on the middle of the base of the second segment which extends less than half-way down the segment; third segment with its sides and nearly its hinder half greyish orange with a gently produced middle triangle; fourth segment similarly marked but with the greyish orange hindmargin rather narrower and the middle triangle larger and almost reaching the foremargin; fifth segment also similar but the greyish orange portion more vague and more extended, and the sixth and seventh segments all obscurely greyish orange. Pubescence on the disc yellow on the orange base and on the greyish orange parts, longer about the sides and hindmargins, but almost absent on the black bases of the third and fourth segments. Belly clear orange on the two basal segments and on most of the sides and hindmargin of the third

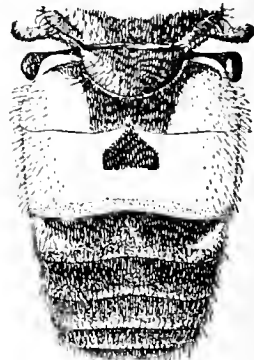


FIG. 246.—*Chrysops quadrata* ♀. × 6.

segment, and slightly so on the sides and hindmargins of the fourth and fifth segments, but dull greyish black on the rest; pubescence short, recumbent, and golden orange, with usually distinct short fringes on the hindmargins.

Legs almost as in the male, but with the base of the front tibiæ rather obscurely luteous, and the hind tibiæ wholly luteous though not so pale as the middle pair; middle femora obviously reddish at the tip to a greater or less degree.

Wings with the blackened markings almost as in *C. cæcutiens*, but the pale space between the basal and middle bands wider, the dark basal band only extending to the base of the upper and middle basal cells and the hindmargin much less blackened, while the boundary of the apical band is less distinct and the hyaline space above the cubital fork is less defined. Squamæ rather paler than in *C. cæcutiens*.

Length about 9 mm.

This species has been closely contrasted with *C. cæcutiens*, from which the ferruginous middle tibiæ of the male and posterior tibiæ of the female readily distinguish it; *C. relictæ* is in many ways very closely allied, but the male of *C. quadrata* has black pubescence on the pleuræ and on the sides of the two basal abdominal segments, as well as the hind tibiæ black and the orange abdominal markings more restricted. The female of *C. quadrata* may always be known by the small isolated black spot on the orange base of the abdomen; it varies a good deal in the amount of reddish coloration at the tip of the middle femora, which may either be almost imperceptible or may extend to a third or even almost a half of the femora; the antennæ often have all the basal joint except its tip orange or reddish, and the third joint reddish orange soon after its base, and even the underside of the second joint reddish orange; palpi often reddish brown. *C. quadrata* is slightly smaller than *C. cæcutiens* and *C. relictæ*. *C. rufipes*, which is almost certain to occur in Britain, has the legs much more extensively red, as all the tibiæ in both sexes and the femora to a large extent in the female are reddish orange, while the basal joint of the antennæ is more thickened.

C. quadrata is not nearly so common in England as *C. cæcutiens* and *C. relictæ*, but yet is widely spread over the southern and midland counties. I have records from Devonshire (Holne on Dartmoor), Dorset (Canford Common and Studland), Hampshire (Lyndhurst, Lymington, Bournemouth, and not uncommon in some parts of the New Forest), Sussex (Abbotts Wood and Guestling), Cambridgeshire (Wicken Fen, and not uncommon in Chippenham Fen), Warwickshire (Sutton Park), and Glamorgan (Porthcawl), while Col. Yerbury took it at Aviemore in Inverness in July 1899; it was first recorded as British by Duncan in 1837 under the name of *C. pictus* Meig. as having been taken by "Charles C. Babington, Esq.," at "Monkswood, Hunts, June 23, 1829," but Walker ignored it. My captures range from June 7 to September 1. It is recorded from almost all Europe.

3. **C. relictæ** Meigen. Posterior tibiæ orange in both sexes. Abdomen with conspicuous yellow markings at the sides of the two basal segments (♂), or with the second segment yellow with a pair of black lobes (♀).

♂. Face mainly covered with dull yellowish dust; the two shining black facial calli nearly circular and indistinctly split by a longitudinal furrow into a larger inner and a smaller outer part, usually well isolated but occasionally united by a narrow line to the two small shining black upright narrow oral calli which are placed just above each side of the upper mouth-edge; buccal

calli represented by an indefinite moderately shining rather greyish black isolated stripe on each side running from the lower eye-angle to the mouth-edge; pubescence consisting of moderately numerous long black hairs which are absent from the facial and oral calli and from a small space between and just above the oral calli, and some yellow hairs occur outside the oral calli; jowls (behind the buccal calli) greyish yellow, with the pubescence all yellow on their lower part and behind the mouth but black on their upper part and near the eyes; back of the head flush with the eyes, blackish grey, and bearing a very minute black bristly postocular fringe; vertex dull black, elevated, and bearing mainly black hairs but sometimes with some pale hairs intermixed; frons obscure greyish yellow, with only just the top angle shining black. Proboscis black, twice as long as the palpi; palpi brownish or slightly greyish black, hardly dilated anywhere but long and cylindrical, and bearing rather bristly black pubescence but with some yellowish hairs beneath about the base. Eyes bare; facets on nearly the lower half smaller than those on the upper part, but with no sharply contrasted division at the semicircular boundary line, and on the back part the small facets extend upwards a little but not nearly to the vertex; eyes in life (fig. 247) similar to those of the female, brilliant green, but darker green (or when viewed from above bluish) and not at all coppery on the larger facets, which occupy the two-thirds of the eye above the brown middle band, or from another point of view the upper two-thirds of the eyes green and the lower third yellowish green; the two brown spots near the middle are united in a long thin bright brown line which extends from *near* the foremargin (at almost as high up as the top of the facial callus) to more than two-thirds across the eye, slightly



FIG. 247.—*Chrysops relictus* ♂.
Left eye in life.

dilated at the discal end of the line (*i.e.*, on the usual middle spot) and very slightly contracted before that (=the connecting line between the two spots); lower brown spot small and narrow, and also very transverse, and placed as in fig. 247; it is only when viewed from above in certain lights that the usual upper spot on the disc of the eye can be traced as a rounded and faintly brown spot placed as in fig. 247, and in just about the same light and from almost the same point of view a slight brown spot can be traced on about the middle of the back margin of the eye which indicates where the usual emargination would occur if the whole hindmargin of the eye were darkened as in *C. cecutiens*, and the lower brown margin of the eye can be seen to be faintly extended further up the back of the eye almost to this spot. Antennæ dull black, slightly greyish and in some lights rather shining; basal joint not much larger or stouter than the second, and bearing conspicuous long black bristly pubescence all over; second joint with similar but shorter pubescence, and with an apparent annulation or constriction at about three-fourths its length; third joint subulate, but slightly thinner about its base, and rather upturned at its tip.

Thorax black, slightly shining but with faint indications of two broad greyish stripes separated by a narrow dark one; humeri and prothorax greyish; pubescence fairly abundant and suberect, mainly black but with numerous shorter depressed thinner brownish yellow hairs intermixed, though the two rather shining black stripes outside the faint grey stripes are usually restricted to rather shorter black hairs which are connected in front with the denser stripe of black pubescence against the dorso-pleural suture; the brownish yellow hairs become more erect about the hindmargin of the disc and though inconspicuous almost supersede the black hairs there and on the disc of the scutellum; a dense stripe of black pubescence occurs on the outer side of the ridge against the dorso-pleural suture, but on the posterior part of the dorsal side of this ridge there are some dense tawny or blackish tawny (rarely inconspicuous) hairs, which are continued over the wing-base and connected with similar hairs on the postalar calli. Pleuræ grey dusted, with the pubescence dense and tawny (but not so bright tawny as in *C. cecutiens*) on the prothorax, on the upper and hind parts of the mesopleuræ, and on the metapleuræ; the pubescence on the lower anterior part of the mesopleuræ is sparse and sometimes black, and on the sternopleuræ less scarce than in

the allied species and dull yellow with sometimes a few black hairs intermixed. Scutellum shining black, with fairly long brownish yellow pubescence, and sometimes with a few black hairs about the tip.

Abdomen dull deep black with orange and orange brown markings; first segment with the sides orange and that colour extending on the hindmargin to nearly a quarter of the segment on each side; second segment with all the sides and a broad irregular triangle extending to almost a third of the segment on each side bright orange, and a dull orange or grey triangle against the middle of the hindmargin, leaving consequently a broad subquadrate black spot which is notched behind and which occupies more than the middle third of the hindmargin, and this spot is extended in width just above the middle and strongly but rather narrowly against the foremargin almost to the sides; third segment with the sides and the hinder half or less on the side thirds dark orange brown, as well as a triangle against the middle of the hindmargin, leaving the middle five-sixths of the anterior half of the segment black as well as the middle third on the hinder half except for the notch behind; fourth and fifth segments with similar but more obscure markings; sixth and seventh segments short and obscure. Pubescence orange at the sides of the two basal segments and often on all the orange part, but frequently the tiny hairs are black on the inner hinder part of the orange on the second segment with a few stragglers on the rest, and sometimes black hairs extend though inconspicuously over all the orange part of the disc; the black hairs on the black part of these segments are shorter than the hairs on the orange part; a rather conspicuous patch of orange hairs occurs on the orange triangle against the middle of the hindmargin; pubescence black on all the rest of the sidemargins, and also on all the third segment except the mid hindmarginal triangle and slightly on the hindmargin more towards the sides, but orange on the fourth segment on all the hindmarginal fringe except just at the sides and a little at the middle where the dark orange triangle should be; the orange pubescence on the fifth segment extends all over except on the base and just at the sides, and apparently over most of the sixth and seventh segments except at the sides; the longest pubescence on the abdomen is the black fringe at the sides of the third, fourth, and fifth segments. Belly greyish black, extensively dull orange on the three basal segments and slightly so on the fourth; middle half of the first segment and rather less than the middle third of the longish second segment though not quite to the hindmargin, and also nearly the middle half of the shorter third segment though distinctly not extended to the hindmargin; in consequence of the third segment being shorter the middle black part appears flatter and is less determinate than that on the second segment; on the fourth segment the sides and hindmargin are rather obscurely orange, while on the next three segments the hindmargins are rather narrowly orange; pubescence nearly all orange, especially as fringes on hindmargins, but the segments (after the two basal ones) bear some black hairs on the disc. Genitalia black about the base but with two terminal lamellæ which are brownish orange at their ends.

Legs black; front tibiæ obscurely ferruginous on the basal half, and all the posterior tibiæ orange except just the base and tip; all the basal joint except the tip of the posterior tarsi orange, and also the base of the second joint. Pubescence on the front coxæ long and orange; front femora with extensive rather dense black fringes in which some pale hairs are mingled; posterior femora with long straggling pale hairs and a few long black hairs intermixed; hind tibiæ with the usual abundant black suberect pubescence all over though most conspicuous dorsally.

Wings blackish with the hyaline spaces restricted to two incomplete bands which widen below; the basal (=middle) hyaline band is composed of a hyaline space on the upper basal cell before its tip, which extends rather more widely across the second basal cell, and then to more than the basal half of the anal cell, and on the inner basal third of the axillary cell, leaving all the rest of the anal and axillary cells with a rather washed-out broadly darkened hindmargin; this leaves three-fourths of the upper basal cell and three-fifths to a half of the lower basal cell blackish, and sometimes the latter has a dark middle streak right through the cell; the outer hyaline band has

the usual hyaline spot across the middle of the submarginal cell extended downwards (with a slightly convex boundary of the blackish part) until it occupies half to two-thirds of the third posterior cell and all its outer boundary, and to all the cubital fork-cell except a vague semicircular washed-out darkened patch on its upper outer part. Squamæ blackish with blacker margins and with scarcely any fringe. Halteres blackish.

- ♀. Face and frons as in *C. quadrata*, the large frontal callus and the black ocellar space being slightly smaller than in *C. cæcutiens*; the yellow line down the middle of the face is the broadest of the three species being about one-third the space between the eyes, while the facial calli are the smallest of the three species and are joined only narrowly or not at all to the oral calli; the facial and oral calli are joined the most widely in *C. quadrata*, while in *C. cæcutiens* they are united almost as narrowly as in *C. relicta*, but the oral calli are much smaller in *C. relicta* than in *C. cæcutiens*; the buccal calli are isolated in all three species, but are quite small or rarely almost absent in *C. relicta* and occasionally so in *C. quadrata*; palpi brown in *C. quadrata* and *C. relicta* but black in *C. cæcutiens*, and usually palest of all in *C. relicta*. Antennæ with the basal joints more often reddish orange in *C. relicta* and *C. quadrata* than in *C. cæcutiens*, as in *C. cæcutiens* they seem to be all or nearly all black. Eyes in life of the same brilliant blue green as, or even bluer than, in *C. quadrata*, but with much smaller dark markings; the hindmarginal band is visible on only the lower part of the eye, where it is almost as broad as in *C. cæcutiens* and *C. quadrata*, but it fades away before the middle, though just above where the emargination should be there is a faint pale brown spot which indicates the widest projection of the band, and sometimes the emargination and the dilatation above it are fairly distinct, but the upper part of the hindmargin is not darkened; the four spots on the disc are small, and the upper three are very isolated, but the bottom (=third) one is transverse and near the foremargin; the top (=first) and bottom spots are the brownest (the others being blackish purple) and may be transverse, the middle (=second) one small and sometimes more remote from the foremargin so that it is almost in a perpendicular line with the one above and the one below instead of being (as in *C. quadrata* and *C. cæcutiens*) more remote from the middle of the disc; fourth (=hindmost) spot small and rather rounded, far remote from any other dark marking.

Thorax ashy black (with the usual two broad greyish stripes) instead of the blackish colour of *C. cæcutiens* or the more brownish grey colour of *C. quadrata* (caused by the more abundant tawny pubescence); humeri ashy grey, and a rather broad stripe from the humeri to the wing-base somewhat yellowish grey, but a broad stripe just above the dorsopleural suture may be of dark brown ground colour and bear darker tawny pubescence, but ordinarily the dense pubescence on the sides of the disc is pale yellow in contrast to the tawny pubescence of *C. quadrata* and *C. cæcutiens*, and on the disc of the thorax there are numerous but not quite dense sloping dull yellow hairs. Pleuræ dull yellowish dusted on the mesopleuræ but more ashy greyish on the lower part, and clothed with dense pale yellow (not, or seldom, tawny) pubescence; on the disc and sides of the thorax and on the pleuræ and scutellum there are no black hairs.

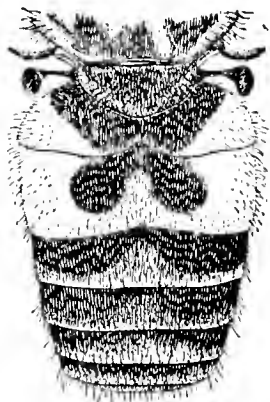


FIG. 248.—*Chrysops relicta*
♀. × 6.

Abdomen (fig. 248) appearing quite distinct from the other species, as the pale markings on the third and subsequent segments are more obvious; basal segment with more than the middle third of the hind margin black and this black part spreading outwards anteriorly until it occupies all the base of the segment, and consequently a yellow (not orange as in *C. quadrata* and *C. cæcutiens*) triangle is left occupying each hind corner; second segment yellow (not orange) with a pair of large rather rounded black lobes extending from the black portion of the hindmargin of the basal segment downwards and outwards across three-quarters of the segment but leaving a dividing yellow

triangle well connected along the hindmargin with the entirely yellow sides ; third segment black with a narrow dull yellowish hindmargin which widens upwards at the middle and forms a rather large ill-defined equilateral triangle which is not extended to the foremargin, and with all the sidemargins left yellowish ; fourth segment with similar but less distinct markings, and also sometimes with the sidemargins entirely yellow ; fifth segment with very vague similar markings which leave considerably more than the hinder half slightly yellowish ; sixth and seventh segments mainly but obscurely yellow dusted ; pubescence short but abundant, pale yellow except on the black parts. Belly obscure dull yellowish on the second segment except for a roundish middle basal spot ; foremargins of the second to fourth segments widely but obscurely and shallowly black, but on the remaining segments obscure dark yellowish ; hindmarginal hems yellow with yellow fringes.

Legs similar to those of *C. quadrata*, but the dorsal black fringe on the hind tibiæ less coarse and less conspicuous.

Wings almost as in *C. cæcutiens*, but slightly more hyaline on especially the basal cells, though not so hyaline as in *C. quadrata* ; sometimes the clouding on the lower basal cell covers almost all the cell except a continuation of the hyaline space of the upper basal cell (Parknasilla, July 15, 1901, Colonel Yerbury) ; the second and third posterior cells not so much darkened as in *C. cæcutiens* and *C. relictæ*, while many of the blackish markings may be more correctly described as brownish ; the pale spot in the submarginal cell broader than in the allied species.

Length about 9.5 mm.

This species is closely allied to *C. cæcutiens* and *C. quadrata*, but *C. cæcutiens* may be known at once by all its tibiæ being black in both sexes ; *C. quadrata* has the hind tibiæ black in the male, and in that sex the pleuræ and sidemargins of the base of the abdomen also bear black pubescence ; the female of *C. quadrata* has the second segment of the abdomen all yellow except a small black basal spot. A remarkable form of this species was taken by Colonel Yerbury at Kenmare in Kerry on July 2, 1901 ; the specimens are larger, broader and darker in both sexes, but in the male with more orange coloring about the sides of the third and fourth abdominal segments and with the pubescence on the orange part of the second segment almost all black though not conspicuously so ; in the female the abdomen is more ovate and the specimens have a richer orange appearance ; the antennæ are all black, with the basal joints slightly more bristly ; the facial calli large ; the pubescence on the abdomen and legs more conspicuous and more orange, and the orange markings on the hindmargins more conspicuous. Another variety of the female, taken by him at Nairn on July 17, 1904, has the facial calli very small and almost entirely outside the facial protuberance, thus forming a moderately narrow black line down the inner edge of the sides of the face close against the bulging middle part of the face and quite isolated from all the other calli. A female taken at Tangham Forest near Woodbridge in Suffolk on August 26, 1907, has the wing-markings unusually blackened but with a rather distinct somewhat hyaline kernel to the discal cell and a long subhyaline streak in the submarginal cell ; the cubital cell is also more hyaline except on the upper part ; the outer margin of the middle cross-band is much more definite ; the ground colour of the face and frons is paler grey, and the facial calli are small and well separated from the oral callus ; the palpi are blacker ; and the yellow base of the abdomen is paler, and in fact the triangle on the middle of the second segment is almost whitish.

C. relictæ is common and widely distributed from at least Devonshire (Torcross) to Assynt, Inverness, Nairn, and Brodie, while numerous Irish

localities are known in Kerry, Cork, and Galway. The specimens from Kenmare, Co. Kerry, have been noticed above in the remarks about the variation of the species. My dates range from May 24 to August 26. It is recorded from North and Central Europe.

Synonymy.—*Tabanus nubilosus* of Moses Harris (1782) is usually given as a synonym of *C. relictæ*, but his figure is uncertain and as he said "The legs are black" it may be taken that he had *C. cæcutiens* before him, and consequently no question of priority can arise. *C. melanopleura* Wahlb. is now believed to be a variety of *C. relictæ* in which the pubescence on the pleuræ is all black. Pandellé's ridiculous statement that *C. cæcutiens*, *C. quadrata*, and *C. relictæ* are only varieties of one species merely serves to show the superficiality of his work.

4. *C. sepulcralis* Fabricius. Entirely black in both sexes.

The smallest British species of the genus, easily known by the absence of orange markings about the base or basal corners of the abdomen.

♂. Face and jowls almost entirely covered by the shining black calli, so that only a narrow brownish orange middle line remains, though in good specimens there may be a little grey dust on the sides of the face (between the facial and buccal calli) extending rather broadly about half-way across the disc of the face; the ground colour of the face may be rather obscurely ferruginous at the place where the grey dust commences near the eyemargins, and the sides of the mouth may be obscurely dark ferruginous, and in fact in some lights all the sides of the face may be broadly though obscurely dark ferruginous from near the antennæ to the sides of the mouth, leaving only the spaces down the sides of the brownish orange middle line shining black; pubescence on all the head (face, jowls, vertex, and antennæ) black or rusty black; back of the head slightly hollowed out behind the eyes right away from jowls to top, and with a minute black postocular fringe; vertex dull black, elevated, and bearing rather dense long pubescence; frons bare, shining black, but dusted brownish orange all across just above the antennæ, and this dust extends all round the antennæ so as to connect with the similar middle line of the face. Proboscis long, black, and rather shining about the tip; palpi black, and bearing long pubescence. Eyes with the facets on about the upper two-thirds larger than those on the lower part, but only contrasted in a line across the middle of the disc (not near the front or back margin of the eyes); in life the eyes are brilliant blue green with three purple spots and a faint streak, two of the purple spots and the intermediate streak being on the forepart of the eye, and the upper spot scarcely above the middle of the eye and not close to the foremargin, while the third spot is a small one near the hind part of the eye in a line with the streak. Antennæ dull black but the third joint rather brownish; basal joint longer than the second, and both bearing long and rather abundant black pubescence.

Thorax and scutellum all black, only moderately shining and not at all striped; pleuræ rather obscured by brownish dust. Pubescence all black or rusty black, long, erect, and fairly abundant; pleuræ bearing rather dense black pubescence even to the lower part.

Abdomen all deep black and very little shining; pubescence abundant and all black, some of the erect hairs on the disc of the two or three basal segments fairly long; even the ends of the genital lamellæ dull black or only slightly brownish. Belly black and very little shining, with the pubescence rather less dense than on the dorsal side.

Legs black, almost dull; pubescence on the coxæ and femora long and black but not dense; hind tibiæ thickened and bearing dense black pubescence.

Wings (fig. 240) mainly blackish, but with a small middle part and a large apical part almost hyaline and with the hind angle (including the anal cell) rather washed out; the middle hyaline part consisting of a space *near* the

tip of the upper basal cell which is connected with a larger sloping space which almost includes the tip of the second basal cell; the large apical clear space occupying most of the apical half (though not including the tip) of the submarginal cell, though really the only truly hyaline part of this cell is an almost oval spot above the base of the cubital fork of which the basal margin begins just before the fork, then lower down the blackish margin retreats in the first posterior cell towards the base of the wing (so that the outer half of that cell is hyaline) and then descends almost perpendicularly across the third posterior cell but indistinctly widens out towards the lower outer corner of that cell; the cubital fork-cell is almost hyaline except for an indistinct darkening about its upper outer corner, so that the subhyaline space in the cubital fork-cell and in three cells below it forms a large space with a slightly concave inner margin; the darkened space which includes both ends of the discal cell extends downwards and includes (though rather diluted at the tip) all the fourth posterior cell and all the base of the postical fork-cell, leaving the apical half of the postical fork-cell less darkened, and after that the whole hind angle of the wing (including the whole of the anal and axillary cells) also less darkened. Squamæ (alar) small and smoky blackish with a short coarse scaly fringe; thoracal pair brownish black and with scarcely any fringe. Halteres blackish.

- ♀. Also entirely black, but usually with some dark tawny or greyish pubescence. Frons at its narrowest part occupying nearly one-third of the head, all black and moderately shining, depressed across the middle because the ocellar triangle above and the large frontal callus below are rather elevated; the large callus quite bare and with an arched upper margin, but the depressed part with slight dark tawny or blackish pubescence, and the upper part of the frons with moderate tawny or blackish pubescence; just above the antennæ a doubly lunate band of brownish orange dust extends completely round the antennæ and for its full width to the eyes, and is connected beneath the antennæ with the similarly brownish orange middle line down the face; on the face there is a small spot of similar dust just about the lower edge of the pit on each side, but otherwise the shining black calli occupy all the face and jowls except on a very narrow brownish orange eyemargin; pubescence on the face rather slight and usually rusty black or grey, but becoming longer and more orange or grey about the mouthmargin and the base of the palpi; back of the head only moderately and equally inflated all the way up, dull black with some short black ciliation near (but not *on*) the eyemargin, and with some rather longer black or rusty black or brownish yellow hairs behind the top corners of the eyes and behind the vertex. Eyes (fig. 249) in life brilliant green or blue green with only three distinct purplish spots and sometimes a faint one higher up, but with a distinct shifting coppery tinge on the forepart from any point of view; the hindmargin not darkened at all; the middle spot small but extending downwards at its back part; the two foremarginal spots considerably larger and more rounded, and the upper spot placed just half-way down the eye but slightly above the isolated middle spot, while the lower spot is rather high up and is only separated from the upper spot by about its own diameter; the three spots form an equilateral triangle. Antennæ as in the male, but the hairs on the two basal joints shorter.

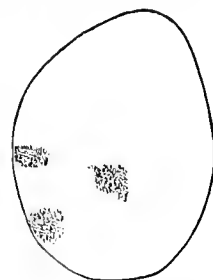


FIG. 249.—*Chrysops sepulcralis* ♀. Left eye in life.

Thorax and scutellum more shining black than in the male, and with very indistinct stripes down the thorax; pubescence more depressed, brownish yellow or brownish grey on the disc, becoming denser and dark tawny or greyish on both sides of the dorsopleural suture but with a narrow line of black hairs along that suture, and these black hairs usually increase into a clump just in front of the wing-base; pleuræ with a large dense clump of rather long dark tawny or greyish hairs on the back part of the mesopleuræ, and with a similar clump on the metapleuræ.

Abdomen moderately shining black; pubescence tawny or yellowish grey or even almost whitish on the hindmargins of the segments, and in good

specimens to a large extent on the anterior corners of the second segment, on triangles at the middle of the hindmargins of the second and third segments, and rather sparsely on most of the fourth, fifth, and sixth segments except at the base of the fourth, while the pubescence on the sidemargins of the two or three basal segments is rather longer and is more distinctly tawny or grey. Belly dull black with the hindmargins of segments narrowly brownish yellow, and with brownish yellow or grey pubescence which forms hindmarginal fringes to all the segments or is sometimes more extended on to the disc of the third and subsequent segments. Ovipositor showing two short blackish yellow lamellæ.

Legs almost as in the male, but the pubescence on the coxæ and usually to a large extent on the posterior femora brownish yellow and rather more sparse; ciliation on the hind tibiæ less conspicuous.

Wings much more hyaline than in the male, as practically only the foremargin and a broad middle cross-band are blackish; the darkened foremargin extended to the tip of the wing (just into the cubital fork-cell) but becoming rather washed out about its end; the upper basal cell all blackened except on the hyaline space near its tip, and the second basal cell all hyaline except at just its base; the outer margin of the blackened middle band almost as in the male but more sharply defined at its lower outer corner and on the basal third of the postical fork-cell, and a broad darkened margin occurs against the lower branch of the postical vein; anal cell sometimes rather widely open or sometimes closed at the wingmargin. Squamæ (alar) rather small, smoky blackish with black margins and fringed with coarse black scales; thoracal pair large and bearing a minute fine greyish black fringe except for a few scales near the angle.

Length about 7.5 mm.

This species shows little variation in a number of specimens (2♂7♀) from Studland Heath, and one female from Parley Heath, in Dorsetshire, from which the above description has been made, but one female has the second veinlet from the discal cell extending in both wings only about half-way to the wingmargin and also has the radial vein incomplete. Six females taken by Mr William Evans in a marshy spot at Aberfoyle in Perthshire on June 30, 1905, have a very distinct appearance, as they are rather larger and have a larger more ovate abdomen upon which the tawny or rufescent pubescence is much more conspicuous (being apparently longer) and never at all greyish either dorsally or ventrally, while the pubescence is also more universally tawny on all the face, frons, vertex, top of occiput, pleuræ, and even on the dorsopleural suture, except that one specimen shows traces of black hairs against the dorsopleural suture. A male and a female in Kowarz's collection from Dorpat in Livonia are evidently conspecific with the Dorsetshire specimens, but the female has the pubescence much more extensively black, as it has numerous black hairs scattered over the disc of the thorax and a broader stripe of black pubescence along the dorsopleural suture, and rusty black pubescence on each side of the stripe and also on the mesopleural and metapleural tufts, while the abdomen has black pubescence about the sides of the three basal segments and rusty black pubescence on all the disc and on the belly; the coxæ and femora have entirely blackish pubescence, and the wings are scarcely anywhere truly hyaline unless on the hyaline portion of the basal cells and on the spot in the submarginal cell, and the second basal cell has a yellowish tinge along its lower margin, while each side of the anal vein is rather widely darkened. The species may be distinguished from any other European one (except *C. maura*, if that be distinct) by its entirely black

colour (including almost all the face), and by the concave rather than convex outer margin of the blackened middle cross-band on the wings, while the upper basal cell is more extensively darkened and the first posterior cell in the female less darkened than in the three other British species; it is also rather smaller and narrower than the three other species.

C. sepulcralis is probably not uncommon in marshy valleys in the great Dorsetshire commons, but it was not recognised until Mr E. E. Austen recorded the capture of two males by Capt. Savile Reid at Studland Heath in August 8, 1895. A visit to Dorset in August 1904 caused Mr J. E. Collin to capture one female on a large wet space on Parley Heath, and an examination of Rev. O. Pickard Cambridge's collection produced one male and five females which he had casually taken near Bloxworth; a visit to Studland in company with Colonel Yerbury in 1906 led to the capture of one male and seven females in a shallow boggy valley between August 20 and September 4, the male being taken on the last date. An examination of the late Mr C. W. Dale's collection showed a male and two females labelled "Studland July, 1880," but he had probably overlooked their distinctness until after Mr Austen's record. Six females taken by Mr Wm. Evans in a marshy spot at Aberfoyle in Perthshire on June 30, 1905, have been specially mentioned above, and he has informed me that they were not uncommon on that day but that he only took them because they were continually settling upon him. It is very probable that the so-called "black variety" of *C. cæcutiens* mentioned by Duncan in 1837 as having occurred in Sutherlandshire and in the South of Scotland may refer to this species. It is recorded from North and Central Europe, but Osten Sacken justifiably refused to accept Kirby's identification of it from North America.

Synonymy.—The only possible doubt about the identification of this species lies with the extreme North European *C. maura* Siebke; Siebke described his species as similar to *C. sepulcralis* in size and form but as having entirely black pubescence, from which it would appear that the Aberfoyle specimens might represent his idea of *C. sepulcralis* and the Studland (or at any rate the Livonian) specimens his idea of *C. maura*, but as against that the Aberfoyle and Studland specimens are hardly alike in size and form. It is almost certain that the male described by Zetterstedt in Dipt. Scand., xii., 4550, belonged to *C. quadrata*.

The two following species of *Chrysops* are likely to occur in Britain:—

C. rufipes Meigen; rather like *C. relictæ* but smaller and blacker and with much more extensively orange legs, the femora being mainly orange in the female and with at least the front knees broadly orange in the male, while the basal joint of the antennæ is more distinctly dilated than in any of the allied species.

C. parallelogramma Zeller; also rather similar to *C. relictæ*, but the outer border of the blackened middle cross-band on the wings rather concave, and the black markings on the second and third abdominal segments of the female smaller and well separated so that they stand almost perpendicularly, whence the name *parallelogramma* is derived.

V. NEMESTRINIDÆ.

Orthorrhaphous brachycerous eremochætous flies of rather large size, distinguished by their peculiar venation.

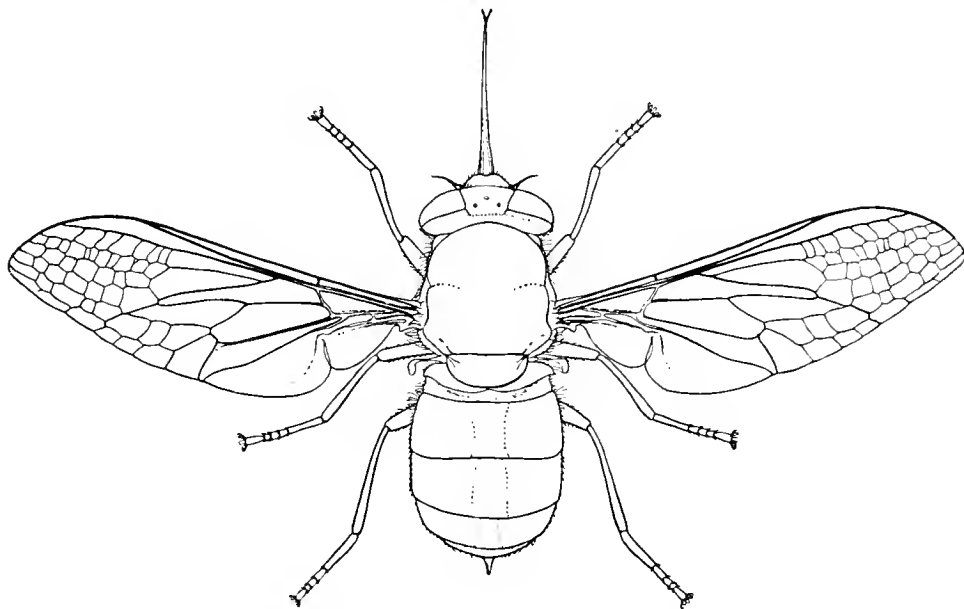


FIG. 250.—*Nemestrina Perezii* ♀. × 3½.

Head broad and short, but often not quite so broad as the thorax, set close against the thorax so that there is no visible neck, nearly always clothed with dense soft equal pubescence but sometimes with a strong tuft on the upper part of the frons, or occasionally the pubescence may be rather slight, and the cephalic bristles are entirely absent. Face small, more or less roundedly produced, separated from the frons by a sharply marked deep suture, usually densely and equally pubescent but occasionally bare, and never with any approach to a face-beard as in the *Asilidæ*. Frons and vertex flush with the eyes or slightly raised; frons sometimes wide in both sexes, or contracted in the male, or comparatively narrow in the female and completely closed by the eyes in the male; when the frons is very broad the ocellar triangle is very large and the three ocelli are placed widely apart, but when the eyes are touching the ocellar triangle is necessarily small and the ocelli are closer together, while in *Colar* they appear to be altogether absent. Proboscis often very long, thin, and porrect (in *Nemestrina longirostris* about four times as long as the whole fly), or long without being porrect (being bent down), or quite short and thick (*Hermoneura*), and when elongate the sucker-flaps are usually small; palpi one- two- or three-jointed, often indistinct, but sometimes rather long and very thin and upturned, or occasionally a little clavate. Eyes usually widely separated on the frons in both sexes, but sometimes approximated or even closely touching for a long distance in the male and then only narrowly separated in the female, usually bare but in some genera with very dense and even long pubescence; facets usually all equal, but I think that the front facets are sometimes a little enlarged in the male. Antennæ very widely separated at the base, small, and inconspicuous unless the thin arista-like style be long; two basal joints bearing stiff hairs; third joint almost as short as the others but more pointed, or more elongate, and bearing a terminal stout or thin bristle-like usually jointed style which is longer than the antennæ and is occasionally tufted at its end.

Thorax rather quadrate with the humeri inconspicuous, absolutely without bristles or bristly hairs but almost always bearing dense fairly equal pubescence all over the disc, the pleuræ, and the scutellum; even the usual patches of stiffer hairs about the postalar calli are absent, but sometimes the pleuræ bear longer tufts of hairs near the back of the mesopleuræ and on the upper part of the metapleuræ behind

the squamæ. Scutellum sometimes unusually large but often small, rounded and unarmed, without any trace of bristly hairs; metanotum almost hidden beneath the scutellum.

Abdomen short and usually rounded, often shorter and even broader than the thorax, less pubescent than the thorax and absolutely without any trace of bristles or strong hairs.

Legs usually slender and rather long, but sometimes rather short and stout though never powerful, absolutely without bristles even to the soles of the tarsi, but with moderately long pubescence on the femora, and almost always with a minute sub-erect equal rather dense pubescence all over the tibiæ and tarsi (rarely rather longer on the tibiæ), which only rarely gives any indication of spicules (like the *Bombylidae*, etc.) on the tibiæ; tibiæ without any spurs. Pulvilli three, the middle one being often rather shorter than the others and often curved up but always pad-like; sometimes all three pulvilli are long and rather narrow, but at other times normally broad; claws long.

Wings with a peculiar venation, which in its most extreme form (fig. 250) exhibits a remarkable network on the apical half of the wing, but in its simpler forms is characterised by the veins curving up and running parallel with the hindmargin of the wing but never ending in the subcostal vein as in *Mydaidæ* though some may end in the lower branch of the cubital fork. Subcostal vein long (and always present in spite of Wandolleck's statement about *Colax*); præfurca rather short; radial vein simple or connected by a veinlet with the cubital fork; cubital vein sloping down until it coalesces for a short space with the discal vein near the end of the curiously shaped discal cell (so that the discal cross-vein is absent), or connected with the discal cell at the same place by a short cross-vein, after which the cubital vein suddenly slopes upwards and may end in a simple long narrow fork (*Hermoneura*, fig. 251) or the fork may be connected by a cross-veinlet close to the base of the upper branch with the radial (*Rhynchocephalus*, fig. 253), or the curving up of the veins and a cross-veinlet may cause at least two closed cells to occur between the space caused by the diverging radial and cubital veins and the wing-tip (*Fallenia*, fig. 252), or the cubital fork (which would otherwise have been long and simple) is connected by a network of numerous cross-veinlets with the veins above and below it; beyond this there is a peculiarity in the venation that the basal part of the cubital vein appears to be carried on as a continuous diagonal vein (called by Loew the "Diagonalader") either to the wingmargin (fig. 254) or at least to the end of the upper branch of the postical vein (fig. 252); discal vein in its end portion throwing up two long veins (not necessarily from the discal cell) which run almost parallel with the wingmargin (and of which the lower one ends at or before the wing-tip) and of which the upper one sometimes ends in the cubital vein well before the wingmargin; discal cell elongate trapezoid, either connected at its lowest point by a short small cross-vein with the upper branch of the postical vein (close to its base) or anastomosing there for a short space; postical vein with a long upper and short lower branch, of which the upper branch runs along almost parallel with the wingmargin until it reaches the end of the closed fourth hindmarginal cell, and the lower branch either ending in the wingmargin or joining the anal vein before the wingmargin, so that the anal cell is either narrowly open or is closed a little before the wingmargin; upper basal cell extremely long and narrow, second basal cell long and unusually broad; in tracing all the principal veins the network of cross-veins in *Nemestrina* has been ignored; posterior cells four or five. The curving up of the veins and their running parallel with the wingmargin is very suggestive of the venation of the *Mydaidæ*, and so is the ending of the veins before the wing-tip; the leaving the whole wingmargin for a large space clear of venation (fig. 252) is only paralleled by the *Mydaidæ*; alula unusually large in some cases, or very narrow, or quite absent; wing-membrane very much rippled, very minutely pubescent. Squamæ (alar) distinct, but not large, and often bearing a very long fringe on the lower part which gets mixed up with the long tuft of pubescence on the pleuræ; thoracal pair absent, or small and hidden in the pubescence. Halteres inconspicuous and often hidden in dense pubescence.

This family may be easily recognised by its peculiar venation, though doubts have arisen as to its relationships. The pad-like empodium (whereby there are three almost equal pulvilli) and the absolutely

eremochætous structure prove its relationship to the true EREMOCHÆTA on the one side, and the dense pubescence and aërial structure connect it with the TROMOPTERA on the other side. If the presence of three pulvilli and the absolutely eremochætous nature be taken as the most important guides to affinity, then the closest allies are the *Cyrtidæ*, and though the two families appear widely divergent in the structure of the head, abdomen, and squamæ, yet the erratic venation of the *Cyrtidæ* shows considerable affinity in *Lasia* (fig. 259 A), etc. There is no relationship whatever to the *Mydaidæ* or *Apioceridæ*, and the venation is widely distinct from them when analysed.

The *Nemestrinidæ* are inhabitants of tropical regions, occurring as Osten Sacken says "sporadically in disconnected, limited areas, far distant from each other, and characterised by a warm, dry, almost rainless, climate. (Central Asia, South Eastern Europe, some parts of Africa, of Australia and the deserts of South America.)" . . . "where there is a minimum of rainfall;" and consequently they are not known in Western Europe nor probably in New Zealand. About one hundred and forty species have been recorded of which about eight are known to occur in Europe, though more than thirty are recorded as Palæartic, and it is practically impossible for any species to occur in Britain. The species with a long proboscis are said to probe flowers whilst hovering before them, like the species of *Bombylius*. The metamorphoses of *Hermoneura obscura* have been partially worked out and figured by Handlirsch (Wien. ent. Zeit., i., 224 and ii., 11, 1882-3), and the full-grown larva has been found in the fully developed pupa of *Rhizotrogus solstitialis* (a very abundant British insect), though the eggs were laid in small heaps in holes in the bark of Silver Firs (Weisstannen), whence the young larvæ issued in great numbers from the burrows in which they were hatched and, having placed themselves erect, were blown away by the wind; after this it is imagined that they attached themselves by the aid of the ventral hooks to the bodies of female *Rhizotrogus* and were carried by them to the place where she deposited her eggs. The Argentine *H. exotica* Wied. is said to lay its eggs in the nests of a large Bee (*Xylocopa Augustii* St Farg.). The larvæ are said to be allied to those of the *Leptidæ*.

Synonymy.—It is curious that the two principal genera in this family have caused strong orthographical disputes, and this is a matter of some importance as both of them have given names to the family and subfamilies. The oldest name is *Nemestrinus*, which was proposed by Latreille in 1802 and altered by him in 1809 to *Nemestrina*; Agassiz gave "Nom. mythol." as the derivative but I have been unable to trace such a derivation; *νημα έστρίς* = three times threaded as if a spider's web, has been suggested, and probably with good grounds for the "*νημα*," but is far fetched as a compound. *Nemistrinus* has been suggested as an emendation, but I do not know upon what grounds nor from what derivation, and accordingly I retain the old spelling. *Hirmonœura* was founded in 1820 by Meigen from "Parallelschweber," but I have been unable to trace any Greek derivation; Agassiz gave "*ίρμος*," "comitatus; *νευρον*, nervus," but I cannot trace the word "*ίρμος*." *Hermoneura* has been suggested as an emendation (from *έρμα*, prop or support), though Philippi in 1865 made *έρμα* = *ορμος*, line or chain (in reference to the veins), and from this some-

how deduced *Hermoneura*, in ignorance that Westwood had in 1835 (I have been unable to check the reference) already used *Hermoneura*. Taking all in all I prefer to retain the old spelling of *Nemestrina* and to call the family *Nemestrinidæ*, but probably *Hirmoneura* is better emended to *Hermoneura*. Dr A. W. Verrall is of opinion that both *Nemestrina* and *Hirmoneura* are so impossible as Greek compounds as to be beyond correction.

Type of venation of NEMESTRINIDÆ.

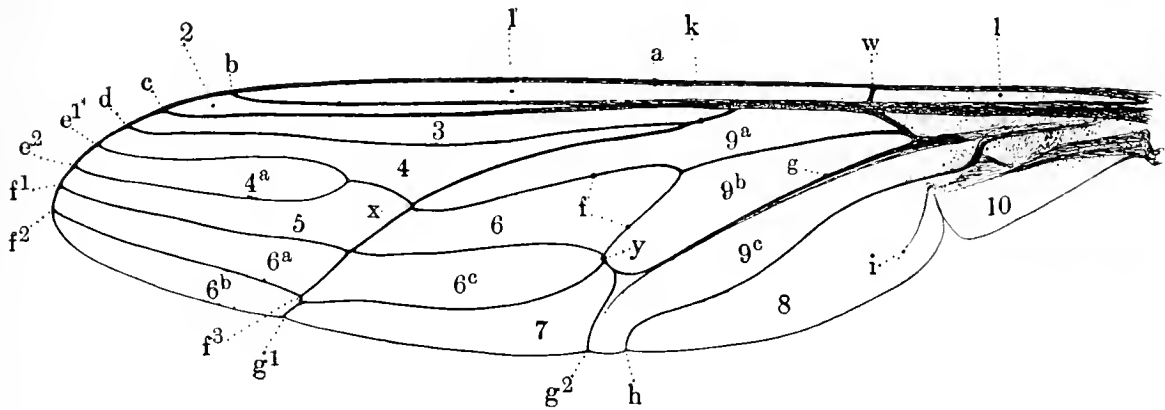


FIG. 251.—*Hermoneura obscura* ♀.

Longitudinal (or long) veins.

- a Costa (or costal vein).
 - b Mediastinal (or auxiliary) vein.
 - c Subcostal (or 1st longitudinal) vein.
 - d Radial (or 2nd longitudinal) vein.
 - e Cubital (or 3rd longitudinal) vein.
 - e¹ Upper branch } of the cubital fork.
 - e² Lower branch }
 - f Discal (or 4th longitudinal) vein.
 - f¹ } These two veinlets represent the usual first and
 - f² } second veinlets from the discal cell.
 - f³ } represents the usual third veinlet from the discal cell which closes the
 - fourth posterior cell.
 - g Postical (or 5th longitudinal) vein.
 - g¹ Upper branch } of the postical fork.
 - g² Lower branch }
 - h Anal (or 6th longitudinal) vein.
 - i Axillary vein.
 - k Præfurca = the common stem of the radial and cubital veins.
- Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

“Diagonal vein” is a name (only used in the *Nemestrinidæ*) for the apparently continuous vein which extends from the base of the præfurca to (or near to) the posterior margin of the wing (at g¹ in the type-wing), really commencing with the præfurca and ending at the tip of the upper branch of the postical vein

Cross (or transverse) veins.

- w Humeral cross-vein.
- x Discal (or middle) cross-vein (not always defined in *Nemestrinidæ*, but the point of connection between the cubital and discal veins always lying near the end of the discal cell).
- y Lower (or small) cross-vein.
- z Anal cross-vein—not existing in the type-wing given, but apparent in *Fallenia* (fig. 252), being really (g²) the lower branch of the postical vein.

Cells.

- 1 Costal (*or mediastinal*) cell.
- 2 Subcostal cell.
- 3 Marginal cell.
- 4 Submarginal cell.
 - 4^a Second submarginal (*or cubital*) cell (*or cubital fork-cell*).
- 5 First posterior (*or subapical*) cell.
- 6 Discal cell.
- 6^a Second posterior cell.
- 6^b Third posterior cell.
- 6^c Fourth posterior cell.
- 7 Postical (*or 5th posterior*) cell (*or postical fork-cell*).
- 8 Axillary cell.
- 9^a Upper (*or 1st*) basal cell.
- 9^b Second (*or middle*) basal cell.
- 9^c Anal (*or 3rd basal*) cell.
- 10 Alula.

Notes on the Venation of the NEMESTRINIDÆ.

The venation is very characteristic and cannot by any possibility be confounded with that of any other family. The chief peculiarities lie in (1) the long Mediastinal and Subcostal Veins; (2) the Parallelism to the hindmargin of numerous veins; (3) the position and the absence or smallness of the Discal Cross-vein, and the consequently very long Upper Basal Cell; (4) the peculiarly shaped Discal Cell and its Veinlets, and (5) the "Diagonal Vein."

1. The **MEDIASTINAL** and **SUBCOSTAL VEINS** are much longer than in any other family of the **EREMOCHÆTA**.

2. The **OUTER VEINS** are very much elongated and slope out towards the tip of the wing, so that the upper branch of the postical fork and the veinlets arising from the upper branch of the discal vein run for a long way almost parallel with the posterior margin.

3. The **DISCAL CROSS-VEIN** is sometimes apparently absent, there being normally only a single small connecting link between the anterior and posterior parts of the venation, and this connection takes place near the end of the discal cell, so that the **UPPER BASAL CELL** is very long and rather narrow. It is remarkable that while there is often a cross-vein placed near this same spot in the allied family *Cyrtidæ*, there is also in that family a strong discal cross-vein (making a second connection) from near the end of the præfurca to near the base of the discal cell of which there is no trace in the *Nemestrinidæ*; on the other hand the veins towards the end of the wing in *Nemestrinidæ* lengthen out and tie themselves to the strong "Diagonal Vein," and sometimes still further strengthen themselves by numerous net-like veinlets, while in the *Cyrtidæ* the veins towards the end of the wing grow weaker and weaker and in many cases disappear. The strength of this "tie" in the *Nemestrinidæ* is evidenced by the way in which the cubital vein is pulled down at this point towards the discal cell, and the same is shown in the **SMALL CROSS-VEIN** where the lower margin of the discal cell is pulled down and the postical vein (both in its lower and upper branches) is pulled up to the "tie"; the strings in the network having been drawn tight at these two points. The *Mydridæ* have similarly placed discal and small cross-veins, but the strengthening of the wing has been obtained in them by tying the ends of the veins to the subcostal vein.

4. The **DISCAL CELL** is elongate trapezoid with the basal side longer than the end one, and with its outer end forming part of the "diagonal vein." The usual veinlets emitted from the discal cell are removed further on so that the two upper ones start beyond the discal cell from a veinlet which would normally represent the third veinlet from the discal cell, being the veinlet which closes the fourth posterior cell and is a continuing part of the "diagonal vein."

5. The "**DIAGONAL VEIN**" is not a vein in itself, but is a continuous line of veins which extend from the base of the præfurca to the end of the upper branch of the postical vein. It is really composed of the præfurca, a long piece of the cubital vein extending to the discal cross-vein (or its equivalent), the veinlet closing the discal cell, the veinlet from the discal cell which closes the fourth posterior cell, and lastly (when existing) the final piece of the upper branch of the postical vein.

This pseudo-vein is very conspicuous, and there is no equivalent vein existing in any other family of diptera.

Other peculiarities worthy of notice exist in the long (and sometimes complicated) fork of the cubital vein, the long narrow anal cell, the undulated anal vein, and the rather short præfurca which may commence not much before the base of the discal cell but still before the middle of the upper basal cell.

Table of the Palæarctic Subfamilies and Genera.

- 1 (6) Proboscis very long; palpi short. NEMESTRININÆ.
 2 (3) Branches of the cubital vein reuniting and forming an almost triangular cell above the end of the discal cell; wing-tip and

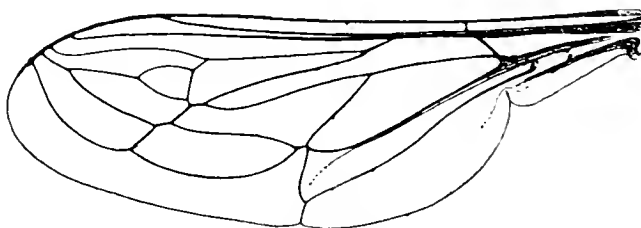


FIG. 252.—*Fallenia fasciata* ♂. × 6.

hindmargin without any outgoing veins except from the end of the closed anal cell (fig. 252). FALLENIA.

The veins near the wing-tip vary, as the terminal portion of the cubital vein may be joined before the wingmargin by the radial vein or by the lower branch of the discal vein.

- 3 (2) Branches of the cubital vein long and running almost parallel to the posterior wingmargin near the wing-tip; "diagonal vein" often continued to the wingmargin.

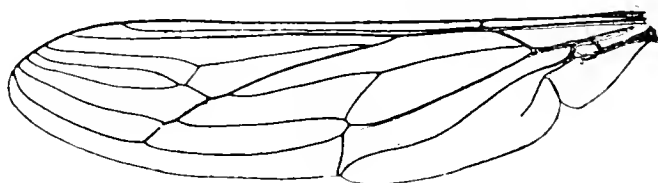


FIG. 253.—*Rhynchocephalus Tauscheri*. × 5.

- 4 (5) "Diagonal vein" not extended to the wingmargin (fig. 253). RHYNCHOCEPHALUS.

- 5 (4) "Diagonal vein" extended to the wingmargin (figs. 250, 254). NEMESTRINA.

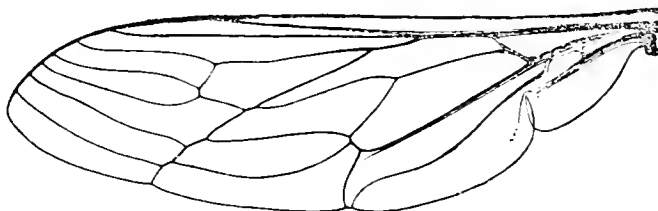


FIG. 254.—*Nemestrina albofasciata* ♀. × 7.

- 6 (1) Proboscis very short; palpi very long and upturned. HERMONEURINÆ.

7 (8) Cubital fork long and simple; anal cell open (fig. 251).

HERMONEURA.

Sometimes there is an adventitious cross-vein near the end of the mediastinal vein connecting that with the subcostal vein.

8 (7) Cubital fork with both branches running into the radial vein and forming a closed cell above the "diagonal vein"; anal cell closed at the wingmargin (fig. 255).

SYMMICTUS.

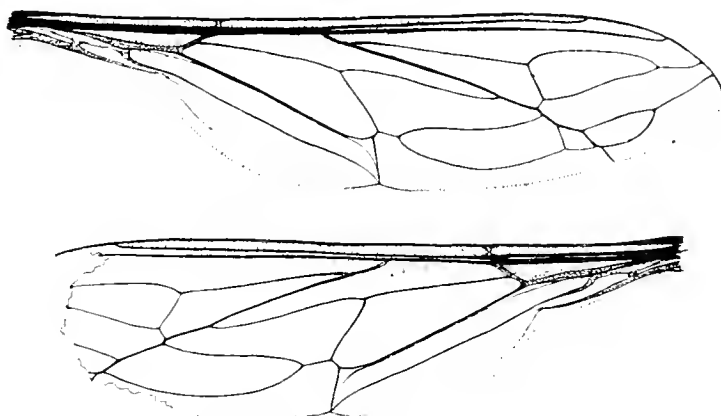


FIG. 255.—Both wings of the type specimen of *Dicrotrypana flavopilosa* Bigot. $\times 6\frac{2}{3}$.

Loew endeavoured to distinguish *Rhynchocephalus* and *Nemestrina* in the *Nemestrinidæ*, and *Hermoncura* and *Symmictus* in the *Hermoneurinæ* by characters derived from the joints of the style and palpi.

VI. CYRTIDÆ.

Orthorrhaphous brachycerous eremochætous flies of medium size, but with remarkably inflated bodies, small heads, and gigantic thoracal squamæ.

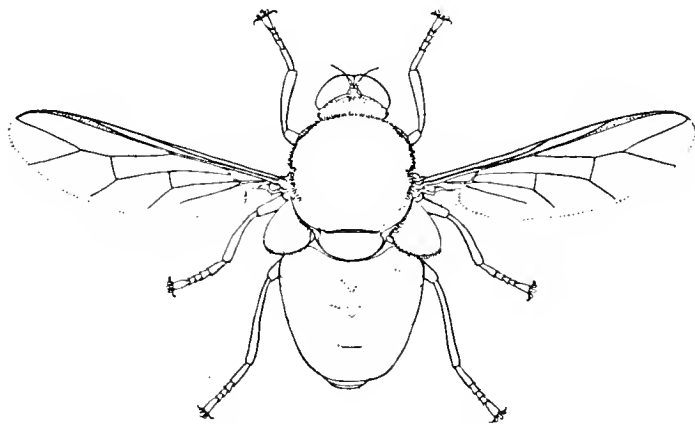


FIG. 256.—*Acroccra globulus* ♂. $\times 7\frac{1}{2}$.

Head very small (or even minute) and rounded, almost wholly occupied by the enormous eyes in both sexes, smaller in the female than in the male but always holoptic. Face very small, placed almost on the underside of the head. Head entirely without bristles, though more or less pubescent; ocelli three, or the front one missing or obsolete, or all three obsolete. Proboscis very variable, sometimes exceedingly long, thin, and conspicuous, but not porrect, and at other times very short, while in some cases the mouth opening seems to be quite closed by a membrane. Palpi usually obsolete. Eyes hairy or bare (bare in all British species), occupying nearly all the head and contiguous in both sexes so that only the small vertical triangle and the small face and mouth stand clear, touching in both sexes for a very long space, in fact usually almost all down the head; facets all equal in both sexes. Antennæ three-jointed, or sometimes appearing to be only two-jointed when the basal joint is minute and almost absorbed into the head, usually short, porrect, approximated at the base, and placed in varying positions at about the middle of the head, or at the extreme top near the ocelli, or at the extreme bottom against the mouth; third joint small but transverse and with a quite bare apical arista which is swollen and polished at its base (British species), or elongate and strap-shaped without any style or arista (*Panopinae*), or short with three apical hairs (*Pterodontia*).

Thorax very gibbous; prothoracic lobes sometimes (*Philopotinae*) enormously developed and meeting dorsally so as to form a prolonged shield on the front part of the thorax; metapleuræ bearing a large tuft of fairly long shelter hairs, and sometimes produced into a sort of peg or knob. Pubescence usually fairly abundant and sometimes even furry, but without any sign of bristles or long hairs, and sometimes quite minute. Scutellum large, unarmed, and clothed like the thorax; metanotum usually concealed by the scutellum.

Abdomen very broad and globose, in fact usually balloon-shaped and pellucid, with about five segments, occasionally contracted on the second and third segments (*Megalypus*) and then with the end knob-like. Pubescence furry, or moderate and rather inconspicuous, without any sign of bristles or long hairs. Genitalia inconspicuous.

Legs simple, never long nor thin, entirely without bristles but sometimes with a short blunt spur on the middle tibiæ, or (*Astomella*) with almost two spurs on the posterior tibiæ and a circlet of very short spines on the front tibiæ. Pulvilli three, the empodium being as pad-like as the outer pulvilli; claws and pulvilli long.

Wings diverging and deflexed when at rest so that they lie against the abdomen, longer in the female than in the male, and with a very peculiarly erratic venation in the British species. Ambient vein sometimes not extending even to the wing-tip,

but sometimes quite complete; præfurca originating almost opposite the base of the discal cell; discal cross-vein (when present) placed close to the end of the præfurca and consequently near the base of the discal cell, but another cross-vein analogous to the union of the cubital and discal veins in the *Nemestrinidæ* (fig. 251) often occurs near or after the end of the discal cell, causing the presence of an extra cell which can only be considered the outer portion of the upper basal cell, the upper basal cell being even then only rather more elongate than in the *Nemestrinidæ*, but these veins often become more or less obsolete until in some cases there appear to be only two posterior cells; posterior cells therefore ranging from five (of which the fourth is sometimes closed) to three or apparently two only; radial vein sometimes entirely absent; cubital fork (when truly present as in *Cyrtus*, *Lasia*, *Eutonchus*, etc.) long and normal, including the wing-tip, or with both branches curving up (almost as in some *Nemestrinidæ*) and running parallel with the wing-margin until they end in the costa well before the wing-tip, but in *Acrocera* there is a wide open spurious cubital fork of which I am convinced that the lower branch is a portion of the discal vein, and then there is also a spurious small cross-vein which is really the upper branch of the postical fork; alulæ very variable in development, sometimes slight (*Cyrtus*, *Pterodontia*). Wing-membrane very much ribbed or rippled, but apparently bare. Squamæ (thoracal) extraordinarily developed, the frenum near the angle and the squamæ beyond being extremely enlarged so that (when seen sideways) they stand up above the wings, and the latter when at rest are depressed sideways against the abdomen; these squamæ are wrinkled and usually densely hairy on the surfaces (as in some species of *Stratiomys*), and their margin is rather strongly thickened and bears a short dense fringe; alar squamæ proportionately little developed, equally short fringed or rarely bare. Halteres covered by the enormous depressed thoracal squamæ, but moderate in size.

The metamorphoses of a few species are known and are very peculiar. The larvæ are parasites on spiders (*Arachnida*) such as the *Avicularidæ*, *Theridæ*, and *Drassidæ*. "Will you walk into my parlour, said the spider "to the fly?"! Giard (Bull. Soc. Ent. Fr., 1894, cliv.) suggests that the "étonnants cuillerons" serve to protect the halteres when the fly enters the spider's nest. König (Verh. zool.-bot. Ges. Wien, xliv., 163, 1894) has given elaborate details of the earlier larval stages of an *Oncodes* and states that the young larvæ have considerable springing powers.

This family may be easily recognised by the three pulvilli, the enormous thoracal squamæ, the globular abdomen, and the humped thorax, but affinities can be seen between the globular shape and that of the small humpbacked *Bombylidæ*, and also between the venation of such genera as *Lasia* and the *Nemestrinidæ*.

The *Cyrtidæ* form a very distinct family of nearly two hundred known species and about twenty-five genera, of which seven genera and about thirty species have been recorded from the Palæarctic region, but at least ten of those require confirmation of their specific distinctness. Only two genera occur in Britain and (as far as is known) only three species, but *Oncodes zonatus* and *varius* and possibly another *Acrocera* may occur; not one of our three species has been recorded from Scotland or Ireland, nor even north of Herefordshire. They occur in all parts of the world but usually as uncommon insects until their very local haunts are discovered, but Osten Sacken states that they are abundant in New Zealand, one species being very common there; the largest number of species occur in America.

Synonymy.—The term *Cyrtidæ* was defended by Osten Sacken (Cat. N. Amer. Dipt., ed. ii., p. 239) against *Acroceridæ* and *Henopidæ*; the name *Henopidæ*, which was adopted by Erichson, is clearly inadmissible as the genus *Henops* had previously been described under the name of *Ogcodes*. The genus *Cyrtus* is older than *Acrocera* and its meaning is applicable to the whole family, while the word *Acrocera* is absolutely contradictory to most of the genera and was probably given to indicate its contrast with them. The term *Cyrtidæ* was used by Newman in 1841, and he had used *Cyrtites* as early as 1835 (Entom. Mag., ii., 389). A few species of *Bombylidæ* (such as *Glabellula*) have at times been mistakenly placed in the *Cyrtidæ*, but the discovery of the importance of the character afforded by the enormous thoracal squamæ has relegated them to their proper place.

Types of venation of BRITISH CYRTIDÆ.

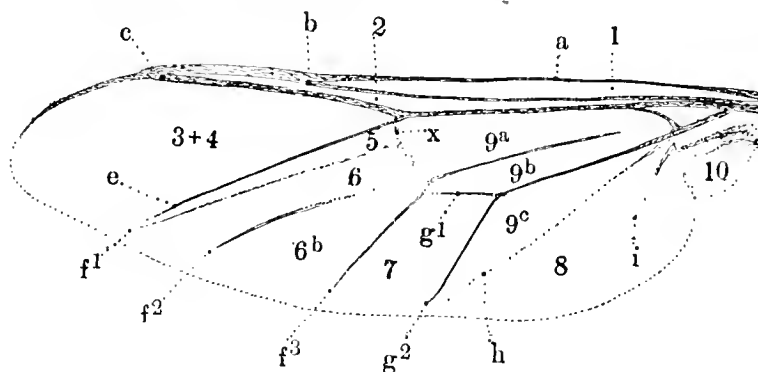


FIG. 257.—*Oncodes gibbosus*.

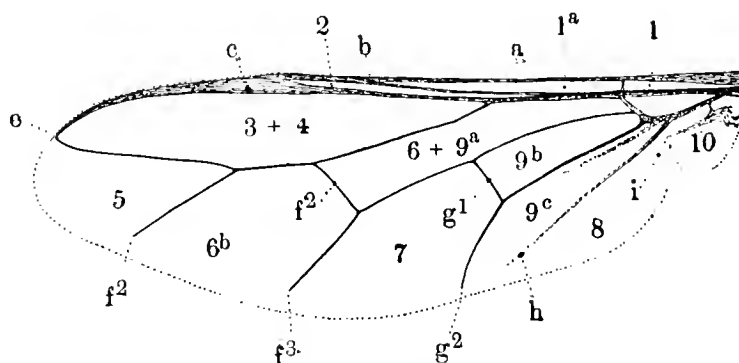


FIG. 258.—*Acrocera globulus*.

All the veins (except the small cross-vein) and cells are distinct in the type-wing of *Lasia* (fig. 259 A), but many are obsolete in the type-wing of *Oncodes* (fig. 257), and the venation is still more imperfect in *Philopota* (fig. 260 E) and *Acrocera* (fig. 258).

Longitudinal (or long) veins.

- a Costa (or costal vein).
- b Mediastinal (or auxiliary) vein.
- c Subcostal (or 1st longitudinal) vein.
- d Radial (or 2nd longitudinal) vein, not present in the type-wings given above.
- e Cubital (or 3rd longitudinal) vein.
 - e¹ Upper branch
 - e² Lower branch
 of the cubital fork, not visible in the type-wings given above.
- f Discal (or 4th longitudinal) vein.
 - f¹ Upper branch of the discal vein, very faint in *Oncodes*.
 - f² Second discal veinlet, faint in *Oncodes*.
 - f³ Third discal veinlet.
- g Postical (or 5th longitudinal) vein.
 - g¹ Upper branch
 - g² Lower branch
 of the postical fork.

h Anal (or 6th longitudinal) vein.

i Axillary vein.

Præfurca = the common stem of the radial and cubital veins.

Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (or transverse) veins.

w Humeral cross-vein, often absent in this family.

x Discal (or middle) cross-vein.

y Lower (or small) cross-vein, sometimes distinctly present (vide fig. 259 G).

Anal cross-vein = g^2 = the lower branch of the postical vein.

Cells.

1 Costal (or mediastinal) cell.

2 Subcostal cell.

3 Marginal cell.

4 Submarginal cell.

4^a Second submarginal (or cubital) cell.

5 First posterior (or subapical) cell.

6 Discal cell.

6^a Second posterior cell.

6^b Third posterior cell.

6^c Fourth posterior cell.

7 Postical (or 5th or last posterior) cell.

8 Axillary cell.

9^a Upper (or 1st) basal cell.

9^{a2} Second upper basal cell, peculiar to certain *Cyrtidæ* (vide fig. 259 A).

9^b Second (or middle) basal cell.

9^c Anal (or 3rd basal, or lowest basal) cell.

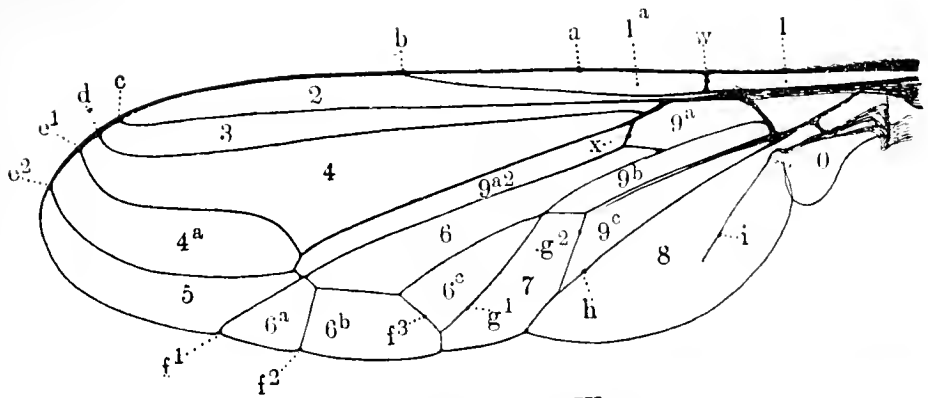
10 Alula.

Notes on the venation of the CYRTIDÆ.

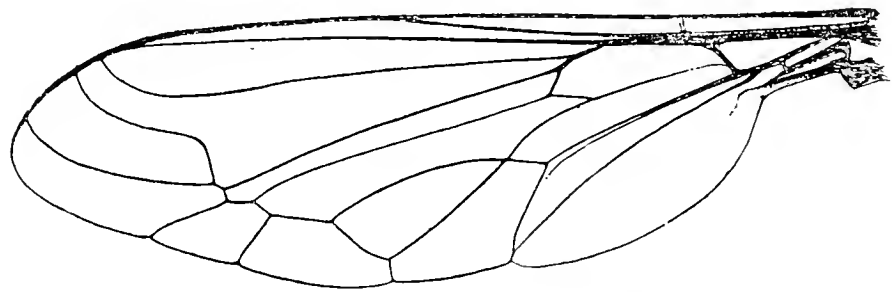
At first glance the system of venation in the British (and in fact most of the European) species is difficult to recognise, but the study of other genera will help to clear up most of the difficulties.

Taking *Lasia* (fig. 259 A), which is nearest the *Nemestrinidæ*, the mediastinal, subcostal, and radial veins are quite simple but the subcostal is unusually long; the cubital starts from a very short præfurca, and immediately sends down a thick discal cross-vein to almost the base of the discal cell, after which it continues parallel with the upper branch of the discal vein until close to the end of the discal cell where it branches into a not very abnormal upturned cubital fork (of which the branches are about equally upturned and both end before the wing-tip), and close to the base of this cubital fork a supernumerary cross-vein occurs (not known in any other family,* though obviously related to the contact between the cubital and discal veins in *Nemestrinidæ* (*Hermoneura*, fig. 251) which represents the discal cross-vein in that family) which ties the cubital vein to the upper branch of the discal vein very near to (or a short distance after) the end of the discal cell. The discal cell is very long (half the wing's length) and narrow being extended unusually near to the wingmargin, and emits three veinlets, the upper one being in a continuous line with the upper side of the discal cell, the second one sloping rather strongly downwards, and the third one being recurrent and closing the fourth posterior cell. The postical vein is forked in almost the usual way, and the upper branch just connects with the discal cell (leaving no small cross-vein) before the middle of the latter, but then diverges again until it is caught by the third veinlet from the discal cell, after which it bends down to the wingmargin; the lower branch of the postical vein slopes downwards and joins the anal vein considerably before the wingmargin, thereby causing a closed anal cell. The upper basal cell is short and broad, but according to the analogy in *Nemestrinidæ* (fig. 251) the long narrow

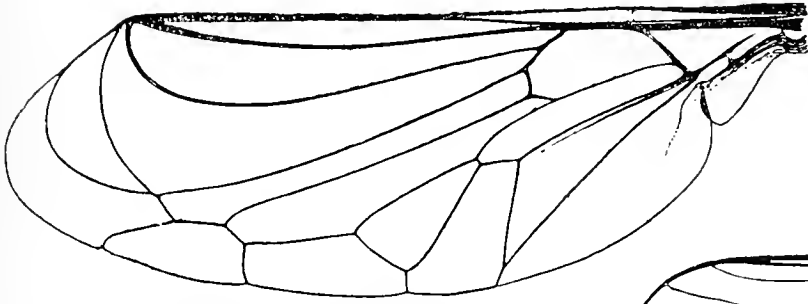
* Unless an adventitious cross-vein which occurs in some species of *Exoprosopa*, upon which Coquillett proposed a genus *Exoptata*, may be of a similar character.



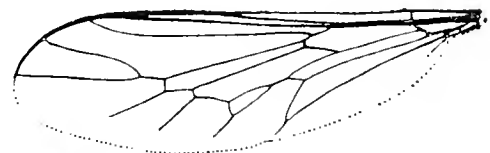
A. *Lasia flavitarsis* Wied. x 8.



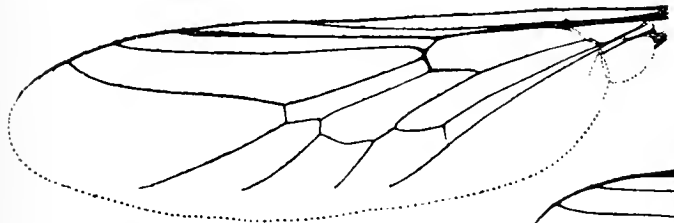
B. *Eulonchus smaragdinus* Gerst. x 8.



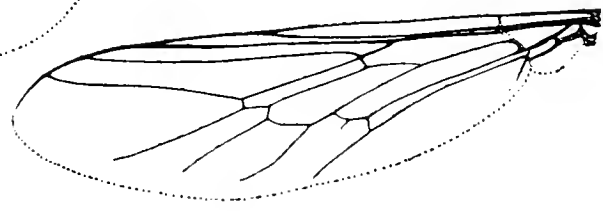
C. *Pteropexus bicolor* Macq. x 8.



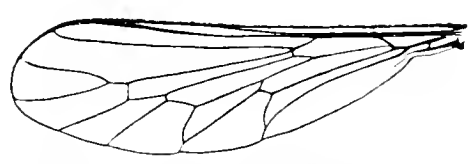
F. *Holops nigrapex* Big. x 8.



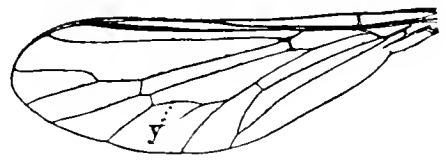
D. *Megalybus crassus* Phil. x 10



E. *Megalybus tristis* Phil. var. x 12.



G. *Cyrtus pusillus* Macq. x 10.



H. *Cyrtus pusillus* Macq. var. x 12.

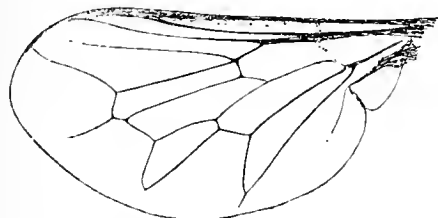
FIG. 259.—Types of venation in *Cyrtidae*.

cell which lies above the discal cell is a second portion of the upper basal cell, and not a basal portion of the first posterior cell; the second basal cell is long and narrow. A comparison of this venation with that of the *Nemestrinidæ* (*Hermoneura*, fig. 251) shows every one of the same veins and veinlets, except the strong discal cross-vein close to the base of the discal cell which is quite absent in *Hermoneura*. It would appear that an absolutely different principle has been adopted (in two allied groups) to strengthen the wings; in the *Nemestrinidæ* by tying the elongated end veins together (exaggerated to an extraordinary degree in *Nemestrina*, fig. 250), but in the *Cyrtidæ* by connecting the anterior and posterior parts of the wing by a strong tie near the base and also (in *Lasia*, etc.) by a second tie towards the end of the wing, but subsequently when the *Cyrtidæ* developed the floating balloon-like flight this second tie was allowed to die out and the outer veins to become obsolete. The course of the "diagonal" vein in the *Nemestrinidæ* is in no way repeated in the *Cyrtidæ* (even though a straight diagonal vein composed of entirely different veins exists in *Lasia*, etc.), but that is because the whole of the outer and posterior veins in the *Nemestrinidæ* slope upwards towards the wing-tip, while in *Lasia* only the cubital fork curves upwards.

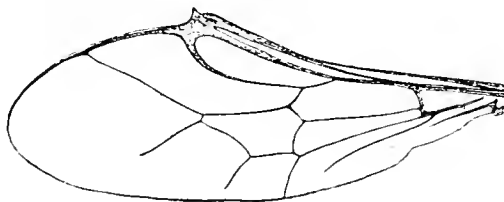
The venation of *Eulonchus* (fig. 259 B) shows but little change from *Lasia*, except that the cubital fork is less *Hermoneura*-like and is distinctly removed from the supernumerary cross-vein. In *Pteropexus* (fig. 259 C) the venation is again almost the same, but the clue is given to the venation of *Pterodontia* (fig. 260 B and C). In *Holops* (fig. 259 F) and *Cyrtus* (fig. 259 G and H) the same type of venation can easily be traced, though some veins become obsolete before reaching the wingmargin, but in *Cyrtus* the upright nature of the upper branch of the postical vein becomes instructive as to future developments. *Megalybus* (figs. 259 D and E) exhibits an important change, but the second upper basal cell and the three veinlets from the discal cell still remain; the fork of the cubital vein has disappeared, and in fig. 259 D the third veinlet from the discal cell (and with it the closed fourth posterior cell) has apparently gone, but fig. 259 E would seem to show that this third veinlet does still exist and that it is the outward continuation of the postical vein which had disappeared* (this again may give a clue to the venation of *Oncodes* and *Acrocera*), the lower branch of the postical vein bends down into the anal vein more abruptly than in any other genus of the *Cyrtidæ*. In *Astomella* (fig. 260 A) a somewhat intermediate stage occurs in which one can now trace an unforked cubital vein, because the apparent lower branch has been accounted for in the previous genera; the closed fourth posterior cell (in this genus actually the third though apparently the fourth) remains, as well as a small cross-vein and a fully developed postical fork, but the second veinlet from the discal cell has entirely disappeared, and consequently the posterior cells are reduced in number; one difficult point becomes cleared up in this genus, as it becomes practically certain that the wide open space at the wing-tip is the first posterior cell and not a submarginal cell. The next stage comes in *Pterodontia* and shows a great change in the development of the discal vein; judging from *Pteropexus* (fig. 259 C) there can be no doubt about the radial vein which curves up into the enlargement of the costa, and then an examination of the wing of *P. analis* (fig. 260 B) shows the continued presence of the two discal cross-veins, and at the same time shows that the so-called outer upper basal cell has become merged into the discal cell, *i.e.* the upper branch of the discal vein has disappeared but the upper veinlet from the discal cell remains; the lower branch of the discal vein bends sharply downwards and (judging by *Megalybus*) receives the short upper branch of the postical vein, and then continues onwards to the wingmargin; in my opinion all this lower margin of the discal cell and the veinlet thence to the wingmargin belong to the discal vein and are not in any way a continuation of the upper branch of the postical vein; in *P. Virmondii* (fig. 260 C) the outer discal cross-vein and the upper veinlet from the discal cell disappear, and apparently there is no upper branch to the postical vein, or if there be one it is anastomosed for a short distance with the lower branch of the discal vein; in *P. analis* there are three posterior cells, but in *P. Virmondii* only two. From *Pterodontia* one passes on to *Oncodes* (fig. 260 D) because the discal cross-vein can still be traced (even though faint); the upper basal cell is much longer, so that the discal cross-vein is further from the base of the wing, and consequently the supernumerary discal cross-vein is no longer required and has disappeared; the shape of the anal cell (in *O. pallipes*) seems to indicate that *Oncodes* may be a degraded form of *Astomella*, a form in which

* This character is not constant in *Megalybus tristis*.

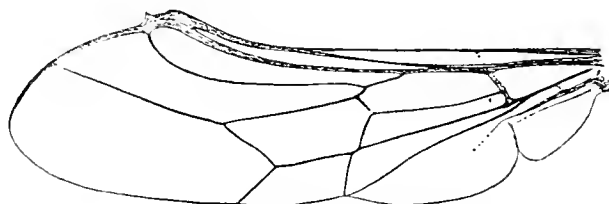
the outer cross-veins have disappeared, and in such a case the lower one of the three vague veins between the cubital vein and the lower branch of the postical vein would be the lower branch of the discal vein, and there would be three discal veinlets extending towards the posterior wingmargin, equalling *Astomella* in number though not in direction; the radial vein would however be entirely absent in



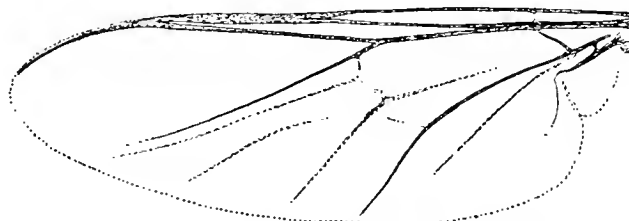
A. *Astomella Lindenii* Erichs. x 8.



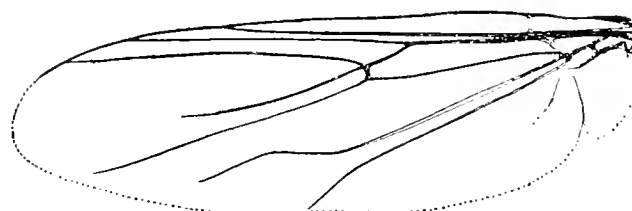
B. *Pterodontia analis* Westw. x 8.



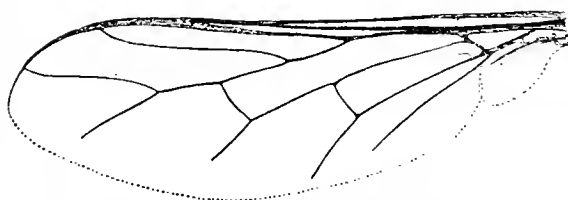
C. *Pterodonia Virmondii* Erichs. x 8.



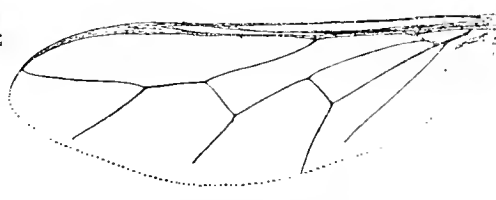
D. *Oncodes basalis* Walk. x 9.



E. *Philopota conica* Wied. x 9.



F. *Acrocera sanguinea* Meig. x 10.



G. *Acrocera globulus* Panz. x 10.

FIG. 20.—Types of venation in *Cyrtidæ*.

Oncodes, but this is proved to be of only specific value in *Acrocera*; I have not full confidence in my interpretation of the venation in *Oncodes*, and my doubt infinitely increases in *Acrocera*. *Philopota* (fig. 260 E) shows the mediastinal, sub-costal, and cubital veins clearly defined, but the next (incomplete) vein may be the upper branch of the discal, and in such case the discal cross-vein is absent, but below that there comes the almost complete second branch of the discal vein,

followed by the unforked postical and anal veins, and the apparent cross-vein will be (as in *Acrocera*) the beginning of the upper branch of the discal vein, and there are two rather undefined basal cells. Lastly in *Acrocera* (figs. 260 F and G) the venation is reduced and transposed in an extraordinary manner; the origin of the subcostal, discal, and postical veins can be clearly traced, but their subsequent developments are almost unintelligible because of the numerous suppressions of long veins and cross-veins; one is bound to suppose that the præfurca emerges from the subcostal vein, and if so a radial vein can be identified in *A. sanguinea* (fig. 260 F) though not in *A. globulus* (fig. 260 G); I feel convinced that the wide open fork which includes the wing-tip is composed of a simple cubital vein in the upper branch, and a continuation of the discal vein (almost as in *Pterodontia analis*) after sundry anastomoses as the lower branch, so that the fork-cell is a posterior cell and not a submarginal cell; then I am convinced that there is no discal cross-vein, but that the almost upright vein just after the middle of the wing is a portion of the discal vein (as in *Pterodontia*); again I am convinced that the almost upright vein connecting the discal with the postical vein is the upper branch of the postical, so that I make out that *A. sanguinea* has one submarginal cell, but *A. globulus* none at all, but that both have three posterior cells; in fact it seems probable that *Acrocera sanguinea* has a venation equivalent to *Pterodontia analis* if (1) the outer part of the discal vein in the latter anastomosed for a considerable distance with the simple cubital vein, (2) that the discal cross-vein were entirely absent so that it enabled (3) the discal vein to run in a straight line from its base to the wingmargin (except for its upward fork).

The suggestion that the venation of *Oncodes* is a degraded form of *Astomella*, and *Acrocera* of *Pterodontia*, is somewhat confirmed by the presence of all four genera in the Palæarctic region.

Two features in the venation are somewhat characteristic of the *Stratiomyidae*, viz., the sometimes absent Ambient Vein and the Præfurca originating almost opposite the base of the discal cell, but these peculiarities cannot show any affinity between the two families even with the additional peculiarity of the woolly haired thoracal squamæ.

Table of the Palæarctic Subfamilies and Genera of CYRTIDÆ.

- 1 (2) Prothoracic plates so strongly developed that they unite dorsally and form a large shield between the mesonotum and the neck.

PHILOPOTINÆ (p. 456).

Discal cell absent; anal cell open (fig. 260 E).

PHILOPOTA.

- 2 (1) Prothoracic plates not conspicuously developed.

- 3 (4) Third antennal joint long and strap-shaped, bent down and without any trace of an apical bristle or style (fig. 261).

PANOPINÆ (p. 456).

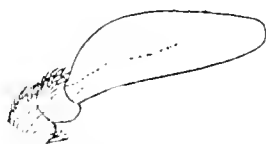


FIG. 261.—*Astomella Lindenii*. × 22.

Antennæ obviously three-jointed. Venation (fig. 260A) moderately complete; upper basal cell divided into two cells; posterior cells four (counting the open space including the wing-tip as a posterior cell), third (normal fourth) sometimes closed; anal cell closed; small cross-vein sometimes present.

ASTOMELLA.

- 4 (3) Third antennal joint usually short and always with an apical bristle or hair-like rays (fig. 262).

CYRTINÆ (p. 457).

- 5 (6) Proboscis elongate and very thin.

Eyes hairy. Venation moderately complete; anal cell closed; small cross-vein absent (fig. 259 G).

CYRTUS.

- 6 (5) Proboscis very short or absent.
 7 (8) Antennæ ending in three thin rays, or with a long thin terminal process emitting three hair-like rays (fig. 262). Costa near the end of the subcostal vein, with a hump bearing a small tooth-like projection near the end (fig. 260 B and C).

PTERODONTIA.

- 8 (7) Antennæ ending in a long arista (figs. 263, 265). Costa not humped.

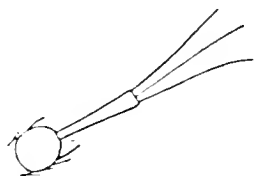


FIG. 262.—*Pterodontia analis*. × 50.

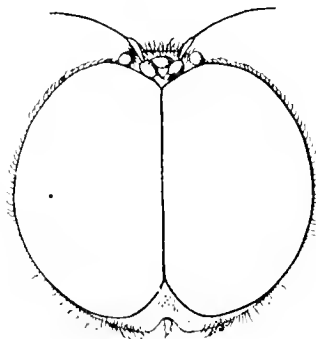


FIG. 263.—*Acrocera globulus* ♂. × 33.

- 9 (12) Antennæ placed at the top of the head near the ocelli (fig. 263). Proboscis short and stumpy.
 10 (11) Eyes hairy. Discal cell complete with apparently three complete veinlets issuing from it; anal cell closed (fig. 264). OPSEBIUS.

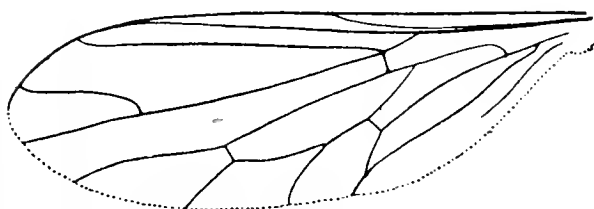


FIG. 264.—*Opsebius inflatus* ♀. (After Loew.)

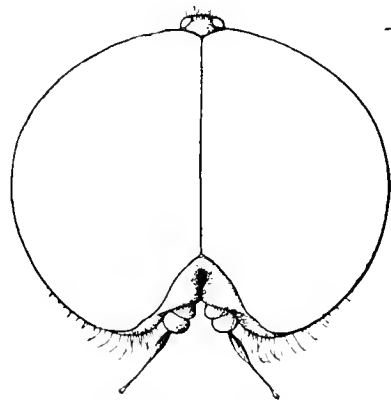


FIG. 265.—*Oncodes gibbosus* ♂. × 27.

- 11 (10) Eyes bare. Discal cell absent, and apparently only one discal veinlet to the posterior margin (fig. 260 G); anal cell open.

1. ACROCERA.

Radial vein present (fig. 260 F).—*Acrocera*.

Radial vein absent (fig. 260 G).—*Paracrocera*.

- 12 (9) Antennæ placed at the bottom of the head near the mouth (fig. 265). Proboscis entirely absent. Three incomplete discal veinlets extended towards the wingmargin (fig. 260 D).

2. ONCODES.

PHILOPOTINÆ.

Prothorax very strongly developed so that the side-plates join dorsally and form a remarkable shield in front of the mesonotum.

Mesonotum exceedingly humped anteriorly so that the head is very much depressed and the abdomen bent downwards more than in the other subfamilies. Proboscis long or short. Venation very imperfect (fig. 260 E).

The essential character of this subfamily lies in the remarkable dorsal development of the prothorax, and as a somewhat similar development characterises the *Toxophorinæ* in the *Bombylidæ* (which also have the drooping abdomen) it may be worth testing whether any closer relationship exists between these insects.

The *Philopotinæ* are represented in the Palæarctic region by only one species, *Philopota murina* Loew, which is confined to Greece and Asia Minor.

PANOPINÆ.

Prothorax not forming a dorsal shield in front of the mesonotum. Third joint of the antennæ long and strap-shaped, and without any apical style or arista.

The characters given above are those which limit this subfamily. The venation gives the basal and discal cells rather well defined (fig. 260 A).

The *Panopinæ* in Kertész's Katalog der Paläarktischen Dipt. included three genera and seven species, but I feel convinced that there should be only one genus and one species. *Pterodontia* is better placed in the *Cyrtinæ*; *Physegaster* is apparently identical with *Astomella*, and I possess a specimen of *A. Lindenii* from Greece with the third posterior cell just as incomplete as in Macquart's figure of *Physegaster maculata*; the specimens of *Astomella* seem to have the dark abdominal markings very variable or even absent, and an examination of the original types of Westwood's *A. apiformis* and *A. bombiformis* (two most inappropriate names) has convinced me that they are only the sexes of a large *Astomella*; *A. Lindenii* is said to differ from *A. curviventris* by its larger size, but many species of *Cyrtidæ* vary exceedingly in size. On the whole I have come to the conclusion that all the specimens recorded from Spain and Portugal to Syria and Algeria belong to *A. curviventris* Duf.

CYRTINÆ.

Prothorax not forming a dorsal shield in front of the mesonotum. Third joint of the antennæ (usually?) short and with an apical arista (figs. 263, 265) or hair-like rays (fig. 262).

No other characters have been recorded as distinctive of this subfamily, but *Pterodontia* has been sometimes included in the *Panopinae*; I consider however that the structure of its antennæ accords better with the *Cyrtinæ*, and its venation is also more in accord.

The *Cyrtinæ* (with the inclusion of *Pterodontia*) in Kertesz's Katalog include five genera and thirty-one species, but, while all the genera are distinct, it is probable that at least fifteen of the so-called species are synonyms or varieties. Only *Oncodes* and *Acrocera* have been recorded away from the Mediterranean region, and of the two genera three species are known to occur in the southern half of England, though it is probable that one or two more may still be found.

1. ACROCERA.

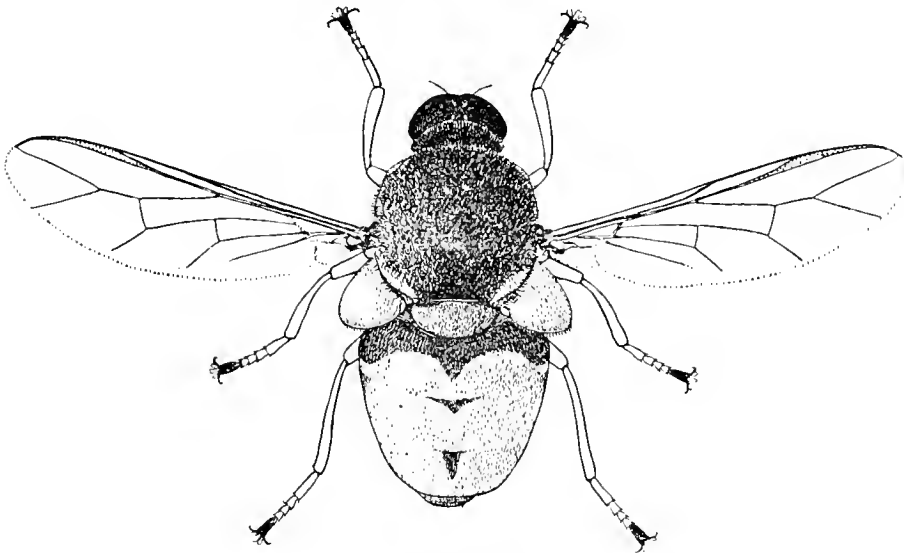


FIG. 266.—*Acrocera globulus* ♂. × 10.

Acrocera Meigen, Illig. Mag., ii., 266 (1803).

Antennæ placed at the extreme top of the head, ending in a long thin arista. Venation very much reduced. Proboscis absent, or very short and stumpy.

Head of the male larger than that of the female, almost all eyes except for the rather large broad triangular vertical space, the tiny mouth part, and the inflated back of the head; head broad ovate when seen from above, but circular when seen from in front; mouth parts very small and almost at the bottom of the head; proboscis short and withdrawn; back of the head rather inflated but close to the thorax and consequently the neck barely visible; ocelli three. Eyes bare, touching beneath the antennæ quite down to the tiny mouth part. Antennæ inserted in the front part of the vertical triangle, apparently two-jointed because the basal joint is concealed; next joint apparently orbicular, and the last joint long ovate with a long thin apical arista.

Thorax strongly arched, with none of the calli very prominent (unless from colour) though the postalar calli are large and conspicuous; pubescence abundant, adpressed and coarse. Scutellum shorter than in *Oncodes*, and with hardly any flat disc.

Abdomen inflated oval, conico-globular, with five obvious segments; pubescence very short and adpressed. Genitalia of the male more dilated than in *Oncodes*.

Legs rather short and stout, quite simple and without any spurs or processes; tarsi as in *Oncodes* but the claws even longer, and the pulvilli shorter and more pad-like.

Wings shorter and smaller in the male than in the female; venation (fig. 266) very difficult to homologise, but with a simple (mediastinal) vein near the costa, then a long (subcostal) vein from which the præfurca issues before the middle of the wing; a radial vein may arise from the præfurca (fig. 260 F), or may be vaguely indicated (fig. 267), or may be quite absent (fig. 266); a wide open fork includes the tip of the wing, of which the upper branch is probably the end piece of the cubital vein, and the lower branch an end piece of the discal vein; below this come two simple long veins (lower branch of discal and postical), and these long veins are connected by one conspicuous rather long apparent cross-vein between the cubital and discal and another between the discal and postical, and the venation ends with a straight simple anal vein; there is no trace of a discal cell; the posterior veins hardly reach the wingmargin; posterior cells three if the cell which includes the wing-tip be one; alulæ large. Squamæ (thoracal) exceedingly large, of apparently thinner texture than in *Oncodes*, and without any long woolly pubescence on the surface; alar squamæ small. Halteres completely covered by the squamæ.

This genus is easily distinguished from *Oncodes* by the vertical position of the antennæ and by the venation; no other genus of *Cyrtidæ* can possibly be confounded with it. The larvæ are parasitic on spiders (*Tegenaria agilis*, etc.).

Acrocera is represented in Europe by about five fairly well distinguished species (of which two have only recently been described by Pokorny), though several more names occur in the list; the species have not been well distinguished (as is the case in many genera of *Cyrtidæ*) because in so many cases they are imperfectly known. *A. globulus* is the only well-known one with the venation as in fig. 266, and therefore should be easily recognised. Nine species are recorded from N. America, but I have not noticed any other records.

Synonymy.—Mik endeavoured in 1886 (Wien. ent. Zeit., v., 276) to separate *Acrocera* into two genera, founded on the presence or absence of a radial vein, and gave the name of *Paracrocera* to the group in which the radial vein was absent. Osten Sacken (Berl. ent. Zeitschr., xl., 323) has shown that Mik was both hasty and careless in this action; hasty, inasmuch as specimens of *Acrocera* occur in which the radial vein is represented by a basal stump or by an incomplete end without any base (fig. 267); careless, inasmuch as he founded *Paracrocera* mainly on *A. globulus* which was the only species known when Meigen founded the genus *Acrocera*, and which must therefore under any circumstances retain the name of *Acrocera* and be its typical species.

1. *A. globulus* Panzer. Wings hyaline; radial vein obsolete. Legs yellow with the tip of the tarsi black. (Fig. 267.)

A small almost globular fly; very distinct from any other British species except *Oncodes*, in which the venation of the wings is very distinct and the antennæ are quite differently placed.

- ♂. Head (fig. 263) nearly globular, but when viewed sideways deeper than broad; back of the head inflated from top to bottom, and the inflation continued under the eyes to the face. Face (if the small triangular space between the lower parts of the eyes may be so denominated) dull black and bare, with a conspicuous central furrow ending below in a small circular pit which represents the mouth opening; the puffed-out back of the head begins close to this, but the inflation is rather less on the upper third than on the other part; this back of the head bears fairly conspicuous yellowish grey rather recumbent pubescence; vertical space somewhat triangular, and by no means small as it has to accommodate the small antennæ and the three ocelli of which the upper two are widely separated. Eyes enormous, quite bare; facets all equal. Antennæ brown, very small and closely approximate at the base; basal joint concealed, second apparently orbicular, third long and narrowly ovate, with a long apical arista which is about four times as long as the antennæ.

Thorax black, obscured by very densely crowded punctuation and by abundant short close pubescence, the latter being mostly tawny but greyer on the sides and front part; humeral swelling large, whitish yellow, extending nearly half-way to the wing-base; postalar calli bone-white, narrow near the wing and gradually widening towards the scutellum until they enclose all the sides of the base of scutellum; mesopleuræ similar in texture and pubescence to the sides of the thorax, but the sternopleuræ and the rest almost bare; the sternopleuræ may have along their upper margin a long irregular yellowish spot which bears a short close yellow down. Scutellum orange, with triangular black corner spots which occupy most of the lateral (not dorsal) margins and extend a little on to the disc; pubescence similar to that on the thorax but shorter and more erect.

Abdomen almost globular, humped, and most so at about the end of the second segment but then curving down on the upper side to the moderately pointed end; when viewed from above the four basal segments form an almost true sphere, with the fifth segment about half as long as each of the three preceding ones and rapidly narrowing; beyond this the genitalia extend and are about half as long and half as wide as the fifth segment. The abdomen is mainly bone-white or yellowish or even orange, with rather variable black markings, which usually cover the middle of the almost concealed basal segment, all the basal half of the second segment with three projections extending downwards, of which the middle one is almost always obvious but does not nearly reach the hindmargin while the lateral ones are less constant and when present are well away from the sidemargins and may extend right across to the hindmargin; the black base of this second segment widens towards the sides until at the actual sidemargins it often occupies the whole of the segment except for the extreme white hindmargin; third segment with a small black middle basal spot, and with a conspicuous black transverse spot at each side which occupies about one-third the depth of the segment, beginning on the foremargin opposite where the lateral extensions of the black band on the second segment should be and sloping downwards on its lower side until at the actual sidemargin it occupies all the segment except the white hindmarginal hem as on the second segment; the fourth segment sometimes has an indication of the middle basal spot, but always has a triangular black spot at each side which occupies all the sidemargin and a part of the foremargin; the fifth segment has similar but more restricted side-spots; pubescence all over very short and depressed, pale yellow, abundant but inconspicuous. Belly black, with the hindmargins of the second and third segments often conspicuously whitish yellow for about one-third of each segment, but on the fourth segment the pale hindmargin is narrower especially towards the sides, and sometimes all the pale hindmargins are vague; pubescence all over pale yellow, very short and recumbent. Genitalia globular, conspicuous, darker orange, and almost bare.

Legs, including the coxæ and trochanters, pale yellow with an inconspicuous darkened streak along the front of all the femora, and with the tarsi conspicuously black on the apical half of the last joint; tibiæ especially the hind pair slightly dilated towards the end. Claws long and black; pulvilli

pale yellow, long and conspicuous. Pubescence pale yellow and very minute all over, with a slight tendency to a short fringe behind the posterior femora.

Wings hyaline with a faint yellowish tinge; veins darkened and rather distinctly defined, though the lower ones hardly reach the margin; subcostal vein thickened, darkened, and almost reaching the wing-tip; radial vein obsolete, or almost so, though occasionally there are vague indications of it or even a detached piece existing (fig. 267). Thoracal squamæ very large, obscurely vitreous, bare (except microscopically) but with short pale yellow fringes and a narrow glistening whitish margin; alar squamæ small, whitish glassy. Halteres clear yellow, knob rather large.

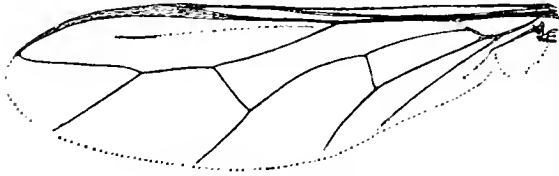


FIG. 267.—*Acrocera globulus* ♂. var. × 14.

♀. Not unlike the male, but with the usual sexual distinctions.

Head smaller than in the male.

Thorax with shorter and greyer pubescence. Scutellum all black, but usually with a brownish tinge which becomes more obvious on the underside.

Abdomen in mature specimens shining black with a brownish tinge; second segment with a pair of long narrow well-separated inconspicuously luteous spots on the hindmargin; third segment with a pair of large obscurely bone-white spots on the hindmargin which unite and form a large spot occupying more than half the depth of the segment but emarginate anteriorly at the middle and shelved off at the sides and not nearly reaching the sidemargins; fourth segment all obscure bone-white except on the blackish foremargin; all these markings are however very seldom well defined, and in obscure specimens little can be clearly noted except perhaps very narrow pale hindmarginal seams on the third and fourth segments and the pale sides of the second segment; the dorsal plate of the fifth segment overlaps considerably on to the ventral segments. Ovipositor short and thick, but conspicuous and ending in a pair of oblong lamellæ.

Legs brownish yellow, with the black tips of the tarsi less determinate and less conspicuous.

Wings longer, more hyaline, and with the subcostal vein less darkened.

Length about 4 mm., but variable from 3.5 to 4.5 mm.

This species has no well-recognised close ally in Europe, as it is almost certain that both *A. orbiculus* Fabr. and *A. tumida* Erichs. are synonyms; at any rate no good comparative distinctions have been pointed out up to the present. *A. lata* Gerst. from Sardinia is but very little known (only three specimens having been recorded) but apparently has the abdomen entirely orange except for a round black spot on the second segment. *A. borealis* Zett., of which one specimen of uncertain sex was taken in Lapland in July 1832, is probably only a dark variety of *A. globulus*; all the other known European species of *Acrocera* have the radial vein obvious.

A. globulus is a species very little known to me in a living state, though I believe it is not uncommon in England and sometimes has occurred in great abundance. Dr D. Sharp has informed me that at Milford in the New Forest it occurred in such numbers at a school outing as to be a nuisance to the children through getting into their eyes, and Schiner states that at Trieste they hovered in the shelter of his cap like *Anthomyia* and were scarcely to be kept off. I have records from Dorset (Parley Common, Glanville's Wootton) Somerset (Shepton Montague), Hampshire (Lyndhurst, Woolmer Forest, Milford), Surrey (Albury, Wimbledon), Middlesex (Esher, Woking), Sussex (Heathfield), Suffolk (Tuddenham Fen), Lincolnshire (Scotton), Gloucester (Forest of Dean),

Hereford (Tram Inn), and Shropshire (Wyre Forest), with dates ranging only from July 10 to August 13. All of these localities are practically in the southern part of England. The Hope Museum at Oxford has a good series but unfortunately without histories except one well-marked rather large female labelled "Donovan"; another rather large female is immature and consequently has a paler abdomen, brownish thorax, and rather brownish wings; two labels are placed in proximity to the series, a printed one bearing "*albipes* Mei." and a MS. one "*globula* x^d S." It is recorded from Northern and Middle Europe.

Synonymy.—The first intelligible description of this species was that given by Panzer in his *Fauna Germanica*, lxxxvi., 20 (1803), under the name of *Syrphus globulus*, and consequently I adopt his specific name. It may be true that Fabricius intended to indicate this species in his *Ent. Syst.*, iv., 311 (1794) under the name of *Syrphus orbiculus*, but his description is absolutely unintelligible, and so is every repetition of it until Wiedemann examined the type at Kiel and sent a more detailed description to Meigen in 1822. I consider therefore that *A. orbiculus* was not really described until 1822, and I can never support the resuscitation of an old unintelligible name identifiable only by reference to a type (which type may easily have been transposed or replaced by a supposed better substitute), when in the meantime an intelligible description, requiring no reference to a type, has been given. If the examination of Fabricius' type in 1822 had revealed a species unrecognised at the time of such examination and redescription a fresh description would establish the species on a sound foundation and it would not matter if the supposed Fabrician type were a changeling or whether the date of its origin was 1794 or 1822, but as a recognisable description accompanied by a name was given in 1803 that must have priority over any description of 1822. I fully recognise the law of priority for recognisable descriptions, but if it is to be enforced for unrecognisable descriptions which may subsequently be made intelligible only by a fresh description, then the sooner any attempt to make descriptions recognisable is given up the better and let us fall back upon comparisons of types alone and burn all our books. When I revived such a name as *Platychirus sticticus* Meig. I made sure that Meigen's description was one which should have been recognised if reasonable care had been exercised, but had his description been unrecognisable I should have sunk his name as a synonym of *P. spathulatus* Rond. or else have thrown it into the limbo of *nomina nuda*.

A. orbiculus (Fabr.) Wied. may therefore be considered a synonym of *A. globulus*; *A. tumida* of Erichson described in 1840 from possibly Germany has never since been recognised and has been sunk by Gerstaecker as another probable synonym. *A. borealis* Zett. described from one specimen of uncertain sex taken in Lapland in July 1822 is apparently only a dark specimen of this rather variable species, and *A. laeta* Gerst. from Sardinia rests at present rather uncertainly upon three specimens.

There might be some reasons advanced for identifying this species with *Syrphus globosus* of Fabricius (*Syst. Entom.*, 770, 1775) which was described from England, and which name is now applied to *Cistogaster globosa* (a species which is not known to occur in England), but "frons ferruginea, linea longitudinali nigra. Thorax "antice ferrugineus" and "Pedes nigri" are prohibitive as regards *Acrocera*.

2. ONCODES.

Ogcodes Latreille, *Préc. Car. Gen. Ins.*, 154 (1796).

Antennæ placed on the extreme lower part of the head, and ending in a long thin style or arista. Venation very imperfect. Proboscis absent.

Head of the male larger than that of the female, almost all eyes except for the small vertex (on which are two ocelli) and the small space at the bottom of the head on which are the antennæ and the indistinct mouth parts; frons slightly produced

below the touching part of the eyes; back of the head rather inflated in the male, but more so in the female, and crammed on to the thorax; jowls slightly inflated. Proboscis absent, the place where it should be being closed with a membrane. Eyes enormous, quite bare. Antennæ (fig. 265) apparently two-jointed, dovetailed into the face; apparent basal joint cylindrical, short and thick; apparent second joint oval, with a long apical thin style, which is dilated at its base but ends in a minute hair-like bristle.

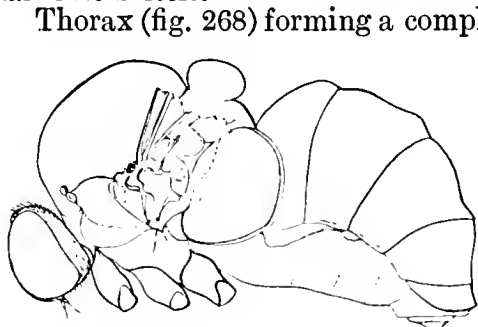


FIG. 268.—*Oncodes gibbosus* ♀. × 11.

Thorax (fig. 268) forming a complete sphere; humeral, præalar, and postalar calli large, but not very conspicuous; pubescence rather dense and soft but hardly abundant enough to be furry, and without the slightest sign of bristles or long hairs even on the postalar calli or the margin of the scutellum. Scutellum large, with a very deep rounded margin which leaves only a small portion of the disc rather flat, pubescence similar to that on the thorax; metanotum rather small.

Abdomen dorsally arched but hardly globular, short ovate with a blunt base and tip in the male, but short and round in the female,

with five obvious segments; pubescence fairly abundant. Genitalia concealed beneath the rather small fifth segment.

Legs rather short and stout, but simple and without any trace of spurs or processes; tarsi with the first and fifth joints longer than the others. Pulvilli and claws well separated from the fifth tarsal joint; claws long and thin; pulvilli in the male almost equally long and thin, but shorter and more pad-like in the female.

Wings short in the male, but larger and longer in the female; venation very imperfect; in *O. pallipes* the two large basal cells and the closed anal cell can be traced but the small cross-vein is absent; the wing-tip is clear of all venation for a very large space; radial vein absolutely absent; cubital vein sloping downwards incomplete, and not forked; discal vein indicated by three incomplete veins running towards the wingmargin long after the wing-tip. Squamæ (thoracal) enormous, depressed, and clothed all over their upper surface with not at all dense woolly pubescence; alar pair rather small but thick, clothed with only minute down. Halteres on comparatively short stems, hidden beneath the thoracal squamæ.

This genus is easily distinguished from *Aerocera* by the position of the antennæ and by the venation. The species occasionally occur in large numbers, sitting on the underside of leaves in the neighborhood of damp meadows or on dry tips of boughs; *O. varius* has occurred near Berlin about the middle of June on *Equisetum limosum*, and Gerstaecker has given (Stettin. ent. Zeit., xvi., 339, 1856) some elaborate and interesting details about finding *O. zonatus* in abundance. The larvæ are parasitic upon spiders, and full details of their early life-history and saltatory powers have been given by König (Verh. zool.-bot. Ges. Wien, xlv., 163-166, Taf. vii. 1894).

Oncodes is represented in the Palæarctic region by about six species, though thirteen names are included in Kertész's "Katalog" of which several are most probably only varieties. The better known species may be tabulated as follows:

1 (2) Wings more or less darkened.

Wings brownish on the basal half or even on the whole wing.

varius Latr.?

(*benacensis* Pok, (?) *guttatus* A. Costa, *fumatus* Erichs., *apicalis* Meig.)

2 (1) Wings not at all darkened.

3 (4) Squamæ with pale margins.

1 *gibbosus* L.

- 4 (3) Squamæ with blackened margins.
 5 (6) Femora black at the base. *zonatus* Erichs.
 6 (5) Femora all yellow (or at least all one colour).
 7 (8) Blackish species. *2 pallipes* Latr.
 (*nigripes* Zett.?)
formosus Loew.
 8 (7) Yellow species.

O. etruscus Griff. is probably a variety of one of these species, but it is at present difficult to say which; it has the wings brownish tinged, and the femora black at the extreme base.

O. pubescens Latr. "Pattes blanchâtres" was queried by Latreille himself as a synonym of "*Syrphus orbiculus* Fab.," which in turn is almost certainly a synonym of *Acroceera globulus*.

O. nigripes Zett. according to a female in Kowarz's collection from Pontresina may be distinct, as it has the frons conspicuously covered with pale down and the thorax more coarsely punctate; legs black with just the tip of the femora yellow, tibiæ brown or dark brown; and the squamæ whitish with the margin blackish in front but light brown behind.

The genus is represented by about ten species from North and Central America, one from South Africa, one from South Asia, and about six from Australia and New Zealand.

1. *O. gibbosus* Linné. Squamæ bone-white, with hardly darker margins. Halteres orange or brownish. Wings with the foremarginal veins pale yellowish, but with no dark clouding. Femora mainly black.

A remarkably gibbous fly, with bone-white markings on the abdomen which are restricted in the female to the narrow hindmargins of the segments.

♂. Head (figs. 265, 268) small, almost globular except for being a little flattened behind and beneath. The enormous eyes occupy almost the whole head except the vertex and the small concealed face; face and frons almost on the underside of the head and forming a nearly equilateral triangle of which the dull velvety frons occupies the upper half, but sometimes the frons is dull black with slight grey tomentum; frons quite bare and with slightly raised margins which slope gradually down inwards so as to leave a broad middle channel. Face very short, dull brown, extending down the sides of the mouth; jowls small but distinct, deep black and bearing some fine pubescence on the back part; lower part of the sides of the mouth also deep black and not quite bare; back of the head dull blackish, narrow but visible all the way up, and bearing inconspicuous brownish or yellowish brown pubescence; ocellar space raised, shining black, with two gleaming red ocelli. Eyes enormous, quite bare; facets all equal, but a channel runs from the back part about half-way across the middle of the eye. Antennæ blackish brown, very small and short; basal joint so minute that the antennæ have often been called two-jointed; third joint distinctly transverse and bearing a subterminal arista; arista swollen and polished black at the base but becoming thinner (though not very thin) and brown or even pale brown and appearing to be thicker near its end than just after about its base, while the actual tip bears a minute apical bristle; arista longer than the antennæ.

Thorax shining black with a slight brownish æneous tinge, and clothed with rather thick brownish yellow, greyish yellow, or greyish pubescence which slightly obscures the ground colour; this pubescence is rather depressed

and becomes greyer about the postalar calli, and on the back part, and especially on the scutellum where it is rather more erect. Pleuræ bare on the lower part, brilliantly shining down the middle part but slightly obscured by grey dust in front and behind.

Abdomen shining black, rather shallowly and not conspicuously punctulate, the punctuation becoming scarcer and vague on the last three segments. All the segments after the basal one have a rather broad bone-white hindmargin which scarcely reaches the sidemargins, and on the second and third segments this bone-white hindmargin is a little narrowed about the middle; above these hindmargins there is a considerable but varying amount of bone-white coloring which is caused by a widening upwards of the hindmarginal colour on to the disc of the segments between the middle and the sides, sometimes in the form of long transverse spots scarcely connected with the bone-white hindmargin but separated from it on the second segment by a slight black line and on the third segment by a depressed line, while more commonly it appears as about doubling the width of the bone-white hindmargin for about the same space, or in the whitest forms the extreme foremargins of the third and fourth segments and sometimes of the fifth bear on each side a long transverse luteous spot which may amalgamate with the extended white coloring; the bone-white hindmargin of the third segment is usually rather wider than that of the second and, without its widening, occupies about one-third of the segment; on the fourth segment the whitish hindmargin occupies fully half the segment and usually forms a broad well-defined band, but sometimes its upper margin is irregular about the middle; on the fifth segment (the last apparent segment) all the hindmargin quite to the sidemargins is bone-white and occupies about half or more of the segment, but the fore-edge of this white marking (while usually straight) may have a shallow emargination on each side of the middle; sixth segment small, concealed under the fifth segment, with its basal half black and its end half bone-white; sometimes even the basal segment has a narrow bone-white hindmargin. The whitest specimen I have seen has the abdomen bone-white, with the small basal segment and three subquadrate dorsal spots black, and this is caused by the bone-white coloring extending up from the hindmargins until it meets the two luteous transverse spots along the foremargins, whereby the second segment is left with a subquadrate black spot on its middle which at its widest part is less than one-third the width of the segment and is narrowest at its fore part but gradually widens downwards and at the middle of its slightly arched hind part extends up to the bone-white hindmargin; the third segment has a similar spot (larger but not so large in comparison with the size of the segment) occupying about one-third the width of the segment and not sharply defined against the foremargin but at its hindmargin fully one-third of the segment away from the bone-white hindmargin except for a slight prolongation just at its middle; the fourth segment has a shallow transverse black spot along its foremargin which occupies hardly more than one-third the depth of the segment and which dies away at the side sixth; the fifth segment has a black foremargin with two very shallow indistinct long luteous transverse markings against the absolute foremargin but otherwise nearly equal all across the segment; the sixth segment has a sharply defined black basal line which occupies nearly half the segment; the foremargins of the third and fourth segments outside the black spots are rather luteous. Occasionally the bone-white hindmargin of the second segment is so much narrowed about the middle as to be interrupted, while that on the third segment is reduced to a fine line. When viewed sideways the lower margin of the dorsal plate is all black except very narrowly at the hindmarginal corners, while the outer margin of the ventral plate is all bone-white. As a rule the larger the specimen the more extended is the white coloring on the abdomen. Pubescence greyish yellow or pale yellow, ubiquitous but depressed and inconspicuous, not at all long, rather scarce and slight and whitish on the last three segments. Belly nearly bare, all six segments well visible, rather brightly shining, nearly all bone-white except at the black base and tip and on the broadish black often interrupted line running down near (but not close to) the sides and often not extended to the end segments, but often the foremargin of each segment rather narrowly and irregularly blackish,

while other obscure markings may be present ; sometimes the hindmargins of the segments may be obscurely darkened, possibly through the concealed black foremargins of segments showing translucently through the hindmargin of the previous segment. Genitalia in large specimens fairly conspicuous, bearing greyish yellow pubescence all over, black at the base, then followed by a pair of approximated dark tawny or orange triangular lamellæ above and a thin projecting dark tawny middle piece.

Legs shining black on the coxæ and trochanters and basal three-fourths or more of the femora, but after that dull orange or brownish or bright red brown, or even dark brown on the hind pair, while the knee joints are narrowly darkened on at least the base of the tibiæ, and the tarsi are more or less darkened dorsally after the basal joint though sometimes not until the fourth or even last joint ; joints of the coxæ and trochanters rather brownish ; large specimens have a tendency towards less blackened front femora and darker hind tibiæ ; anterior femora slightly dilated about the middle and the hind femora after the middle, all being rather rugose perpendicularly ; tibiæ stout and nearly straight, slightly larger at the tip than at the base ; tarsi thinner than the tibiæ, and the joints in relative length being 51234, the fifth joint being rather stout and strong and slightly shorter than the first, with the others gradually decreasing in length ; claws and pulvilli long, entirely projecting beyond the fifth joint ; claws black, curved, dilated at the base ; pulvilli three, the middle one being slightly shorter than the other two, all brown. Pubescence on the femora nearly equal all over, pale but inconspicuous ; on the tibiæ and tarsi short and closely adpressed all over, pale and fairly abundant but very inconspicuous because so short and adpressed ; there is no sign of any bristles, long hairs, or spurs.

Wings quite hyaline, except that the veins on the foremargin are pale yellowish down to the base of the cubital vein and the basal third of the postical vein is pale yellow ; costal vein extending almost to the tip of the wing ; extreme base of the costal and subcostal veins blackish and slightly swollen, while the base of the costa bears slight pale pubescence ; postical vein only faintly forked towards the discal vein ; sometimes the wings have a faint brownish tinge. Squamæ (thoracal) enormous, resembling roughened glass in colour, but usually with a pale yellowish margin, and the whole disc bearing an abundant almost dense though inconspicuous whitish pubescence which is as long as the marginal fringe ; sometimes these squamæ appear to have a thickened margin with a slight darkening all round just before the margin, while at other times the margin is as vitreous as the disc ; alar squamæ small, inconspicuous, glassy whitish. Halteres rather small, completely covered by the thoracal squamæ, bright orange or orange brown or brown.

- ♀. Exceedingly like the male, but the bone-white markings on the abdomen reduced to narrow lines on the hindmargins of the segments.

Head distinctly smaller.

Thorax with shorter and less abundant pubescence, less punctulate and consequently much more shining black ; humeri and postalar calli brownish.

Abdomen shining black, less punctulate and consequently more shining, with narrow bone-white hindmargins of segments which occupy about one-sixth of each segment but which hardly reach to the sidemargins of the basal segments until the sixth segment which is half bone-white ; a very short rather narrower seventh segment is often visible and is black on its basal half but bone-white on its apical half, and after this appears a still narrower all blackish eighth segment (= base of ovipositor?), which is followed by a thick short ovipositor ; sometimes the bone-white bands on the fourth and fifth segments are broader and occupy a quarter of the fourth segment and a third of the fifth segment. Belly bone-white with the base and tip black ; incisures darkened narrowly at the middle, but more widely towards the sides.

Legs less distinctly black, the front femora having only about the basal quarter quite black and the next third obscurely brownish.

Wings larger and conspicuously longer, paler, and with the blackened base

of the costal and subcostal veins less distinct. Squamæ whiter. Halteres orange.

Length about 4.5 mm. but very variable in size in both sexes (3.5 to 5.5 mm.), some specimens being three or four times as large as others.

This species varies considerably in size in both sexes but especially in the male, and in the extent of the bone-white bands or markings. It is easily distinguished from its allies by the pale glassy squamæ which have no dark margins, by the partially black femora, and by the absence of any darkening on the wings.

O. gibbosus seems to be a fairly common New Forest fly in June and July, as I have taken it there myself hovering or floating high up in the air, and I have seen a large number of specimens from there; I have also seen specimens from Herefordshire taken by Colonel Yerbury in the Golden Valley and by Dr J. H. Wood at Woolhope. Mr Claude Morley has recorded it from Barnby Broad in Suffolk, and there is a male in the Hope Museum at Oxford labelled as from Richmond Park on July 4, 1835. Curtis said that it was taken "in May and June on Wimbledon Common, "and in Coombe Wood," while he said of his *Henops marginatus* (which was almost certainly the female of *O. gibbosus*) from the New Forest, "My specimens I purchased of the late Mr Joseph Standish, who beat them out of old white thorn bushes that were covered with lichen, the end of June and beginning of July. They were so sluggish in the net that they laid with their wings closed, which made it difficult to detect them; and the least pressure destroyed the rotundity of their bodies, which are very thin, and with the large wings and scales appear to be well adapted to enable the insect to float like a balloon in the air, subject to the influence of any current that may prevail." The few certain dates that I know range only from June 26 to August 5, and I may note that all the males were taken in June or July but all the females in August. The remarkable fact recorded (Entom. Month. Mag., xxxviii., 205, 1902) by Rev. H. S. Gorham as to the storing of upwards of fifty specimens of this fly in a hollow thistle (*Cnicus palustris*) stem by *Crabro interruptus* at Emery Down in the New Forest shows that the species must be common or at least locally abundant, and his statement that there is a mimicry between them and the spider they prey upon makes a closer study of their habits most desirable. It is recorded from Central and Northern Europe.

Synonymy.—It is almost certain that Curtis' figure and description of *Henops marginatus* refer to this species, as his statement "Legs dull ferruginous, fuscous towards their base" could not apply to *O. pallipes*, and I am confirmed in this opinion by a female in the Hope collection at Oxford labelled "*marginatus*."

2. *O. pallipes* Latreille. Squamæ smoky, with blackish margins. Halteres black. Wings with the foremarginal veins blackish, but with no dark clouding. Legs entirely pale luteous.

Very much like *O. gibbosus*, but easily recognised by the diagnostic characters.

♂. Longer in proportion to its width and less bladder-shaped than *O. gibbosus*. Head almost as in *O. gibbosus*. Eyes with the dividing line running from the back across the middle almost absent, though some irregular facets show where it might be.

Thorax rather densely punctate, clothed with conspicuous denser and much longer pubescence than *O. gibbosus*, and this pubescence is more brownish yellow or brownish and obscures the ground colour more, and is also more erect and more entirely of one colour.

Abdomen mainly dull (or sometimes obscurely) luteous, with large black dorsal spots and with narrow yellow hindmargins to the segments; narrower than in *O. gibbosus*, being conspicuously longer in proportion to its width and consequently much less globular, and also much less bladder-shaped when viewed sideways because the belly is flatter; hindmargins of the second to fifth segments narrowly clear pale yellowish, but otherwise an obscure luteous or brownish luteous colour spreads over all the abdomen except on the large black dorsal spots, and inconspicuously on the lateral spots; the large black dorsal spots are subquadrate and are placed against the foremargin of each segment, that on the second segment being the widest and reaching downwards to the pale hindmargin but rather undefined and occupying fully three-fifths of the width of the segment or sometimes even too undefined for accurate measurement; the spot on the third segment is better defined and occupies about the middle half of the segment and though slightly produced behind about the middle is still not quite extended to the yellowish hindmargin; the spot on the fourth segment is similar, but is slightly less wide and only extends down about two-thirds of the segment and is consequently well separated by luteous coloring from the narrow yellowish hindmargin; on the fifth segment there is a smaller less defined spot, which occupies about the middle third of the foremargin and extends only about a third down the segment, though sometimes this spot is too undefined for accurate measurement; the sixth segment appears to be all black, but has a narrow obscure luteous hindmargin or tip and also very vague luteous tinges on its middle; viewed sideways the lateral margins of the dorsal plate are not narrowly though sometimes rather indefinitely black, but distinctly more narrowly so on the fifth segment and not extending to the end of that segment. Pubescence long erect and rather abundant but not very conspicuous, greyish brown on the three or four basal segments but paler grey on the rest. Belly obscurely luteous brown with four pairs of large badly defined pitchy black spots placed at the basal corners of the second to fifth segments, and with conspicuous rather wide whitish hindmargins to those same four segments, the sixth segment being black on the basal half and luteous on the apical half; belly by no means bare but with only inconspicuous thin light grey pubescence.

Legs pale luteous or almost yellow from the extreme base of the femora to the last joint of the tarsi, and even the claws luteous with curved black tips; coxæ and trochanters shining black but rather obscured by the longish pale pubescence; knee joints darkened, but hardly at the base of the tibiæ. Pubescence on the femora pale yellow rather abundant and long all over, and not quite so much adpressed on the tibiæ and tarsi as in *O. gibbosus*.

Wings hyaline, but the foremarginal veins smoky; venation more complete than in *O. gibbosus*; costal vein thin and dark nearly up to the end of the mediastinal vein, then thickened and dirty yellowish until the end of the subcostal, then again often more conspicuously black on the thickened costal margin, but fading away just before the tip of the wing; mediastinal and subcostal veins brownish yellow; cubital vein becoming pale before the wingmargin; even the postical vein yellowish, and its upper branch across to the discal vein usually visible though sometimes very faint and not quite reaching the discal vein; base of the wing rather blackish; lower basal cell and anal cell usually complete or almost so, the latter being closed. Squamæ (thoracal) smoky (in some lights blackish) vitreous, roughened, with a distinct well defined blackish margin, and with long greyish white pubescence all over the disc and on the margin; alar squamæ small, paler, and without any pubescence but with minute down on the disc and margin. Halteres with dull black knobs and obscure stems.

- ♀. As usual in this genus the head is smaller and the wings are longer than in the male. Pubescence shorter than in the male, but much longer, darker, and more erect than in *O. gibbosus*.

Thorax less punctulate, and consequently more shining than in the male; humeri and postalar calli very slightly brownish.

Abdomen with the pale hindmargins of segments narrower and straighter because the abdomen is so much less balloon-shaped; in a small brightly shining (possibly immature) specimen from Wells the abdomen has inconspicuous obscurely defined dark luteous markings against the pale hindmargins on the second to fourth segments, and the fifth segment has inconspicuous similar but more extended markings. Belly with only the hindmargins of the fourth to sixth segments rather broadly white, as well as just the middle of the hindmargin of the third segment.

Legs in the specimen from Tram Inn more obscurely luteous than in the male, but in the specimen from Wells clear pale yellow.

Wings as in the male, but in the specimen from Wells (possibly immature) less dark about the foremarginal veins though still with a blackish tinge.

Length about 5.5 mm.

This species may be easily distinguished from *O. gibbosus* by the blackened margin of the thoracal squamæ, from *O. zonatus* by its entirely pale legs, and from *O. varius* by its hyaline wings. I do not know much about its variations, but Erichson stated that his two specimens had the prothoracic lobes, the postalar calli, and the scutellum, yellowish piceous, but his specimens may have been females as I have found similar traces in that sex. P. Marchal (Bull. Soc. Ent. Fr., 1899, 286) has given some details concerning the eggs and very young larvæ of this species; Giard (Bull. Soc. Ent. Fr., 1894, cliii.) once found a pupa, along side of which were the remains of a spider of the genus *Clubiona*.

O. pallipes is but little known as British, and is still less known in Central Europe where *O. zonatus* and *O. varius* are well recognised. Colonel Yerbury took two males and a female near Tram Inn on July 23, 1902, and one male at Tarrington on August 1, 1902, both these localities being in Herefordshire; he also took a male at Porthcawl in Glamorgan on July 17, 1906, and Mr C. G. Lamb took an apparently immature female at Wells in Somerset in July 1903. Dr J. H. Wood has also taken a few specimens at Tram Inn and Shobden Marsh, and there is a specimen in the Dale collection at Oxford which was taken at Glanville's Wootton in Dorset on June 23, 1888. Its distribution is not well known, but it probably occurs over most of Central Europe. It is worthy of note that Gerstaecker once sought in a known locality near Berlin for the allied *O. zonatus* on July 26 and could not find a specimen, but found it plentiful on August 3.

Synonymy.—This species appears to have been but very little known to German authors, and consequently has been very much confused by them, though most French authors appear to have known and understood it. It is practically certain that the species now described is Latreille's *H. pallipes*, of which Fallén's *H. gibbosus* and Meigen's *H. marginatus* are synonyms. I am also of opinion that Meigen's *H. limbatus* is a synonym of this (as Meigen himself suspected) and not of *O. varius* Latr., which has the wings partly brownish, while Meigen's *H. limbatus* had "flügel "glasartig." Three specimens in Bigot's collection labelled *O. pallipes* are very unsatisfactory; one very immature specimen and one very bad one have the scutellum palish at the tip, while the third is an obvious female *O. pallipes* though in very bad condition; one female in his collection labelled *O. marginatus* has the abdomen all obscurely luteous tawny with no clear dorsal spots and the hindmarginal lines inconspicuous but the last segment normally colored and the foremargin of the wing very yellowish but the squamæ obviously darkly margined.

O. zonatus is a very probable British species and is closely allied to

O. pallipes, but has the thorax rather densely punctate and bearing longer more erect pubescence than in *O. gibbosus*, though this pubescence is pale grey as in that species, and not so long, erect, or abundant as in *O. pallipes*; abdomen clear black with conspicuous bone-white bands on the hindmargins of the second to sixth segments, usually widest at the middle on the third and fourth segments, and with a slight similar band on the fifth; belly white, with an entire black band near the base and with triangular black spots down the sides; femora black at the base, becoming bright brown about the middle and orange on the apical quarter; tibiæ darkened anteriorly and dorsally except at the tip; hind tibiæ slightly curved; tarsi all obscured dorsally; claws black; wings with the fore-marginal veins brownish; squamæ whitish glassy, with rather broad brown (sometimes only light brown) margins; halteres with light brown knobs; polished base of the arista short. Female with the hindmargins of the abdominal segments obscure luteous; femora with the basal half or more black.

DIPTERA BRACHYCERA

TROMOPTERA

Two pad-like pulvilli only. Strong bristly hairs or even bristles usual on the thorax, and spicules or even bristles on the legs, with an apical circlet of spines on the tibiæ. Aërial flies, usually clothed with dense furry pile.

Head usually holoptic, but sometimes dichoptic in the male, and without cephalic bristles (except a pair of ocellar bristles in *Toxophora*); never sunk between the eyes on the vertex in such a way as to make the eyes appear protuberant; collar never bristly. Eyes always bare, facets all equal in size in both sexes (Conf. *Systropus*), and (as far as is known) unicolorous and not brilliantly colored in life. Antennæ with the third joint never annulated, and usually with a style or arista or pencil of hairs which when present is always terminal.

Thorax either with or without bristles, eremochætous though densely pubescent in most *Bombylidæ*, but closely allied species may have præsutural bristles or strong bristly hairs on the postalar calli, and in many genera numerous strong bristly hairs may occur on other parts until in the *Toxophorinæ* and the *Therevidæ* strong chætotactic bristles are present (figs. 294, 311), though no bristles ever occur on the pleuræ. Strong tufts of dense pubescence are almost always present on the mesopleuræ and metapleuræ, but the hypopleuræ are bare in order to allow free movement of the middle femora. Scutellum unarmed, but often with a few strong marginal bristles.

Abdomen ordinarily without any approach to bristles amongst the furry pubescence, though strong hairs may occur. Genitalia rarely at all conspicuous, but the ovipositor is sometimes (*Anthrax*, *Thereva*) provided with a circlet of spines as in some *Mydavidæ* and *Asilidæ*.

Legs usually weak and thin, only adapted for alighting; femora often with bristle-like spicules on the underside, which become strong in some species, tibiæ with minute spicules and an incomplete apical circlet of spines in the *Bombylidæ*, which develop into rows of bristles and a complete apical circlet of spines in the *Toxophorinæ* and *Therevidæ*. Pulvilli never more than two, and even these sometimes obsolete (*Anthrax*, etc.).

Wings with a venation of the ordinary type for the earlier families of the BRACHYCERA, but in the *Bombylidæ* the posterior cells are never more than four in number and the small cross-vein is always absolutely absent, while in the *Therevidæ* the posterior cells are always five in number and the

small cross-vein is prominently present; anal cell always long and contracted or closed near the hindmargin; ambient vein complete. Squamæ (both alar and thoracal) small or at the utmost moderate in size, but occasionally (*Toxophora*) with remarkably long fringes.

The perfect insects are never very large and never very small; they are essentially aerial, and the *Bombyliidæ* possess a hovering power which is developed sometimes to a most remarkable degree, while the *Therevidæ* are very active and the males sometimes execute frantic aerial dances. They are essentially sun-lovers and never blood-suckers, and though the *Therevidæ* are reputedly "Robber-Flies" the statement requires confirmation. The larvæ are parasitic and (as far as is known) have two very distinct stages of development in the *Bombyliidæ*, the mobile one after hatching and the torpid one after reaching their intended host, while in the *Therevidæ* they are very active in their earlier stages.

The TROMOPTERA are easily distinguished from the EREMOCHÆTA by the presence of only two pad-like pulvilli, and usually by the presence of distinct bristles on the thorax and legs; even when these bristles are absent still spicules and an apical circle of spines exist on the tibiæ, and usually the spicules or spines beneath the hind femora are of a stronger nature than those which occur in any EREMOCHÆTA. The DERMATINA are distinguished by their remarkable absence of pubescence and bristles, by their pedestrian heavily built legs, by their different antennæ, and by the totally distinct system of venation in which the discal vein always ends before the wing-tip. The ENERGOPODA (certainly in the *Asilidæ*) possess strong stout bristles on the thorax and legs, or at any rate have coarse dense pubescence in place thereof, and are essentially pedestrian and predaceous species apparently without any powers of hovering* or dancing.

The TROMOPTERA (in the sense adopted by me) include only the *Bombyliidæ* and *Therevidæ*, but in the sense of the founder (Osten Sacken) included the *Nemestrinidæ*, *Cyrtidæ*, and *Scenopinidæ*. The reason for Osten Sacken's inclusion of the first two of these families lay in the stress which he placed in the aerial habits of the superfamily, while I have been more impressed by the structural characters afforded by the total absence of bristles and the presence of three pad-like pulvilli and consequently have included them in the EREMOCHÆTA. As regards the *Scenopinidæ* it is probable that Osten Sacken himself would not have included them in his TROMOPTERA, but placed them there in association with the *Therevidæ* "according to the received opinion."

Osten Sacken's words (Berl. ent. Zeitschr., 1896, p. 368) in connection with the founding of the Superfamily TROMOPTERA are worthy of quotation, but it must be borne in mind that he included the *Nemestrinidæ*, *Cyrtidæ*, and *Scenopinidæ*.

* Colonel Yerbury informs me that he has seen the male of a species of *Promachus* (or some allied genus) hovering over the female when courting.

“**Tromóptera.** The relationship of the *Nemestrinidae*, *Cyrtidae* and *Bombyliidae* is obvious, and has been noticed by the earliest writers; it finds its confirmation in the history of the transformation of these families. They are all parasitic in their larval stages, and, as far as known, all show two stages of development of the larva, the mobile one after hatching, and the torpid, after reaching their intended host. The *Cyrtidae* and *Nemestrinidae*, both a cheta (that is without macrochaetae), are specialized types, the former, as far as known, are parasites of spiders; the *Nemestrinidae* are not universally distributed, but occur sporadically in disconnected, limited areas, far distant from each other, and characterized by a warm, dry, almost rainless, climate. (Central Asia, South Eastern Europe, some parts of Africa, of Australia and the deserts of South America.) [Compare in Berghaus’s *Physic. Atlas*, new edit.; the map *Meteorologie*, N^o. XI (1886) has areas tinted in the palest blue, indicating a minimum of rainfall; those are the regions of the *Nemestrinidae*.]”

“As I have said above, the prevalence of holoptic heads in the male, connected with the power of hovering, and legs, fit principally for alighting, distinguish the *Tromóptera*. Dichoptic heads in the male occur only exceptionally. The number of posterior cells as a maximum is five in the *Cyrtidae* and *Nemestrinidae* and four in the *Bombyliidae*. But as the venation in all these families is very variable, and subject to degradation, this is not a very deep-seated character. The number of pulvilli is normally three in the *Cyrtidae* and *Nemestrinidae*, and in this, just as in the number of posterior cells, they approach the *Eremochaeta*. Whether this double coincidence is an index of some hidden relationship is as yet unknown.”

“The *Bombyliidae* are a much more numerous family than the two just mentioned ones, spread almost universally, but always seeking dry and sunny situations. The variety of forms in this family is unique among Diptera: *Bombylius*, *Anthrax*, *Lomatia* are the principal types, showing a more or less distinct system of macrochaetae, especially on the sides of the thorax (*Bombylius* on the abdomen, concealed within a dense clothing of fur). The extremes, as to form, are the slender *Systropus*, entirely bare of hairs or bristles, and the heavy *Toxophora* with comparatively small wings, but stout legs, and showing an unusual development of stout macrochaetae on the thorax, and even a pair of ocellar bristles on the head (a unique case, I believe, among *Tromóptera*), almost a pedestrian among aërial Diptera! Among all this variety of forms, however, the parasitism of the larvae is a constant character.”

“I have no hesitation in placing the *Therevidae* among the *Tromóptera*, but I would consider them as an ancestral form. I derive this opinion from the fact that species of this family are apparently common in New Zealand (which, as well known, abounds in non-evoluted forms, as Dr D. Sharp calls them in his paper on N.-Z. Coleoptera). All collections

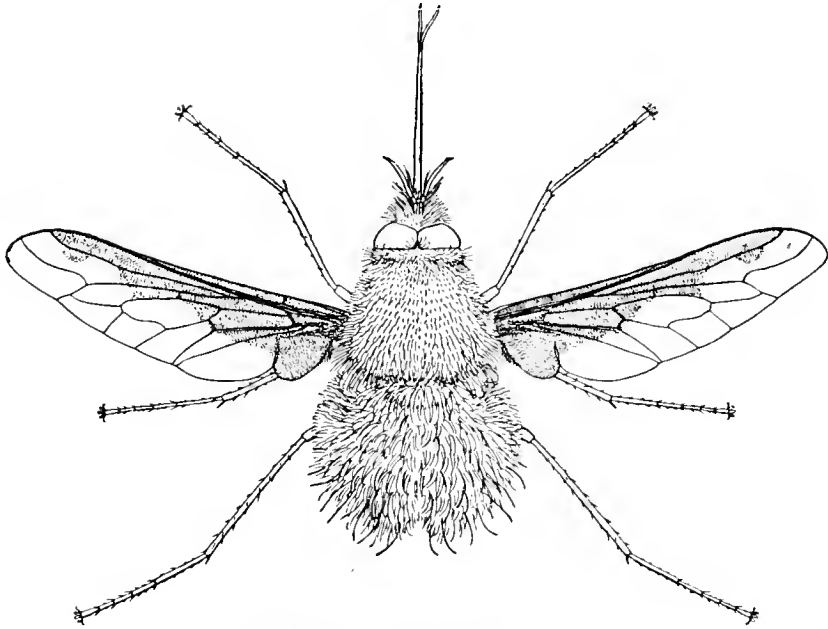
“ from N.-Z. contain *Therevae*, and the earliest Dipteron described (1775) “ from these islands was *T. bilineata* Fab., collected by Sir J. Banks, “ companion of Capt. Cook. The greatest difference between the *Therevidae* “ and the three above-mentioned normal families of *Tromoptera* consists “ in their earlier stages; however the great mobility of the larva of “ *Thereva* in hunting for prey, favored by its serpentine shape and tough “ consistency, may be premonitory of the first, mobile stage of the larvae “ of the other groups. Besides the *Therevidae*, the *Cyrtidae* also seem to “ be comparatively frequent in N.-Z. Three species of *Cyrtidae*, represent- “ ing as many genera, have been brought from that country. One of them, “ *Oncodes brunneus*, seems to be exceedingly common. Thus, of the four “ families of Diptera, composing the Superfamily *Tromoptera*, the *Therevidae* “ and *Cyrtidae* seem to be much more common in N.-Z. than in Europe “ or in North America. The *Bombylidae*, on the contrary, flourishing in “ the rest of the world, seem to be exceedingly rare in N.-Z. I have never “ seen a *Bombylid* (or still less a *Nemestrinid*) from N.-Z. in any collection, “ and none have been mentioned, as far as I know, in literature, except the “ two species of *Neuria*, in Schiner’s Novara-work, quoted as coming from “ Auckland, N.-Z., but the origin of which still requires confirmation, as “ there is no other authority for the locality. One of these *Neuriae* has “ been described by Macquart from Eastern Australia; the locality of the “ other is vaguely described by Fabricius as ‘the Islands of the Pacific “ Ocean.’ Such a striking result, although based upon rather meagre “ data, has its significance, the more so as both *Bombylidae* and *Nemes- “ trinidae* are very abundant in Australia. This result seems to me a “ potent argument for the opinion that the *Therevidae* are an ancestral “ form among the *Tromoptera*.”

“The *Scenopinidae*, according to the received opinion, may be placed “ alongside of the *Therevidae*, although they are glabrous and bristleless, “ while *Therevae* have a regular system of macrochaetae on the thorax.”

ARRANGEMENT.

The natural sequence of families runs from the *Cyrtidae* to the *Bombylidae*, probably through the bare humpbacked *Glabellula*, *Platypygus*, etc., on through the *Bombylinae* to the *Lomatinae* and *Anthracinae* and thence to the chætophorous and five-posterior-celled *Therevidae*, after which embryonic characters may lead to the *Scenopinidae*, or else the stepping stone would seem to be natural on to the *Apioceridae* (with which the *Mydidae* must have some close affinity, as is proved by the venation) and so on to the *Asilinae*; or else a connection may be traced from the *Philopotinae* to the *Toxophorinae* through the remarkable dorsal development of the prothorax, but against that has to be placed the very strong chætotaxy of *Toxophora*; in fact the position of the *Toxophorinae* and *Systropinae* is not clear.

VII. BOMBYLIDÆ.

FIG. 269.—*Bombylius major* ♂. × 3.

Orthorrhaphous brachycerous flies of moderate to rather large size, seldom small nor remarkably large, often bearing bristles but the bristles usually concealed in the dense furry pubescence. Proboscis often long and porrect. Legs thin and usually almost without bristles but with minute spicules, used for alighting purposes only; pulvilli two only.

Head rather round or transverse, narrower than or as broad as or occasionally broader than the thorax, and so closely applied to the thorax that any neck is seldom conspicuously apparent. Frons and vertex not at all sunk between the eyes; occiput puffed out from the eyes (except in *Systropinae*) and sometimes bearing long postocular hairs; ocelli present. Proboscis usually very long and porrect (and then horny and pointed), but sometimes short and with broad sucker-flaps; palpi one- or two-jointed. Eyes bare, usually touching or at least approximated in the male (and even touching in both sexes in *Systropus*). Antennæ porrect, approximate or remote at the base; third joint not annulated, though in many species a distinct suture cuts off the base of the joint, and usually produced style-like or ending in a style or circlet of bristly hairs, but sometimes without any process.

Thorax in all British species without any conspicuous chætotactic bristles, though tufts of longer pubescence of a somewhat scaly nature may occur above the wing-base and on the postalar calli, but in many non-British species præsutural, supra-alar, and postalar bristles are evident, or even sometimes (*Torophorinae*) an elaborate and unusual chætotaxy, while in the *Anthracinae* closely adherent scales often occur hidden beneath the long dense pubescence, though when these scales are abundant the pubescence is less dense; metapleuræ usually densely hairy, but the hypopleuræ bare so as to allow a free movement of the middle femora. Scutellum usually clothed like the thorax, but sometimes with inconspicuous (or rarely with conspicuous) marginal bristles or bristly hairs, and sometimes clothed only with scales, never armed; metanotum small, concealed under the scutellum.

Abdomen (*Bombylinae*) almost globular and clothed with dense furry pubescence intermingled with which may be some longer straggling hairs, or (*Anthracinae*) more elongate with almost parallel sides and less furry pubescence on (at least) the disc, or (*Cyllenina*, *Mulio*, etc.) with strong hindmarginal bristles, or (*Systropus*) very elongate slender and bare; the six to eight segments often difficult to trace under

the furry pubescence. Genitalia inconspicuous; those of the male sometimes turned to one side, and the ovipositor sometimes with a circle of spines (*Anthrax*).

Legs rather long and weak, made for alighting only and never for predatory purposes; hind pair usually elongated. Moderately strong bristles (like little sticks) may occur beneath the femora (especially the hind pair), and inconspicuous rows of spicules occur down the tibiæ, rarely (*Toxophorina*) developing into obvious stick-like bristles, while a circle of terminal spines is almost always present; numerous short bristles occur on the tarsi, especially on the soles, but touch-hairs are completely absent. Pulvilli two (said to be three in *Cyrtosia*), the empodium being minute, and sometimes even the pulvilli are only microscopical (*Anthrax*, etc.); claws moderate in size or small, or the front pair very small while the others are normal.

Wings usually half open or outspread when at rest; venation distinct from the other families of the BRACHYCERA (except the *Cyrtidæ* and *Scenopinidæ* and some *Stratiomyidæ* and *Asilidæ*) owing to the complete absence of the small cross-vein, as the upper branch of the postical vein forms the lower margin of the discal cell for a considerable distance (rarely reduced to a point), and after excluding this upper branch of the postical vein the discal cell emits only two veinlets (or occasionally only one) to or towards the wingmargin, so that there are never more than four and sometimes only three posterior cells; fork of the cubital vein (when present) almost always rather short and wide open, similar to that in *Tabanidæ*, so that the upper branch ends well before and the lower branch considerably after the wing-tip; submarginal cells rarely one (*Platypygus*, etc.) commonly two, but sometimes three, four, or even five, the third one being caused by an adventitious cross-vein between the upper branch of the cubital fork and the radial vein, while the others are caused by similar adventitious cross-veins; præfurca starting far before the end of the upper basal cell and usually soon dividing at a very acute angle into the radial and cubital veins, but sometimes (*Anthracinae*) extended until almost or quite level with the discal cross-vein near the middle of the discal cell, and when this is the case the radial vein usually appears to start from the cubital almost rectangularly and not unfrequently a recurrent veinlet is thrown back at this angle of the radial vein; discal cell very rarely absent (*Cyrtosia*, *Apolysis*, etc.); anal cell more often open than closed, but sometimes shortly pedunculate. Alula sometimes strongly developed and either beset with scale-like marginal hairs (*Anthrax*), or with longer and shaggy hairs (*Bombylius*), or bare and even rippled, but at other times the alula and hind angle of the wing disappear. Wing-membrane sometimes smooth (*Phthiria*) or sometimes conspicuously rippled or even almost ribbed near the margin, minutely pubescent or only microscopically so (*Anthrax*). Squamæ (alar) rather large with a thickly set rather long broad flattened scale-like fringe (*Anthrax*), or difficult to see and with a simple short or a woolly long marginal fringe, or (*Phthiria*) moderately developed and with a short delicate fringe; frenum sometimes distinctly widened before the angle and bearing long hairs similar to those surrounding it, but otherwise the thoracal squamæ absent. Halteres small and concealed in the dense pubescence of the furry species, but not at all covered by the squamæ.

The metamorphoses of many species are well (though almost always only partially) known; many species of *Anthracinae* (*Anthrax*, subgenus *Hyalanthrax*) are parasitic upon the larvæ of Lepidoptera, more especially upon *Noctuidæ* of the genus *Agrotis*, but others are parasitic upon Aculeate Hymenoptera (*Anthophila*); *Callistoma* sometimes proves to be a check upon the ravages of a locust (*Caloptenus italicus*) by preying in the egg-capsules of the species; *Bombylius* itself is usually parasitic upon Aculeate Hymenoptera (*Anthophila* such as *Andrena*, *Colletes*, etc.). The larvæ have an obvious head and are amphipneustic, while the pupæ are mummy-like; the following is quoted from Dr Sharp's (Cambridge Natural History, Insects, Part II., 486) translation of Fabre's writing upon the life history of *Argyramæba (Anthrax) trifasciata*. "The parent-fly oviposits by "merely dropping a minute egg while flying over the surface of the mass

“ of masonry by which the grubs of the Mason-bee, *Chalcidroma muraria*, “ are protected. From this egg there is hatched a minute delicate vermiform larva. In order to obtain its food, it is necessary for this feeble creature to penetrate the masonry; apparently a hopeless task, the animal being scarcely a twentieth of an inch long and very slender . . . the frail creature hunts about the surface of the masonry, seeking to find an entrance; frequently it is a long time before it is successful; but though it has never taken any food it is possessed of great powers of endurance. . . . Finally, after greater or less delay, the persevering little larva succeeds in finding some tiny gap in the masonry through which it can force itself. . . . Having once effected an entrance the organisation that has enabled it to do so is useless; this primary form of the larva,” which may have lived without food for some weeks, “ has, in fact, as its sole object to enable the creature to penetrate to its food. Having penetrated, it undergoes a complete change of form, and appears as a creature specially fitted for feeding on the quiescent larva of the bee without destroying it. To accomplish this requires an extreme delicacy of organisation and instinct; to bite the prey would be to kill it, and if this were done, the *Anthrax* would, Fabre supposes, ensure its own death, for it cannot feed on the dead and putrefying grub; accordingly, the part of its body that does duty as a mouth is merely a delicate sucker which it applies to the skin of the *Chalcidoma*-grub; and thus without inflicting any perceptible wound it sucks day after day, changing its position frequently, until it has completely emptied the pupa of its contents, nothing being left but the skin.” The larva changes to a pupa the next spring, and then is provided with a special apparatus for piercing the enclosing masonry. “ Thus this species appears in four consecutive forms—in addition to the egg—each of which is highly specialised for the purposes of existence in that stage.” The males of the genus *Bombylius* are magnificent hoverers in bright sunshine, and are capable of evading quick strokes of a net and then boldly renewing their hovering in almost the same spot; the females however usually hover in a more feeble fashion at blossoms or low growing plants in somewhat the same fashion as the Humming-bird moth (*Macroglossa*); the species of *Anthraxinae* commonly rest on bare hot sand or on bare patches or foot-paths on heaths and commons, though even then they are very ready to move with a peculiar hovering flight, and the females may be found on the blossoms of large *Umbelliferae*.

The *Bombylidae* form a large family of very beautiful flies, of which many show most varied forms of wing coloration while others show most attractive hues in the pubescence or scales; sometimes bright silvery tufts appear at the wing-base or near the end of the abdomen, or cross-bars or small spots occur on the abdomen, and in some exotic species brilliant prismatic scales occur on the frons and scutellum; many of these varied hues can only be seen in certain lights, and a specimen which

when viewed from in front appears to be of a black or gloomy colour may when seen from behind glitter with brilliant spots. They naturally occur in their greatest numbers in the dry and sunny regions of the world and are abundant in Australia, though no species is known from New Zealand. About 1700 species are known, of which more than 500 have been recorded from the Palæartic region, but in Britain we possess only a few stragglers as we live in the most northern and western range of the family. Only nine species are now admitted as undoubtedly British, of which three appear to be confined to the commons of the South-west (*Bombylius minor*, *Anthrax fenestratus*, and *A. circumdatus*), while only four are known with certainty from Scotland (*B. major*, *B. canescens*, *A. paniscus*, and *P. pulicaria*), and only one from Ireland (*B. canescens*), though Walker included *B. major*, *A. paniscus*, and *P. pulicaria* from Ireland, and *B. minor* (probably in mistake for *B. canescens*) from Scotland. Although only nine species are now admitted into the British List it is remarkable that about twenty-five others are reputed to have occurred; this can partly be accounted for by our early collectors having been attracted by the beauty of the various species, and having brought specimens home from travels in Europe too hastily mixed them up in their British collections.

This family is distinguished by the small number of posterior cells, and by the total absence of the lower (or small) cross-vein, the upper branch of the postical vein always forming for a long (or rarely short) space the lower margin of the discal cell; the *Scenopinidæ* and a few *Cyrtidæ* and *Stratiomyidæ* also possess these characters, but the *Bombylidæ* cannot be confounded with the hairless *Scenopinidæ* nor with the *Stratiomyidæ*, and the *Cyrtidæ* though rather closely allied can be easily distinguished by their enormous thoracal squamæ and by the presence of three pulvilli.

ARRANGEMENT:—The most natural arrangement is apparently arrived at by beginning with those genera which are most allied to the *Cyrtidæ* both by their shape and their deficient venation, and consequently the *Bombylinae*, commencing with *Glabellula*, *Platypygus*, etc., would be the first subfamily. The *Anthracinae* being the most distinct subfamily would come last (showing a relationship to the *Therevidæ* in the circlet of spines on the ovipositor) and would naturally be preceded by the *Lomatinae*, but the position of the *Toxophorinae* and the exotic *Systropinae* is not so obvious. On the other hand there may be a close relationship between some of the *Toxophorinae* and the Cyrtidous subfamily *Philopotinae*, grounded on the remarkable development of the prothorax and the extreme pendulousness of the somewhat cylindrical abdomen.

The subfamilies accepted in this work are five in number, but the systematic arrangement of the *Bombylidæ* still awaits a competent monographer, the limits of some of the subfamilies being not well defined, and the allocation of various genera open to doubt. The *Anthracinae* are the

most easily distinguished, through the long præfurca and the very distinct divergence of the radial and cubital veins whereby the radial vein appears to originate rectangularly from the cubital vein quite close to (or only shortly before) the discal cross-vein; very few genera remain doubtfully placed in this subfamily, though in *Henica* Macq. (= *Lagochilus* Loew) and in some other genera the small cross-vein is placed (*Lomatia*-like) towards the end of the discal cell, and in *Mulio* (and its close allies) the præfurca is rather long and the divergence of the veins considerably before the discal cross-vein. The *Systropinae*, though the last subfamily to be suggested, are also well defined through the remarkable elongation and bareness of all parts of the structure, and through the somewhat hollowed-out back of the head. It is not easy to decide the nearest relationship of the *Systropinae*, but it is curious that they seem to be allied to the most strongly bristled genus in the whole family, viz., *Toxophora*, because of the similarity of the peculiar structure of the scutellum and the basal joint of the antennæ; if this surmise be correct, it is not so difficult to trace the relationship through the *Toxophorinae* to the *Lomatinae*, though a great difference of opinion may exist as to the boundary line. The *Toxophorinae* in the sense adopted by me do not form a very coherent group, especially as regards *Eclimus* (including *Thevenetimyia*) and *Tomomyza*; Schiner included *Amictus* (including *Thlipsomyza*) and *Cyllenia* in his *Lomatinae*, but I have laid more stress upon the remarkable "humpiness" of the *Toxophorinae* and have therefore included those genera which also show many points of divergence from the *Lomatinae* in their more bristly nature, longer proboscis, and cylindrical abdomen. The remarkable dorsal development of the prothorax in *Toxophora* and *Lepidophora* may distinguish those two genera from the others included by me in the subfamily, but they seem to be allied to *Eclimus* and *Thevenetimyia* which have the most *Lomatia*-like figure. *Tomomyza* is of still more doubtful location and may well belong to the *Lomatinae*, but has a more cylindrical abdomen and an upright discal cross-vein placed near the middle of the discal cell, and also seems to be allied to *Cyllenia*. The *Lomatinae* (restricted by the omission of the genera just mentioned) become a rather symmetrical subfamily and are distinguished from the *Bombylinae* by a more oblong flatter abdomen and many minor details which are mentioned under the characters of the subfamily. The *Bombylinae* are also not quite homogeneous, and when the genera which have a simple cubital vein are better known it is very probable that they will form another subfamily, the *Platypyginae*, distinguished further by the almost total absence of pubescence and by the humped Cyrtidous-like figure.

I have been able to examine specimens of the following genera :

BOMBYLINÆ: *Anastæchus*, *Bombylius*, *Dischistus*, *Geron*, *Heterostylum*, *Lordotus*, *Phthiria*, *Platypygus*, *Plocas*, *Rhabdopselaphus*, *Systæchus*, *Usia*, and the rather aberrant *Corsomyza* and *Lasioprosopa* (head very transverse), *Sericosoma* and *Pantarbes* (antennæ widely separated, and abdomen conical).

LOMATINÆ: *Anisotamia*, *Comptosia*, *Ligyra*, *Lomatia*, *Macrocondyla*, *Scinax*, *Tritoneura*, and the rather aberrant *Cyrtophorus* (thorax humped, *Torophorinarum*?), *Aphæbantus* and *Epacmus* (antennæ widely separated).

TOXOPHORINÆ: *Amictus* (incl. *Thlipsomyza*), *Cyllenia*, *Eclimus*, *Lepidophora*, *Thevenetimyza*, *Tomomyza* (*Stomylomyyia* Bigot),* and *Torophora*.

SYSTROPINÆ: *Systropus*.

ANTHRACINÆ: *Anthrax*, *Argyrocnæba*, *Astrophanes*, *Dipalta*, *Exoprosopa*, *Hyperalonia*, *Litorrhynchus*, *Spongostylum*, and the rather aberrant *Mulio* (incl. *Chalcochiton*), *Callistoma*, and *Henica* (*Lagochilus*) which have the discal cross-vein at a considerable distance from the end of the long præfurca.

I have not had time to study the character indicated by Bezzi in the indented hindmargin of the eyes, but the following notes and possible affinities may be worthy of attention:

Torophora may show affinity to *Systropus* in the long basal joint of the antennæ and the sloping scutellum.

Eclimus may be near *Torophora* or *Systropus* or *Codionus*.

Prorachthes may be near *Cyllenia* or *Eclimus*.

Cyllenia and *Amictus* appear to be near *Torophora*.

Leptomomyza connects *Bombylius* with *Usia*.

Platypygus may be allied to *Usia*.

Henica may connect *Cyllenia* with *Anthrax*.

Tomomyza has an *Anthrax*-like appearance.

Aphæbantus and *Epacmus* connect the *Lomatinae* with the *Anthracinae*.

The incomplete ambient vein in *Phthiria*, *Geron*, and *Torophora* may afford some clue to affinities.

Amictus auripilus Bigot is an *Eclimus*.

Type of venation of the BOMBYLIDÆ.

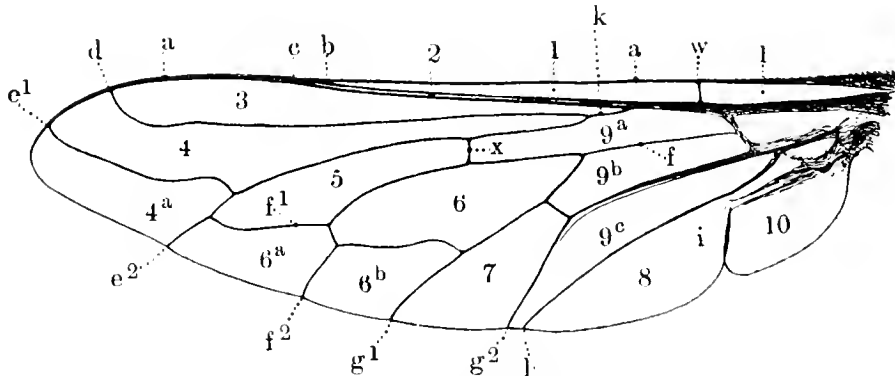


FIG. 270.—*Bombylius discolor*.

Longitudinal (or long) veins.

a Costa (or costal vein).

b Mediastinal (or auxiliary) vein.

c Subcostal (or 1st longitudinal) vein.

d Radial (or 2nd longitudinal) vein.

e Cubital (or 3rd longitudinal) vein.

e¹ Upper branch } of the cubital fork.

e² Lower branch }

f Discal (or 4th longitudinal) vein.

f¹ Upper veinlet } from the discal cell.

f² Second veinlet }

g Postical (or 5th longitudinal) vein.

g¹ Upper branch of the postical fork (always anastomosing for some dis-

* The single type specimen of *Stomylomyyia leonina* Bigot has lost both wings and the last joint of the antennæ, but I am convinced that it is only a specimen of *Tomomyza europæa* Loew.

tance with the lower branch of the discal vein, and thereby appearing to be a third veinlet from the discal cell).

g^2 Lower branch of the postical fork.

h Anal (or 6th longitudinal) vein.

i Axillary vein.

k Præfurca = the common stem of the radial and cubital veins.

Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (or transverse) veins.

w Humeral cross-vein.

x Discal (or middle) cross-vein.

y Lower (or small) cross-vein, always absent in the *Bombylidae*.

z Anal cross-vein = g^2 , when that vein unites with the anal vein before the wing-margin.

Cells.

1 Costal (or mediastinal) cell.

2 Subcostal cell, sometimes almost lost in *Bombylidae* through the close approximation of mediastinal and subcostal veins.

3 Marginal cell.

4 Submarginal cell.

4^a Second submarginal (or cubital) cell (or cubital fork-cell), which when 4 is divided by an adventitious cross-vein as in fig. 278 becomes the third submarginal cell and so on.

5 First posterior (or subapical) cell.

6 Discal cell.

6^a Second posterior cell.

6^b Third posterior cell.

7 Postical (or 4th posterior) cell = the 5th posterior cell of the *Tabanidae*, *Therevidae*, *Asilidae*, etc.

8 Axillary cell.

9^a Upper (or 1st) basal cell.

9^b Second (or middle) basal cell.

9^c Anal (or 3rd basal) cell.

10 Alula.

Notes on the Venation of the BOMBYLIDÆ.

The peculiar characteristics of the venation of this family lie in (1) the presence of only Four or Three Posterior Cells, and (2) the complete Absence of the Small Cross-vein.

(1) THE DISCAL CELL emits (irrespective of the upper branch of the postical vein) only two (or sometimes only one) veinlets towards the wingmargin, of which the upper often bends up to (and sometimes even joins) the lower branch of the cubital fork some distance before the wingmargin, and then closes the first posterior cell. There are therefore never more than four nor less than three posterior cells, and this character gives an infallible distinction from the *Therevidae*, *Asilidae*, *Tabanidae*, etc. The cubital fork is liable to throw a veinlet from its upper branch to near the end of the radial vein and thereby cause the existence of three submarginal cells, while sometimes other cross-veinlets occur in connection with the cubital fork and cause a fourth or even a fifth submarginal cell, but these extra submarginal cells are very unlike the third submarginal cell which occurs in many *Asilidae*, as in the latter the veinlet is recurrent to almost the base of the radial vein.

(2) THE SMALL CROSS-VEIN is entirely absent, as the upper branch of the postical fork forms for a long (or rarely punctiform) distance the lower margin of the discal cell. It is, of course, possible for an inexperienced student of venation to mistake the base of the upper branch of the postical fork for a small cross-vein, but when it is recognised that the postical vein always has a large open fork in all the families of the BRACHYCERA until after the *Asilidae* no such misinterpretation should be possible. This character also distinguishes the family from the *Therevidae*, *Tabanidae*, etc.

Other details worthy of note lie in the frequent close approximation of the mediastinal vein to the subcostal, thereby making the latter for once in a way

appear to be the true "first long-vein," in the comparatively short subcostal vein, in the usually wide open cubital fork (when present) which includes the wing-tip in a similar fashion to the *Tabanidæ*, in the variation in the length of the præfurca, and the position of the discal cross-vein, and in the frequently most remarkable loop of the radial vein near its end which may turn up rectangularly or even be looped back into the costa.

Table of the Subfamilies of BOMBYLIDÆ.

- 1 (8) Præfurca short (fig. 270), and the radial vein emitting the cubital vein at an acute angle far before the discal cross-vein. Antennæ almost always approximated at the base. Frons narrowed in the male so that the eyes almost or quite touch, or if the eyes be widely separated in the male (as in some species of *Usia*) then the abdomen unusually broad and short and usually almost bare.
- 2 (5) Abdomen rounded or oblong, usually furry, or with soft pubescence. Antennæ never conspicuously long. Occiput inflated.
- 3 (4) Abdomen short and rounded; usually both thorax and abdomen clothed with furry pubescence. Eyes without an indentation on the middle of the hindmargin. Proboscis always long, and with very small sucker-flaps except in the species with a simple cubital vein (*Platypygus*, etc.). Thorax usually arched, almost circular, and almost without bristles. Radial vein never with a strong loop before its end. Head usually narrower than the thorax. BOMBYLINÆ (p. 483).
- 4 (3) Abdomen oblong, rather flattened, and seldom with furry pubescence. Eyes often with an indentation at the middle of the hindmargin. Proboscis usually short and with fairly broad sucker-flaps. Thorax comparatively flat, thinly haired, but with some strong bristles towards the sides. Head usually as wide as the thorax; frontal triangle large. Radial vein almost always with a strong loop just before its end, and ending rectangularly or recurrent in the costa; posterior cells always four; discal cross-vein often sloping. LOMATINÆ (p. 506).
- 5 (2) Abdomen long and tubular, either bare or with conspicuous bristly hairs. Eyes without an indentation at the middle of the hindmargin. Antennæ usually very long, especially the basal joint. Proboscis almost always long. Thorax more or less humped. Discal cross-vein upright.
- 6 (7) Abdomen, legs, and antennæ remarkably long and bare. Occiput hollowed. Posterior cells three only. Prothorax normal. Eyes usually touching in both sexes. SYSTROPINÆ (p. 513).
- 7 (6) Abdomen and legs moderately long, and often with bristles or bristly hairs. Occiput inflated. Thorax almost always with strong bristles on the disc, and very much humped against the head. Abdomen very much drooped downwards. Prothorax

sometimes extended dorsally into an anterior thoracic shield, on which are some very strong bristles. Thorax and abdomen often with scaly pubescence. TOXOPHORINÆ (p. 509).

- 8 (1) *Præfurca long* (figs. 305, 306), and the cubital vein apparently emitting the radial vein rectangularly (or at least abruptly) nearly opposite the middle of the discal cell and very close to the discal cross-vein (unless the latter be placed near the end of the discal cell). Eyes often with an indentation at the middle of the hindmargin. Antennæ always widely separated at the base. Frons often very little narrowed in the male. Abdomen usually oblong. ANTHRACINÆ (p. 515).

As far as British species are concerned we have only to deal with the *Bombylinae* and *Anthracinae*, and our species are easily distinguished by the different divergence of the radial and cubital veins. The other sub-families have never been well differentiated and considerable difference of opinion may arise as to their limitations; I have dealt with this subject in some detail under the family and subfamily characters, but my work is merely of a tentative nature owing to my studies in this family having been but slight and superficial. Many genera of *Bombylidae* are insufficiently characterised, and my hasty studies for this work have already suppressed two (*Eniconoura* and *Stomylomyia*).

BOMBYLINÆ.

Præfurca short, ending almost opposite the base of the discal cell. Antennæ approximated at the base. Proboscis usually long and porrect. Abdomen short and rounded.

Head rather small and rounded, rarely (*Lasioprosopa*, *Corsomyza*) transverse and wider than the thorax, considerably puffed out behind the eyes but without bristles. Proboscis conspicuously long and horny (except in *Glbellula* and *Platypygus*), with very small sucker-flaps. Eyes approximated or touching in the male, or when widely separated (*Glbellula*, *Platypygus*, *Usia*) then the abdomen short and broad; eyes with no indentation at the middle of the hindmargin. Antennæ approximated at the base; basal joint not specially long nor bare; style variable.

Thorax arched and often humpbacked, usually clothed with dense furry pubescence, but sometimes with few hairs, or even bare in those species which have a simple cubital vein.

Abdomen short and broad, rarely conical, often clothed with dense furry pubescence but sometimes bare.

Legs thin, sometimes bare, but often with stick-like spines beneath the femora and with spicules and a circlet of terminal spines on the tibiæ. Pulvilli two as in all TROMOPTERA, unless it be correct that *Cyrtosia* has three.

Wings (fig. 270) with the radial and cubital veins leaving the short præfurca at an almost equal very acute angle which is almost opposite the base of the discal cell; subcostal vein comparatively short; radial vein never looped before its end, but in *Ploas* (fig. 278) drawn back by the adventitious connecting veinlet and ending rectangularly in the costa; cubital fork usually short and wide open (but not in *Phthiria* or *Usia*); submarginal cells one, two, or three; posterior cells four or three; anal cell open or closed.

The *Bombylinæ* are easily distinguished from the *Anthracinæ* by the short præfurca and usually by the radial and cubital veins diverging from the præfurca at an acute angle long before the discal cross-vein; from the *Toxophorinæ* and *Systropinæ* by the short rounded abdomen; and from the *Lomatinae* (which are the nearest allies) by the rounder abdomen (except perhaps in *Oligodranes*), by the longer proboscis, and usually by the less looped or upturned radial vein. The species with the simple cubital vein will probably form a separate subfamily distinguished by almost total bareness, humped figure, and (except in *Cyrtosia*) short proboscis.

Table of Palearctic Genera of BOMBYLINÆ.

- 1 (8) One submarginal cell, the cubital vein (if present) being not forked.

Extremely humpbacked, almost or quite bare flies, somewhat like *Cyrtidae*.

- 2 (5) Radial vein practically absent.
3 (4) Proboscis short.

Second basal cell very large, emitting two simple veins in addition to the two branches of the postical vein (fig. 271).

One little known arctic species.

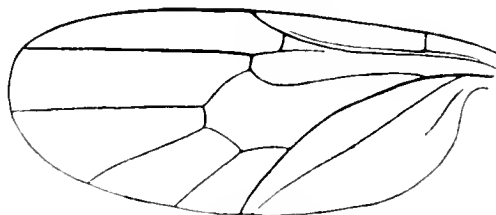


FIG. 271.—*Glbellula arctica* Zett. ♂.
(After Becker)

GLABELLULA.

- 4 (3) Proboscis long and perpendicular.

Second basal cell moderately large, emitting only one forked vein in addition to the two branches of the postical vein (fig. 272).

EMPIDIDEICUS.

- 5 (2) Radial vein present.

- 6 (7) Discal cell absent, being merged into the third posterior cell (fig. 273).

Proboscis long. Eyes touching in the male.

CYRTOSIA.

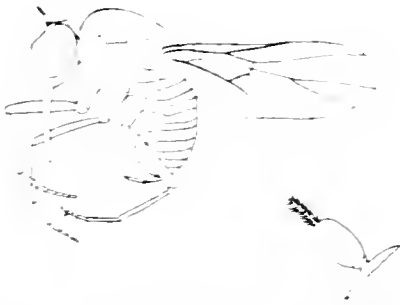


FIG. 272.—*Empidideicus carthaginiensis* ♀.
(After Becker)

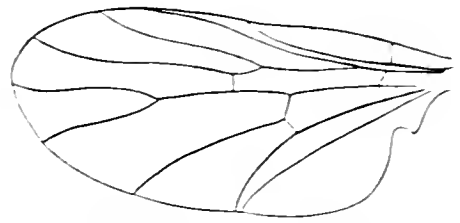


FIG. 273.—*Cyrtosia marginata*.
(After Ferris)

- 7 (6) Discal cell closed (fig. 274).

Proboscis short. Eyes separated in both sexes.

PLATYPYGUS.

- 8 (1) Two or three submarginal cells, the cubital vein being always forked.

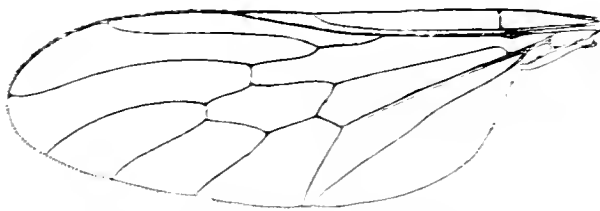


FIG. 274.—*Platypygus chrysanthemi* ♀. × 14.

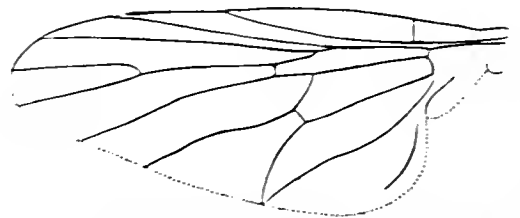


FIG. 275.—*Apolysis humilis*. (After Loew)

- 9 (16) Posterior cells three only (figs. 275, 276).

Discal cell sometimes absent.

- 10 (11) Discal cell absent, being merged into the second posterior cell (fig. 275).

APOLYSIS

- 11 (10) Discal cell present (fig. 276).

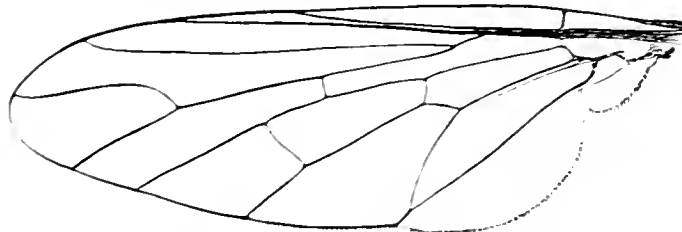


FIG. 276.—*Geron gibbosus* ♂. × 13.

- 12 (15) Abdomen rather long and conical or narrow.

Eyes of the male touching.

- 13 (14) Palpi long. Basal joint of antennæ rather short and thick, little

longer than the second joint. Antennæ shorter than the head. OLIGODRANES.

14 (13) Palpi very short. Basal joint of antennæ long and thin, more than twice as long as the second joint (fig. 277).

Antennæ rather long: third joint long and evenly pointed. Scutellum long, rather triangular. GERON.

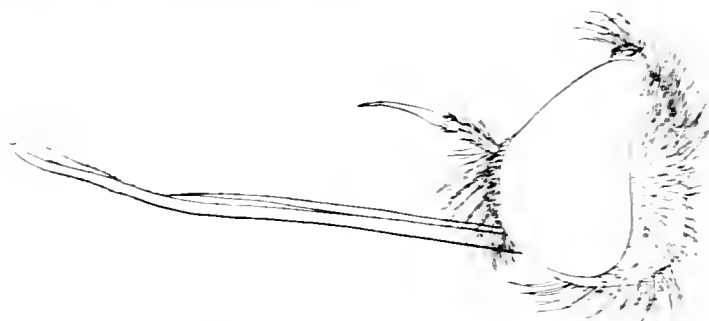


FIG. 277.—*Geron glifus* ♂. × 23.

15 (12) Abdomen short and broad.

Eyes of the male usually separated. Antennæ not so long as the head. Scutellum rather short, broad, and rounded. Legs without spicules. USIA.

16 (9) Posterior cells four.

Discal cell always present.

17 (20) Submarginal cells three (fig. 278), caused by the upper branch of the cubital fork being united to the radial vein by a cross-vein.

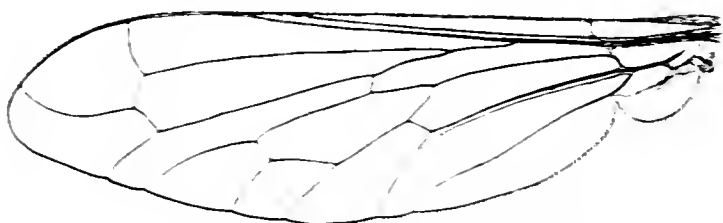


FIG. 278.—*Flebot rufescens* ♂. × 18.

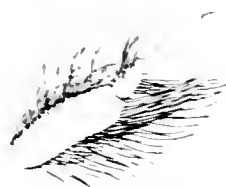


FIG. 279.—*Flebot rufescens* ♂. × 18.

18 (19) Basal joint of antennæ short (as in *Bombylius*). TRIPLASIUS.

19 (18) Basal joint of antennæ long and stout (fig. 279). PLOAS.

20 (17) Submarginal cells two only (figs. 282, 284, etc.).

21 (28) First antennal joint about as long as the second (figs. 280, 282).

Legs without spicules on the femora.



FIG. 280.—*Fibbia pulicaria* ♂. × 42.



FIG. 281.—*Fibbia pulicaria* ♂. × 40.



FIG. 282.—*Fibbia pulicaria* ♂. (After Becker)

22 (25) Anal cell open. Abdomen broad and flat. Third antennal joint with long hairs about its tip (fig. 282).

Legs without bristles.

- 23 (24) Radial vein very much looped up at its end (fig. 283).
Alula small and indented off from the hind angle of the wing.

LEGNOTOMYIA.

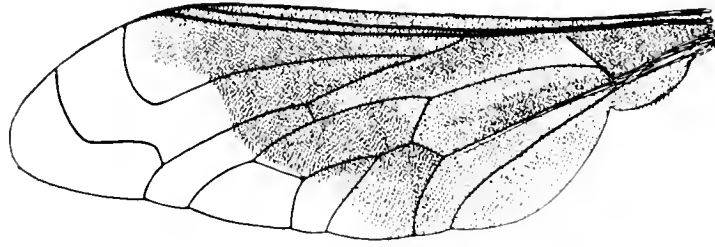


FIG. 283.—*Legnotomyia trichorrhœa* Lw. (After Becker)

- 24 (23) Radial vein only moderately curved up at its end (fig. 284).
Alula large and hardly indented off from the hind angle of the wing.

PSIATHOLASIUS.

- 25 (22) Anal cell closed. *Thereva*-shaped flies. Third antennal joint with a terminal style (sometimes minute).

- 26 (27) Discal cell not widened towards its end (fig. 281). 1. PHTHIRIA.

- 27 (26) Discal cell widened towards its end. HETEROTROPUS.

- 28 (21) First antennal joint much longer than the second (fig. 285).
Anal cell open.

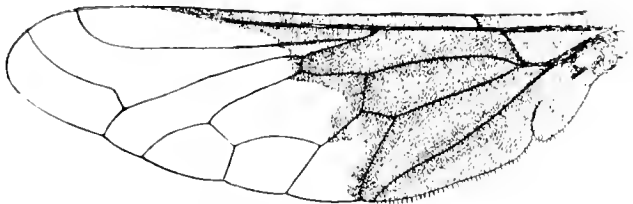


FIG. 284.—*Psiatholastus bombyliiformis* ♂. (After Becker)

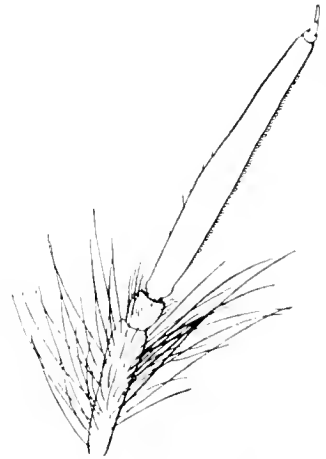


FIG. 285.—*Bombylius major* ♂. × 23.

- 29 (32) Upper basal cell only as long as the second; first posterior cell closed (fig. 286).

Legs usually with spicules on the femora.

- 30 (31) Underside of the head moderately pilose, and hence its different

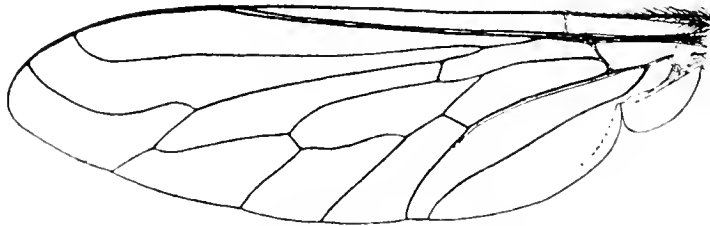


FIG. 286.—*Systæchus sulphureus*. × 12.

parts (including the base of the antennæ, the oral edge, etc.)
easily perceptible.

SYSTÆCHUS.

- 31 (30) Underside of the head densely pilose, and hence the root of the antennæ, epistoma, mouth, etc., completely hidden.

ANASTÆCHUS.

- 32 (29) Upper basal cell longer than the second one (fig. 287).

Not much longer in *Ploas*, of which a few species occur with only two submarginal cells.

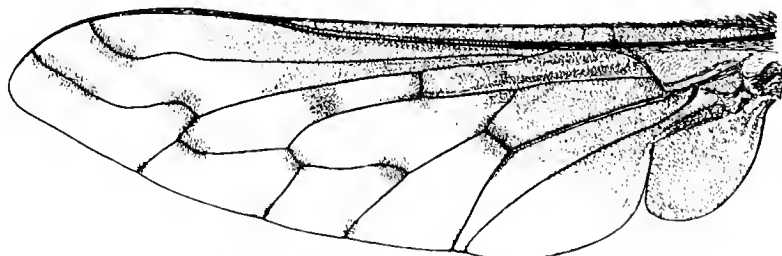


FIG. 287.—*Bombylius discolor* ♂. × 6.

- 33 (34) First posterior cell closed (fig. 287).

2. BOMBYLIUS.

- 34 (33) First posterior cell open (fig. 288).

- 35 (36) Basal antennal joint elongate and slender and bearing only moderate pubescence (fig. 289).
Hind femora spinose beneath.

DISCHISTUS.

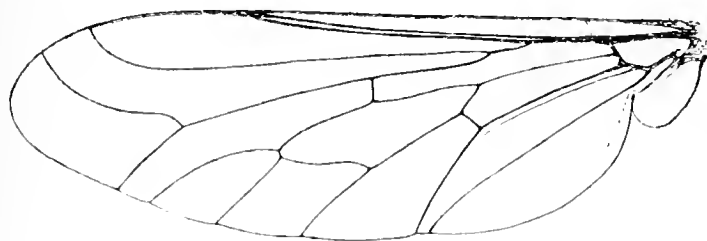


FIG. 288.—*Dischistus minimus*. × 12.

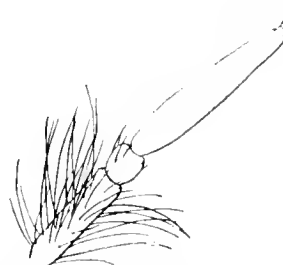


FIG. 289.—*Dischistus minimus*. × 32.

- 36 (35) Basal antennal joint swollen and bearing abundant long bristly hairs (fig. 279).

Hind femora not spinose beneath.

N.B.—Most species of *Ploas* have three submarginal cells (fig. 278).

PLOAS.

1. PHTHIRIA.

Phthiria Meigen, Illig. Mag., ii., 268 (1803).

Small, rather slightly pubescent flies of a light grey or yellowish grey appearance.

Head of the male nearly semicircular but that of the female almost circular, not broader than high when seen from in front, but about as wide as the thorax; face broad, but very short down the middle because the large and rather wide mouth-opening extends up between the wide side-cheeks; frons of the female broad, depressed on the middle part; ocelli three. Proboscis long and thin, almost like a bristle, directed forwards in a slight arch, and with very small sucker-flaps; palpi rather short and very thin. Eyes of the male approximated or touching, but of the female widely separated by the broad frons. Antennæ (fig. 280) porrect, shorter than the head, and approximated at the base; two basal joints almost equally short;

third elongated, peg-shaped with a (sometimes very short and indistinct) terminal style.

Thorax oval, longer than broad, and not much arched, clothed in the male with rather abundant but not dense fairly long erect pubescence without any sign of bristles, but in the female with only short depressed pubescence; pleuræ with only slight pubescence, except for a rather dense tuft on the mesopleuræ; metapleuræ bare. Scutellum large and semicircular.

Abdomen with seven segments, conical in the male but rather ovate and rather flattened in the female; pubescence as on the thorax of the female.

Legs long and thin, entirely without bristles except for some tiny spicules on the hind tibiae.

Wings (fig. 281) longer than the abdomen; cubital vein with a long fork which is not very widely open, the upper branch ending in the wing-tip nearer to the lower branch than to the radial vein; discal cross-vein well beyond the middle of the discal cell, almost upright; discal cell emitting two veinlets to the wingmargin in addition to the upper branch of the postical vein; submarginal cells two; posterior cells four, all wide open but the third one sometimes rather contracted; anal cell closed and even petiolate; ambient vein not continued round the alula.

The metamorphoses are unknown, but should not be difficult to trace.

The flies occur on bare patches among low growing flowers, and our British species is sometimes abundant on *Compositæ* on sandy grassy ground near the coast. They bore into the blossoms with their long proboscis and are said to rest so during the night.

This genus is easily distinguished by the long and little widened cubital fork of which the upper branch runs straight out to the wing-tip, and by the closed anal cell.

Phthiria includes about fifteen Palæartic and about twenty North American species, while stray species are recorded from Central and South America (Chili), South Asia, and South Africa; all other references require confirmation. We have only one species known as British, though one or two more may occur.

1. ***P. pulicaria*** Mikan. Scutellum all black or at the utmost with a yellow spot at its tip. Frons strongly prominent. Wings with the third posterior cell rather contracted towards the wingmargin.

By far the smallest British species of the *Bombylidæ*.

- ♂. Head almost triangular in profile, the produced frons (or more strictly speaking the very much inflated upper part of the side-cheeks) forming one point of the triangle, and the vertex and hind mouth angle forming the other two points; frons and upper part of the side-cheeks conspicuously produced but not to the extent of half the diameter of the eye when viewed in profile, but when seen from above for about as long a space as the eyes touch; frons itself depressed as compared with the inflated cheeks, slate colored but (when viewed from in front) separated from the side-cheeks by a paler grey depression, and bearing comparatively long but not dense erect black hairs, or more correctly those on the back part erect but those on the fore part sloping rather forward. Face mainly occupied by the very much inflated broad side-cheeks which leave only the middle quarter occupied by the depressed bare slaty grey epistoma; side-cheeks in profile light slaty grey but more blackish when seen from in front, descending nearly straight from the antennæ for about one-third their length but then sloping back a little to the upper mouth-edge and thereby becoming a little narrower about half-way down this slope, but still broad to all the mouth-edge, and all clothed with numerous though not dense equal long erect black hairs, but the inner margin of each side-cheek with a fringe of long white hairs which curve somewhat over the face and mouth, while a similar white pubescence extends all round and behind the mouth; the side-

cheeks are separated from the jowls by a depression, but the jowls merge into the back of the head, and all this part is light grey and fairly puffed out and clothed with rather long yellowish white pubescence up to the vertex, but on the upper third of the back of the head is a postocular fringe of longer thin black hairs; vertex greyish black, rather large, and considerably elevated, clothed with rather long greyish yellow hairs which slope forward. Proboscis dull black, more than twice as long as the head; palpi small, dull black. Eyes long, being nearly as long as high when seen in profile, somewhat four-sided but the front side little more than half as long as the hind side, and this partly caused by a large shallow depression of the eyes between the vertex and the frons; the eyes touch for about one-third of the distance between the occiput and the antennæ, but the frontal triangle is longer than the vertical one. Antennæ (fig. 280) dull black; first and second joints short and cup-shaped, about equally long but the second rather the stouter, and both bearing very short black bristles; third joint lancet-shaped, nearly three times as long as its broadest part (or the two basal joints together), and bearing a few very short inconspicuous dorsal hairs; style so short and thick as to be inconspicuous.

Thorax and pleuræ light grey, but the disc of the thorax usually showing three indistinct broad blackish or brownish stripes which do not extend to the front part; humeri concolorous; pubescence on all the upper side composed of rather long greyish yellow hairs, which are all equal and nearly erect but not very dense; pleuræ lighter grey, with similar but whiter pubescence on the mesopleuræ, and a slight fringe on the hypopleuræ. Scutellum more brownish even to the very tip, and bearing similar but rather longer pubescence.

Abdomen dull brownish black, with pubescence similar to that on the thorax but rather sparser and longer and more radiating and on the basal segment denser, and with traces of sparse pale greyish yellow scaly pubescence all about the disc. Belly light greyish, with rather long sparse greyish pubescence. Genitalia rather knobbed, with two large bulging greyish brown side plates and a long under part which is prolonged into a shining black point.

Legs dull dark greyish brown; front coxæ long; all the coxæ and the anterior femora postero-ventrally with long greyish white pubescence; hind femora with sparse long pale pubescence; a short scaly adherent whitish grey pubescence exists on all parts of the legs and especially on the hind femora, but there are no bristles on the hind femora, and the only spicules are a row of tiny dorsal ones on the hind tibiæ; pulvilli whitish yellow, fairly distinct for so tiny a tip to a tarsus.

Wings (fig. 281) hyaline, but (when viewed from behind) with the whitish gleam so usual in flies which occur on dry sand, minutely pubescent but not at all ribbed or rippled; base, stigma, and mediastinal vein pale brownish yellow, other veins brown and not very intense; discal cross-vein distinctly beyond the middle of the discal cell and sometimes placed at about two-thirds of its length; the three marginal spaces of the wing after the wing-tip almost equal (the middle one being very slightly the narrowest) but the fourth space (= third posterior cell) only rather more than half as long as the third. Alar squamæ large, glassy yellowish with a less glassy margin and a short yellowish fringe. Halteres large and conspicuous, light brown but with the base of the knob only brownish yellow.

- ♀. Rather distinct from the male. Head when seen from above more rounded; frons at the vertex about one-third the width of the head and thence steadily widening down to the antennæ where it is nearly twice as wide as at the vertex, suddenly produced from about its middle to the base of the antennæ; the flat upper part of the frons light grey with a slight glistening scale-like yellow pubescence on its middle lower part and a slight sloping longer yellowish pubescence near the sides, and the sides themselves sometimes yellowish; the produced part of the frons is broadly dull yellowish at the sides and bears there short glistening scale-like yellow pubescence, but its middle part is grey and has minute black hairs at its sides, and the blackish grey part of the side-cheeks close to the frons between the antennæ and the

eyes extends a little way down the side-cheeks and bears numerous longer rather drooping black hairs; sides of the mouth and all the lower part of the side-cheeks and all the chin and jowls whitish yellow with rather long not at all scarce whitish yellow pubescence, more especially near the mouth-margins and on the jowls and chin; back of the head grey with a slight blackish tinge, almost equally inflated up to the vertex and bearing fairly abundant erect shorter yellowish pubescence which is short and glistening close against the eyes; the absolute margin against the eyes on the upper part is slightly or even conspicuously yellowish. Eyes more rounded though extended rather pointedly to the vertical eye-angle, widely separated. Antennæ as in the male.

Thorax rather lighter grey with no trace of any dark stripes, but dull yellow on the humeri, on an equal broad stripe extending back on each side from them to the wing-bases, on the postalar calli (as a long but rather narrow stripe), on the metapleuræ, and on the tip of the scutellum, the latter being sometimes extensively and conspicuously yellow, or at other times only yellow at quite the tip; pubescence mainly pale yellow, short, depressed, squamose, and dense enough to almost conceal the ground colour, but numerous suberect longer pale hairs also exist; pubescence on the pleuræ short, sparse, and whitish yellow. Scutellum with numerous longer more erect pale yellow hairs.

Abdomen more greyish, but the sides of the basal segment often extensively yellow or at other times only obscurely so and to a small extent; pubescence mainly composed of conspicuous short depressed squamose hairs which considerably conceal the ground colour, but with a number of longer suberect brownish yellow hairs scattered all over. Ovipositor short and blunt.

Legs with shorter less conspicuous whitish yellow pubescence on the coxæ and femora, and with adherent short pubescence which rather densely covers all the femora (especially the hind pair); trochanters (especially the middle pair) brownish. Rows of minute spicules may be just traceable on the tibiæ.

Wings almost as in the male. Alar squamæ more glassy white, and their fringes pale yellow. Halteres pale, almost whitish yellow.

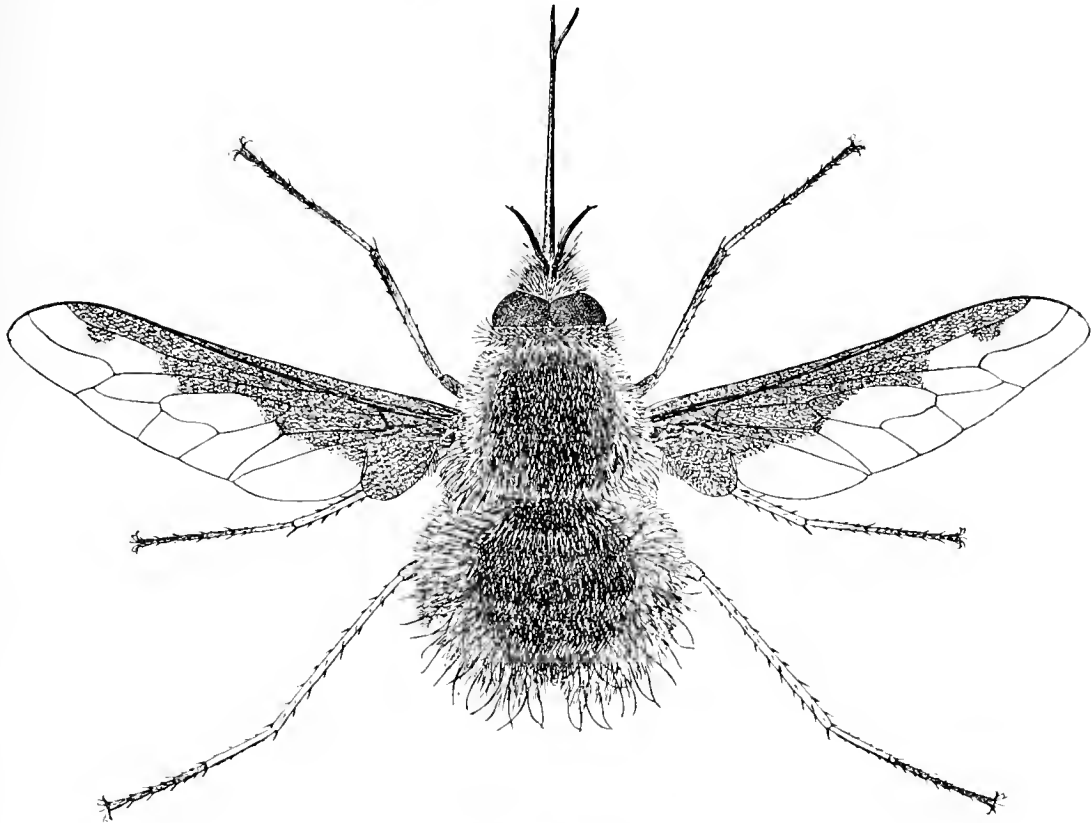
Length about 3.5 mm.

This species has several close allies on the continent, of which *P. canescens* may be the nearest but that has the frons but little produced and the third posterior cell scarcely narrowed at all; *P. convergens* also has the frons but little produced but the third posterior cell conspicuously narrowed. A female specimen which I possess has the left wing with a conspicuous cross-vein between the upper branch of the cubital fork and the radial vein a little before the tip of the latter, while the right wing has a trace of a similar fork and also has the upper end cross-vein of the discal cell absent.

P. pulicaria occasionally occurs in some abundance on the bare patches of sand amongst short herbage near coast sand-hills, and on the flowers of various species of *Compositæ*. I have records from Cornwall (Padstow, a female with unusually blackish wing-veins taken by Mr C. G. Lamb), Hampshire (Christchurch), Suffolk (Covehithe, whence Curtis recorded it as abundant on the denes in June 1833 sucking the florets of *Hieracium pilosella* and *Hypochaeris radicata*), Norfolk (Winterton), Cheshire (t. B. Cooke), Wales (Porthcawl, Barmouth, and Llanbedr), and Scotland (Aberlady, Aberdeen, and Nairn). My dates extend from the end of May to July 25. It is recorded from all North and Middle Europe.

Synonymy.—No doubt need arise on this point, and I am glad that Walker's attempt to revive an older name supposed to have been given for it by Olivier was given up by Walker himself in 1856 upon the belief that Olivier's name might refer to some species of *Geron*.

2. BOMBYLIUS.

FIG. 290.—*Bombylius major* ♂. × 4.

Bombylius Linné, Syst. Nat., Ed. x., T., i., 606 (1758).

Moderately large, middle-sized, or rather small flies, which are clothed with dense furry pubescence, and in all British species with that pubescence mainly tawny. Many species have conspicuously marked wings.

Head semicircular, small in comparison with the thorax, and placed at a lower level because of the high arch of the thorax. Face short, densely hairy, and with a large mouth-opening from which projects a horizontally porrect long thin horny proboscis (fig. 290) which has small narrow sucker-flaps; palpi short and thin. Frons bearing either long pubescence or scales. Ocelli three. Eyes elliptical, bare, touching in the male, but separated by the broad frons in the female, not indented at the middle of the hindmargin. Antennæ (fig. 285) porrect, approximated at the base; basal joint much longer than the second and bearing long straight hairs; second joint short and cup-shaped; third joint elongate, long strap-shaped in the British species, but conical, peg-shaped, or even dilated leaf-like in others, and sometimes bearing dorsal scales; style terminal and jointed.

Thorax oval, short but strongly arched, usually with only dense furry pubescence but sometimes with fairly distinct præsutural bristles. Scutellum broad, unarmed, and also bearing dense furry pubescence in all British species, but sometimes bearing only scales.

Abdomen round, short but arched, with seven segments but the last segments indrawn, covered with dense furry pubescence in which sometimes long hairs of a different texture occur.

Legs long, thin, and bearing spicules; hind legs elongate, and the hind femora often with stiff bristly spicules on the underside; tibiæ all with rows of minute spicules and with small terminal spurs. Pulvilli distinct, but the empodium minute.

Wings (figs. 290, 291) outspread when at rest, hyaline, or with a brown foremargin, or with brown spots; radial vein gently curved up to the costa but not looped; cubital vein with a wide open fork which has its upper branch ending before the wingtip and much nearer to the radial vein than to its lower branch; submarginal cells two only; posterior cells four, the first one closed through the upper veinlet from the discal cell running into the lower branch of the cubital fork at some considerable distance from the wingmargin; discal cross-vein placed near or just before the middle of the discal cell and consequently the upper basal cell distinctly longer than the second one; upper branch of the postical fork forming for a long distance the lower margin of the discal cell; anal cell contracted towards the wingmargin but distinctly open.

The metamorphoses of a few species are partially known, but the earlier stages are not well understood even though the eggs have been seen to be laid near the burrows of bees; in a later stage the larvæ prey upon the larvæ and (probably) pupæ of small bees (*Andrena*, *Colletes*, *Halictus*, etc.). An account is quoted on page 475 of the changes in structure of a larva of this family (though not of this genus), and some interesting details are quoted on page 502 concerning the breeding habits of *Bombylius canescens*.

Bombylius is a very large genus even after shedding off *Dischistus*, *Systæchus*, etc., and nearly a hundred Palæartic species have been recorded. It contains many of the most beautiful and attractive species of the whole order, and the power of "hovering" possessed by the males is of the most perfect nature; when poised apparently motionless in mid air they can defy the best efforts at capture, and they return fearlessly again and again to the same spot. The females hover in front of the blossoms of low growing plants, such as *Prunella* and *Erica*, and probe the flowers with their long proboscis. Two of our most beautiful British species are not uncommon in the southern half of England in the earliest bright days of March and April and may be found hovering and darting about the flowers in most country gardens, but the clear winged smaller species occur later in the hottest days of summer. About twenty-five species have been recorded from North America and a similar number from South and West Africa, but only a few from South Asia and Australia.

Table of Species.

- 1 (2) Wings with numerous brown dots (fig. 291). 1 *discolor*.

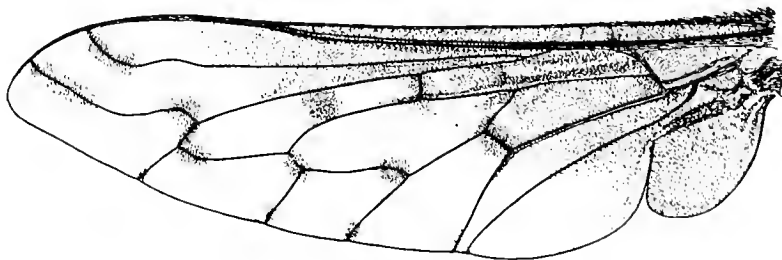


FIG. 291.—*Bombylius discolor* ♂. × 6.

- 2 (1) Wings not dotted.
 3 (4) Wings with a sharply defined dark brown foremargin (fig. 290). 2 *major*.
 4 (3) Wings at most with only a slight and indistinctly defined light brown foremargin.

- 5 (6) Numerous long black hairs standing out amongst the short dense tawny pubescence behind the eyes; face with conspicuous black pubescence on the sides and across under the antennæ. Femora mainly black. 3 *canescens*.
- 6 (5) Only short dense apparently shorn tawny pubescence behind the eyes; face without any conspicuous black pubescence. Femora mainly orange. 4 *minor*.

B. venosus Mikan is closely allied to *B. canescens*, but has hardly any black pubescence extending across the face just under the antennæ, and has the front part of the frons in the female almost entirely pale haired; two obvious black præsutural bristles also exist of which there is no trace in *B. canescens*; the upper part of the pleuræ is said to have several black hairs intermixed in the tawny pubescence, and it is altogether a larger species than *B. canescens*.

B. fulvescens Meig. is closely allied to *B. minor*, but has the discal cross-vein before (instead of at) the middle of the discal cell, the face and antennal district with black hairs, and the abdomen without the middle fascia of black hairs.

B. fugax Wied. This and the next species differ from *B. minor* in having the femora almost wholly black; *B. fugax* has the discal cross-vein before the middle of the discal cell, and has practically no black hairs on the abdomen, and is usually larger than *B. minor*.

B. cinerascens Mikan is distinguished from *B. fugax* by having the discal cross-vein at the middle of the discal cell, by the numerous black hairs about the antennal district, and by two black præsutural bristles on each side of the thorax. I have a note that one or two males standing under the label of *B. minor* in the Dale collection at Oxford have black femora.

Systæchus ctenopterus or *sulphureus*, or *Anastæchus nitidulus*, if occurring in Britain may be distinguished from any *Bombylius* by the distinct venation.

1. **B. discolor** Mikan. Tawny haired, but with black hairs all about the end of the abdomen. Wings dotted. Antennæ with the third joint linear.

A very beautiful fly, which is easily distinguished from its close allies by the abundant black hairs about the end of the abdomen.

♂. Frons triangular with a deep middle furrow, greyish brown, clothed with long dense black hairs (not quite so long as those on the vertex or those on the basal antennal joint) but with a few tawny hairs intermixed on the front part and with some short depressed glittering yellowish hairs at the sides just above the upper margin of the cheeks, where also a slightly darker brown band of ground colour crosses from the antennæ to the eyes; face produced (in profile) nearly as much as the length of the eyes, greyish brown, clothed on the middle part with dense reddish tawny pubescence which droops at the tips of the hairs and with some black hairs intermixed close around, while all the hairs on the upper part of the side-cheeks are black and more erect, but the tawny hairs only die out by steadily growing

shorter, and on the lower part of the side-cheeks and below the eyes the tawny hairs extend up to the eyes even though a few straggling black hairs also reach to these parts; behind the mouth the dense long pubescence is dark reddish tawny mixed with black, but on the small dull orange jowls it is nearly all dark reddish tawny and merges into the tawny pubescence on the lower part of the pleuræ; back of the head not much puffed out, clothed with very dense coarse brownish tawny pubescence in which no black hairs are intermixed and which merges into the similar dense pubescence of the thorax; vertex dull black, elevated, and bearing a tuft of long exclusively black hairs. Proboscis rather shining black, as long as from the front of the head to the tip of the scutellum. Eyes touching for about as long a space as the length of the vertex, hardly widening from top to bottom. Antennæ dull black; basal joint linear and about five times as long as wide, covered with brownish orange or greyish dust and bearing all over (except on the basal third) numerous but not dense long straight black hairs which are directed forwards and outwards; second joint about one-third the length of the basal joint, long cup-shaped, also rather obscured by brownish orange dust but ferruginous at the tip, and with numerous short black hairs on the upper and outer sides which point almost straight forwards; third joint long strap-shaped, quite twice as long as the basal joint, gradually diminishing towards the tip; style short, two-jointed, the basal joint being short transverse but the end joint conical and ending in a point.

Thorax with a dull black ground colour which is obscured by very dense tawny pubescence; this pubescence besides being very dense is perfectly equal just as if it had been shorn, but when seen from above the ground colour shows somewhat through on the disc and causes a blackish brown appearance, while the sides are shimmering paler tawny and indicate a depressed whitish yellow patch just above each wing-base and similar but longer haired depressed patches on the postalar calli; seen from in front the pubescence is brownish yellow but paler posteriorly and the same two patches appear less distinctly whitish, while right on the middle of the front part a reddish brown short V-shaped marking becomes obvious; seen from behind the pubescence is almost all unicolorous pale brownish yellow without any whitish patches, though when tilted the short forked brown line right in front is visible; seen sideways the pubescence is all yellowish but with possibly a slight brownish tinge on the front part, and thence backwards with a whitish shimmer down the disc, but usually without any visible whitish patches or brown front line; a microscopical examination fails to show any black hairs or any approximation to bristly hairs anywhere, though the patches of depressed whitish hairs seem to be of a different texture to the rest of the pubescence; pleuræ with dense deep black hairs extending widely from the front part to the wing-base, but after that and on quite the lower part of the mesopleuræ with dark reddish brown pubescence, that on the back part being longer rather less dense and somewhat directed backwards; just behind the wing-base a bright reddish orange tuft pointing backwards is conspicuous (= fringe of alar squamæ) and a similar tuft occurs on the metapleuræ, but both these tufts are quite distinct from the long yellow fringe on the alulæ. Scutellum with its pubescence merged into that of the thorax and with no long marginal hairs.

Abdomen dull black, but obscured by very dense long pubescence which is brownish yellow on all the basal two-thirds but black on the rest; pubescence on the belly all black except at the sides near the base, and this black pubescence extending upwards on the sides of the abdomen at the junction of the second and third segments and up all the sides of the fourth segment; the anal black pubescence apparently coarser and more tangled than the brownish yellow pubescence, and including some isolated rather longer thin hairs, while a few isolated long black hairs may occur amongst the tawny hairs on the hindmargin of the fourth or even third segment, and sometimes a few isolated inconspicuous long thin tawny hairs occur in the black pubescence; when seen from behind the tawny pubescence has a paler sheen about the sides, and extends furthest down the sides of the first and second segments.

Legs dull orange, but the coxæ, trochanters, and most of the femora

black, leaving the apical eighth of the front, the apical third of the middle, and the apical half of the hind femora, orange, though not very definitely so on the posterior pairs; extreme tip of the hind femora with a small blackish spot in front; last three joints of all the tarsi blackish; coxæ with long dense tangled clumps of black hairs, and these hairs extending onwards though less coarsely dense along two thirds of the under part of the front femora and along more than half the middle femora, while the hind femora bear a rather sparser longer black pubescence on about the basal half or more, and the hind femora have in addition about six long black antero-ventral stiffer bristly hairs on the apical half and a few rather shorter ones about the tip above and in front; all tibiæ with rows of twelve to twenty small moderately equal black spicules, there being three rows on the front pair (front row depressed) and four on each of the posterior pairs; front tibiæ with three small black spurs beneath, middle pair with about five unequal spurs, and the hind pair with a circlet of small spurs of which three on the underside are most distinct; tarsi with numerous tiny black bristles, which become very numerous on the soles; tibiæ and tarsi with some minute elongate golden scales. Pulvilli elongate ovate, almost as long as the claws, dirty whitish; empodium only a minute spine; claws black, rather long.

Wings (fig. 291) brown (sometimes dark brown) all across the base (including the alula), but the lower margin of this brown part sloping steadily though irregularly upwards from the end of the alula to the middle of the costal part of the marginal cell and leaving the rest of the wing hyaline with numerous small brown spots; six of these dots occur at the tips of the veins (counting the two veins at the tip of the anal cell as one) of which those at the tips of the radial and upper branch of the cubital are the largest, a seventh spot occurs on the discal cross-vein, an eighth near the middle of the first posterior cell (=closed cell above the discal cell), a ninth at the base of the upper branch of the cubital fork, a tenth on the end of the first veinlet issuing from the discal cell where it joins the lower branch of the cubital fork, an eleventh on the end veinlet of the discal cell, a twelfth on the basal part of the upper branch of the postical fork, and a thirteenth at the lower angle of the discal cell; there are hyaline kernels near each side of the discal cross-vein and one at the end of the lower basal cell; discal cross-vein well before the middle of the discal cell; the stout black basal part of the costa bears numerous brownish golden scales behind and a few above; alulæ large, with a minute brownish yellow fringe and with a conspicuous fringe of pale golden hairs along the basal edge. Alar squamæ not small, blackish brown with a broad blackish margin of which the fringe forms one of the conspicuous orange tufts mentioned as being visible on the pleuræ after the wing-base and below the alulæ. Halteres small, light brown, but difficult to detect because so deeply imbedded in the long dense pubescence.

- ♀. Extremely like the male. Frons at the vertex about one-third the width of the head, reddish brown, steadily widening until well past the antennæ and the face there nearly half the width of the head; the middle part of frons bears dense reddish brown or pale brown pubescence which is short when compared with the other pubescence (about a quarter as long as the neighboring black hairs), but towards the sides numerous longer black hairs are intermixed which are however still shorter than the other adjacent black hairs but which merge into those on the upper part of the cheeks, and sometimes short glistening depressed pale yellow hairs occur near the sides when level with the antennæ as in the male; ocellar space with a tuft of much longer outspreading black hairs, and near this towards the sides are other black hairs which are not quite so long; the reddish tawny pubescence on the face extends (though only short) out to the eyes, and the longer dense and almost whitish pubescence on the lower part of the jowls and behind the mouth merges into similar pubescence on the lower part of the mesopleuræ. Eyes longer in proportion, so that their front margin (in profile) is nearly a semicircle. Antennæ with the strap-shaped third joint a little broader and contracting on the last third only.

Thorax as in the male, but the pubescence on the lower part of the pleuræ

whitish rather than tawny and merged into the similar pubescence on the jowls.

Abdomen similar to that of the male but the basal pubescence usually more rufous tawny and with a dorsal line (more or less interrupted) of short but conspicuous (when seen from behind) silvery white pubescence on at least the last three or four segments which sometimes extends back almost to the base; a thin row of long (longer than the tawny hairs) black hairs is fairly obvious on the hindmargin (except at the middle) of the second segment, and still more numerous black hairs occur on the hind part of the third segment, after which the fourth and fifth segments are more intensely black haired and have more tangled long outstanding hairs of which a few may sometimes be inconspicuously tawny; anus (when visible) brown and encircled with a fringe of red-orange or yellow hairs strongly contrasting against the dense short black pubescence on the short last abdominal segment; ovipositor also with a reddish orange or yellow fringe.

Legs orange or pale yellow, leaving little more than the basal half of the anterior femora black and even less (though indeterminately) of the hind pair; tarsi less blackened towards the tip; coxæ with less dense black or brownish black pubescence, and the femora with rather dense black to brownish orange pubescence; hind femora with the row of antero-ventral stiff black bristles more numerous (ten to twelve) and extended more towards the base, and the other bristles about the apical third also more numerous; tibiæ with the rows of small black spicules rather more conspicuous.

Wings, squamæ, and halteres as in the male.

Length about 13 mm.; but varying from 10 mm. to 14 mm.

This species appears to vary but very little except in size, even though it has a wide geographical range; it can be distinguished from *B. medius* and its allies by the conspicuous black pubescence on the hinder part of the abdomen. The marginal spots on the wings are sometimes faint and the two large ones especially may occasionally almost disappear; I have noticed several female specimens in which the radial vein throws off a short adventitious fork on the upper side almost level with the base of the cubital fork; I once took a remarkably small specimen near Uckfield in Sussex (8 mm.).

B. discolor is not uncommon in early spring in the southern half of England, as I have taken it in Sussex (all large woods and even open roadsides), Kent (Darenth, Folkestone, etc.), and Suffolk (my own garden), while I have records from Devon (Plymouth and Tavy Valley), Dorset (Glanvilles Wootton), Somerset (Bath and Bristol), Hants, Essex, Cambs, Suffolk (Ipswich, Sudbury, and Felixstowe), Norfolk, Oxfordshire, Berks (Emborne), Hereford (Tarrington), and Glamorgan (Porthcawl), from March 15 to May 17. It never has been so common in my garden as *B. major* and I have not seen it in recent years; it is a magnificent hoverer in sunny places in woods, and is then very difficult to catch, but when attracted by low growing flowers or seen out in cool sunshine it is not difficult to secure. It is recorded from all Europe except the North and extends to the countries bordering on the Mediterranean (where it is most abundant) but it is curious that while not uncommon in England it does not appear to occur in Scandinavia, while *B. medius* is common there but does not occur in England. *B. medius*, which has the pubescence tawny or even pale yellow all round the abdomen, should still be sought for in England.

Synonymy.—This is now fully unravelled, though many old authors (including Walker) persisted in calling it *B. medius*.

2. **B. major** Linné. Tawny haired. Wings with an irregular but sharply defined dark brown foremargin extending to the tip and without any isolated spot. (Fig. 290.)

A very pretty conspicuous bee-like fly, which is quite distinct from any other British species.

- ♂. Frons brownish ashy grey with a middle furrow, clothed with long dense hairs which are black on its upper part but which become mainly light brown near the antennæ, and with some short (about a quarter the length of the long hairs) pale brown depressed pubescence about the border line between the frons and the side-cheeks; face produced (in profile) snout-like about as much as the length of the eyes, brownish grey, and clothed on the middle part with dense long mainly yellowish brown or brownish yellow hairs which droop at their tips, and intermingled with which are a few equally long black hairs, but towards the sides of the face the black hairs increase in number until all the long pubescence near the eyes becomes black and more erect, and this is caused by the yellowish brown hairs growing shorter and more drooping as they approach these sides; the long black hairs diminish in numbers downwards and are reduced to a single rather sparse row down the lower part of the eyemargins and round under the eyes to the hind eye-angle; jowls small, light greyish yellow, and bearing long whitish pubescence which is hardly so dense as the pubescence on the face, and with shorter (about one-third the length of the long pubescence) depressed whitish pubescence, and this long pubescence merges into the similar whitish pubescence on the lower part of the pleuræ; back of the head inflated to about as much as a third the length of the eye, and clothed with dense coarse dark tawny pubescence intermixed with which are numerous but not dense much longer erect thin black hairs, which rest as a sort of collar against the dense tawny pubescence of the thorax; vertex greyish black, triangular, elevated, and bearing a tuft of long exclusively black hairs. Proboscis dull black, about as long as the distance from the tip of the snout to the tip of the scutellum. Eyes touching for about as long a space as the length of the vertex, slightly widening downwards. Antennæ (fig. 285) dull black, about as long as the distance from the tip of the snout to the back of the head; basal joint linear, about five times as long as wide, covered with light grey dust, and bearing all over (except about the base) numerous long straight black hairs which point outwards and rather forwards; second joint about one-third the length of the basal one, long cup-shaped, and obscured by light grey dust but with the tip ferruginous, and bearing numerous short black hairs on the upper and outer sides which point forwards; third joint long strap-shaped, about twice as long as the basal joint, bare, slightly thickened about the middle; style short, two-jointed, with the basal joint quadrate and rather narrower than the tip of the third antennal joint, and the thinner and rather tapering end joint about twice as long as the basal one.

Thorax with a deep black ground colour obscured by very dense pale tawny pubescence; pubescence all equal as if shorn; when seen from above the deep black ground colour is visible, but the front part and sides appear dirty greyish yellow or greyish brown, and there is a pale yellow patch above each wing-base and a larger longer fan-like yellow patch behind each wing-base radiating down to the patch on the metapleuræ; seen from in front the pubescence appears to be dirty greyish white or greyish yellow or even brownish with broad paler or even almost whitish sides, and when tilted the sides after the wing-base are broadly shimmering yellow and then the disc of the thorax has a more brownish yellow tinge; seen from behind the pubescence has a unicolorous dirty brownish orange hue because the pale patches above and behind the wing-base are not visible unless the specimen be tilted almost upright; seen sideways the pubescence is mainly dirty whitish or brownish yellow, against which (when pale) the brownish tawny pubescence and the long black ciliation on the back of the head stand out conspicuously, while the pubescence above and behind the wing-base appears to be rather

tawny; no black or strong hairs exist anywhere on the dorsal part; pleuræ on the upper part with dark rufous tawny pubescence (so dark as to appear blackish until closely examined) extending broadly from the front part and usually narrowing to the wing-base, but not always very conspicuous when the dorsal pubescence is darkish, and below this dark band is a fairly broad white band (not very sharply defined) which extends from the jowls all along the lower part of the mesopleuræ until it rises quite up to the wing-base at the back part of the mesopleuræ; after this the pubescence on the pleuræ is longer and usually yellower, still dense and sloping backwards on all the space from the postalar calli to low down the pleuræ; all the lowest part of the pleuræ between and about the posterior coxæ are densely black haired, and this black pubescence extends outwards in a rather large deep black patch behind (even perhaps on to the base of the abdomen). Scutellar pubescence merged into that on the disc of the thorax.

Abdomen deep dull black obscured by very dense long pubescence which is mainly brownish orange, but the sides of the third segment (beginning widely on the fore part but narrowing back to the hind corners) bear black pubescence and form a black fascia across the belly, and when viewed from above the marginal pubescence of this third segment appears darkened, and in addition numerous isolated longer black hairs occur on the hindmargins of the second, third, and fourth segments, while on the fourth and subsequent segments similar black hairs are sparsely scattered all over the segments and stand out from the tawny pubescence; pubescence of the abdomen considerably longer than, but not so neatly shorn as, that on the thorax. Belly (when seen from beneath) with four conspicuous large white or whitish tufts which are separated cross-ways by the black fascia (broadest about its middle) and longitudinally by the blackish grey middle line which occupies about the middle third of the belly on about the basal half but less towards the tip.

Legs dull orange, but the coxæ, trochanters, and base of the femora black, leaving about the apical sixth of the front, nearly the tip half of the middle, and the apical two-thirds (or more on the upper side) of the hind femora, orange; extreme tip of hind femora darkened in front; tarsi darkened soon after the basal joint and becoming blackish on about the last three joints; front coxæ with long dense brownish white pubescence, middle pair with less abundant dark brownish pubescence, and the hind pair with blackish pubescence; all the femora with long but not at all dense blackish pubescence on about the basal half and also thereabouts (or closer to the base and specially noticeable on the front pair) with less erect long greyish pubescence which develops on the rest of the anterior femora into inconspicuous adpressed greyish white almost scaly pubescence, and on the hind femora into similar but more glistening whitish scaly pubescence; hind femora antero-ventrally with a row of about eight conspicuous rather long black bristles not extending quite to the base, and postero-ventrally with a similar row of smaller black bristles; tibiæ and tarsi with small black spines almost as in *B. discolor*. Pulvilli and claws almost as in *B. discolor*.

Wings (fig. 290) dark brown or almost blackish brown all across the base (though rather lighter on the alula), and the lower margin of this dark part sloping upwards steadily and determinately though irregularly from the end of the alula to the end of the marginal cell, but extending somewhat downwards into the discal and submarginal cells and as a spot connected with the dark marginal cell about half-way further on in the first submarginal cell; there are no hyaline or subhyaline spots in this dark part of the wing, but the rest of the wing is greyish hyaline without any dark spots or cloudings; discal cross-vein before the middle of the discal cell; the stout black basal part of the costa bearing a few small inconspicuous golden scales in front and behind; alulæ large, with a minute blackish brown fringe which becomes lighter on the outer part, and with a long rather conspicuous brownish orange or dull yellow fringe along the basal margin. Alar squamæ small, brown with a thick darker margin and with a long fringe which may form one of the orange tufts visible behind the base of the wing. Halteres small and very difficult to trace in the long dense pubescence, dark orange on the stem but the knob dark brown.

♀. Extremely like the male. Frons at the vertex one-third the width of the head, dark greyish brown, widening rapidly until a little below the antennæ, after which the face slightly contracts to the mouth; face at its widest part half as wide as the head; frons apparently bare about the middle and all across above the antennæ because there is no short scaly pubescence there, but actually with some long thin yellow hairs, and with short brownish tawny pubescence on the sides about the middle and across just below the ocelli, while all the upper part and the part below the short brownish pubescence bear long black by no means dense hairs; ocellar space with long black outstanding hairs. Eyes more rounded on their front margin (in profile).

Thorax almost as in the male, but the broad dark stripe along the pleuræ paler (even pale brown) and hardly so well defined and only rarely of at all a blackish hue. Sometimes (especially in large specimens) a number of inconspicuous black hairs occur on the middle near the front part of the disc, showing indications of the var. *australis* mentioned below.

Abdomen with the rows of long black bristles on the hindmargins of the segments better defined, and altogether with more numerous long black hairs; anus with a tawny fringe on its inner margin, but externally with a ring of longer black hairs.

Wings, etc., as in the male.

Length about 11 mm., but varying from 8 mm. to 12 mm.

This species appears to vary but little in British specimens except in size, but as it has a very wide geographical distribution local forms appear to exist; the var. *australis* Lw. is abundant in Southern Europe, and has a conspicuous patch of black hairs on the front part of the thorax just about where the V-shaped mark occurs in *B. discolor*; specimens from California have the dark longitudinal line down the belly almost absent, so that a practically entire snow white broad fascia exists before the black brown one, and possibly these may represent *B. fratellus* Wied. which in that case may claim varietal though probably not specific rank. It has some very close European allies, but *B. fimbriatus* and its nearest allies have the dark outer spot in the first submarginal cell quite isolated, while *B. basilinea* from Sicily is still doubtfully distinct, and *B. consanguineus* is accepted as only a variety.

B. major is not uncommon in early spring in the southern half of England; I have records from Devon (Plymouth and Tavy Valley), Somerset (Bristol), Hants (New Forest), Sussex (various localities), Kent, Essex (Epping Forest), Cambs (Dullingham), Suffolk (my own garden, where it can be looked for with confidence on any sunshiny day during its season), Norfolk, Oxford, Hereford (Tarrington), Cheshire, Warwickshire, Worcestershire, and Shropshire. Colonel Yerbury has taken it at Porthcawl in Glamorgan, and Duncan recorded it in 1838 from Raehills, Dumfriesshire, while Mr A. Adie-Dalglish has caught it at Riddon in Argyllshire, and a specimen was taken by Mr Anderson Fergusson at Ayr in 1896. I consider it distinctly commoner than *B. discolor*, and I think it is a rather less difficult species to capture. My dates range from March 27 to May 27. It is recorded from all Europe, and from Japan and North America. Dr T. A. Chapman gave (Entom. Mon. Mag., xiv., p. 197) long details of the larva and pupa of this species which he bred from the cells of *Andrena labialis*, and he called special attention to the cephalic spines of the pupa which he considered were expressly formed to tear down the clay-stopping in front of the pupa and to be in fact actual digging organs; he added that the pupa was the only one he knew that was "actually provided with mattock and shovel with which "to do its own navigating."

3. *B. canescens* Mikan. Pale tawny haired. Wings with the base and foremargin light brown. Head with numerous long black hairs behind the eyes; sides of the face and a cross-band under the antennæ black haired. Thorax without any black hairs between the humeri and the base of the wings. Femora mainly black.

A soft pale tawny haired clear winged small *Bombylius*, closely resembling the next species.

♂. Frons shallow triangular, blackish grey, and clothed with numerous long black hairs and still more numerous shorter rather depressed dull yellow hairs which however do not extend to the upper angle; face broad, produced at the upper part less than the length of the eyes and then sloping rapidly back to the lower eye-angle, greyish yellow where the pubescence is yellow but blackish where the pubescence is black, clothed on the middle part with dense long yellowish or whitish yellow hairs which droop at their tips and which are surrounded on their upper and side margins by a broad dense band of equally long but more erect deep black hairs, and this band contracts downwards and does not extend on to the lower part of the cheeks, where only the yellowish pubescence exists and even that in turn becomes pale yellow on the small ashy grey jowls and back of mouth and merges into the similar pubescence on the lower part of the pleuræ; back of the head considerably puffed out and bearing numerous though not very conspicuous long thin black hairs and a shorter denser coarse brownish yellow pubescence which rests like a collar on the similar pubescence of the thorax; viewed from in front the radiating long black hairs behind the eyes are conspicuous (being numerous though not dense) but do not quite extend to the upper eye-angles; vertex black, considerably elevated, and bearing a tuft of long pubescence which is brownish yellow and erect on its back part but black and directed forwards on its front part. Proboscis dull black, not quite so long as from the point of the face to the tip of the scutellum. Eyes touching for about as long a space as the length of the vertex, rather widening towards the lower part. Antennæ dull black; basal joint rather obscured by orange dust and bearing numerous long almost entirely black hairs (but perhaps with one or two yellowish hairs); second joint cup-shaped, with numerous very short black bristles; third joint strap-shaped with a small basal swelling, slightly increasing in size from the base to the middle and then decreasing to the tip, not quite bare and in very good specimens bearing just before the middle several glistening yellow dorsal scales; style as usual.

Thorax deep black, obscured by very dense equal long pale tawny or dirty pale yellowish pubescence; when seen from above the black ground colour is well visible all over the disc, but the front and sides show only brownish tawny or dirty brownish yellow pubescence which is hardly or only a little paler above the wing-base or on the large radiating patch of longer hairs between that and the corner of the scutellum; seen from in front, behind, or sideways the pubescence is all soft yellow or almost brownish yellow or even of a brownish tawny tint, against which (in the front view) the long radiating black hairs behind the eyes stand out distinctly; on the back part there is some minute scaly pale yellow pubescence similar to that on the scutellum; there are no black hairs anywhere; pleuræ with dense long pubescence similar to that on the disc of the thorax but growing paler below like the pubescence on the jowls. Scutellum with pubescence similar to that on the disc of the thorax and merging into it, but in addition with minute scaly pale yellow pubescence all over the disc.

Abdomen deep dull black, but densely covered with long pale yellow pubescence which has a more or less brownish tinge, and which is longer than that on the disc of the thorax but not so neatly shorn, while underneath that is a short scaly pale yellow pubescence; isolated long black hairs occur on the hindmargins of the second, third, fourth, and fifth segments

especially towards the sides, and these black hairs, though stronger and more rigid than the thin yellow hairs and longer than those on the fourth and fifth segments, are not very easily detected. Belly greyish black with no black hairs intermixed in the pale pubescence, but when seen from beneath the long black hairs on the sides and dorsal part of the abdomen become much more distinct.

Legs dull brownish orange, but the coxæ, trochanters, and most of the femora black, leaving the apical sixth of the anterior femora and the apical quarter of the hind femora orange; extreme tip of the hind femora with a blackish spot in front; tarsi black, but brownish at the base; coxæ and base of femora with long pale yellow or brownish yellow pubescence, which extends further along the anterior femora than along the hind pair; all the femora rather thickly though hardly crowdedly covered with dirty whitish scales; hind femora with a row of about seven long stiff black antero-ventral bristles not extended to the basal third or more; the small bristles on the tibiæ in rows of six or seven, and those on the tarsi apparently rather more distinct on the last four joints of the front pair. Pulvilli very small and ovate, dirty yellowish white.

Wings brownish or almost brownish orange across all the base to about the end of the anal cell and to about half-way across the subapical cell and onwards to the costa further on, but without any definite boundary, so that the hindmargin and the tip of the wing are broadly (more than one-third of the wing) rather brownish hyaline, or the wings may have no approximation to any defined boundary between the brownish orange base and the lighter tip and hindmargin; middle cross-vein just before the middle of the discal cell; thickened black base of the costa with numerous adpressed short golden hairs in front, above, and especially behind, the hairs on the back part being longer and less adpressed close to the base; aluke with a minute dark brown fringe, and with a long brownish yellow fringe on the inner edge. Alar squamæ not small, orange brown with a thick blackish brown margin and with long orange fringes. Halteres orange on the stem, and yellow or orange on the top of the knob.

- ♀. Extremely like the male. Frons at the vertex about one-quarter the width of the head but steadily widening down to below the antennæ where the face is about two-fifths the width of the head, dull black, with abundant scaly dull yellow pubescence of which the lower corners against the eyes and level with the antennæ form patches of more glistening scales which contrast with the adjacent long black pubescence of the side-cheeks, but on the upper half of the sides of the frons numerous long more erect black forwards-sloping hairs are intermixed, and lower down the frons (after an interval) are some shorter (though still long) erect black hairs; ocellar space as in the male with a tuft of long black hairs on all the fore part (which radiate forwards) and with numerous equally long dull yellow erect hairs on the back part. Eyes when seen in profile more rounded in front. Antennæ with the second joint almost bare, and the third joint with no yellow scales on its upper side.

Thorax, scutellum, and abdomen with more abundant very short depressed pale yellow scaly pubescence (hidden beneath the long pubescence) which is easily rubbed off and then leaves the abdomen dull velvety black. Anus pale orange with only very short yellow pubescence.

Legs with the small black bristles about the tip of the hind femora more obvious than in the male.

Wings more hyaline, being only a little brownish about the basal quarter and along the costa to the end of the subcostal cell.

Length about 8 mm., but varying from 7 mm. to 10 mm.

This species resembles *B. minor* only of the known British species, but has many close allies on the continent. It may be easily distinguished from *B. minor* and its allies by the postocular fringe of long black hairs. The closely allied *B. venosus* has hardly any black pubescence across the face just under the antennæ, and has the front part of the frons in the female almost entirely pale haired, and is a rather larger species which

Loew says occurs a little earlier in the year; my continental representatives of *B. venosus* have two distinct black præsutural bristles on each side of the thorax of which I can find no trace in *B. canescens*, and my continental males have a broader more puffed-out blackish grey frons; *B. venosus* is also said to be distinguished from *B. canescens* by the presence of black hairs on the pleuræ between the humeri and the wing-base, but I am not sure that this is a constant character. I give these details at some length because *B. venosus* is very likely to occur in Britain. I cannot satisfactorily distinguish light colored specimens of *B. variabilis* through their description, but it is not likely to occur here as it has a more southern range. *B. canescens* varies very much in size, and probably *B. fugax* was introduced by me as British on a very large specimen of *B. canescens* before I knew of its great variation in size.

B. canescens is by no means common in Britain though it is widely distributed and sometimes occurs in fair numbers. I have records from Cornwall (where I found it in some numbers near Penzance on July 11, 1871) Devon (Stowford Cleeve), Herefordshire, Worcestershire (Wyre Forest), Monmouth (Abergavenny), and Pembroke (Saundersfoot), while in Scotland it has occurred in Perthshire (Pitlochry), Kinross, and according to Duncan near Edinburgh; in Ireland Colonel Yerbury took it in 1901 commonly at Glengariff and Kenmare, and his remarks in the Irish Naturalist of March, 1902, are worth quoting. He says, "As nothing has been put on record regarding the hosts, ovipositing habits, etc., of this Dipteran the following notes may be of interest:—Roughty Bridge, near Kenmare, June 27. A female was observed hovering over a bit of bare ground containing numerous burrows of small Hymenoptera; she was hovering about 12 inches above the surface of the ground, and every now and again brought the point of her abdomen round under her thorax, and gave a sort of 'flick,' which gave one the impression that she was throwing off an egg; if such was the case, the eggs must be cast about at hazard, the larvæ finding their way after hatching to the nest of the Hymenopteron, either by clinging to the host, or else by crawling about until a suitable burrow is found. The above female Bombylius was caught, and also several bees, the apparent owners of the burrows over which she was hovering. The bees have been kindly identified for me by Mr Saunders as *Halictus rubicundus* and *H. nitidiusculus*."

"July 10th—South Bank of the Kenmare River, about one mile below the Suspension Bridge."

"On this occasion *Bombylius canescens* was flying in some numbers over a bank running alongside of a country road (a rough estimate of the numbers made at the time was forty specimens). In order to ascertain what was going on, a length of about 4 yards was selected and a watch kept on the insects working this stretch. The regular frequenters appeared to be eleven Bombylii, numerous bees, and a few Anthomyidæ. The Bombylii were, however, acting in a manner quite different from the female observed on the 27th June; several times one of them was seen to settle on the ground near the burrow of a Hymenopteron and to remain quite still, and it was assumed that she was ovipositing, but though the spot was carefully marked and the neighbourhood searched with a lens, no sign of an egg could be found, and the conclusion eventually arrived at was that they were not ovipositing, but were all

“ old spent females basking in the sun and making the most of the last few hours of their existence. All these (40?) Bombylii were much worn, and therefore useless as specimens. A stroke of the net was, however, made at one of them, and resulted in the capture of one bee and one Bombylius. The bee has been identified for me by Mr Saunders as *Halictus villosus*, female. *Bombylius canescens* appears, therefore, to be a parasite on more than one species of *Halictus*.”

It is most probable that this *Bombylius* was referred to by Dr T. A. Chapman in the Entomologist's Monthly Magazine of February 1878 when he wrote, “ I watched the oviposition of a small brown species, a number of years ago, when observing the habits of *Odynerus spinipes*. A portion of the same hot, sunny bank where *spinipes* had a colony was frequented by this species, which would approach tolerably close to me when I refrained from moving; the process of oviposition was conducted against the bank of earth in a manner closely similar to that adopted by dragon-flies on the surface of water; the fly (not, of course, a pair, as with dragon-flies) would approach the bank within an inch or so, and carefully examine it, and, if satisfied, would make a little sudden swoop, bringing the extremity of the body close to the bank, by passing from a horizontal to a sloping attitude, yet not touching it, the small white egg being seen to be thrown with a short jerk against the bank. On several occasions I noticed very closely the spot, but always failed to find the egg, which was not, however, surprising in the rough and cracked earth. I over and over again, however, satisfied myself that it was not thrown into the burrow of any bee, though *Halictus* and others were numerous in the same bank.” My records extend from May 27 to July 11, so that its period of occurrence is very distinct from the early spring species (*B. major* and *B. discolor*).

Synonymy.—Most of the British records of *B. minor* undoubtedly refer to *B. canescens*, and of three males in the Hope Museum one was labelled “*minor*” and one “*fulvus*,” while I expect my record of *B. posticus* Meig. (= *B. fugax* Wied.) was founded on a large specimen. Walker's description of *B. minor* when contrasted with his *B. ctenopterus* (= *canescens*) would seem to refer to true *B. minor*, as I have mentioned under that species; but Curtis' *B. minor* (Brit. Ent. 613) was obviously *B. canescens*.

4. **B. minor** Linné. Tawny haired. Wings without any conspicuous markings, though darkened on the basal half in the male. Head without any long black postocular fringe, and the face without any conspicuous black hairs. Legs orange.

♂. Frons small and triangular, bearing on the sides of the fore part short yellowish or whitish pubescence; face small, less than one-third the width of the head and hardly widening downwards, moderately produced just below the antennæ to about one-quarter the length of the eye but then sloping straight back towards the lower eye-angle, covered with light greyish yellow dust and clothed with dense rather long yellowish to whitish pubescence which is drooping at the ends of the hairs and which overhangs the very large mouth-opening like a drooping fair moustache; towards the eyemargins on the upper part of the side-cheeks there is only a short glistening scaly whitish yellow pubescence; the outer edges of the long pubescence include some thin nearly erect long black hairs; jowls pale greyish yellow and bearing rather long pale yellow pubescence which merges into similar pubescence on the under part of the pleuræ; the underside of the head and the space behind the mouth bear whitish pubescence; back of the head but little inflated and

clothed with dense coarse brownish orange pubescence, which grows paler on the lower part and includes no trace of long black hairs but forms a distinct short cropped collar against the longer paler pubescence of the thorax; vertex greyish brown, moderately elevated, and bearing a tuft of long (though not so long as in the other British species), mixed tawny and black hairs. Proboscis dull black, about as long as from the tip of the face to the tip of the scutellum. Eyes touching for about as long a space as the length of the vertex, and about equal in size from top to bottom. Antennæ dull blackish brown, longer than the head; basal joint linear, about four times longer than wide, and bearing (except at the base) long pale pubescence beneath but comparatively short dorsal pubescence; second joint slightly cup-shaped, and bearing only very short inconspicuous bristly hairs; third joint strap-shaped, slightly widest about its middle, not absolutely bare, and with a few pale scales on the upper side just before its middle; style very short.

Thorax dull black, but obscured by very dense long level (though rising into a sort of crest on the front part) tawny to almost whitish pubescence; seen from above the ground colour is not much obscured on the disc though the conspicuous brownish tawny pubescence obscures all the front part and sides, while the long radiating hairs of the fans between the wings and the scutellum are pale yellow; seen from in front or sideways the dense pubescence appears mainly soft pale yellow or brownish yellow with the front quarter (including the crest) whitish yellow; seen from behind it appears browner; no black hairs occur anywhere but at least two rather strong reddish orange præsutural bristles can be traced; pleuræ with almost equally dense but rather paler pubescence like that on the fore part of the thorax and on the lower part of the back of the head. Scutellum with pubescence similar to and merging into that on the disc of the thorax, and with scarcely any short scaly pale yellow pubescence.

Abdomen deep black, but covered with dense long brownish yellow or pale tawny pubescence, which is slightly longer than (but not quite so neat as) that on the thorax; hindmargin of the second segment and its neighborhood with numerous long black hairs extending round over the sides so as to form an indistinct fascia, and the third segment with similar but rather less numerous black hairs, but no black hairs elsewhere. Belly greyish black.

Legs dull brownish orange, with the thickened base of the front femora blackish and the base of the posterior pairs slightly darkened; hind femora with a blackish dot at the tip in front; tarsi beginning slightly darker than the tibiæ and soon growing blackish; coxæ with dense pale yellow or even whitish pubescence, and the anterior femora with a pale yellow fringe behind, and the hind femora with a little long pale pubescence about the base; femora almost covered with yellowish white scales; hind femora with an antero-ventral row of about six or eight long stiff black bristles and with a few smaller anterior and dorsal bristles about the tip; tibiæ and tarsi with the spicules almost as in *B. canescens*; pulvilli as in *B. canescens*.

Wings rather dark brownish all across the base, and this colour slopes indefinitely upwards and outwards to about the end of the subcostal cell but has no defined boundary; rest of the wing hyaline with a greyish brown tinge; small cross-vein just before or at the middle of the discal cell; thick black basal part of the costa as in *B. canescens*, but with shorter and more whitish scales; alula smoky blackish with a minute pale brown fringe on the outer part and a long conspicuous whitish yellow fringe all along the margin near the base. Squamæ (alar) not small, brownish yellow with a slightly darker thick margin on which is a long pale yellow fringe. Halteres brownish yellow, with the top of the knob yellowish.

- ♀. Very much like the male, but the wings much less infuscated. Frons at the vertex about a quarter the width of the head, but the eyes gradually diverging until half-way down the face; frons greyish white and bearing rather dense coarse whitish pubescence which slopes forward, and with the pubescence on the part just in front of the ocelli longer, more erect, and tawnier, but without any glistening scales on or near the frons; face also greyish white with longer whitish rather coarse drooping pubescence on the upper half even to the sides but not extending far down the sides of the mouth, and with no trace of black hairs; postocular pubescence scaly and depressed, whiter and

shorter than the coarser pubescence behind it, and agreeing with the main pubescence on the frons; ocellar space with some inconspicuous forwards-directed black hairs between the ocelli.

Thorax slaty grey with three broad light brownish stripes; pubescence dense as usual and mainly pale yellow, but brownish tawny on the three brown stripes so that the middle stripe extends to the front but the broader side stripes are considerably abbreviated anteriorly; a few scattered black hairs can usually be traced on at least the hind half of the disc; there are about three obvious reddish orange præsutural bristles, and the large depressed tufts of long pale hairs on the postalar calli are conspicuous. Scutellum without the short scaly pale yellow pubescence which occurs so freely in *B. canescens*, and with some rather inconspicuous upturned long hairs on the margin.

Abdomen greyish black but obscured by the abundant long tawny and pale yellow pubescence and by short almost scaly brownish yellow pubescence which does not occur in the male; hindmarginal cross-rows of long strong black hairs more conspicuous than in the male, and there is a row on the hindmargin of the fourth segment, and even a sparse row on the fifth segment; anus with only very short yellow pubescence.

Legs almost as in the male but less darkened at the base of the femora, and the antero-ventral bristles on the hind femora rather more numerous.

Wings not at all brown about the base or fore part, though the thick brownish subcostal vein tinges its neighborhood; alulae lighter brown with a blackish marginal line.

Length about 8 mm.

This species has numerous allies on the continent, but at present has only one in Britain. *B. canescens* is easily distinguished by its postocular fringe of long black hairs and by the band of dense black hairs across the upper part of the face; other continental allies may be distinguished by their blacker legs and differently placed discal cross-vein, and I think that a black legged species occurs in England. It varies in the extent of the darkening on the wings of the male, in the tint of the pubescence, and I believe in the more or less distinctness of any stripes of darker pubescence on the thorax of the female. *B. minor* has been very seldom correctly recorded as British, as practically all the old records referred to *B. canescens*; it is however probably a fairly common inhabitant of the large commons in Dorsetshire, and it has also occurred in the Isle of Wight; the British Museum possesses a specimen from Barmouth, and the Rev. E. N. Bloomfield recorded one as taken by Mr Tuck at Tostock in Suffolk, but I suspect that that was only *B. canescens*; there are also three or four specimens in the Entomological Club collection. It was not uncommon on Studland Heath in Dorset on August 22 to 28, 1906, but the males were extremely difficult to catch; they could be detected by their shadow or by their shrill humming note, but they dodged any ordinary stroke of a net; the females were more easily captured while hovering in front of low-lying blossoms, and some were taken on August 24 and 26 at Arne on the flowers of sea lavender (*Limonium*). It is a late summer insect as my records of dates extend from July 11 to August 28, but no specimens were found after the latter date.

Synonymy.—There can be no doubt that almost all the old English records of *B. minor* referred to *B. canescens*, but several specimens of the true *B. minor* exist in the Dale collection at Oxford mainly under the name of *B. ctenopterus*. A small male in the Hope Museum (presumed to be British) labelled "*posticus*" may be a small *B. cinerascens* but is certainly not *B. posticus* (= *B. vulpinus*); a larger male in the same collection labelled *minor* (both in MS. and in print) is *B. fulvescens*, but has no history to prove it British. Walker's description probably referred to the true *B. minor* because it is evident that his *B. ctenopterus* was founded on *B. canescens*, but I do not trust his record for Scotland.

LOMATINÆ.

Præfurca ending (as in *Bombylinæ*) almost opposite the base of the discal cell. Antennæ approximated at the base. Proboscis usually short. Abdomen rather oblong but not cylindrical.

Head hardly transverse, as broad as or rather narrower than the thorax, never depressed, but fitted closely on the thorax. Face usually and often considerably produced over the large or long narrow mouth-opening. Frons large, almost as in *Anthracinæ*. Occiput rather or considerably inflated and not bearing any strong bristles. Proboscis usually short and thick, with rather large sucker-flaps, but sometimes porrect and long though hardly so conspicuously as in the *Bombylinæ*. Eyes of the male very much approximated or even touching, and often with an indentation at the middle of the hindmargin which indicates the commencement of an impressed line bisecting the eyes transversely. Antennæ approximated at the base, but not always closely so (*Lomatia*) and sometimes widely separated (*Aphæbantus*, *Epæmus*); basal joint only moderately long, and often thick; style practically absent.

Thorax not humped nor with the prothorax unusually developed; mesonotum usually with two or three præsutural bristles on each side, and often with postalar bristles, but without any dorso-central or prothoracic bristles, and sometimes (*Comptosia*) without any bristles. Scutellum large, with the disc flat, and the broadly rounded margin without any strong bristles.

Abdomen longer than broad, rather flattened, rather oblong, never broad or round or globular (rather conical in *Antonia*), and never in the least tubular and bare as in *Systropinæ*, not depressed at the base nor drooping, and without any bristly pubescence.

Legs without spines beneath the femora or with only a few slight ones, but the tibiæ with spicules.

Wings (fig. 293) with the radial and cubital veins diverging from the short præfurca at a very acute angle almost opposite the base of the discal cell and consequently far before the discal cross-vein; subcostal vein rather long; cubital fork usually wide open as in *Bombylius*; cubital vein always forked, and the submarginal cells two or three; radial vein almost always strongly looped a little before its end and then curved up so that it ends rectangularly or even recurved into the costa; discal cross-vein usually placed near the end of the discal cell, and often sloping; posterior cells four, the first one either open or closed; anal cell open (closed in *Prorachthes*).

The *Lomatinae* are dealt with here in a more restricted sense than heretofore, as the bristly species which have a tubular abdomen [*Tomomyza*, *Amictus* (including *Thlipsomyza*), and *Cyllenia*] have been relegated to the *Toxophorinæ*. The subfamily may now be distinguished from the *Toxophorinæ* by the rather oblong flattened abdomen, by the absence of bristles or bristly hairs on the disc of the thorax or on the abdomen, by the thorax not being humped and the head and abdomen not depressed, by the comparative absence of scaly pubescence, and usually by the shorter proboscis and basal joint of antennæ. They hardly require comparison with the *Systropinæ*, and the short præfurca and position and style of the divergence between the radial and cubital veins at once distinguish them from the *Anthracinæ*, but it is difficult to draw a fixed line between them and the *Bombylinæ*. The most obvious distinctions from

the *Bombylinæ* lie in the rather flattened oblong abdomen, and the absence of dense furry pubescence, as well as the usually shorter proboscis, but in cases of doubt attention should be given to the pronounced loop near the end of the radial vein, and to the position of the discal cross-vein which in the *Lomatinae* is frequently placed quite near the end of the discal cell, a character which (I believe) is not shared by any other subfamily of the *Bombylidae*, and this discal cross-vein is often sloping in *Lomatinae*; the absence of any alula or hind angle of the wing is also more usual in *Lomatinae* than in *Bombylinae*.

Table of the Palaearctic Genera of LOMATINÆ.

This subfamily has never been clearly differentiated, and I have removed several genera with a long proboscis and an almost bristly abdomen to the *Toxophorinae*, to which subfamily I have also removed *Tomomyza* because of its humped figure. Other genera (*Plesiocera*, *Codionus*, etc.) are not well known and may not belong here, so that altogether this table is only a tentative one.

Proboscis short in all Palaearctic genera.

1 (4) Anal cell closed, or almost so.

2 (3) First posterior cell open.

Pubescence rather scaly.

PRORACHTHES.

3 (2) First posterior cell closed and petiolate.

Venation almost as in fig. 292, but the discal cross-vein placed at the middle of the discal cell, the radial vein less looped, and the upper branch of the postical vein forming part of the lower margin of the discal cell for a shorter distance.

CONONEDYS.

4 (1) Anal cell open.

5 (10) Discal cross-vein before (or very near) the middle of the discal cell.

6 (9) Upper branch of the postical fork forming the lower margin of the discal cell for only about one-fifth of the length of the latter.

7 (8) Antennæ approximated at the base.

Thorax with obvious præsutural, postalar, and scutellar bristles. Hind femora only slightly spinose beneath.

PLESIOCERA.

8 (7) Antennæ widely separated at the base.

APHCEBANTUS.

9 (6) Upper branch of the postical fork forming the lower margin of the discal cell for a long distance.

Hind femora not spinose beneath. A little known and unsatisfactory genus.

CODIONUS.

10 (5) Discal cross-vein much beyond the middle of the discal cell and sloping obliquely.

- 11 (12) Alula and hind-angle of wing rather well developed (fig. 292); first posterior cell closed or contracted.

Præsutural and postalar bristles present. Spines beneath the femora numerous but small.

ANISOTAMIA.*

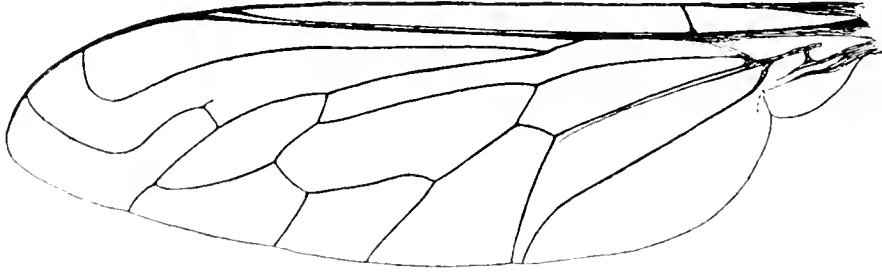


FIG. 292.—*Anisotamia ruficornis* ♀. (From a specimen in the Paris Museum.)

- 12 (11) Alula almost absent, and hind angle of wing almost or quite sloped away (fig. 293).

Only two or three præsutural bristles. Basal joint of antennæ short.

- 13 (14) Submarginal cells two only (fig. 293).

Abdomen rather oblong and flattened. Hind femora without any bristles beneath. First posterior cell open, only moderately contracted.

LOMATIA.

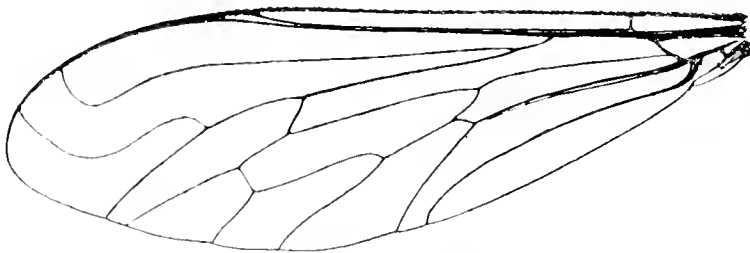


FIG. 293.—*Lomatia lateralis* ♀. × 10.

- 14 (13) Submarginal cells three.

Abdomen long and narrow, rather conical. First posterior cell closed.

ANTONIA.

* Macquart's figure of the wing of *Anisotamia* (Dipt. Exot. ii., T. xiv., F. 2) undoubtedly refers to *A. ruficornis*. Williston considers *Anisotamia* to be only a section of *Oncodocera*.

TOXOPHORINÆ.

Præfurca ending (as in BOMBYLINÆ) almost opposite the base of the discal cell. Antennæ usually very long, approximated at the base. Thorax usually very much humped, with the head and abdomen remarkably depressed; thorax (except in *Eclimus*) with strong bristles on the disc or sides. Abdomen long and tubular.

Head moderately transverse but rounded behind the eyes, as wide as or rather wider than the thorax, usually depressed and almost at a right angle with the equally depressed abdomen. Face usually produced over the long and narrow mouth-opening. Ocellar space with a pair of strong bristles in *Toxophora*, but ordinarily the frons with only the usual tuft of pubescence. Occiput more or less inflated, and without any occipital or postocular bristles (except some strong bristles in *Lepidophora* which are placed quite out on the back of the head); ocelli distinct. Proboscis usually long and thin, though hidden in the long mouth-opening in *Tomomyza*, short and thick in *Cyllenia*, and not very long in *Lepidophora*. Palpi very long and thin in *Toxophora*, but short in *Cyllenia*, *Amictus*, and *Tomomyza*. Eyes of the male touching or closely approximated and the front facets sometimes rather enlarged, but the eyes have no indentation at the middle of the hindmargin. Antennæ porrect, closely approximated at the base, usually very long, but only as long as the head in *Eclimus* and short in *Tomomyza*; basal joint usually very long and thin (much longer than the head in *Toxophora*); in *Lepidophora* the antennæ bear plume-like scales, especially on the third joint.

Thorax so much humped, and the head and abdomen (except in *Thevenetimyia*) each so much bent down that they are almost at right angles to one another (fig. 294); prothoracic plates so much developed in *Toxophora* and *Lepidophora*

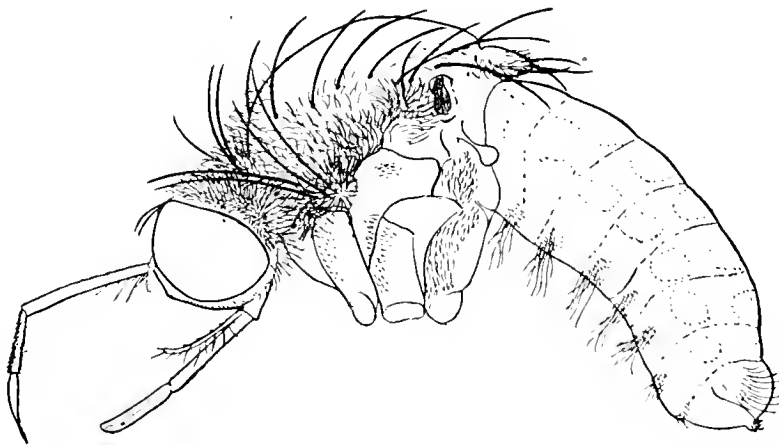


FIG. 294.—*Toxophora maculata*.

as to meet dorsally and form a sort of shield (as in *Philopotinae*) between the mesonotum and the head, and this shield bears several strong bristles, which in *Toxophora* are curved; mesonotum with strong præsutural and (except in *Eclimus*, *Thevenetimyia*, etc.) postalar bristles, besides more or less distinct dorso-central bristles. Pubescence in *Toxophora* and *Lepidophora* mainly scaly. Scutellum rather large, and in *Toxophora*, etc., with strong marginal bristles; in *Toxophora* and *Lepidophora* the disc of the scutellum forms a flattened arch right on to the abdomen (as in *Systropinae*).

Abdomen tubular and elongate, sometimes (*Eclimus*, *Thevenetimyia*, and to a certain extent *Lepidophora* and *Amictus*) very elongate and narrow, drooping from the thorax (except in *Eclimus*, etc.), and sometimes (*Amictus* and *Cyllenia*) bearing

strong bristly hairs. Pubescence in *Toxophora* and *Lepidophora* mainly of a scaly nature, and the males of *Lepidophora* and *Thevenetimyia* with splayed out lateral tufts of scaly feathers which apparently mimic the anal tufts of *Sesiidæ* (*Lepidoptera*).

Legs with strong bristles beneath the hind femora (except in *Eclimus*, and only slight in *Thevenetimyia*) but limited to the apical part in *Toxophora* and occurring in the male only of *Cyllenina maculata*, and with conspicuous bristles or spicules on the hind tibiæ (except in *Eclimus* and its allies).

Wings with the radial and cubital veins diverging at an acute angle almost opposite the base of the discal cell and consequently far before the discal cross-vein, and this cross-vein upright and placed slightly or considerably beyond the middle of the discal cell; radial vein varying from not being looped at all before its end (*Toxophora*) to being exceedingly looped (*Lepidophora*); cubital fork short and wide open; submarginal cells two or three; posterior cells three or four; anal cell closed and petiolate in *Toxophora*, and closed at the wingmargin in *Lepidophora*, but open in the other genera; alula and hind angle of the wing well developed in *Toxophora*, and *Lepidophora*, but weak in *Tomomyza*, and absent in *Amictus* and *Cyllenina*.* Squamæ usually with only a slight fringe, but in *Toxophora* with a remarkably long rigid one.

Some of the species of *Lepidophora* and *Thevenetimyia* seem to mimic *Sesiidæ* (*Lepidoptera*).

The *Toxophorinæ* were suggested as a separate subfamily by Schiner in 1868 (Novara Reise, Dipt., 116) for *Toxophora*, *Eclimus*, *Lepidophora*, *Eniconeura*, *Systropus*, and *Dolichomyia*, upon the characters of three posterior cells, the structure of the antennæ, the usually humped thorax, and the usually very long and narrow abdomen. Of these genera *Systropus* and *Dolichomyia* are now separated off into the subfamily *Systropinæ*, and *Eniconeura* is synonymous with *Toxophora*. *Lepidophora* has four posterior cells, and in many ways is so much allied to *Toxophora*, especially in the remarkable development of the prothorax, that at one time I was inclined to restrict the *Toxophorinæ* to these two genera, but when I tried to define the *Lomatinae* I came to the opinion that *Amictus* and *Cyllenina* through their tubular elongate abdomen, their drooping head and abdomen, their long proboscis (in *Amictus*), and their unusual bristliness, had more in common with the *Toxophorinæ* than with the *Lomatinae*, and then I came to the conclusion that *Eclimus* (with its allied genera) and *Tomomyza* (from its affinity to *Cyllenina*) must also join them. *Eclimus* and *Thevenetimyia* differ in many ways from the subfamily characters, as their thorax is not humped nor the abdomen so much drooped, while the bristles are reduced to about two præsutural, and the basal joint of the antennæ is only moderately long. *Tomomyza* has an *Anthrax*-like appearance and a short proboscis, but does not readily associate with the *Lomatinae*. Like Osten Sacken I must leave further developments of the grouping of these genera to the monographer.

Table of the Palearctic Genera of TOXOPHORINÆ.

- 1 (2) Prothorax exceedingly developed so as to form a dorsal shield between the mesonotum and the head. Anal cell closed.

* Bigot's collection contained a single specimen each of *Eclimus Quedenfeldti* and *E. venosus*; *E. Quedenfeldti* has a fairly well-developed alula and hind angle, but in *E. venosus* both are entirely absent.

Squamæ with very long rigid fringes. Proboscis long and stiff. Ocellar bristles (2) long and distinct. Basal antennal joint long and thin. Tibiæ very bristly. Posterior cells three only (fig. 296); radial



FIG. 295.—*Entoneura fuscipennis*.
(From a specimen in the Paris Museum.)



FIG. 296.—*Toxophora maculata* ♂. × 12.

vein ending almost straight; anal cell petiolate. The American genus *Lepidophora* has four posterior cells and a very much looped radial vein.

TOXOPHORA.

- 2 (1) Prothorax almost normal. Anal cell open.

Ocellar bristles merged into general pubescence (unless moderately distinct in *Amictus*). Squamæ with short inconspicuous fringes. Posterior cells four.

- 3 (4) Thorax scarcely humped, and without any strong bristles except about two præsutural ones. Abdomen, even if arched, beginning on the same plane as the thorax, long, narrow, and hairy. Hind femora without spines beneath, tibiæ almost bare.

Proboscis long and thin.

ECLIMUS.

- 4 (3) Thorax strongly humped, and usually with strong bristles or bristly hairs on the disc besides distinct præsutural, postalar, and scutellar bristles. Abdomen pendulous. Hind femora beneath often, and the tibiæ always with strong spines.

- 5 (8) Proboscis long, protruding far (*Amictus*) or moderately (*Cyllenia*) beyond the mouth-opening. Discal cross-vein far beyond the middle of the discal cell.

Wings short and narrow.

- 6 (7) Proboscis long and thin, conspicuously porrect. Basal joint of antennæ long and cylindrical, second joint short, third joint long, thin, and pubescent; antennæ nearly as long as the head (fig. 297).

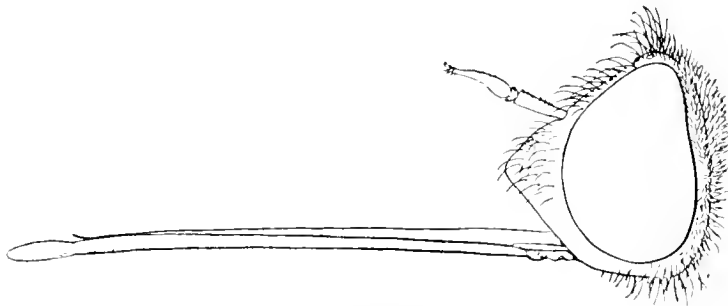


Fig. 297.—*Amictus pictus* ♀. × 10.

First posterior cell open or closed; radial vein not abruptly up-curved at the tip. Hind femora spinose beneath. Palpi thin.

Submarginal cells two (fig. 298).
Submarginal cells three.

Amictus.
Thlipsomyza.

AMICTUS.

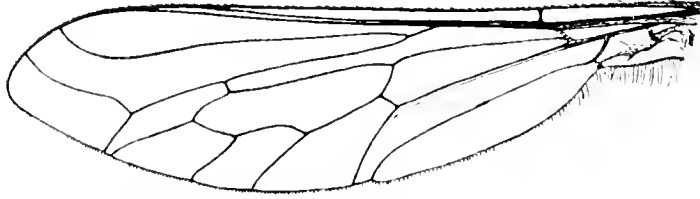


FIG. 298.—*Amictus pictus* ♂. × 12.

- 7 (6) Proboscis stout and only slightly produced beyond the mouth-opening. Basal joint of antennæ thick, third joint short; antennæ less than half the length of the head, and without any style but with several bristly hairs in its place (fig. 299).

Radial vein sharply upcurved at its tip; submarginal cells three (fig. 300). Dorso-central rows of bristles long and continued up to the

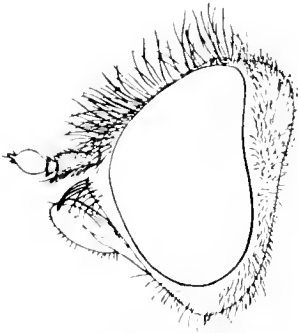


FIG. 299.—*Cyllenia maculata* ♀. × 14.

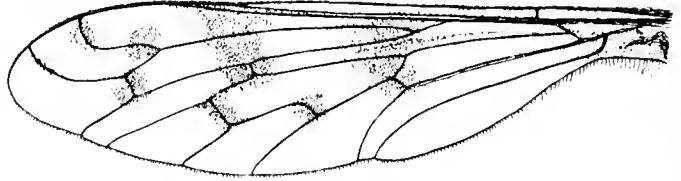


FIG. 300.—*Cyllenia maculata* ♀. × 12.

fore part of the thorax. Hind femora with a long spinose ciliation beneath in the male but practically bare in the female. More allied to *Tomomyza* than to *Amictus*.

CYLLENIA.

- 8 (5) Proboscis short, hidden in the very long and narrow mouth-opening over which the face is extended roof-like. Discal cross-vein hardly beyond the middle of the discal cell in *T. europæa* (fig. 301).



FIG. 301.—*Tomomyza europæa* ♂. × 12.

Abdomen conico-tubular and rather drooping. Thorax with bristles and thin bristly hairs.

TOMOMYZA.

SYSTROPINÆ.

Very elongate, thin, bare, long-legged species. Basal joint of the antennæ very long, thin, and almost bare. Occiput hollowed out. Posterior cells three only.

Head (fig. 302) transverse, when seen from above more than twice as broad as long; face and frons quite bare; mouth-opening long and narrow, being extended almost up to the antennæ. Below the touching eyes the small frons and the narrow face gradually widen down to the lowest level of the eyes, the face at its middle being only about one-eighth the width of the head and widening to about one-sixth at the lowest part; back of the head excavated and bare; ocelli three, placed on a small but distinct tubercle. Collar small and short. Proboscis long, thin, and porrect, as long as or twice as long as the thorax; palpi small. Eyes in both sexes bare and touching on the frons (narrowly separated in the female of *S. chilensis* and of *Dolichomyia*), and without any indentation at the middle of the back margin; facets in the male rather larger above and in front than in the female. Antennæ very elongate, thin, and porrect, as long as the head and thorax together (but in *S. chilensis* only about as long as the head), very closely approximated at the base and scarcely diverging up to the end of the long thin basal joint; basal joint nearly or quite half the length of the antennæ and with some minute bristles beneath; second joint about a third the length of the first, and diverging; third joint still more diverging, elongate but slightly widened, flattened, and usually pointed.

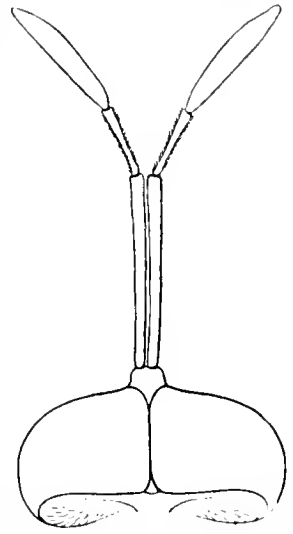


FIG. 302.—*Systropus fenoides*.
× 9.

Thorax humped anteriorly though not conspicuously so, bare of all bristles and with very slight short pubescence, but with a large præalar depression on each side; prothorax moderate in size and without bristles; hypopleuræ and metapleuræ large or very large, and bearing slight down but no bristles. Scutellum rather small, sloping down from the thorax to the abdomen and concealing the middle part of the metanotum, but the latter has a peculiar always pale colored membranous tubercle on each side.

Abdomen very long, thin (like *Leptoqaster*), and quite bare, with nine segments in the male, but only eight in the female. Genitalia (=last segment) of the male usually moderate in size though distinct and sometimes knobbed, of the female sharply compressed and ending on the underside in two small points.

Legs rather short and thin on the anterior pairs, but the hind pair very long and rather thickened, bare of bristles and pubescence except for three rows of spicules and some short spurs on the hind tibiæ and some plantar spines on the tarsi, and in some species an antero-ventral spine occurs near the middle of the hind femora.

Wings (fig. 303) comparatively short, being much shorter than the elongate

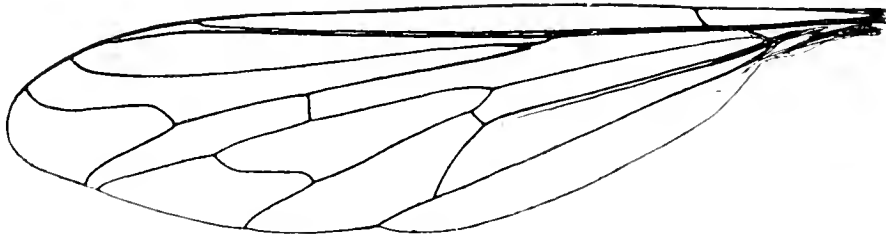


FIG. 303.—*Systropus fenoides*. × 7.

abdomen; mediastinal and subcostal veins very long; præfurca very short; radial vein only moderately curved up to the costa and ending nearer to the subcostal than to the upper branch of the cubital fork; submarginal cells two, rarely

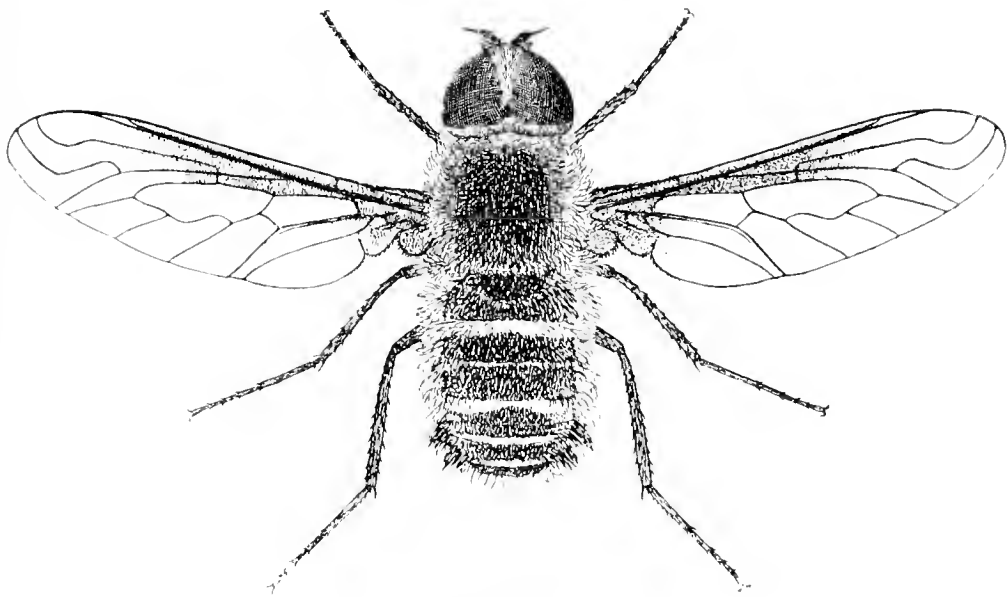
three ; posterior cells three only, all open, first one long and usually narrowing towards the wingmargin ; cubital fork wide open ; discal cross-vein upright and placed after the middle of the discal cell ; anal cell closed and petiolate ; alula absent, and the hind angle of the wing quite shelved off. Squamæ apparently absent, but the alar pair existing though small. Halteres very conspicuous, on long stalks.

This subfamily is difficult to locate. The three posterior cells and wide open cubital fork at once place the species in the *Bombylidae*, but they are as widely removed as possible from the *Bombylinae* and *Anthracinae* ; their nearest allies are apparently the *Toxophorinae* (with which Schiner united them because of the three posterior cells), and with which they somewhat agree in the shape of the body, in the elongate basal joint of the antennæ, and in the sloped scutellum, but from which they are very distinct in the absence of bristles or pubescence and in the hollowed-out back of the head. They are apparently mimics of *Amphiphila* (*Hymenoptera*), but give an idea in structure of *Leptogaster* (*Asilidae*).

The *Systropinae* are composed of only two genera (*Systropus* and *Dolichomyia*) and about forty species, which mainly occur in Africa, Asia, and North and South America, though quite recently some Chinese species have been described. The larvæ are parasitic on Lepidoptera (*Limacodes*).

Synonymy.—The erroneous spelling *Xystropus* was first suggested by Agassiz in 1846.

ANTHRACINÆ.

FIG. 304.—*Anthracinus circumdatus* ♂. × 5.

Præfurca long, ending almost opposite the middle of the discal cell, and usually close to the discal cross-vein (unless the latter be placed beyond the middle of the discal cell); radial vein usually appearing to start out of the cubital vein at a right angle. Antennæ well separated at the base. Proboscis usually short. Abdomen rather oblong and rather flattened.

Head transverse, about as broad as the thorax and closely fitted against it even though considerably puffed out at the back, and without any bristles; frons large. Proboscis porrect, but almost always short and usually thick, with fair-sized sucker-flaps. Eyes often hardly more approximated in the male than in the female, and often with an indentation at the middle of the hindmargin. Antennæ rather or very widely separated at the base; basal joint not specially long or bare.

Thorax rather flat, clothed with moderate or rather dense pubescence, and usually with traces of præsutural, supra-alar, and postalar bristles but with no bristles on the disc.

Abdomen distinctly longer than broad, almost oblong, but neither tubular nor drooping, and usually bearing soft pubescence.

Legs thin, though not so thin as in *Bombylinae*, often with spines beneath the femora and always with spicules and an apical circlet of small spines on the tibiae. Pulvilli usually obsolete; claws sometimes toothed at the base, and the front claws much shorter than the others.

Wings (fig. 304) with the radial vein usually appearing to arise at a right angle out of the straight vein formed by the unusually long præfurca and cubital vein, and not arising until nearly opposite the middle of the discal cell and close to the discal cross-vein when the latter is near the middle of the discal cell; subcostal vein long; radial vein usually more or less looped before its end; submarginal cells two, three, or four (or even five), caused by an adventitious almost upright veinlet connecting the upper branch of the cubital fork with the radial vein (fig. 306), and by another nearer the wingmargin connecting the branches of the cubital fork with each other (fig. 305); cubital fork rather short and wide open; posterior cells four or three, the first being either open or closed; upper branch of the postical vein usually forming a considerable portion of the lower margin of the discal cell, but sometimes the contact is only punctiform; anal cell open.

The *Anthracinæ* are the most sharply defined subfamily in the *Bombylidae*, owing to the long præfurca and the peculiar divergence of the radial vein at its fork from the cubital, the oblong flattish figure, the well separated antennæ, and (usually) well separated eyes in both sexes; *Henica* Macq. (= *Lagochilus* Lw.) is peculiar in having the discal cross-vein placed much further on towards the end of the discal cell, and in *Mulio* and *Callistoma* the divergence of the radial and cubital veins is not very abrupt and takes place before the middle of the discal cell, but the long præfurca readily distinguishes them from the other subfamilies. The upper knee-like angle at the divergence of the radial vein frequently throws back an incomplete recurrent veinlet towards the base of the wing, but such veinlet is seldom of even specific value, and even the adventitious cross-veinlets from the upper branch of the cubital fork are in some cases not of specific value, though they have been used in some cases for generic distinctions; the first posterior cell may be open or closed in closely allied species, but is wide open in all the British species.

Synonymy.—The distinct appearance of the *Anthracinæ* as contrasted with the common species of *Bombylius* early gave rise to a suggested family *Anthracidae*, but a wider knowledge has relegated them to their proper position as a subfamily of the *Bombylidae*.

Table of Palearctic Genera of ANTHRACINÆ.

- | | | |
|---|---|--------------|
| 1 | (4) Proboscis long, horny, and pointed at the tip. Radial vein diverging from the præfurca well before the discal cross-vein. | |
| 2 | (3) Abdomen narrow and tubular. | CALLISTOMA. |
| 3 | (2) Abdomen broad and flattened. | MULIO. |
| 4 | (1) Proboscis short, with fairly broad sucker-flaps. Radial vein diverging from the præfurca close to the discal cross-vein. | |
| 5 | (6) Submarginal cells four (fig. 305). Claws not toothed near the base. | HYPERALONIA. |
| 6 | (5) Submarginal cells three (fig. 306) or two (fig. 304). Claws toothed near the base. | |

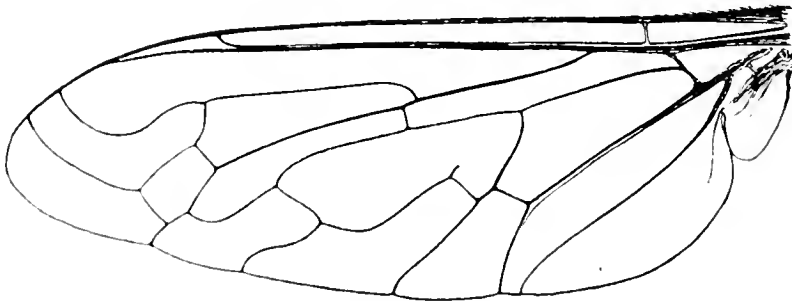


FIG. 305.—*Hyperalonia ferrea*. × 6.

- 7 (10) Submarginal cells three (fig. 306), *i.e.*, the upper branch of the cubital vein connected by a cross-vein with the radial.

- 8 (9) Third joint of the antennæ elongate-conical, with a more or less long style separated from the cone by a distinct suture and ending in a microscopic bristle, but without any apical pencil of hairs (fig. 307). Pulvilli undeveloped.

N.B.—These characters do not apply to several European species

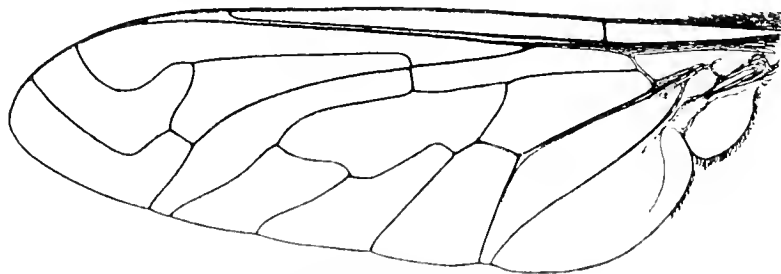


FIG. 306.—*Exoprosopa Minos* ♀. × 6½.

which have been placed in *Exoprosopa* simply because they have three submarginal cells and apparently a terminal style, e.g., *E. stupida* has no separated style but only the apical microscopic bristle, and *E. Pallasii* has only a short rather thick style.

EXOPROSOPA.

- 9 (8) Third joint of the antennæ and its style as in *Argyramæba* (fig. 308). Pulvilli developed. SPONGOSTYLUM.
- 10 (7) Submarginal cells two only (fig. 304).
- 11 (12) Antennal style separated from the prolongation of the third antennal joint by a distinct suture, and bearing an apical pencil of hairs (fig. 308). Pulvilli developed.

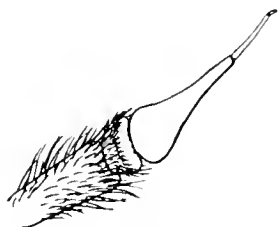


FIG. 307.—*Exoprosopa Jacchus* ♂. × 33.



FIG. 308.—*Argyramæba sinuata* ♀. × 22.

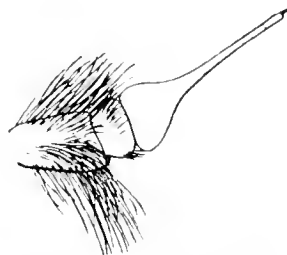


FIG. 309.—*Anthrax Paniscus* ♂. × 33.

Third antennal joint usually shaped like a flattened onion except for the contrasted style-like prolongation, but stages occur in which it is more conical.

ARGYRAMÆBA.*

- 12 (11) Antennæ with the third joint produced into a long style-like cone which bears a microscopic apical bristle but no pencil of hairs (fig. 309). Pulvilli usually undeveloped.

Contact of the discal cell with the third posterior at least twice as long as with the postical, the latter contact being sometimes only punctiform.

3. ANTHRAX.*

* Bezzi contends that *Argyramæba* should be called *Anthrax*, and that *Anthrax* in the sense used above should be called *Hemipenthes*.

3. ANTHRAX.

Anthrax Scopoli, Ent. Carn., 358 (1763)?

Large, medium-sized, or even small flies of black or brownish red colour, often bedecked with particolored or pale pubescence.

Head semicircular, inflated behind but slightly inarched at the middle, as broad as or a little broader than the thorax. Face very short, sometimes conically projecting but sometimes only gently convex; mouth-opening large; ocelli three. Proboscis only a little produced, or withdrawn into the mouth-opening; sucker-flaps rather broad; palpi small, thin, and cylindrical, apparently not jointed. Eyes of the male separated on the frons, but not quite so widely as in the female, both sexes with an indentation at the middle of the hindmargin. Antennæ porrect, short, widely separated at the base; basal joint short and cylindrical; second joint cup-shaped; third joint ranging from the shape of an elongate cone to that of a flattened onion, with a filiform style; style not bisected, and with a microscopic bristle but no pencil of hairs at its tip.

Thorax quadrate with rounded angles, wider behind than in front, and with indistinct præsutural but distinct postalar bristles. Scutellum broad and short, without any marginal bristles; metanotum completely concealed.

Abdomen rather flat and oblong, longer than the thorax, with seven segments. Genitalia small and almost hidden, with the male forceps placed asymmetrically in connection with the abdomen; ovipositor with a circlet of short blunt spines.

Legs rather long, but not so thin as in *Bombylius*; hind pair lengthened and often bearing conspicuous scaly pubescence, while all the femora and tibiæ may bear some shorter more depressed scaly pubescence; front tibiæ sometimes quite bare, or sometimes with small spicules; posterior tibiæ with an apical circlet of spines; front tarsi varying in shape and in nature of pubescence; front claws varying in size; pulvilli absent or usually very small, but sometimes fully developed.

Wings in life half open when at rest, very often with variegated markings and spots; cubital vein with a wide open fork, of which the upper branch is strongly S-swung and ending in the costa very much nearer to the radial vein than to its own lower branch, sometimes with a recurrent veinlet from its first bend (showing an inclination towards three submarginal cells); radial vein also often showing a recurrent veinlet from its rectangular bend, and with a loop before its end; postical fork-cell touching the discal cell for less than half the distance that the third posterior cell does, and sometimes with only a punctiform contact, but the small cross-vein never present; discal cross-vein upright and placed at or before the middle of the discal cell; posterior cells four, all well open; anal cell open; a præalar hook occurs close against the base of the wing but is often concealed by pubescence.

Larvæ parasitic on the larvæ and pupæ of *Lepidoptera* (*Agrotis*, etc.), *Hymenoptera*, and *Orthoptera*.

The flies occur on bare patches and pathways on commons or on sand-hills, and though they readily settle after a peculiar hovering flight they are very quick in their movements and difficult to catch.

Anthrax is still an enormous and not very homogeneous genus, but Osten Sacken (*Biologia Centrali-Americana* Dipt., i., 112) endeavoured to establish some definite groups to which he gave subgeneric names, in the hope that they would lead to a more accurate subdivision of the genus. Three of those groups are well represented in Europe, and two of them in England, while increased knowledge tends to show that the different groups are parasitic upon the larvæ of widely distinct groups (if not orders) of insects. These subgenera may be characterised as follows:—

THYRIDANTHRAX.—Antero-proximal half of the wings more or less dark, with more or less large subpellucid spots on cross-veins and bifurcations; abdomen dark with white bands on the third and fourth segments; the

third joint of the antennæ in the shape of an elongate cone, gradually merging into a style which is not longer than the cone; face moderately projecting; proboscis withdrawn (or projecting a little); front tibiæ smooth; front tarsi comparatively stout, slightly tapering, beset on both sides with delicate, erect hairs, but no spicules; front claws rather small; no pulvilli.

A. fenestratus, etc.

ANTHRAX.—Antero-proximal portion of the wings to a greater or less extent black or dark brown; thorax sometimes with white stripes at the sides, and the abdomen sometimes with white cross-bands, but the prevailing colour black, with a black pubescence; the third joint of the antennæ short-conical, sometimes very short, with an abruptly commenced long undivided style which bears a microscopic bristle at the tip; face very little projecting, only slightly convex; proboscis not projecting; front tibiæ provided with minute, easily abraded spicules; front tarsi rather stout, furnished above and below with characteristic delicate, erect pubescence, and with the joints distinct; in some species the pulvilli are distinctly developed but in others they are very small or rudimentary.

HYALANTHRAX.—Wings hyaline with sometimes only the costal cell darker; body with a yellow fur; abdomen often banded in both sexes or in the female only; the third joint of the antennæ short-conical, with a styliform prolongation which gently but distinctly tapers from the base to the tip; face very little projecting, only slightly convex; proboscis withdrawn; front tibiæ sometimes beset with spicules and then the patagia-like organs at the base of the wings unusually developed, these organs being usually clothed with a dense covering of scales and often with a brilliant silvery or golden reflection; similar scales, in such cases, adorn the enlargement of the base of the costa; the præalar hook is concealed under these scales, and becomes visible after their removal only; the shade of colour of the scales sometimes different in the two sexes.

Thyridanthrax is well represented by our *A. fenestratus*, and contains about a dozen well-recognised Palearctic species. *Anthrax* (sensu stricto) has no representative in Britain, but contains a large number of Palearctic species of which however many are not well recognised. *Hyalanthrax* may possess more than fifty Palearctic species, but very careful examination of a large number of the recorded species will have to be made both to elucidate synonymy and to test the limits of the subgenus; many of the species are *exceedingly* closely allied, and good descriptions are very scarce; some authors have got out of the difficulty by stating that only one very variable species occurs in their country, but that is because they have been unable to clear up the difficulties of separating the species, while I on the contrary believe that there are still a considerable number of undistinguished European species; the difficulties are increased by the fact that the sexes are often differently banded on the abdomen, so that the male of one species may be very much like the female of another. I am convinced that I have correctly identified and distinguished three species in Britain, but I quite expect that two or three more will occur. Other groups such as *Pæcilanthrax*, *Chrysanthrax*, and *Lepidanthrax* occur in America but have not been recognised in Europe, while probably some groups occur in Europe which have not been recognised in America. The present knowledge of the earlier stages of the various species of *Anthrax* is incomplete, but enough is known to cause a belief that the

different groups of species are parasitic upon different orders of insects or at any rate on widely different groups. Specimens of *Hyalanthrax* have been bred several times, and always from the larvæ of *Noctuidæ* belonging to or near the genus *Agrotis*; *Thyridanthrax* (*Anthrax*) *fenestratus* as Kunckel d'Herculeis calls it, probably through a mistake for *A. fenestratus* (which is not at all likely to occur in Algeria, being replaced there by some allied species which would probably be *A. perspicillaris* Loew), has been bred in considerable numbers from a Locust (*Ocnerodes*), and Kunckel d'Herculeis has published a detailed history of its metamorphoses; but *A. fenestratus* is also said to have been bred from the Bee, *Megachile muraria*. *Anthrax* (sensu stricto) *morio* is said to have been bred from aculeate *Hymenoptera* (*Osmia*, *Megachile*, and *Odynerus*). Considerably over a hundred species of *Anthrax* have been recorded from North America but none from South America; nearly fifty are recorded from South Asia and more than thirty from South Africa, but I believe comparatively few from Australasia.

Synonymy.—The genus *Anthrax* was founded by Scopoli in 1763 for the coal-black *A. morio*, and, although his generic characters are as usual hopelessly unrecognisable, *A. morio* (if correctly identified by Scopoli) would be the type of the genus, and consequently Loew would not have been justified in founding a genus *Hemipenthes* for that species; moreover Osten Sacken has shown that Loew's principal character for *Hemipenthes* is not distinctive from *Anthrax* (sensu stricto). Other authors have noticed the distinctness of *Hyalanthrax*, though they have not defined the characters so clearly as Osten Sacken, and consequently *Aspiloptera* of Kunckel d'Herculeis may be taken as a synonym; *Villa* of Lioy was founded in a paper which does not come within the range of scientific literature, Lioy's own countryman, Rondani, saying of it "c'est de la poésie." Bezzi (*Zeitschr. Hymen. Dipt.*, ii., 192, 1902) has contended that Scopoli's *A. morio* was not the same as Linné's species but was *Argyramæba anthrax*, and that consequently the present genus *Anthrax* (after shedding *Hemipenthes*) is without a name, or should be known by the name of *Hemipenthes*.

Table of Species.

- 1 (2) Wings with extensive dark markings in which are hyaline spots (*Thyridanthrax*). 1 *fenestratus*.
- 2 (1) Wings at most only brownish on the foremargin (*Hyalanthrax*).
- 3 (4) Abdomen of the male without bands, of the female with only three distinct bands. Hind tibiæ with a dorsal fringe of conspicuous splayed-out black scales.
Largest species, common on coast sandhills. Wings with the fore-marginal browning limited to the costal and subcostal cells. 2 *Paniseus*.
- 4 (3) Abdomen of the male banded, of the female with five distinct bands. Hind tibiæ without any splayed-out black scales.
- 5 (6) Wings with the foremarginal browning limited to the costal and subcostal cells.
Smaller species, occurring on shrubby slopes of chalk hills. Male with only three distinct pale abdominal bands. 3 *cingulatus*.

6 (5) Wings with the foremarginal browning at least including the upper basal cell.

Small species, occurring on heathy commons. Male with five distinct pale abdominal bands.

4 *circumdatus*.

Some other species allied to *A. Paniscus* which may have occurred in England are mentioned after the description of that species, one of which (*A. flavus*) is larger, while another is smaller, than any of the above species.

The males of our clear-winged species can easily be distinguished, as *A. Paniscus* has no trace of bands of pale scales across the abdomen, while *A. circumdatus* has five and *A. cingulatus* practically only three bands, and the last two species can be distinguished from each other by the extent of darkening on the foremargin of the wings.

The females of our three species are less easily distinguished, but the extensively dark foremargin of the wings of *A. circumdatus* should readily distinguish that species.

<i>A. Paniscus</i> ♀.	<i>A. cingulatus</i> ♀.	<i>A. circumdatus</i> ♀.
Abdomen with practically only three bands of pale scales, which are placed on the foremargin of the 2nd, 3rd, and 4th segments, those on the hindmargin of the 5th and 6th segments being scarcely defined.	Abdomen with five well-defined bands of pale scales.	Abdomen with five bands of pale scales.
Postocular scales silvery.	Postocular scales whitish.	Postocular scales yellowish.
Legs with numerous pale scales; hind tibiæ with a dorsal fringe of splayed-out black scales.	Legs with scarcely any pale scales on the tibiæ; hind tibiæ with no splayed-out black scales.	Legs with numerous pale scales; hind tibiæ with no splayed-out black scales.
Wings with only the costal and subcostal cells darkened.	Wings with only the costal and subcostal cells darkened.	Wings with the foremargin conspicuously darkened for considerably more than the costal and subcostal cells.

The female of *A. Paniscus* may be known from the males of *A. circumdatus* and *A. cingulatus* by the different abdominal banding, wider frons, and more densely scaled hind tibiæ.

1. **A. fenestratus** Fallén. Wings with conspicuous dark brown markings. Scutellum reddish brown. Legs black, with reddish tibiæ.

A very handsome particolored fly. The dark wing-markings suggest an idea of *Chrysops*.

♂. Ground colour black, moderately shining; clothed all over with conspicuous particolored pubescence.

Face rather produced roof-like over the elongate mouth-opening, broadly blackish all down the middle and on the sidemargins but with the intermediate spaces rather obscurely orange-red, and with the lower part of the sides and all round the mouth-edge except on just the front part obscurely orange or yellow; on all the middle part of the face shimmering elongate yellowish white (ranging to brownish orange) scales occur, and these scales extend upwards for some distance above the antennæ, and downwards (becoming sometimes silvery) on the lower orange sides of the face; some pale yellow or orange (rarely black) pubescence begins on the eyemargins a little below the antennæ and is erect and not scaly, and yellow hairs usually occur over all the sides of the face (especially on the lower part) among which are on the upper part a few black hairs of similar texture, but occasionally all these scattered hairs are black; pubescence round the front part of the mouth-margin all yellow except just at the middle; the space from the

bottom of the eyes back to the mouthmargin fairly wide, dull orange-red or yellow, and nearly bare; the absolute underside of the head more blackish and bearing only sparse microscopical black pubescence; lower part of the back of the head hardly puffed out and practically bare, but the hindmargin of the eyes indented considerably about the middle so that the back of the head is much wider there, and the upper part also widely arched out; postocular pubescence entirely composed of fairly abundant shimmering white closely adpressed scaly hairs, but all the pubescence about the deep channel at the top of the occiput is mainly black and more erect. Frons brownish black, at its uppermost part fully one-eighth the width of the head, and continuing so until about half-way down but then gradually widening in a slight curve down to the antennæ where it is nearly half the width of the head, and the face very slightly widening after this; frons (best seen when viewed from behind and above) with rather long dense coarse black pubescence quite down to and even past the antennæ. Proboscis large, with a long blackish base and with large ribbed brownish orange sucker-flaps, only the sucker-flaps being extruded from the large mouth-opening; palpi long and very thin, but not half the length of the proboscis, brown or dull reddish orange, and also mainly concealed in the mouth-opening bearing minute erect black pubescence. Eyes quite bare; facets all equal, but with the peculiar line at the middle of the back part towards which the facets slope from both above and below much less conspicuous than in *A. Paniscus*. Antennæ orange-red on the two basal joints, but brown on the third joint and style; basal joint more than twice as long as deep, bearing numerous black bristly hairs both above and beneath; second joint short and transverse, bearing some shorter black bristles; third joint forming an elongate cone which imperceptibly merges into a long blunt apical style so that the two seem to form one elongate joint which is longer than the two basal joints together; third joint and its style quite bare.

Thorax black, with a rather short moderately dense erect thin blackish pubescence on the disc, in front of which is a conspicuous broad dark tawny collar composed of dense longer pubescence which extends all round the front part of the thorax even to the underside; numerous scattered whitish scales occur on the disc which tend in very perfect specimens to form two stripes which considerably widen out near the scutellum but which leave all the depressed middle part near the scutellum clothed with only black scales; above each wing-base a patch of tawny scales occurs which is somewhat extended backwards; postalar calli with some very long yellow bristles pointing straight backwards, and above each wing-base is one long strong dark orange bristle preceded by two or three similar but shorter bristles; pleuræ with abundant, longer, and paler tawny pubescence, but with a large conspicuous patch of dense white pubescence all about in front of and beneath the wing-base though not extended at all away from the oval patch, and all the upper part of the metapleuræ with conspicuous glistening white coarse pubescence; pleuræ on their under parts greyish black and almost bare. Scutellum reddish brown, but black on the base and basal corners, and with the erect thin black hairs extending all over just as on the thorax, but with the pubescence at the sides white and rather long, and with pale scales all over except on the middle, while round the margin are about eight or ten yellow or black long bristly hairs.

Abdomen short oblong, moderately shining black; second segment distinctly the longest, but the third slightly longer than the others; second, third, and fourth segments almost forming a square; ground colour chestnut on the sides of the second segment and also near the sides on the foremargin of the third segment; second segment with an interrupted narrow band of cinnamon scales close against the foremargin; third and fourth segments with conspicuous interrupted bands of elongate white scales, of which the one on the third segment occupies more than half the depth of the segment but does not extend to the sides; the white band on the fourth segment is similar but is extended to the sidemargins in the form of long white hairs and is more widely interrupted in the middle; the second segment has numerous black scales all over except on the interrupted basal line of cinnamon scales and on the middle, and also has dark cinnamon hairs on the chestnut part of the

sides, besides several cinnamon scales scattered amongst the black ones; third segment with cinnamon scales more about the margin of the white band and behind that to the hindmargin; fourth segment similar, but with the cinnamon scales rather more numerous; fifth segment black haired, but with numerous conspicuous cinnamon scales forming a band on the hindmargin; sixth segment similar, but with the cinnamon scales more numerous than the black ones, and with a conspicuous small patch of white scales on the middle; seventh segment nearly all clothed with coarse white scaly hairs, but with black hairs at the basal corners; longer inconspicuous erect black hairs occur all over the abdomen, and a few very fine pale hairs occur mainly on the white bands; marginal pubescence of the abdomen long and white on the basal segment and on the extreme base of the second, but long coarse shaggy and conspicuously black on the rest of the second and on all the third segment, then shorter more depressed and nearly all white on the fourth segment, and black again on the fifth and sixth segments and denser and more conspicuous than the white pubescence of the fourth segment, and white on the last segment except at the extreme basal corners. Belly greyish black, but all the hindmargins broadly obscure orange; seventh segment all orange, and the eighth (or genitalia) black with orange margins; but sometimes nearly all the fourth and fifth segments are orange, or even the third, fourth, and fifth segments except at the basal margins of the fourth and fifth; pubescence abundant, dark orange, closely adpressed, almost scaly; the scaly hairs at the sides of the third and fourth segments inconspicuously whitish at the sides for the full depth of the segment, but sloping away on the lower side until they die out before reaching the middle third of the segments, and traces of similar whitish hairs exist about the sides of the hindmargins of the fifth and sixth segments; a few inconspicuous long erect black hairs are scattered all over as on the upper side, and intermingled with them are a few similarly long and thin pale hairs; the actual margin of the dorsal plate (commencing with the tuft of bright tawny hairs with white tips on the lower part of the metapleuræ) has its pubescence long clear white on the second segment, shorter and tawny on the third and fourth, mainly black on the next three but tawny at the basal corners, and pale yellow round the tip. Genitalia mainly concealed, but a pair of subquadrate lateral plates can be detected.

Legs dull black, but all the tibiæ reddish orange except rather obscurely about the tip of the front pair; tip of the front femora behind and almost the apical third of the middle pair behind obscurely reddish orange, and the base of the posterior tarsi sometimes slightly reddish; front coxæ long, with mainly shorter adpressed tawny pubescence, and with longer black hairs intermixed with a very few pale ones; posterior coxæ mainly with longer erect black bristly hairs and some shorter orange ones, especially at the base towards the outside; all femora and the posterior tibiæ densely covered with closely adhering shimmering elongate golden scales; front tibiæ with a few similar scales which however do not extend to the tip; anterior femora with rather sparse thin inconspicuous short black pubescence behind. Front femora and tibiæ with no strong black bristly hairs, and the front tibiæ with no trace of spicules or spurs; tibiæ distinctly longer than the tarsi; tarsi slightly tapering, with no long "touch-hairs" or spicules though bearing a peculiar erect short sparse pubescence both above and beneath. Middle femora with a row of about five black bristles on the middle part beneath but with the end ones tending towards the upper side; middle tibiæ with four rows of similar but smaller bristles (5-7 in each row) and with a circlet of spurs; hind femora with a row of about nine black bristles beneath and with three or four more antero-dorsal near the tip; hind tibiæ with several rows of numerous (6-10) bristles and with a circlet of spurs; posterior tibiæ about as long as their tarsi. Pulvilli absent; front claws black, very small; posterior claws fairly long, very little curved and with an indication of a tooth at the obscurely orange base; empodium absent or exceedingly minute.

Wings on the basal two-thirds dark brown interspersed with hyaline spots, and with the apical third and all the hindmargin irregularly and unequally hyaline; the apical end of the brown colour ends in two steps, *i.e.*, not in one continuous slope; the first of the four "window" spots runs

interruptedly across near the base of the wing, the second forms a large sub-square spot near the middle of the dark colour which usually has its lower marginal space slightly brownish but occasionally sharply defined, the third forms a double spot at the discal cross-vein and has its upper portion clear hyaline but its lower part usually slightly brownish, while the fourth forms the other double spot on the (apparent) lower cross-veins and always has both its parts obviously tinged with brown; base of the wings black tending towards dark brown near the first hyaline band; foremargin of wings and stem of postical vein brownish orange; costa with a broad dull black base on which are dense dull black stout scales, and in good specimens these are overlaid with numerous orange scales which decrease in number as they recede from the base of the wing; at the extreme wing-base is a very small tuft of brownish yellow or shimmering orange hairs, and between this and the broad costal space is a strong black hook bent finger-like and slightly tapering; discal cross-vein opposite to, or a little before the origin of the cubital vein; the portion of the upper branch of the postical fork which forms the lower part of the discal cell very short, being only from an eighth to a fifth the length of the basal end of the discal cell or sometimes only a spot. Squamæ (alar) fairly large, dull black with a tinge of brown or altogether brown, with a thick dull black or dark brown margin, and with a dense continuous moderately long snow-white fringe, while a similar but shorter fringe extends round the alulæ. Halteres brownish orange, or even yellow, with a darkened stem.

♀. Very similar to the male, in fact so much like it that the sexes are not at all easily distinguished. Frons deep black, usually rather wider than in the male, being at the vertex sometimes about one-seventh the width of the head and widening more regularly, the sides being oblique without any trace of a curve, and with a few golden scales on its middle part; face and neighborhood of antennæ with numerous more silvery grey or brownish yellow scales; the red-orange part of the face may be wider and more conspicuous and may bear more dense yellowish silvery scales, while the scales against the front part of the mouthmargin are more tawny; back of the head more puffed out, with the silvery sheen behind the eyes most conspicuous on the widened space about the middle, but less conspicuous on the upper part. Eyes when viewed from in front not quite so wide above the middle part.

Thorax with fewer erect thin black hairs on the disc, but with several long yellowish white bristles on the postalar calli.

Abdomen without any chestnut coloring near the basal corners. Belly blackish with only very narrow inconspicuous tawny hindmargins, and with a universal adpressed cinnamon pubescence amongst which is no trace of white hairs; numerous inconspicuous long pale hairs are scattered all about, but no black ones occur except near the tip; ovipositor small, orange.

Legs with the anterior tibiæ a little more darkened at the tip; front tarsi more pubescent, and the bristles on the posterior tibiæ more numerous.

Length about 10 mm., but varying from 7 mm. to 12 mm.

This species is very easily distinguished from any other in Britain, and probably from any *Anthrax* in North Europe, but several very closely allied species occur in Southern Europe and in North America, of which one (*A. gallus* Loew) occurs as near as Bordeaux. *A. gallus* and *A. perspicillaris* (a common species in Italy, Greece, Asia Minor, and South Russia) have the tuft of white hairs beneath the wing-base extending as a complete stripe across the pleuræ to the bottom of the sternopleuræ between the front and middle coxæ, and both have the tomentum on the third and fourth ventral segments all conspicuously snow-white; *A. hispanus* from Spain has the face all luteous, and the white tomentum on the belly even more extended; while *A. mutilus* from Rhodes has

the face and fore part of the frons yellowish, and is moreover less closely allied; apparently also *A. gallus*, *A. perspicillaris*, and *A. hispanus* have the tibiæ more extensively black.

A. fenestratus is limited as to its range in Britain, as I have seen recent specimens from only Dorsetshire, Hampshire, and Surrey, though a specimen has been recorded from Wellington College, Berkshire (Hope Museum) taken on August 4, 1902. I have seen it fairly common at Bournemouth and I know that it occurs on many of the hot sandy commons in and near the New Forest and in South Dorset; in Surrey it occurs in similar localities about Chobham and Weybridge. The original locality, discovered by the late J. C. Dale in 1821, was at Parley Heath (where I found it again in August 1904) which is a continuation of the Bournemouth locality and is partly in Dorset and partly in Hants. I have also taken it at Studland in Dorset. My records extend from June 19 to the end of August, but Curtis adds September; in June 1901 Dr D. Sharp took twenty eight specimens at Matley in the New Forest all of which were males, and my own experience seems to be that the males are much more common than the females. It is accurately recorded from only Middle and North Europe and North Asia, as all records south of that apparently refer to one of the allied species. Künckel d'Hercule states that he bred *Anthrax fenestralis* (*fenestratus*?) from the egg-case of a large locust (*Oenoceros* sp.), but his species was probably one of the allies.

Synonymy.—There can be but little doubt that this is the true *A. fenestrata* Fallén, as it is the only Swedish species to which his description can apply, and it is equally certain that it is the *A. ornata* Curtis. There is however the usual difficulty that so few good descriptions exist of supposed well-known species; everybody is supposed to know *A. fenestrata* Fallén and consequently authors have not troubled about its description. The name *fenestrata* was first used by Fallén in 1814, and his description might be doubtful because he said "Pedes nigri," which does not apply to our species; the next use of the name was Meigen's in 1820, but his description obviously included *A. perspicillaris*; Macquart's description in 1834 said nothing about the legs, and might apply to any of the closely allied species; Zeller's remarks in the Isis of 1840 I have not seen. Zetterstedt, who must have known Fallén's species correctly, wrote in his *Insecta Lapponica* (1837), "Pedes nigri, femoribus ferrugineo-squamulosis, genubus tibiisque præsertim anticis sæpe obscure testaceis," which is almost in accord with our species, only I consider the tibiæ always *obscure testaceis præsertim posticis*; in 1840 and subsequently he made no reference to the legs whereby he might seem to have acquiesced in Fallén's "pedes nigri." Walker in 1851 said "pedibus fulvis" and "legs tawny" . . . "tips of the tarsi black," which is hopelessly inaccurate. Bonsdorff in Finland's *Tvävingade Insekter* (1861) said nothing about the legs. Schiner in 1862 had obviously one of the allied species, probably *A. perspicillaris*, before him. Jaenicke in 1867 had probably two or three species before him, but his notes are insufficient for distinction. Lastly, Loew in 1869 when differentiating the allied species always appeared to consider the legs of *A. fenestrata* to be black, especially as he gave as one of the distinguishing characters of *A. mutilus* "tibiis præter apicem luteis." An examination of various continental specimens shows that several from Bohemia in Kowarz's collection are practically the same as our species, the legs being quite as pale, but the markings rather brighter and the cinnamon scales on the abdomen more abundant and more generally scattered; a type of *A. perspicillaris* from Loew is well distinguished. Bigot's collection contained numerous specimens under his label of *A. fenestratus* from Corsica, Sicily, Spain, etc., but not one of them was the same as our species. I remain therefore confident that our species is the true *A. fenestratus* Fallén and that that species has reddish orange tibiæ.

2. **A. Paniscus** Rossi. Wings hyaline, except for a brownish fore-margin down to the subcostal vein. Pubescence dense and tawny, with three black and two white alternating tufts at the end of the abdomen. Abdomen of the male without any bands of yellow scales, but that of the female with one narrow and two rather broad bands. Scutellum and legs black.

A large handsome fly, covered with dense tawny pubescence, but with alternate black and white tufts at the end of the abdomen, and with three bands of yellow scales on the abdomen of the female.

♂. Face slightly and equally produced, not projecting at all over the mouth-opening, all dull black but covered with long yellow or orange scales which almost or quite obscure the ground colour except just over the middle of the mouth-edge, while on and above this mouth-edge are a few black scales; numerous more erect but inconspicuous black hairs occur on the upper eye-margins, and a few such hairs straggle on to the disc of the face while on the lower half some longer yellow hairs occur intermixed with the yellow scales. Face at the antennal base one-third the width of the head, but becoming a little narrower on the lower part; sides of the mouth when almost under the head flush with the eyes, leaving only a narrow line on which is a single row of coarse yellow scales; mouth-opening long and narrow, dull black; back of the mouth and the underneath parts of the head quite bare, and the narrow mouth-edge near the bottom of the eyes light brown; back of the head very considerably puffed out, beginning rather narrowly at the bottom but quickly widening to the middle and upwards, all slaty black and vaguely shining, but the lower part almost all covered with whitish scales which become silvery near the eyes (when viewed from behind), and which are most dense and conspicuous but almost confined to the eyemargin after the lower quarter of the head, while thence upwards the back of the head behind these scales is black with only minute black hairs and behind them again with dense furry short yellow pubescence, and (unless in very perfect specimens) with very few tiny orange scales except near the eyes where the scales are more numerous and shimmering white about the middle of the eyes but become yellower or even orange higher up the head; behind the vertex on the absolute back of the head short pale yellow pubescence is visible, and about the narrow middle channel are some inconspicuous short black bristly hairs. Frons narrow, being at the top less than one-twelfth the width of the head but widening (with an almost imperceptible curve) to nearly one-third the width of the head at the antennæ, dull black with abundant erect rather rigid black hairs, and with conspicuous dark orange scales on at least the lower half (in perfect specimens on the whole) of the frons. Proboscis long and narrow, with long narrow brown sucker-flaps which usually just protrude below the mouth-opening; palpi black, long, narrow, and concealed. Eyes bare and with the facets all equal, but just at the middle behind a peculiar line divides the facets so that those above and below slope towards it for nearly a quarter the width of the eye. Antennæ dull black; basal joint slightly longer than the short transverse second joint, and bearing rather dense hairs both above and beneath, those above being all black while those beneath may be nearly all black or may have either a few or a good many pale hairs intermixed; second joint with shorter black hairs above and beneath; third joint with a slight brownish tinge, slightly broader at its base than the second, forming a short triangle until produced into a long cylindrical point which has a blunt tip, but which bears on that tip a minute style; the narrow prolongation of the third joint is twice as long as the short triangular base and altogether the third joint is longer than the two basal joints together.

Thorax dull black, densely clothed with tawny pubescence which is shortest and least abundant on the disc and consequently leaves the ground

colour there but little concealed; the disc also often has some inconspicuous blackish tawny hairs intermixed and numerous closely adherent black scales, so that these combined clothings give it a barer and darker appearance than the rest of the thorax; the tawny pubescence is richest in colour and most dense on the fur-like collar, though that which extends from the collar down the sides to the wing-base is nearly as much so, and then the pubescence from the wing-base down the sides to and across the hindmargin is usually though not always paler tawny; on the postalar calli are from three to six long strong yellow bristly hairs which are bent back towards the scutellum, and just above the wing-base are about five similar but shorter more depressed and less conspicuous hairs; near the front part of each absolute wing-base is usually a conspicuous snow-white patch of scales, but sometimes this patch has a slight yellowish tinge in certain lights, and occasionally is so much darkened as to be rather inconspicuous, and moreover the patch becomes invisible if the wings are somewhat raised because it is then hidden between the wing-base and the thoracic pubescence; pubescence on the flat slope on the hind part of the disc rather coarse and not short. Pleuræ with similar dense tawny pubescence on all the upper part of the mesopleuræ and metapleuræ, but with less dense and greyer pubescence on the lower part, while the absolute sternum is dull greyish black and bears only slight pale pubescence. Scutellum with pale tawny pubescence which is comparatively inconspicuous because the abundant closely adhering black scales dominate the ground colour, but with some long strong bristly hairs round the margin which are often not very easy to detect owing to their being merged in the dense surrounding tawny pubescence, though about six of them round the tip are obviously black; a few thin inconspicuous yellow scales occur about the sides of the margin.

Abdomen oblong, being from the tip of the scutellum to the anus (when denuded of pubescence) rather more than one and a half times longer than broad; in absolutely denuded specimens the sides of the two basal segments are rufescent; the whole of the four basal segments are densely covered with tawny pubescence, which is richest in colour and longest down the sides but is paler, less dense, and more irregular in length on the disc, while black scales occupy a large portion of the disc of the fourth segment and thereby reduce the tawny pubescence, and similar black scales exist also on the disc of all the previous segments but are hidden by the denser pale pubescence; fifth and sixth segments with the marginal pubescence deep black and quite as long and dense as the previous tawny pubescence, but sometimes this deep black pubescence is a little broken up by pale hairs, while on the disc the paler tawny pubescence still extends but is usually weaker and consequently the middle quarter is rendered more dull black through the dense adhering black scales; seventh segment with the marginal pubescence snow-white but with the middle (apical) third again deep black; the extreme basal corners of this seventh segment have some inconspicuous black hairs, but the black coloring both at these basal corners and at the tip is mainly composed of more raised longer black or brownish black scales among which however towards the margin are some longer black hairs; the dorsal surface of the abdomen bears no trace of pale scales. Belly dull black, with conspicuous but not at all dense unarranged pale yellow pubescence of about the same length as that on the dorsal side; on the extreme inner margin of the dense marginal pubescence (which appears paler when viewed from beneath than from above) are several elongate black scales and a few long black hairs which are almost concealed by the long dense pale tawny pubescence; disc of the belly densely clothed with close black scales and with rather slight bands of pale yellow scales on the hindmargins of the second to fifth segments (inclusive), and these yellow scales are rather numerous and more extended on the fourth segment but yet are scarce in comparison with the black scales and do not occur on the middle of the segment; some irregular scales occur on the sixth segment; a few tawny hairs occur between the black and the white tufts at the end of the sixth segment. Genitalia very small, orange.

Legs all dull black; hind pair slightly thickened, especially on the tibiae. Pubescence on the front coxæ abundant and pale yellow on the front part but

more brownish behind and with a few black bristly hairs about the tip; posterior coxæ with abundant greyish yellow pubescence, the middle pair with more numerous black bristles at the tip, and the hind pair with one long bristle on the outside (usually hidden in the abundant yellow pubescence); anterior femora with moderate inconspicuous pubescence behind and beneath which may be either yellowish or blackish, and the posterior pairs with moderate blackish or pale pubescence beneath near the base. Bristles on the middle femora few and not conspicuous but with a few antero-ventral ones in a row after the middle, while the hind femora have a conspicuous row of about seven black antero-ventral bristles and two less distinct anterior ones near the tip; front tibiæ with dorsal and postero-ventral rows of easily abraded black spicules; middle tibiæ with four rows of small but distinct bristles and with two or three fair-sized apical spines besides some rather shorter ones; hind tibiæ with smaller and more numerous black bristles which are almost lost among the sloping black scales, and with a circlet of apical spines. Scales on the front femora both in front and behind pale and conspicuous though not crowded; middle femora with similar but more crowded scales almost all over; hind femora with still more crowded pale scales all over except on the apical dorsal and anterior surfaces, while closely adherent black scales occur on this apical dorsal surface; pale scales also occur sparingly behind the basal half of the posterior tibiæ, and sometimes these pale scales are much more extended and become fairly conspicuous on the front part of the hind tibiæ; closely adherent black scales occur sparingly on the upper side of the front tibiæ near the base and in greater quantity on the middle tibiæ, but on the hind tibiæ besides dense and adherent black scales there are numerous long splayed out sloping black scales which give the tibiæ the appearance of being considerably incrassated. Pulvilli absent; front tarsi with short delicate almost erect pubescence above and beneath; front claws shorter than the others.

Wings shimmering glassy, but sometimes slightly greyish, with the base and foremargin conspicuously yellowish brown from the costa to the subcostal vein, while the space below that is occasionally faintly brownish down to the discal vein; præfurca slightly margined with brown, and all these anterior veins and the stem of the postical vein brown while the other veins are black; the absolute root of the wing brownish black; the broadened base of the costa black or brownish black with a densely spinose foremargin, and bearing dense small black scales amongst which are some pale ones near the base but well away from the actual foremargin, but these pale scales vary very much in extent and are sometimes restricted quite to the inner base, but when more considerably extended over the widened base of the costa they may be replaced at the inner base by some inconspicuous ferruginous scales; the patch of silvery (or yellow) scales on the wing-base has been described before when dealing with the thorax, but between it and the spinose foremargin there is occasionally (but rarely) a black finger-like spine, and even when this does occur it is usually very small and I feel convinced is usually quite absent; discal cross-vein often exactly opposite the base of the cubital vein, but sometimes after and occasionally just before it; base of the radial vein often rectangular and sometimes throwing out a short recurrent veinlet; loop of the radial vein before its tip rather deep; the piece of the upper branch of the postical fork which forms the lower margin of the discal cell about as long as, or slightly shorter than, the basal line of the discal cell; the ambient vein obviously black, and becoming rather conspicuous round the alula; alulae bearing some greyish white scales on the inner two-thirds of their margin. Squamæ brownish yellow with a rather darker margin but blackened at the root; fringe rather long, very dense, scale-like and coarse, pale dull yellow to orange. Halteres small, pale orange with darker orange stems.

- ♀. Rather like the male, but the pubescence less abundant and each of the second, third, and fourth segments of the abdomen bearing a band of pale scales.

Frons at the top about one-eighth the width of the head and steadily widening to fully one-third its width at the antennæ, black, moderately

shining, and with much more numerous golden scales than in the male; face with very few black hairs on the eyemargins. Eyes slightly smaller.

Thorax and scutellum almost as in the male, but the black scales less abundant and the silvery patch at the base of the wing quite absent.

Abdomen black, mainly dull; the longer pubescence exactly as in the male except that the pale tufts at the tip are pale yellow rather than silvery, and the pubescence on the disc is much less abundant and consequently the ground colour less obscured; a conspicuous band of golden scales occurs on each of the second, third, and fourth segments, of which the one against (but not *on*) the front margin of the second segment is the broadest and occupies slightly more than one-third of the segment, and the one on the front margin of the third segment is the narrowest, but the band on the front margin of the fourth segment is almost as wide as the one on the second segment; these two bands are narrowest at the middle and widen a little towards the sides, while all three bands merge into the long tawny or yellow side pubescence; the hindmargin of the sixth segment bears an inconspicuous narrow not dense band of golden scales, and the hindmargin of the fifth segment may have a very inconspicuous and still narrower band; the seventh segment forms a short triangle not half so wide as the sixth segment, and has black scales on the disc, and some yellow scales and long yellow hairs about its basal corners besides conspicuous black pubescence. Belly with numerous conspicuous white scales on the fourth, fifth, and sixth segments, covering all the fourth segment and the hindmargins widely of the fifth and sixth segments, but the seventh segment with less conspicuous more scattered scales; the three basal segments have less conspicuous yellowish scaled hindmargins, and also numerous less conspicuous yellow hairs, and on the seventh segment are fairly numerous longer black hairs; but at first glance the belly appears to have a black fascia across the fifth and sixth segments which is extended at its middle to the tip of the abdomen; ovipositor orange.

Legs with the pale scales on the inside of the hind tibiae more regularly numerous and conspicuous, and the black scales less splayed out.

Wings as in the male, but the dilated base of the costa with more numerous tawny scales except on the front part. Squamæ and halteres as in the male.

Length about 12 mm., but varying from 10 mm. to 14 mm.

This species varies but very little. Occasionally a specimen of either sex may reach 14 mm. in length, but usually the size is very regular; in these large specimens the silvery patch at the base of the wing has a tendency to become obscure, and the pale scales against the hindmargin of the eyes to be less silvery. One female has conspicuous pale hairs beneath the basal joint of the antennæ, and one taken by Colonel Yerbury at Barmouth on September 4, 1902, has the pubescence on the sides and back part of thorax more tawny (like the fur collar), and has a small præalar spine at the base of the costa, and the whole margin of the dilated costal base more spinose; a female taken at Sidmouth by Mr Fred. Smith in August, 1871, has the præalar spine distinct and the costal base as spinose as in the Barmouth specimen just mentioned; and a large female also taken by Mr Fred. Smith at (probably) Southend in 1870 has the pubescence on the pleuræ rich tawny, and the middle of the face unusually black haired. An immature female taken at Barton Mills on July 9, 1901, has white scales all over the third to sixth segments of the belly, but at present I have seen no other female from that locality; other very fresh females have unusually numerous tawny scales on the fifth and sixth dorsal abdominal segments.

Some closely allied species occur in Britain, of which I now recognise *A. circumdatus* and *A. cingulatus*, both of which have obvious bands on the abdomen in both sexes; both are also rather smaller, and *A. circumdatus*

has the foremargin of the wings more conspicuously and extensively darkened; I have pointed out all the distinctions I have been able to detect in the descriptions of those two species, but I may add that the female of *A. Paniscus* can be distinguished from that of *A. circumdatus* by the much less blackened marginal and upper basal cells of the wing, and from *A. cingulatus* by the narrower band of golden scales on the fourth abdominal segment and the practical absence of any band on the fifth or sixth segment, while both those species have less conspicuous black scales on the hind tibiæ and have the radial vein less looped. Besides these I believe we possess a larger species very closely allied to *A. Paniscus*, which may be *A. hottentottus* L. (= *A. flavus* Meig.), and which has no silvery scales at the wing-base, the tufts near the tip of the abdomen yellower, the ground colour at the sides of the abdomen near the base reddish, and the middle tibiæ rufescent, but I have seen no recent or satisfactory specimens. We may also possess a much smaller British species with clearer wings, of which I have seen two old specimens without any history, and I once saw (but failed to catch) a small specimen on the sandhills at Palling in Norfolk.

The following species have two white tufts of pubescence alternating with three tufts of black pubescence at the tip of the abdomen. *A. halteralis* Kowarz; a species very near *A. circumdatus* but with blackish halteres, the abdomen with five pale bands in both sexes, and the wings darker and with a more distinct præalar spine. *A. claripennis* Kowarz also has the abdomen banded in both sexes, the wings pellucid in front and with a small præalar spine, while the male has only three bands on the abdomen, the first one being on the foremargin of the fourth segment and the others on the hindmargins of the fifth and sixth segments, and consequently is very closely allied to *A. cingulatus* but has the frons narrower at the vertex. *A. hottentottus* and *A. flavus* (which are given as synonymical by Bezzi) are the closest allies of *A. Paniscus*, and I can only distinguish them at present (with the material I possess) by their larger size and by the yellow patch of scales at the base of the wings in both sexes.

A. Paniscus occurs in abundance in many hot sandy localities, and I had closely examined more than a hundred specimens before I came against any other British clear-winged *Anthrax*. It apparently occurs wherever there are coast sandhills, as I have numerous records from the South (Cornwall, Devon, Somerset, Hants, and Kent), East (Norfolk, Suffolk, Essex), and West (Glamorgan, Merioneth, Carnarvon, Cheshire), while Colonel Yerbury informs me that he has seen it at Aberlady in Haddington, so that it is one of the few Scotch *Bombylidæ*. I think the only localities I know far away from the coast are the sandy commons near Barton Mills in Suffolk, and perhaps the neighborhood of Darenth in Kent (unless the specimen from Darenth be true *A. flavus*), but it may be noted that many marine species of insects and plants occur near Barton Mills. An interesting note as to the date of its occurrence has been given by Colonel Yerbury, who after several weeks collecting at Porthcawl in 1906 saw his first specimen on July 19, but found it in abundance on July 20; some other records as to the sexes on some dates are of interest, e.g., on June 29 and July 9, 1901, a number (twenty-seven) of specimens were taken near Barton Mills which were all males with the exception of one immature female which occurred on July 9, and even on August 9 a

large number captured in the same locality were all males, but of forty-four specimens taken by Mr C. J. Wainwright at the Land's End and St Ives from July 29 to August 8, 1899, ten were males and thirty-four females; these records tend to show that the males appear late in June or early in July, while the females do not appear until the middle of July, and after that date both sexes probably linger on to the beginning of September. A female taken at St Ives by Mr C. J. Wainwright on August 1 and a male at the Land's End on July 13 were very unusually large but were obviously not distinct, while I suspect that a very small specimen seen by me at Palling also belonged to this species. Colonel Yerbury exhibited at the Entomological Society of London on November 21, 1900, a specimen which had been bred by Mr Holland of the Hope Museum, Oxford, from a Lepidopterous pupa found in sand at St Helens, Isle of Wight, the pupa having been found on July 7 and the fly emerging on July 12, 1899; Webster has recorded (Bull. Dep. Agric. Ent., xxii., 44) a North American species of *Anthrax* as parasitic on *Agrotis herilis*.

Synonymy.—It is at present very difficult to disentangle the synonymy of the European species of the group distinguished by Osten Sacken under the name of *Hyalanthrax*, because no good and accurate comparative descriptions have been published by any of the old authors. The original description of *Bibio Paniscus* of Rossi is as follows:

"* 1433. B. PANISCUS.

"Long. 6. l. Lat. 2. l.

"Hirta, flavescens, compressa, abdomine nigro, fulvo-strigoso, alis hyalinis costa fusca.

"Statura, et magnitudo *B. hottentottæ* eique valde affinis, et forte mera varietas, sed corpus in hac magis compressum, et magis elongatum. Thorax, et abdomen constanter nigra dorso fere nudo, pilis rufis lateralibus longiusculis hirta. Ani regio obtusa fasciculo pilorum pilis albis intermixto. Subtus vix pubescens. Pedes nigri, tenues. Alae hyalinae costa nigra. Variat colore villorum minus rufo.

"Habitat in silvis frequens in floribus Umbellatis."

I see nothing contradictory in this description as "abdomine . . . fulvo-strigoso" may well apply to the female, while "costa nigra" is counterbalanced by "costa fusca." It is certain that Rossi had a species before him which had the abdomen narrower and more truncate than his *A. hottentotta* and which had a black anal tuft between two white tufts. I sent a pair of our English species to Bezzi in order to be certain that it occurred in Italy, and he wrote me that both sexes agreed perfectly with the species which he possessed under the name of *A. Paniscus*; he also remarked that it was the rarest Italian species of the group except *Anthr. halteralis* Kow., the commonest ones being *hottentotus* L. (*flavus* Schin.) and *circumdatus* Mg. (*hottentotus* Schin.). A specimen in the Hope Museum at Oxford was labelled *A. flava*.

3. *A. cingulatus* Meigen. Wings hyaline except for a very narrow blackish brown foremargin which does not extend below the subcostal vein. Abdomen with three conspicuous bands of yellow scales in the male, and five in the female.

Very similar to *A. circumdatus*, but with the darkened foremargin of the wing much more restricted and the male with only three bands of pale scales across the abdomen; also similar to *A. Paniscus*, but the male with a banded abdomen and the female with the bands more conspicuous.

- ♂. Frons slightly wider at the vertex than in *A. Paniscus* or *A. circumdatus*, and with fewer golden scales; face with scarcely any black hairs on the upper eye-margins or over the middle part of the mouth-opening; postocular scales about the middle part of the head more silvery than in *A. circumdatus*. Antennæ with the basal part of the third joint more globular than in the two allied species, but with the styliform portion quite as short as in *A. circumdatus*.

Thorax with the usual silvery patch above each wing-base; pubescence on the flat slope near the scutellum as in *A. circumdatus*.

Abdomen without distinct bands until the fourth segment; outstanding tawny pubescence as short as in *A. circumdatus* and also comparatively absent on the disc, but the outstanding black pubescence on the fifth and sixth segments and on the base of the seventh more conspicuous, and the pale tufts on the last segment pale yellow and comparatively small, while the apical black tuft is as conspicuous as (though smaller than) in *A. Paniscus*; the black tufts are conspicuous in combination with the long exclusively black pubescence on the disc of the fifth, sixth, and seventh segments; a few golden scales can be traced on the base of the second segment but not enough to form a band, and a very few can be traced near the extreme basal corners of the third segment, but the first obvious band of yellow scales is a broad and conspicuous one on the base of the fourth segment which covers more than the basal half of that segment except where so much emarginated behind at the middle as to be almost or quite interrupted; on the hind-margins of the fourth and fifth segments are conspicuous though narrow equal bands of golden scales, more obvious than in *A. circumdatus* but not quite extended to the sidemargins. Belly almost as in *A. circumdatus*, but the fifth and sixth segments deeper black because of the deep black scales on them; fourth segment covered with whitish scales except down the middle, while similar scales form bands across the hindmargins of the fifth and sixth segments, but black scales occur abundantly on all the segments except the fourth and first; the long straggly pubescence comparatively sparse and brownish tawny.

Legs blacker than in the two allied species because there are only a few scattered pale scales mainly beneath the basal half of the posterior femora and about the base of the middle tibiæ; hind tibiæ without the splayed out black scales of *A. Paniscus*, and the hind femora with rather obvious long black pubescence about the base and with few (four) postero-ventral bristles which do not occur on the basal half.

Wings hyaline with only the costal and subcostal cells rather brownish or even tinged with a blackish hue, and without the slightest trace of darkening in the marginal cell; widened base of the costa without any pale scales; loop of the radial vein shallow; rectangular base of the radial vein usually with a recurrent veinlet, and also the base of the upper branch of the cubital fork sometimes with one; the piece of the upper branch of the postical fork which forms the lower margin of the discal cell as long as (or longer than) the base of the discal cell. Squamæ more orange than in *A. circumdatus*. Halteres with orange knobs.

- ♀. Rather blacker looking than *A. circumdatus* and with a more spatulate abdomen.

Frons slightly broader at the vertex than in the two allied species and perhaps more gradually widening; postocular scales greyish yellow and rather less abundant.

Thorax as in *A. circumdatus*.

Abdomen with five distinct yellow bands, of which the first and third are broader than the others, and the third band (across the base of the fourth segment) even broader than in *A. circumdatus* as it occupies almost all the segment except at its emarginated middle part; the three narrow bands rather more sharply defined than in *A. circumdatus*, and the last segment bearing numerous tawny or yellow scales except on the base; the black side-tufts on the hind half of the fifth and the whole of the sixth segments more conspicuous than in *A. circumdatus*. Belly clothed with dense pale yellow scales except on the formargin of the fifth, sixth, and seventh segments, and also with rather long pale yellow pubescence on the four basal segments.

Legs blacker than in the two allied species even though there are a considerable number of pale scales on the femora, but the tibiæ (especially the hind pair) bearing scarcely any pale scales; hind femora with only about three postero-ventral bristles which are placed near the middle.

Wings blacker at the base and with a more blackish hue in the costal cell than in *A. circumdatus*, and sometimes faintly smoky over the portion which is strongly darkened in *A. circumdatus*; costa with hardly any pale scales on the widened black base. Squamæ almost blackish orange.

Length about 10 mm., but varying from 9 mm. to 11 mm.

This species shows but little variation, but it is worthy of notice that Loew (Zeitschr. ges. Naturw. x., 100, 1857) stated that both the yellow colour of the pubescence and the dark foremargin of the wings lose their colour to a certain extent with age. The male is not difficult to distinguish from its English allies as it has only three distinct abdominal bands, while *A. circumdatus* has five and *A. Paniscus* none. The female requires considerably more care in determination, but has the foremargin of the wing much less darkened than in *A. circumdatus*, while *A. Paniscus* is normally a larger species and has the last two abdominal bands indistinct. The European *A. claripennis* is very closely allied, but has the costal cell quite hyaline and the postocular scales whitish, while the male has the frons at the vertex distinctly narrower and the band on the fourth abdominal segment less wide.

A. cingulatus is at present very little known as a British species, but is not uncommon at Wormsley near Stokenchurch in Buckinghamshire, where it occurs on the steep slopes of the Chiltern Hills, and I believe that a female taken by Colonel Yerbury at Holne in South Devon on July 28, 1896, belongs to this species. The Wormsley locality was found by Mr W. R. Grant on July 7, 1895, when he took three females, and on July 17, 1898, he took three of each sex, but it was not until after we had been taking *A. circumdatus* in Dorset in August 1906 that Colonel Yerbury called my attention to the distinctness of the Wormsley species from *A. circumdatus*, though he had long before recognised its distinctness from *A. Paniscus*; a search for it about July 13, 1907, was ineffective, but as that year was a remarkably late season a further search was made on August 13 and produced two males, with which several females occurred on that and the three succeeding days. The specimens all occurred amongst the long grass and flowers of a small glade surrounded by trees, but I have little doubt that the species is widely spread along the Chilterns.

Synonymy.—It is impossible to ascertain how far the old British authors distinguished the clear-winged species of *Anthrax*, and it is almost certain that they mistook the two sexes of *A. Paniscus* for distinct species; it is however probable that they distinguished *A. circumdatus* because the localities they gave would suit that species, and consequently I believe that the *A. cingulata* of Walker (Ins. Brit. Dipt. i., 78) referred to *A. circumdatus*, but the late Edward Newman gave me a specimen which I believe to be a true *A. cingulatus*. Villeneuve states that Meigen's collection contains two types, of which the male has been figured by Meigen and is the species now described, but that the female is only *A. Paniscus*.

4. ***A. circumdatus*** Meigen. Wings hyaline, but with a rather wide smoky blackish brown foremargin which includes at least the upper basal cell. Abdomen with five bands of yellow scales in both sexes. (Fig. 304.)

Very similar to *A. Paniscus* and *A. cingulatus* but distinguished from both by the more extensive and obvious darkening of the foremargin of the wing, and from *A. Paniscus* by the banded abdomen of the male.

♂. As the species of this group are exceedingly closely allied I give only comparative characters, mainly with *A. Paniscus*.

A smaller narrower species than *A. Paniscus* with a much more conspicuously smoky blackish foremargin of the wing which occupies the whole of the base and is bounded below exactly by the upper side of the discal cell until the dark cloud fades away in an indefinite diagonal direction from about two-thirds or more of the discal cell towards the end of the subcostal vein. Pubescence slightly shorter.

Head with the space between the eyes at the vertex slightly narrower and widening downwards with straighter sides; frons with more diffused golden scales; face without any black hairs on the upper part of the eye-margins or with them very indistinct; back of the head more greyish black and perhaps duller, with the pale postocular scales smaller and yellower or greyer or even tawny orange but distinctly not silvery anywhere. Antennæ possibly with the dilated triangular base of the third joint tapering more gradually into the style-like portion, and thereby making the latter appear shorter.

Thorax with the silvery patch at the base of each wing very much as in *A. Paniscus*; pubescence on the flat slope on the hind part of the disc less coarse and slightly shorter; pubescence on the pleuræ similar in colour to that on the disc.

Scutellum margined about the sides with conspicuous dark tawny scales.

Abdomen with five bands of yellow scales, and with much less pale pubescence on the disc so that the black ground colour is much more obvious, and the few erect thin black hairs on this black part of the end segments more conspicuous because of the absence of the concealing tawny pubescence; the black tufts on the sides of the fifth and sixth segments rather smaller, less conspicuous, and less combined with the other black pubescence on those segments, and the white tufts smaller and rather yellowish or at least not brilliantly white, while the apical black patch is smaller or at any rate less defined because of the pale pubescence on the hindmargin of the sixth segment. Abdomen with five bands of elongate yellow scales, the bands on the foremargin of the second and fourth segments being rather broad and conspicuous as they occupy about one-third of each segment though rather narrowed about the middle (especially on the fourth segment); the three narrow bands placed respectively on the foremargin of the third segment and on the hindmargins of the fifth and sixth segments are also conspicuous though much narrower than the other two, and sometimes a slight band of yellow scales occurs on the seventh segment; no other yellow scales occur on the disc of the abdomen except a very few scattered ones about the middle of the fourth and fifth segments. Belly with the fourth segment almost entirely covered with pale yellow recumbent coarse scaly pubescence, and the fifth and sixth (and to some extent the seventh) segments with similar pubescence which is abundant rather broadly on the hindmargins, while the basal segments have still sparser scaly yellow pubescence but have some long pale yellow hairs; the middle part of the third segment and the base of the fifth and sixth segments bear some depressed black scales which may be rather concealed in very perfect specimens.

Legs without any splayed out black scales on the hind tibiæ though with very numerous short black bristles and some closely adpressed black and grey scales; hind tibiæ bearing fairly numerous and sometimes abundant yellow scales; hind femora with the postero-ventral row of black bristles less complete, but with numerous black scales on the underside; claws tawny on the basal half.

Wings with the foremargin darkened or almost blackened (though not

so much as in the female) down to exactly the line of the discal vein, but with the darkening fading out indefinitely in a diagonal line from about two-thirds of the discal cell towards the end of the subcostal vein; rectangular origin of the radial vein more commonly with a recurrent veinlet, and the loop of this vein with a more shallow upturn near the tip; the piece of the upper branch of the postical fork which forms the lower margin of the discal cell is as long as or longer than the base of the discal cell. Squamæ darker, with darker orange fringes. Halteres not so pale orange on the top of the knob, and with the base of the knob and the stem dark orange or almost blackish.

♀. Very similar to *A. Paniscus*, but the distinction of the wing darkening even more pronounced.

Frons less expanding downwards; back of the head with the postocular scales yellow and becoming orange yellow about the middle of the head, and more diffused over the back of the head, while some tiny black intermixed pubescence which is just visible in *A. Paniscus* is hardly visible in this species.

Scutellum as in the male.

Abdomen broader but more truncate than in the male, and apparently narrower and more parallel-sided than in *A. Paniscus*, though this appearance may be only caused through rather shorter side pubescence and the broader and more sharply defined pale bands; pubescence on the disc shorter and less pale than in *A. Paniscus*; pale bands more conspicuous and more orange than in *A. Paniscus* because of the sparser pale pubescence, and more defined on at least the second, third, and fourth segments, and also more pronounced on the fifth and sixth segments even though those segments sometimes have more abundant golden scales; bands on the third and fourth segments rather emarginate at the middle behind, and the pale side tufts near the tip smaller and less distinct, while the apical black space may be larger but less sharply black because it includes numerous tawny scales. Belly covered with dense tawny golden scales, except on the fore half of the fifth, sixth, and seventh segments, while the basal segments have also numerous long tawny hairs.

Legs almost as in the male, with no splayed-out scales on the hind tibiae and with rather stronger bristles on these tibiae; yellow scales far more numerous, the posterior femora being almost covered with them, and those on all the tibiae and the front femora being numerous but more scattered; anterior femora with some moderately long but not dense black pubescence except near the tip; hind femora with about eight antero-ventral spines but none near the base; front tarsi with abundant short erect pubescence more obvious than in the male; claws hardly tawny at the base.

Wings with the darkening on the foremargin more conspicuous than in the male, and consequently more easily noticed than in any other British species; præalar spine conspicuous in one specimen.

Length about 11 mm.

This species varies in the colour of the pubescence from light greyish yellow to fulvous, and the venation seems to be liable to various small aberrations; the recurrent veinlet from the upper angle at the origin of the radial vein is frequently present and sometimes rather long, and the radial vein may diverge from the præfurca opposite to or before or after the discal cross-vein. A male taken by Mr F. C. Adams at Lyndhurst has a moderately long veinlet issuing in both wings from the upward bend of the discal vein in the third posterior cell, though the veinlet is imperfect at its base in the right wing; this specimen very nearly destroys the essential character of only four posterior cells in the *Bombylidae*!

This species is very similar to *A. Paniscus* and even more closely allied to *A. cingulatus*, from both of which however it is distinguished by the darker foremargin of the wing, which character is very obvious

in the female, while the male is distinguished from *A. Paniscus* by its banded abdomen, and from *A. cingulatus* by its different banding. Several other continental species are probably also very much allied, but in most cases better descriptions are wanted; a few further notes upon allied species are given under *A. Paniscus*.

A. circumdatus was not fully recognised by me as British until I saw two specimens which were sent by Mr R. C. Bradley for exhibition at the Entomological Society on April 20, 1904; the male of these two was caught by Mr W. G. Blatch at Poole in Dorset on July 24, 1870, and the female by Mr R. C. Bradley at Bournemouth (which is close by, though in Hampshire) on August 30, 1900. I next saw a female which had been taken by Mr H. Donisthorpe in the New Forest on August 1, 1901, and then two pairs taken by Mr F. C. Adams at Lyndhurst on July 22 to 28, 1901. It is practically certain that this is the species recorded by Curtis in 1824 under the name of *A. flava*, upon which he said, "End of June, " borders of woods, Devon, Parley Heath, upon places where the turf had " been pceled off, and hovering over a bank; Mr Dale, Monk's Wood, " Huntingdonshire; Rev. W. L. P. Garnons," and being desirous of testing Curtis' locality I went in August, 1904, to Parley Heath and Canford Heath, but found only *A. fenestratus* sparingly; a visit however to the Rev. O. Pickard-Cambridge disclosed a long series (twenty or more) of *A. circumdatus* which had been taken by him on Bloxworth Heath at intervals in the previous thirty or forty years, and no allied species was known to him, so that Coucké's idea of all these closely allied species being only varieties of one species is completely dissipated. The Rev. O. Pickard-Cambridge used to take them when searching for the spider, *Xysticus sabulosus*, which occurs about the end of August and in September. I subsequently saw odd specimens which had been taken in the New Forest by Colonel Yerbury (August 31, 1894, 1♀) and Mr H. W. Andrews (August 21, 1903, 1♂), near Chobham in Surrey by Mr Edward Saunders (August, 1904 and 1905), and finally Colonel Yerbury, Mr J. E. Collin, and myself found the females not uncommon at Studland, Arne, and Bloxworth Heaths in Dorset in August 1906 from the 22nd to the 27th (but only one male), when they were rather worn and after which date not a single specimen was seen. I have no doubt it occurs over a very wide expanse of the commons in the south of England, but its habitats are quite distinct from those of either *A. Paniscus* or *A. cingulatus*.

Synonymy.—There can be no doubt but that this species is the one recorded by Curtis under the name of *A. flava* from at least the Parley Heath locality, though Curtis does not seem to have recognised that the female of *A. Paniscus* (called by him *A. hottentotta*) has pale bands on the abdomen. A specimen exists in the Hope Museum at Oxford under the label of *Anthrax Belzebub*, and the species does bear a superficial resemblance to *Lomatia sabæa* and to a less extent to *L. Belzebub*; another specimen in the same museum stands under the name of *A. cingulatus*, though there is also a specimen correctly labelled *A. circumdatus*.

VIII. THEREVIDÆ.

Orthorrhaphous brachycerous but by no means eremochætous flies of moderate size and more or less conical shape, usually resembling the *Bombylidæ* in their furry pubescence but distinguished by the five posterior cells; also resembling some *Asilidæ* but distinguished by the eyes being not protuberant from the sunk vertex.

Head usually almost as broad as the thorax, somewhat semicircular, and rather puffed out behind the eyes, but with hardly any obvious collar and only a short

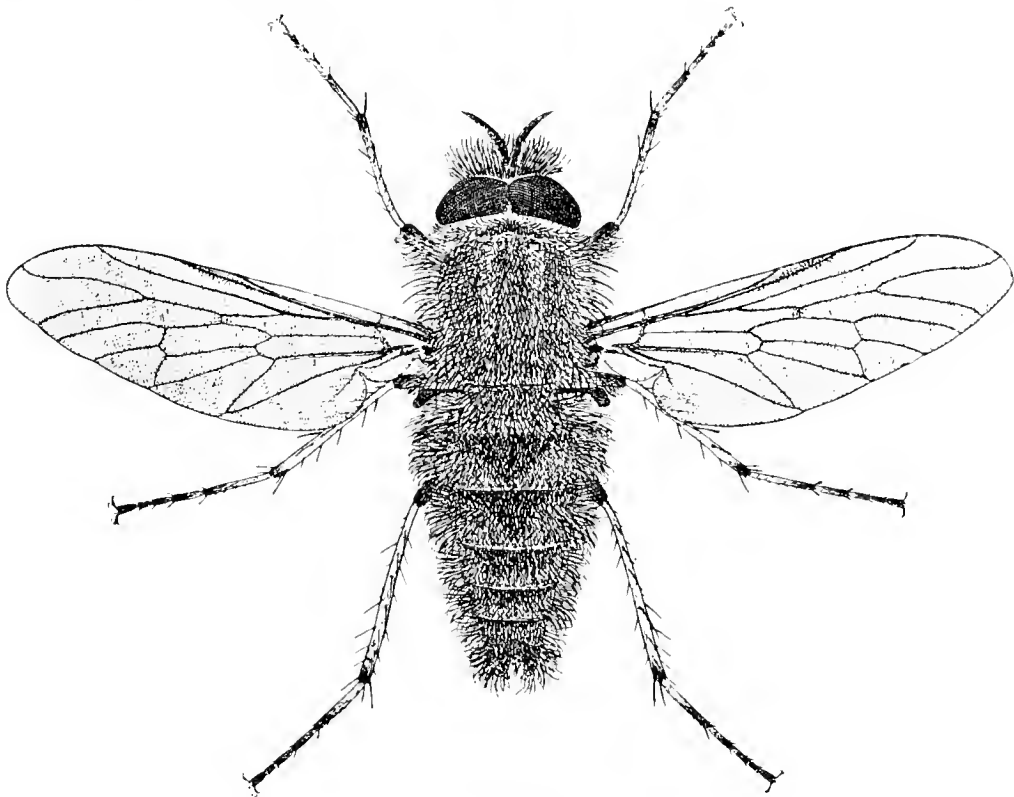


FIG. 310.—*Thersea nobilitata* ♂. × 5.

neck; cephalic bristles practically absent except for the strong black postocular bristles and some bristles which usually occur quite out on the upper part of the actual back of the head. Frons by no means excavated between the eyes, but usually rather (and sometimes strongly) produced near the base of the antennæ, ranging from densely hairy (*Thersea*) to quite bare (*Psilocephala*); ocelli three. Face hairy or bare, but never with a distinct mouth-beard. Proboscis rather prominent, upturned and rather thick, but not porrect and produced; sucker-flaps broad; palpi not jointed; but in *Xestomyza* the proboscis and palpi are elongate and thin. Eyes bare, not bulging out from the vertex, touching or considerably approximated in the male, but widely separated in the female. Antennæ porrect, approximated at the base, and composed of three joints with an apical (sometimes jointed) style; basal joint large and long; third joint elongate, and often with an indistinct basal annulation whereby the antennæ may appear to be four-jointed.

Thorax (fig. 311) rather flattened, usually (but not always) densely pubescent in the male but with the pubescence shorter and more adpressed in the female, and with some strong black (usually conspicuous) chaetotactic bristles, which show no

humeral bristles but about four (two to six) præsutural in a row, two (or one) supra-alar, one strong postalar, and usually one or two pairs of præscutellar; other dorso-central bristles only rarely present. Scutellum with two pairs of conspicuous slightly convergent long black marginal bristles, or one pair only in *Xestomyza*.

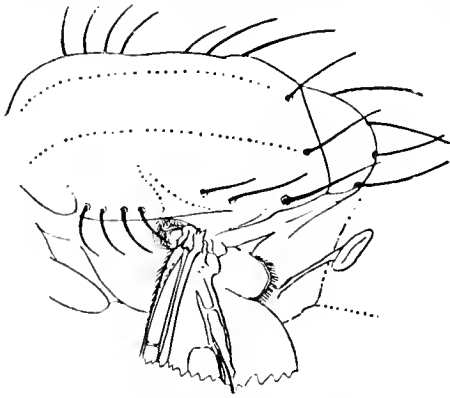


FIG. 311.—*Thereva nobilitata* ♀. × 10.

Abdomen with seven (or more) segments, usually rather elongate and conical, and also usually bearing dense soft pubescence which is rather erect in the male but depressed in the female and which never includes any strong bristly hairs. Genitalia of the male rather long and moderately conspicuous, but of the female long and shining and bearing at the end a circlet of coarse black spines (fig. 319) similar to those which occur in some *Mydaiidæ*, *Apioceridæ*, *Anthracinæ*, and *Asilidæ*.

Legs slender, rather long, and bearing distinct bristles which are hardly macrochætæ and which are not adapted for predatory purposes; anterior coxæ with two (or more) bristles in front near the tip, and the hind coxæ with one outside not so near the tip besides two or three small ones in front at the tip; anterior femora often with about two (1-3) bristles beneath near the middle and sometimes one behind; hind femora usually with an irregular row of antero-ventral bristles; front tibiæ with two or three rows of shorter bristles, while the posterior tibiæ have four rows, and all have an apical circlet of about six spines, of which one almost anterior is conspicuously long on the front pair but about four are long on the posterior pairs; tarsi rather thin and with small circlets of bristles at the tip of each joint (except the last), though the circlets are short and inconspicuous on the front pair; posterior tarsi with short plantar bristles on the basal joint, and the front tarsi sometimes with a few "touch-hairs" on the underside. Pulvilli two only or none; empodium represented by a thin bristle or absent.

Wings (fig. 310) with a well marked and comparatively simple venation somewhat intermediate between that of the *Tabanidæ* and that of the *Asilidæ*, but distinguished from the former by the longer upper basal cell and the less wide open cubital fork, and from the latter by the shorter subcostal vein. Subcostal vein comparatively short; præfurca fairly long and commencing long before the base of the discal cell; cubital vein with a simple fork, which is long but begins beyond the end of the discal cell and is rather wide open and includes the wing-tip; discal cross-vein placed near the middle of the discal cell, and consequently the upper basal cell longer than the second; discal cell always well defined and entirely composed of the discal vein, as the small cross-vein is distinctly present; discal cell always emitting three veinlets to (or towards) the wingmargin, which are either quite simple or the lower one may curve down enough to join the upper branch of the postical fork and thereby cause a closed fourth posterior cell; postical vein with a well defined simple fork, of which the upper branch is connected by the small cross-vein to the discal cell near the base of the latter, and this branch is usually joined by the third veinlet from the discal cell close to the wingmargin, while the lower branch is always united with the anal vein near the wingmargin so as to form a closed anal cell; submarginal cells always two; posterior cells always five. Wing-membrane crowdedly but not very distinctly rippled, minutely pubescent. Squamæ with only the alar pair developed, but they are rather large and peculiarly folded so that the strongly defined margin is angled about the middle and gives an impression of there being two pairs of squamæ; fringe above that fold rather short, even, and delicate, but after the fold long and similar to the pubescence on the neighboring part of the metapleuræ when there is long pubescence there but otherwise with only a moderate fringe; frenum distinct. Halteres in no way concealed, and with the upper part of the stem widening out to the knob.

The metamorphoses in all stages are not satisfactorily known, but the young larvæ are very mobile in hunting for prey; they are serpentine

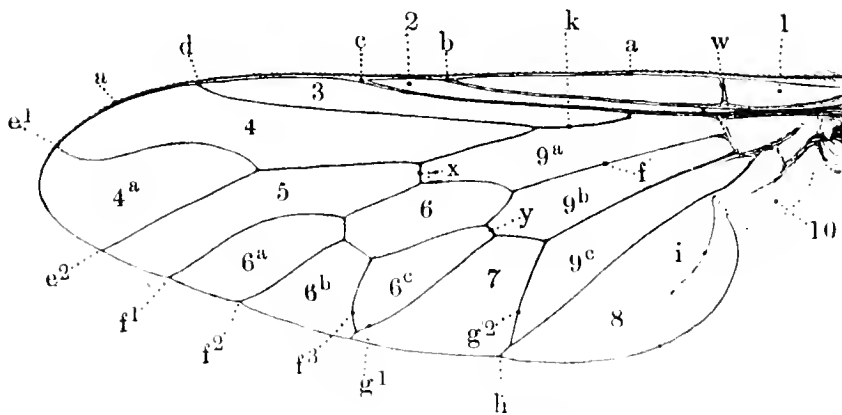
and of tough consistency and show apparently nineteen segments; they are said to occur in fungi and rotten tree-trunks but I received a female specimen of *T. nobilitata?* from Mr C. D. Ash, which he was confident he had bred from a Lepidopterous larva, and also a male from Essex (June 23, 1901) which had been bred from *Triphaena interjecta*, which tends to confirm Wahlberg's statement (Vet. Acad. Handl., 1838,?) that he had bred *T. eximia* from *Noctua* larvæ; Westwood also stated (Proc. Ent. Soc. Lond., 1859, 59) that the larvæ had been bred from the pupæ of *Aleucis pictaria* and *Sphinx ligustri*; it is probable that the active young larvæ live in loose earth and sand and are ready to prey upon any vegetable or animal refuse, or even to affix themselves to living larvæ.

This family is well defined and may be distinguished most readily from the *Bombylidae* by the presence of the small cross-vein and the five posterior cells. It is hardly necessary to compare it with the eremochæteous *Tabanidae* and *Leptidae*, but it is desirable to give some distinctive characters from the *Asilidae* and *Apioceridae*. The *Asilidae* are more heavily built pedestrian predaceous flies with the eyes widely separated in both sexes and conspicuously bulging out from the depressed or even excavated vertical portion of the frons; their bristles are as a rule much more strongly developed, the tarsal bristles being evidently used for grasping prey; the subcostal vein is much longer and frequently (*Laphrina* and *Asilina*) receives the radial vein before its tip. The *Apioceridae* are easily distinguished by their spatulate palpi and their venation, the subcostal vein being very long and receiving the radial vein and the upper branch of the cubital fork (or both branches) before its tip, so that these veins run upwards rather parallel to the wingmargin.

The *Therevidæ* are not a large family, about 250 species being known which have been placed in rather more than a dozen imperfectly distinguished genera; they seem to occur in all parts of the world, though the majority have been described from Europe and North America (about seventy species from each); they are, however, apparently numerous in New Zealand. In Britain we recognise about a dozen species, of which I have seen only one (*T. annulata*) from Ireland, though Haliday recorded *T. cincta* (probably *nobilitata*) from Holywood in Co. Down; hitherto our species have been in a chaos of nomenclature for the reasons given by Loew in 1847, which are as true to-day as when he wrote them sixty years ago; Loew then said, "The genus *Thereva* belongs to the Dipterous genera of " our Fauna which quickly attract the eyes of the collector through their " beauty; his first success in distinguishing them causes him no difficulty, " partly because he at first possesses only universally common species, and " partly because he applies no close criticism of the existing descriptions " to the few species of his collection; as soon as he enriches these, he " must become doubtful about identifications which he had previously " considered certain; he notes that these descriptions apply to two or " more closely allied species and does not know to which of these they

“ belong; he sees that species are often sharply and surely distinguished “ by trifling differences but finds little or no information upon such “ distinctions in the existing descriptions; he discovers that in the genus “ *Thereva* essentially distinct species may agree in all points of structure “ and be only distinguished by the difference of coloration, and at the same “ time that the colour of many species is exceedingly variable; these “ circumstances compel him to study afresh for a long time before he “ arrives at a definite result.” After writing these words in an introduction, Loew proceeded to describe thirty-three European species, to twenty-one of which he gave new names, and it is disconcerting to find that two of his names have sunk as synonyms and that no less than twelve out of the remaining nineteen new species have never been recognised (or at any rate recorded) by subsequent writers. The distinctive specific characters in the restricted genus *Thereva* (*sensu meo*) lie in the colour of abdominal ground markings (probably the best character), the colour of the pubescence on frons, face (middle as distinguished from sidemargins), jowls, lower, middle, and upper parts of the back of the head, basal antennal joint, thorax and abdomen especially, back of front femora, etc., while in the females distinctions may be found in the shape of the shining black callus on the frons (a character not absolutely invariable), and the ground colour and pubescence of the last abdominal segments. I have not the slightest doubt that there are many perfectly good species distinguished by these apparently trivial characters, but the difficulty lies in fixing the absolute distinction; perhaps under microscopic examination characters will ultimately be found in the genitalia, but at present the eye distinguishes our species better than the lens. The character of the presence of two pairs of præscutellar bristles is usually useful for distinguishing *T. fulva*, *annulata*, and *lunulata*, but is not infallible, while the wide open fourth posterior cell is characteristic of *T. lunulata*. To add to our difficulties, specimens of British species seldom look exactly like specimens of the same species from the continent, so that even after identification by description doubts may easily re-arise upon comparison. Schiner says the species are as a rule “ Robber Flies,” which have a somewhat cunning and uneasy cat-like demeanour, in that they lurk between the leaves of low shrubs, and know how to conceal themselves like lightning without flying away. I have never seen them acting predaceously myself, though I admit that their actions appear very suspicious, and it is worthy of note that Professor Poulton has not been able to obtain any record for his paper on predatory Diptera; Walker however states that they sometimes prey on other insects, and Williston says, “ Their food is chiefly “ other diptera, for which they lie in wait upon leaves and bushes, or upon “ the bare ground.”

Synonymy.—I consider the spelling *Thereva* to be both more correct and more euphonious than *Thereua*; it is also the original spelling proposed by Latreille, and I cannot find the spelling *Thereua* until Agassiz incorrectly stated in 1846 (*Nomenclator Zoologicus*) that it was Latreille’s spelling of 1796.

Type of venation of the THEREVIDÆ.FIG. 312.—*Thereva annulata* ♂.

Longitudinal (or long) veins.

- a* Costa (or costal vein).
b Mediastinal (or auxiliary) vein.
c Subcostal (or 1st longitudinal) vein.
d Radial (or 2nd longitudinal) vein.
e Cubital (or 3rd longitudinal) vein ; always with a simple fork which includes the tip of the wing.
 *e*¹ Upper branch } of the cubital fork.
 *e*² Lower branch }
f Discal (or 4th longitudinal) vein ; always including all the discal cell and all the veins issuing from it.
 *f*¹ Upper veinlet } from the discal cell.
 *f*² Second veinlet }
 *f*³ Third veinlet }
g Postical (or 5th longitudinal) vein ; always with a simple fork, but the branches of the fork usually uniting with veins on either side before reaching the wingmargin.
 *g*¹ Upper branch } of the postical fork.
 *g*² Lower branch }
h Anal (or 6th longitudinal) vein.
i Axillary vein.
k Præfurca = the common stem of the radial and cubital veins.
 Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (or transverse) veins.

- w* Humeral cross-vein.
x Discal (or middle) cross-vein.
y Lower (or small) cross-vein.
 Anal cross-vein = *g*² = the lower branch of the postical fork.

Cells.

- 1 Costal (or mediastinal) cell.
 2 Subcostal cell.
 3 Marginal cell.
 4 Submarginal cell.
 4^a Second submarginal (or cubital) cell (or cubital fork-cell).
 5 First posterior (or subapical) cell.

- 6 Discal cell.
- 6^a Second posterior cell.
- 6^b Third posterior cell.
- 6^c Fourth posterior cell.
- 7 Postical (or 5th posterior) cell (or postical fork-cell).
- 8 Axillary cell.
- 9^a Upper (or 1st) basal cell.
- 9^b Second (or middle) basal cell.
- 9^c Anal (or lower, or 3rd basal) cell.
- 10 Alula.

Notes on the Venation of the THEREVIDÆ.

The venation is very simple and liable to very little variation.

SUBCOSTAL VEIN short, thereby affording a distinction from the *Asilidae* and *Apioceridae*. PRÆFURCA rather long, starting before the middle of the upper basal cell and consequently far before the base of the discal cell. Discal cross-vein placed near the middle of the discal cell, and consequently the upper basal cell longer than the second. CUBITAL FORK wide open and including the wing-tip, but not so wide open as in the *Tabanidae*, and usually the upper branch ending as far from the radial vein as from the lower branch; the cubital fork starts after the end of the discal cell. DISCAL CELL hexagonal and emitting three almost equidistant veinlets, of which the lower one is usually bent down and sometimes closes the fourth posterior cell. POSTERIOR CELLS always five, the fifth (postical) having its upper vein sometimes connected at the wingmargin with the third veinlet from the discal cell, and its lower vein always connected with the anal vein. SMALL CROSS-VEIN always distinct.

Table of the Palearctic Genera of THEREVIDÆ.

- 1 (6) Basal antennal joint almost as long as (or even longer than) the head. Species almost bare.
- 2 (3) Basal antennal joint long and thin, antennæ twice as long as the rather short head.
Fourth posterior cell closed. Abdomen elongate, pointed.
- 3 (2) Basal antennal joint remarkably thick, much longer than the other two together; antennæ hardly longer than the rather long head (fig. 313).

PHYCUS.

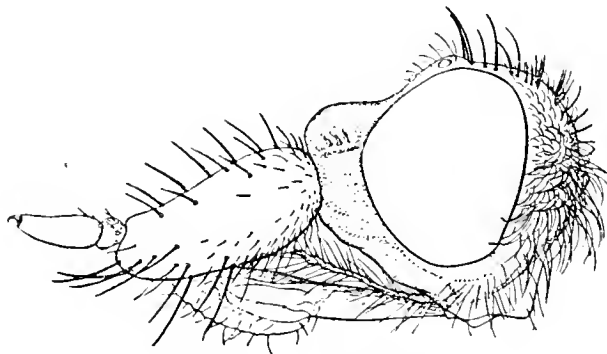


FIG. 313.—*Xestomyza chrysanthemii* ♀. × 24.

- 4 (5) Eyes of the male separated. Basal antennal joint bristly from base to tip (fig. 313).

Discal cross-vein near the middle of the discal cell.

XESTOMYZA.

- 5 (4) Eyes of the male touching. Basal antennal joint bristly near the tip only.

Discal cross-vein considerably beyond the middle of the discal cell.

BARYPHORA.

- 6 (1) Basal antennal joint much shorter than the head. Species sometimes furry.

- 7 (8) Cubital fork long and rather narrow (as in *Leptis*), fig. 314.

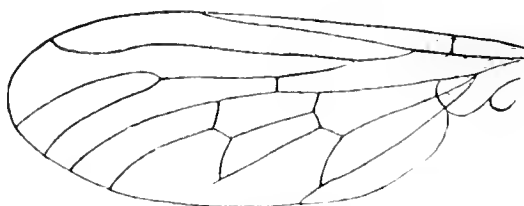


FIG. 314.—*Rueppellia*.

Basal antennal joint shorter than the third; style rather long and distinctly jointed, two-thirds as long as the third antennal joint. Fourth posterior cell closed.

RUEPPELLIA.

- 8 (7) Cubital fork wide open (as in fig. 312).

Basal antennal joint as long as the third; style short, indistinctly jointed.

- 9 (10) Pulvilli absent.

Femora bare.

CENOPHANOMYIA.

- 10 (9) Pulvilli distinctly present.

- 11 (12) Face and frons with long dense pubescence (fig. 315).

Abdomen conical. Very furry species.

1. THEREVA.

- 12 (11) Face bare; frons bare or in the male with pubescence not longer than that on the basal antennal joint.

Species almost bare, except in *Dialineura*.

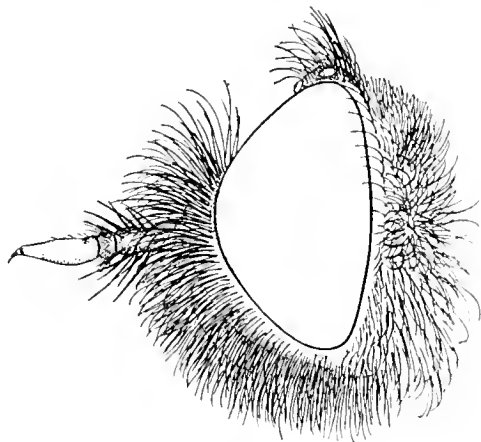


FIG. 315.—*Thereva nobilitata* ♂. × 18.

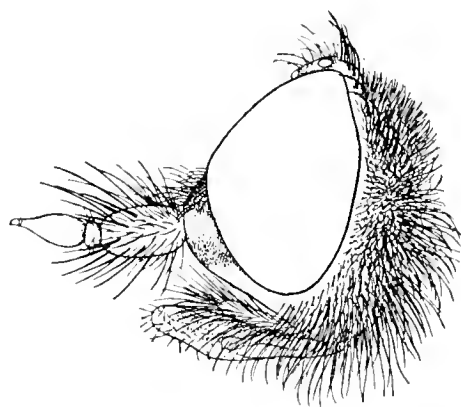


FIG. 316.—*Dialineura anilis* ♂. × 25.

- 13 (14) Basal antennal joint swollen, more bristly than usual, and as long as the other two joints together (fig. 316). Frons pubescent in the male. Furry species.

Fourth posterior cell wide open.

2. DIALINEURA.

- 14 (13) Basal antennal joint not swollen nor more bristly than usual, shorter than the other two joints together (fig. 317). Frons bare. Abdomen elongate, oblong rather than conical.

Almost bare species.

3. PSILOCEPHALA.

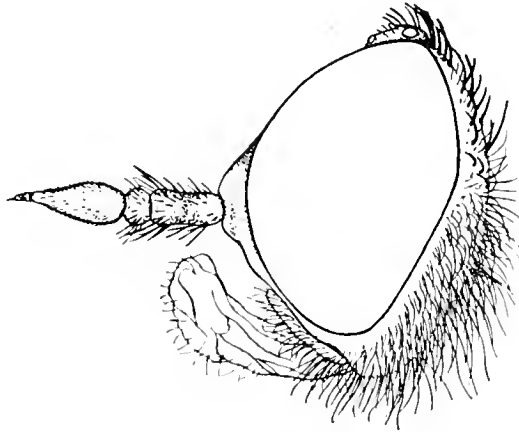


FIG. 317.—*Psilocephala ardea* ♂. × 33.

Synonymy.—I believe that *Cionophora* Egger is an absolute synonym of *Xestomyza*, and I very much doubt the distinctness of *Baryphora* Loew, *Tabuda* Walker, or *Pachyrrhiza* Philippi; it is noteworthy that Loew made no reference to *Xestomyza* when founding his genus *Baryphora*, and his figure of the antennæ is very misleading; Egger also made no reference to either *Xestomyza* or *Baryphora* when founding *Cionophora*; I possess several specimens of *Xestomyza chrysanthemi* and one female of *Baryphora speciosa*, and have endeavoured to show their differences. *Tabuda* Walker (1856) and *Pachyrrhiza* Philippi (1865) are probably synonyms of *Xestomyza* Wied. (1820) or *Baryphora* Loew (1844), but the American entomologists profess to distinguish *Tabuda* by its less produced and less flattened frons and its more pubescent basal antennal joint. Macquart's genus *Exapata* was in my opinion founded on an injured or deformed specimen of an ordinary *Thereva*, and I believe (though I am not quite certain) that I possess the original specimen of *Ex. anthracoides*, and if so it is very closely allied to *T. fulva* but may be distinct as there are indications of cloudings on the cross-veins and on the upper margin of the discal cell after the discal cross-vein (= *T. arcuata*?). I have given a more limited interpretation of the genus *Dialineura* than has usually been done as I have placed the most stress upon Rondani's second character, "Antennæ articulo primo inerassato," and have ignored his character founded on the open fourth posterior cell. The genus *Phycus* Walker may have been misunderstood by subsequent authors, but my characters have been drawn from *P. canescens* only. *Anabarrhynchus* Macquart is very closely allied to *Dialineura* and *Psilocephala* but has the eyes of the male well separated. Some of the other genera have been very imperfectly distinguished and when well known may be refounded on better characters or be suppressed.

1. THEREVA.

Thereva Latreille, Précis car. gén. Ins., 167 (1796).

Medium-sized flies of rather conical shape, clothed with dense furry pubescence which obscures the dark ground colour, and may be silvery white, fulvous, brown, or even mainly black in colour.

Head (fig. 315) semicircular but not flat behind, short, and without any obvious neck to connect it with the thorax, but not crammed on to the thorax. Frons

slightly produced towards the antennæ, bearing in the male long dense pubescence, but in the female only short pubescence; a transverse shining black bare callus (sometimes divided into two spots) is almost always present on the broad frons of the female, and though this callus varies in shape it does not give infallible specific distinction. Face sloping or gently curving down to the mouth, and bearing in the male long dense pubescence, which extends round under the eyes and all up the back of the head to the vertex, while on the upper part of the back of the head are indications of a postocular row of rather strong black bristles, and out on the back of the head well away from the eyes are some more black bristles; in the female the pubescence is shorter and the black bristles are more numerous and conspicuous; back of the head rounded out behind the eyes, mouth-opening large and long being extended considerably forwards; ocelli three. Proboscis rather withdrawn but upturned and not extending up to the antennæ; sucker-flaps large and ribbed; palpi cylindrical, rather knobbed at the tip, and conspicuously pubescent. Eyes bare, touching in the male for a considerable space but in the female widely separated; facets hardly conspicuously contrasted in size. Antennæ (fig. 318) porrect, approximated at the base, rather long, but not longer than the head; basal joint long and cylindrical, not inflated, but bearing some long pubescence on the basal two-thirds and some stiff black bristles on the apical part; second joint about a quarter the length of the first, and also bearing shorter but more numerous bristles; third joint divergent, about as long as the first, and with an indistinct annulation near its base, bare of pubescence, and ending in a short style which bears a very short thread-like apical filament.

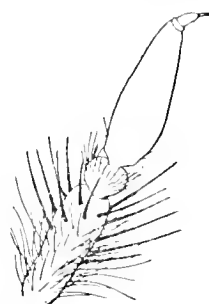


FIG. 318.—*Thereva nobilitata* ♀. × 30.

Thorax oval, densely pubescent in the male but with shorter more depressed pubescence in the female; strong black chaetotactic bristles are always present, of which about four (3-6) are præsutural, two supra-alar, one strong postalar, and one or two pairs præscutellar, but the pairs of præscutellar bristles are liable to vary in an irregular manner so that they may be asymmetrical. Scutellum semicircular, with two pairs of conspicuous black marginal bristles; metanotum small and bare, rather concealed beneath the projecting scutellum.

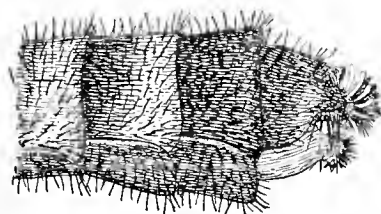


FIG. 319.—*Thereva nobilitata* ♀.
End of abdomen.

Abdomen conical and longer than the thorax, with seven or eight obvious segments in the male, but with the distinct eighth segment in the female forming the basal portion of the ovipositor; hindmargins of segments usually yellowish on just a marginal hem both dorsally and ventrally; pubescence dense and almost furry in the male but with hairs of different lengths, and with shorter usually adpressed pubescence on the basal segments in the female, and in the latter sex the pubescence on the fifth to eighth segments is short and rigid (fig. 319). Genitalia of the male fairly distinct, but the ovipositor of the female (fig. 319) longer and more produced and ending in a circlet of conspicuous thick black spines.

Legs slender, and bearing abundant soft pubescence in addition to some black bristles on at least the coxæ and anterior femora. Bristles on the coxæ about two on the front, four on the middle, and one on the hind pair; those on the anterior femora usually (but not always) two or three (rarely one) beneath (or almost antero-ventral) near the middle, and those on the hind femora forming an irregular antero-ventral row of about seven bristles; tibiæ with rows of small bristles and with circlets of spurs, but the rows on the anterior pairs do not extend to the base, and though there are about three rows of three (3-6) bristles on the front tibiæ, four rows of about three (3-7) bristles on the middle tibiæ, and four rows of about eight bristles on the hind tibiæ extending the whole length, yet the bristles vary in both species and individuals; tarsi normal, but with a few "touch-hairs" beneath the front pair, and with short strong black plantar bristles on the posterior pairs; there is a small process on the front of the hind coxæ near the base, which is not easily detected in the pubescence.

Wings normal in venation; fourth posterior cell usually closed but occasionally just open in the female or in individual specimens though this cell is more or less

widely open in a number of species which many authors have placed in *Dialineura*. The metamorphoses of scarcely any species are well known, but the larvæ are very active in their earlier stages and are said to live in damp earth and in fungi, while the pupæ have been found beneath stones; there is however reason to believe that the larvæ are (like the *Bombylidae*) parasitic on Lepidopterous (*Noctuae*) larvæ as I have noted on page 539.

This genus is well distinguished if limited to the densely hairy-faced species which have the basal joint of the antennæ not dilated and the fourth posterior cell distinctly contracted towards the wing-margin even if not quite closed. *Dialineura* can then be distinguished by the dilated basal joint of the antennæ, the bare face, and the widely open fourth posterior cell, but this last character is only subordinate value as it occurs in many species of *Thereva*. *Psilocephala* may be at once distinguished by its bare frons and face and its more oblong abdomen.

Thereva is by far the largest genus in the family, and more than fifty species (in my interpretation of the genus) have been described from Europe. They occur on the leaves of shrubs and on large leaved plants (such as nettles) and in hedge-rows, where they sit very warily and are not at all easy to capture, while some species sit on hot dry sand or bare places; I have seen the males of *T. annulata* executing a frantic dance over hot white sandy places in small numbers in the hottest sunlight, and I think I have also seen the males of *T. nobilitata* acting in a similar manner, while other species are said to dance in small swarms (like some species of *Empidæ*) round about an individual bush. I cannot help suspecting that hybrids occur in this genus, as I have seen a female taken at Padstow in Cornwall in July 1902 which gave me the impression of being a hybrid between *T. bipunctata* and *T. nobilitata*, which both occurred there at that time, but it may have been a female of *T. marginula* which however has not yet been recognised as British; Colonel Yerbury has taken *T. annulata* (♂) and *D. anilis* (♀) *in cop.*, and I have seen specimens of *T. annulata* with a most suspiciously brownish pubescence on the thorax; Zetterstedt has recorded *T. bipunctata* ♂ *in cop.* with *T. annulata* ♀, and Rossi (Faun. etrusc., vol. ii., p. 274) stated that he had taken his *B. marginata* (which is consequently a *Thereva*, and possibly *T. marginula* Meig.) *in cop.* with *T. plebeia*; Rossi's *B. marginata* was described between his *B. plebeia* and *B. anilis*, of which the latter seems to be *T. annulata*. Numerous species of *Thereva* occur in North and South America, South Asia, and Australia, while three species each are recorded from South Africa and New Zealand.

Synonymy.—I have preferred the original spelling of *Thereva* to the emendation *Thereua*, as mentioned in the synonymy of the family. *Bibio* Fabricius (1781-1787) is practically a synonym of *Thereva* but is quite distinct from *Bibio* Geoffroy (1764).

Table of the MALES.

- 1 (14) Pubescence not silvery white (even though mainly whitish is *T. bipunctata*).
- 2 (13) Pubescence of abdomen mainly tawny, yellowish grey, or black (not whitish or pale yellowish grey). Wing-veins normally distinct.

- 3 (4) Pubescence wholly bright tawny (black hairs may be traced with difficulty down the mid dorsal line of the abdomen, and inconspicuous thin black hairs occur all about the disc of the thorax, besides the usual strong black bristles). Præscutellar bristles in two pairs. *1 fulva.*
- 4 (3) Pubescence obviously considerable mixed with black or at any rate not wholly bright tawny. Præscutellar bristles normally in one pair (except sometimes in *T. arcuata*).
- 5 (6) Abdomen mainly jet black with bands of bright tawny pubescence. Tarsi ferruginous at the extreme base only. Præscutellar bristles sometimes in two pairs. Fourth posterior cell often just open. *2 arcuata.*
- 6 (5) Abdomen not jet black with bands of bright tawny pubescence. Tarsi considerably ferruginous at the base.
- 7 (8) Abdomen and thorax with mainly black or dark brownish yellow pubescence. Pubescence on the face and jowls extensively black. Rather large species. *5 circumscripta.*
- 8 (7) Abdomen and thorax with considerable obvious tawny or greyish yellow pubescence. Pubescence on the face and especially the jowls not extensively black. Medium-sized species.
- 9 (10) Abdomen with pale ventral and black dorsal pubescence, and the pale pubescence not extending beyond the sides. *4 plebeia.*
- 10 (9) Abdomen with the pale ventral pubescence extending over the sides and to a considerable extent on to the disc.
- 11 (12) Ground colour black. Abdomen rather narrow and elongate. *2 arcuata.*
var. inornata.
- 12 (11) Ground colour brownish black. Abdomen wider at the base and apparently less elongate. *3 nobilitata.*
- 13 (2) Pubescence of abdomen mainly whitish grey or pale yellowish grey. Smallish species. Wing-veins very intense. Præscutellar bristles in one pair. *6 bipunctata.*
- 14 (1) Pubescence silvery white. Præscutellar bristles (normally) in two pairs.
- 15 (16) Halteres blackish. Fourth posterior cell usually wide open. *7 lunulata.*
- 16 (15) Halteres whitish. Fourth posterior cell closed or almost so. *8 annulata.*

Table of the FEMALES.

- 1 (12) Frons with a shining black callus or pair of spots.
- 2 (11) Frontal callus (normally) entire. Seventh abdominal segment with short rigid black hairs.
- 3 (4) Almost wholly tawny species. Præscutellar bristles in two pairs. *1 fulva.*

- 4 (3) Species by no means wholly tawny. Præscutellar bristles in one pair (except sometimes in *T. arcuata*).
- 5 (8) Fifth and subsequent abdominal segments bearing short rigid black hairs. Abdomen black, with light grey hindmargins which widen moderately at the sides.
- 6 (7) Frontal callus very large (fig. 322) extending up to the front ocellus. Wing-veins hardly darkened. 4 *plebeia*.
- 7 (6) Frontal callus small. Wing-veins darkened. 5 *circumscripta*.
- 8 (5) Fifth and sixth abdominal segments (normally) bearing short rigid pale hairs. Frontal callus moderate in size.
- 9 (10) Thorax with two rather obvious grey stripes. Abdomen with the black markings on the second and third segments extending to the sidemargins. Præscutellar bristles sometimes in two pairs. Fourth posterior cell sometimes just open. Tarsi sometimes ferruginous at only the extreme base, or (var. *inornata*) considerably ferruginous at the base. 2 *arcuata*.
- 10 (9) Thorax very indistinctly striped. Abdomen golden with the black markings on the second and third segments not extending to the sidemargins. Præscutellar bristles in one pair only. Fourth posterior cell closed. Tarsi considerably ferruginous at the base. 3 *nobilitata*.
- 11 (2) Frontal callus divided into a pair of spots (fig. 323). Seventh abdominal segment pale haired. 6 *bipunctata*.
- 12 (1) Frons brown on the upper part, but without any shining black callus.
- 13 (14) Halteres blackish. Fourth posterior cell more or less wide open. 7 *lunulata*.
- 14 (13) Halteres whitish. Fourth posterior cell closed or almost so. 8 *annulata*.

I have called attention in my notes upon the variation of *T. bipunctata* to a British specimen which may represent *T. marginula* Meig.

Very few species of *Thereva* can be determined with certainty from single specimens unless they are quite normal and in very perfect condition. *T. fulva*, *T. lunulata*, and *T. annulata* should be easily named in both sexes and the females of *T. bipunctata* and *T. plebeia* can be distinguished by their frontal callus, while the male of *T. bipunctata* is not difficult to name because of its rather smaller size and whitish abdominal pubescence; the female of *T. circumscripta* is not known to me with certainty, but may be distinguished from that sex of *T. plebeia* by its smaller frontal callus and probably from *T. nobilitata* and *T. arcuata* by sharply defined light grey abdominal bands. There then remain the males of *T. arcuata* (of which the tawny and black form is very distinct), *T. nobilitata*, *T. plebeia*, and *T. circumscripta* and the females of *T. nobilitata* and *T. arcuata*, and as far as my experience goes these are all difficult species, and their determination can only be arrived at by a close examination of the descriptions.

1. **T. fulva** Meigen. Almost wholly bright tawny-haired, but usually with a slight dorsal line of black hairs on the abdomen though without fine transverse lines of black hairs across the hindmargins of the segments, and with black hairs on the vertex, frons, and sides of the face in at least

the male, besides the black chætotactic bristles. Abdomen of the female with the seventh abdominal segment and the ovipositor shining black. Præscutellar bristles two pairs.

An extremely beautiful bright tawny fly.

♂. Face and frons entirely covered with dull golden dust; frons bearing conspicuous long black pubescence which extends (though gradually contracting) down the sides of the face almost to the bottom of the eyes but becomes almost restricted to a single row of hairs on the lower part; all the rest of the face with long dull yellow drooping pubescence which becomes paler on the lower part and which is divided by the long mouth-opening; lower part of the face, jowls, and lower part of the back of the head covered with more whitish dust, while the pubescence on the rather wide jowls is long and dull yellow with (almost always) a few black hairs intermixed though not enough to call a clump; lower part of the back of the head with long shaggy pale yellow pubescence, but the upper part covered with tawny dust and with denser shorter and tawny pubescence, while out on the middle part of the back of the head are about six (or fewer) irregular black bristles, and there is a single postocular row of about twenty long black bristly hairs on the upper half of the head which curve over at their tips and which are connected with the black pubescence on the dull yellow vertex; the conspicuous tuft of long black hairs on the frons leaves the hairs quite close to the base of the antennæ dull yellow. Eyes touching for almost one-third of the distance between the occiput and the antennæ, and with the facets almost imperceptibly diminishing in size from the upper part downwards. Antennæ entirely obscured by dull yellow dust on the two basal joints and the base of the third joint, but the third joint is dull dark brown with its basal annulation rather orange; the stout black bristles on the apical half of the basal joint and on the second joint conspicuous, but the finer pubescence on the basal half of the first joint dull yellow.

Thorax and scutellum with the ground colour apparently dull brownish orange, but entirely covered with almost erect dense tawny, dark tawny, and yellow pubescence besides the strong black chætotactic bristles, but a close examination shows that (almost always) numerous thin black hairs are scattered all over the disc, and these black hairs (except when very few) cause a darker tawny appearance on that part; the chætotactic bristles placed as usual (fig. 311) but the præsutural bristles often irregular (sometimes four on one side and two on the other), and the præscutellar bristles always present in two pairs; pleuræ with rather long dense pubescence which is tawny on the upper part but paler below, and the tuft on the metapleuræ large, long, dense, and tawny. Scutellum with rather longer tawny pubescence, and with fewer or none of the longer thin black hairs; metanotum bare of pubescence but covered with greyish yellow dust.

Abdomen entirely dull brownish orange but covered with dense tawny pubescence, and in some lights the second to fifth segments with sharply defined perfectly equal bare orange hindmarginal hems, of which a trace exists on the sixth segment; pubescence apparently all tawny but a few black hairs can be traced on a middle dorsal stripe, though not on the hindmargins, and occasionally these black hairs are numerous enough to form a fairly conspicuous black dorsal stripe on the six basal segments, and may even extend across the hindmargins of the sixth and seventh segments and even on to the disc of the seventh and genital segments. Belly with a dull blackish ground colour obscured by yellowish grey dust, and with conspicuous yellow hindmargins to the second to sixth segments and a tawny hindmargin to the seventh segment; pubescence long but not conspicuous, as it is thin erect and pale when compared with that on the dorsal side. Genitalia with two large broad tawny side-plates which end in narrow tawny claspers, between which on the upper part at the base is a pair of lamellæ which are shorter and darker than in *T. nobilitata*, while the genitalia are conspicuously bright tawny when seen from beneath and bear long rather bristly tawny hairs.

Legs dull blackish, but the tibiæ dull orange except at the narrow indefinite blackish tip, and the tarsi dull orange about the base of the basal joint of the front pair and on most of the two basal joints of the posterior pairs except at their tips; front part of the hind femora covered with yellow scaly hairs. Pubescence fairly abundant and long behind and beneath the anterior femora, brownish yellow with numerous long black hairs intermixed; front coxæ with two black bristles, middle coxæ with four, and the hind coxæ with one; other bristles strongly developed in accordance with the generic characters.

Wings with a distinct yellowish tinge which becomes positively orange on the subcostal vein and on the basal part of the postical vein, while the cubital vein from its base to its fork and the upper branch of the postical fork (with the exception of its basal part) are also rather orange; sometimes there is a slight suspicion of darkening about the upper outer angle of the discal cell; when viewed from the wing-tip the orange colour about the base and stigma is conspicuous. Squamæ (alar) small, glassy yellowish with a blackish base, brownish margins, and a short rather dark fringe. Halteres orange, with the base of the knob sometimes brownish.

♀. Resembling the male, but distinguished by the usual sexual characters. Frons occupying less than one-fifth of the head at the vertex but steadily widening downwards, dull dark rich golden at the top but with a large

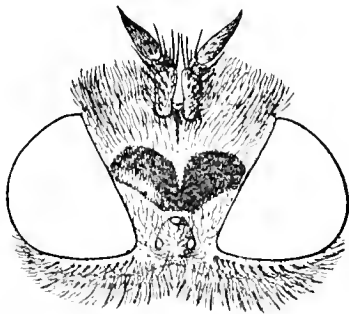


FIG. 320.—*Thereva fulva* ♀.
× 16.

brilliantly shining black obcordate callus—or (say) a brilliant black crossband from eye to eye, which sends a broad bend upwards in the middle almost to the ocelli, but on the lower side has a conspicuous narrow triangular emargination (fig. 320)—while below this shining black callus the frons just above the antennæ is dull golden; pubescence on the frons mainly black but partly tawny, not dense from the vertex almost down to the antennæ, and leaving the shining black callus bare except anteriorly at the sides, though the pubescence just above and about the antennæ is yellow; face pale yellow and bearing dense pale yellow pubescence, while similar pubescence is continued round under

the eyes and up the back of the head, but as it ascends becoming tawny until it reaches the black hairs of the vertex, and there is a postocular row of about twelve stout black (almost) bristles on the upper part of the head which bend slightly forwards, while in addition about sixteen black bristles right out on the upper part of the back of the head are continuous from side to side; one or two black hairs occur immediately under the eyes, but otherwise there are no black hairs after those on the frons down the face and round the jowls and back of the head until the postocular bristles; back of the head moderately puffed out. Antennæ with the fine yellow pubescence about the base of the basal joint short.

Thorax with the ground colour much more obvious and with a pair of faint narrow paler stripes down the disc; pubescence mainly short, recumbent, tawny, and hardly dense enough to conceal the ground colour, but still with several of the rather longer erect black hairs all over the disc, besides the black chætotactic bristles of which the præsutural are usually four in number but sometimes three on one side and four on the other; præscutellar pairs two as in the male; pleuræ with rather long thin yellow hairs in which no black hairs are intermixed, and the tuft on the metapleuræ still dense and conspicuous; the ground colour of the lower part of the pleuræ is light ashy grey. Scutellum with tawny pubescence, amongst which no black hairs occur except the four long marginal bristles.

Abdomen with the six basal segments entirely dull fulvous except for a narrow shining black base on the fifth and sixth, and these six segments bear an abundant depressed yellow pubescence which becomes fairly long and more erect and conspicuous about the basal corners and rather long on a præhindmarginal fringe on the basal segment, but all over the disc the pubescence is short and depressed and without a trace of black hairs

until the middle of the base of the fourth and fifth segments, where about three or four almost microscopical rather erect black hairs exist, but on the sixth segment all the pubescence is erect and rigid and the tiny erect black hairs may predominate; seventh segment shining black, but slightly dusted with yellow at the sides towards beneath, and with its pubescence sometimes all yellow but sometimes black except on the yellow dusted part; eighth segment shining black and bearing short rigid black hairs. Belly with thin but nearly erect and almost all yellow pubescence which is shorter than in the male, though a few black hairs may occur down the middle of the fifth and sixth segments and sometimes all over the seventh segment; eighth segment forming a bare ventral genital plate. Ovipositor with numerous short thick-set dark tawny spines, but with the usual circlet not so well defined as usual.

Legs with the coxæ light ashy grey (like the pleuræ just above them) and bearing whitish grey pubescence; pubescence behind the anterior femora very much shorter, less conspicuous, and all yellow; hind tibiæ with four rows of bristles, but the antero-ventral row consisting of only four bristles.

Wings without any trace of darkening at the upper outer corner of the discal cell. Squamæ more whitish glassy, with a brownish yellow margin and pale fringe.

Length about 9.5 mm.

This species varies a little in the amount of black hairs intermixed with the tawny pubescence on the thorax, on the sides of the face, and on the dorsal line of the abdomen. A remarkable male taken by Colonel Yerbury at Porthcawl on June 10, 1903, has the frons moderately wide but bare between the eyes, and with an indication of black calli where it widens out, the face with but few black hairs, the postocular ciliation more confined to the upper part and composed of about twelve bristles, the pubescence on the thorax short and depressed, the abdomen with scarcely any black dorsal hairs, the seventh and eighth segments more blackish, and the genitalia smaller; I do not think it is a hermaphrodite, but I consider it to be a male with numerous female characters. This species may be distinguished from all British allies by its almost entirely bright fulvous pubescence, and also from most of them by its two pairs of præscutellar bristles; occasionally other species have two pairs of these bristles, and its nearest continental ally, *T. subfasciata*, appears to always have them, but the male of *T. subfasciata* has paler pubescence and has an inconspicuous fine hindmarginal fringe of black hairs right across the abdominal segments, whereas the male of *T. fulva* has the dorsal black hairs (even when they exist) not confined to the hindmargin and not spread far away from the dorsal line. The female of *T. subfasciata* may be easily distinguished by its dulled lighter colored seventh abdominal segment. *T. subfasciata* is almost certain to occur in Britain, as it is not uncommon in North Germany and Scandinavia.

T. fulva is decidedly uncommon in Britain and although all our old lists included it I have failed to find it in any old collections, the specimens representing it being nearly always *T. nobilitata*. It is however a very distinct and very beautiful species, but requires great care in collecting to preserve its brilliant pubescence intact. I first caught it near Farningham Road Station in Kent on June 18, 1868, when I believe it was not uncommon, and I took another male at Foot's Cray in the same neighborhood, while Colonel Yerbury found it not uncommon at Dartford in July 1908, which makes it probable that Stephens (who often collected in Kent) may have correctly identified the species. Colonel

Yerbury also took several specimens at Porthcawl in Glamorgan in 1903 and 1906, and these are the only other British specimens I have seen. The dates range from June 10 to July 8.

Synonymy.—As I have said above I believe that all the old British records (with the possible exception of Stephens') refer to other species and mainly to *T. nobilitata*. I cannot doubt the correctness of my own determination even though Loew stated that the "sehr intensive gelbe Färbung und, ausser den gewöhnlichen schwarzen Borsten, keine Beimischung schwarzer Härchen." Walker's description applies fairly well to the female, but his statements of "*hind borders of the third and following segments black, shining; underside grey, ferruginous and shining at the tip;*" are not very applicable. It is also remarkable that I have never seen a specimen of *T. fulva* in any old British collection. In my notes on the synonymy of the genera of *Therevidæ* (page 544) I have called attention to the possibility of the genus *Exapata* having been founded upon a distorted specimen of this or some closely allied species.

2. *T. arcuata* Loew. Thorax dark brown with two narrow pale stripes. Pubescence mainly rufous orange, but the abdomen with conspicuous jet black bands; jowls without a clump of black hairs. Abdomen rather narrowly conical. Præsutural bristles often two pairs. Tarsi ferruginous only at the extreme base. Wings with a very faintly clouded arc above the discal cell; fourth posterior cell often just open.

Var. *inornata* Verrall. Pubescence grey or greyish yellow, with indistinct black bands on the abdomen. Tarsi considerably ferruginous.

A rather elongate conical species which is distinguished in its typical form by its beautiful rufous orange pubescence which with the jet black bands across the abdomen give it a very striking appearance, though the form *inornata* bears a strong resemblance to *T. nobilitata*.

♂. Face and frons covered with greyish tawny dust, which however has a blackish tinge on the upper part of the frons; frons bearing long black pubescence which spreads out like a fan at the sides and extends down fully two-thirds of the sides of the face, but then grows scarcer until it is reduced to a single line of hairs or sometimes dies out on the lower sixth of the face; all the middle part of the face bearing dense bright foxy tawny pubescence (in which one or two black hairs may be detected), but the black hairs on the sides just below the antennæ may stray out for a short distance and on the other hand the foxy pubescence may extend all round the antennæ and occupy all the front part of the frons (unless obscurely just about the middle); a shimmering whitish margin encircles the lower half of the eyes; the foxy pubescence clothes all the lower part of the head (amalgamating with the similar dense pubescence on the front coxæ) but a thin line of black hairs runs under the lowest angle of the eyes, and the black hairs extend a short distance up the back of the head; back of the head otherwise clothed with foxy pubescence which however becomes rather darker on the upper part, and with the usual overhanging long black postocular ciliation on the upper part which extends to the more dense black hairs on the vertex, while out on the back of the head quite away from the eyes are about half a dozen black bristles which are sometimes difficult to detect amidst the dense foxy pubescence; vertex covered with brownish dust. Eyes touching or at least approximated for a space which is rather longer than the vertical triangle; when seen in profile the eyes are deeper than usual in proportion to their length and when seen from above seem to be shorter than usual; facets almost imperceptibly diminishing from the upper

to the lower part. Antennæ with the basal joint covered with greyish yellow dust and with fine pale tawny pubescence on its basal part and the usual stiff black bristles on its apical part, but these bristles not so numerous nor so strong as usual; second joint with numerous short black bristles; third joint blackish brown, and bearing a tiny black dorsal bristle near its base; style short.

Thorax dark brown, with two distinct but inconspicuous widely separated tawny stripes which extend its whole length; pleuræ ashy grey. Pubescence almost erect and mainly black on the disc, but foxy red all round the margin, and when viewed from in front this foxy red pubescence appears to be even more abundant and to be interspersed (though shorter than the black hairs) on the disc; chaetotactic bristles as in fig. 311, but with five or six unequal præsutural bristles and sometimes a trace of a second præscutellar bristle on one or both sides; pleuræ with abundant foxy red pubescence (slightly paler than that on the sides of the dorsum), and with the dense tufts on the mesopleuræ and metapleuræ very conspicuous and including no black hairs except a few at the hinder upper corner of the metapleural tuft. Scutellum with long dense tawny pubescence and the usual black marginal bristles.

Abdomen more conical than in *T. nobilitata* and *T. plebeia*, deep velvety black with bright orange bands; the deep black colour occupying the basal segment except at the sides, a spot on the second segment beginning on about the middle half of the base but narrowing somewhat triangularly down to the orange hindmarginal hem, the basal two-thirds of the third segment (and even more about the middle but less than half on the sidemargins), the basal two-thirds of the fourth, fifth, and sixth segments even to the sidemargins, and sometimes the seventh and eighth segments; the hindmarginal hems broad and clear orange on the second segment, and narrower but still bright orange on the third and fourth segments, but becoming lost in the greyish orange bands on the fifth and sixth segments; greyish orange bands lie between the bright orange hindmarginal hems and the black base of the segments or lie on the hindmargins themselves and the one on the second segment is almost interrupted at the middle but widens out at the sides (in conjunction with the bright orange hindmarginal hem) until it may occupy the whole of the sidemargins, and the one on the third segment is obscurely narrowed at the middle but widens out slightly at the sides to rather more than half the sidemargins, while the one on the fourth segment does not widen out at all; the greyish orange bands on the fifth and sixth segments occupy the hindmarginal third of each segment. Pubescence very conspicuously bright rufous orange but with a fairly broad black dorsal stripe which forms a series of slight crests because the hairs droop just before (and overhang) each bare hindmarginal hem; the bright rufous orange pubescence diminishes in length and density on the fourth and fifth segments, and the whole pubescence becomes mainly black on the sixth segment, and all black but rather longer again on the seventh and eighth segments, and almost forming a tuft about the base of the seventh segment. Belly shining black, with conspicuous broad pale orange hindmarginal hems on the second, third, and fourth segments, and with a narrow hem on the fifth segment; pubescence on the second to fifth segments remarkably long and thin, though not at all dense, in fact almost sparse, black on all the seventh segment, and partly black but mainly rufous orange on the eighth segment. Genitalia with a pair of upraised blackish lamellæ, and near them with a pair of lurid red narrow lamellæ which bear some pale orange hairs on the inner side, and with two subquadrate blackish plates beneath which bear some reddish orange hairs at their end margins.

Legs black, but the tibiæ blackish red except rather broadly at their tips, and the base of the first tarsal joint (and more on the middle pair) obscurely reddish orange. Pubescence on the anterior coxæ tawny and so dense that the usual strong black bristles are almost hidden, but on the hind coxæ shorter and less dense and mainly black; on the front femora the pubescence behind and beneath is densely matted and dull black, and the black pubescence may extend even more but usually the pubescence on the upper part is mainly yellow; on the middle femora it is similar but less matted; while on the hind femora it is pale and fairly conspicuous but is limited to

the basal third; the front femora have two or three black bristles on the underside, while the middle femora have four or five inconspicuous ones, and the hind femora have about seven inconspicuous ones in a row.

Wings with a strong smoky tinge which becomes more conspicuous on the upper outer quarter, and this smoky tint tends to form kernels in the marginal, submarginal, and cubital fork cells; there is a slight clouding all about the base of the first posterior cell, and a more distinct clouding just above the dip in the upper branch of the discal vein, while there is a slight cloud on the basal part of the upper branch of the postical vein; veins thin, brownish black, but rather yellowish on the mediastinal vein, the præfurca and the veins just after it, and on the stem of the postical vein; when viewed from the wing-tip the veins are hardly intensified but the cloud above the dip in the discal vein extends (though less distinctly) back to the discal cross-vein; fourth posterior cell sometimes just open, sometimes just closed, and sometimes differing in the two wings. Squamæ (alar) smoky blackish orange, with a long blackish fringe on the outer part and a short blackish fringe on the inner and lower part. Halteres blackish brown, with the stem rather paler.

- ♀. Similar to *T. nobilitata*, but with rufous golden pubescence and with more distinct and wider entire black abdominal bands. Frons and face more golden both in ground colour and in pubescence; black hairs on the jowls under the lowest part of the eyes rather more numerous than in *T. nobilitata* but not forming a clump as in *T. plebeia*; pubescence on the back of the head longer and more reddish orange, and the black postocular bristles stronger, and those out on the back of the head more numerous; frontal callus a little larger than in *T. nobilitata*, less emarginate in front, and distinctly wider against the eyes. Antennæ with the basal joints golden rather than grey, and the third joint browner and without a pale base.

Thorax brighter brown, and consequently the golden brownish stripes more distinct especially anteriorly and posteriorly and along the sidemargins and the middle stripes widened out laterally at their front end; back part of the thorax and the scutellum golden brownish almost like the stripes; black pubescence on the disc less abundant, and the depressed pubescence more orange, while the tuft on the metapleuræ is conspicuously orange; præscutellar bristles usually in two pairs, but sometimes two bristles on one side and one on the other side, or one out of two bristles on one side smaller than the other.

Abdomen with alternate orange and black bands, and clothed with reddish orange pubescence; hindmarginal hems narrow but bright orange on the second and third segments, and very narrow on the fourth and fifth segments, and these hems are preceded by greyish orange bands; on the second segment the greyish orange band occupies about a quarter of the segment at its middle but gradually widens until it occupies two-thirds of the sidemargins, leaving the anterior part of the segment black; on the third segment the greyish orange band is more equal and occupies less than half the segment at its middle but widens out to more than half the sidemargins; on the fourth segment the bands are similar to those on the third but the greyish orange band is not widened at the sides though it is slightly narrowed at the middle, and the black band is more shining; on the fifth and sixth segments the bands are similar to those on the fourth but the light colored bands are slightly more greyish and occupy more of the segment, so that the shining black basal bands occupy less than half each segment or are sometimes reduced to a narrow basal margin; the seventh and eighth segments are shining black with no reddish tinge beneath. Pubescence less dense than in *T. nobilitata* but longer, more erect, and more conspicuous, besides being rufous orange; it forms a conspicuous fringe on the hindmargin of the basal segment, and is fairly abundant on the greyish orange parts of the abdomen but is more sparse or even absent on some parts of the black ground colour; the erect stubby bristles on the fifth and sixth (and to a small extent on the fourth) segments are a little longer than in *T. nobilitata* and are more extensively black, being almost wholly black on the sixth segment, and form little fringes on the actual hindmargins of the fifth, sixth, and seventh

segments; seventh and eighth segments with numerous short black stubby bristles. Belly greyish black on the three basal segments, more blackish but still dusted on the next three, and rather shining black on the seventh, while the bare brightly polished apparent eighth segment forms the underside of the base of the ovipositor; hindmarginal hems conspicuously pale yellow and unusually broad on the second and third segments, narrow on the fourth, and only just visible on the fifth; pubescence on the second and third segments long, thin, sparse, erect, and yellow, on the fourth segment shorter but still pale, on the fifth segment more rigid and mainly black, and on the sixth and seventh segments all black. Ovipositor almost all black, but some of the spines on the apical cirlet have a slight lurid red tinge and some longer bristles immediately against the hindmargin of the seventh ventral segment are conspicuously lurid red.

Legs similar to those of the male, the tibiae (especially the anterior) and tarsi being darker and more extensively black than in *T. nobilitata* so that the tarsi are ferruginous at only the extreme base of the posterior pairs; anterior femora with longer postero-ventral pubescence than in *T. nobilitata*; antero-ventral bristles on the femora about three on the front pair, three on the middle, and seven on the hind.

Wings similar to those of *T. nobilitata*, and without any cloudings unless a faint arc can be traced above the end portion of the discal cell. Squamæ with darker margins.

Length about 11 mm.

This species, as I understand it, does not seem to vary much in its handsome form. The tufts of black pubescence in the male on the dorsal line of the abdomen may resolve themselves into black triangles on the second, third, and fourth segments, and the greyish orange bands may not reach the sidemargins, so that these may appear all black except on the bright orange hindmarginal hems, or the bands on the fifth to the eighth segment may be more greyish and a little less orange, while the seventh and eighth segments may be entirely but inconspicuously brownish ashy grey; the golden pubescence may be more extensive but by no means dense; the præscutellar bristles on the thorax have a strong tendency in both sexes to form two pairs as in *T. fulva*, but this is more common in the female, and again in the female it is more common to find the fourth posterior cell even wide open in both wings, though when it is narrowly open in one wing it is often closed in the other, but the male shows this tendency in a minor degree. It may be rather difficult to distinguish it from tawny haired specimens of *T. nobilitata*, but in the male the conspicuous velvety black entire abdominal bands form an obvious distinction, while the general rufous orange coloration is conspicuous in comparison with the greyish fulvous pubescence of *T. nobilitata*; numerous small distinctions may be found in the fewer black hairs on the middle part of the face, more numerous black hairs below the lowest angle of the eyes, more conspicuous thoracic lines, frequent occurrence of two pairs of præscutellar bristles, yellower scutellum, black tufts of pubescence at the sides of the abdomen near its tip, and longer pubescence and bristles, blacker tibiae and tarsi, etc., but I cannot trace any good distinction in the cloudings on the wings. The female has a slightly larger and differently shaped frontal callus which extends more to the eyemargins (though the shape of this occasionally varies in all species of the genus), and in cases of doubt may be distinguished by the blacker tarsi.

T. arcuata (as described above) is apparently a species limited with us to North Scotland as I have seen it from only Nethy Bridge, Golspie, Brodie, Logie, and Forres, from July 27 to September 9. I have never

taken it myself, but Colonel Yerbury has given me five specimens (2♂, 3♀), and the Cambridge Museum has about five others taken by Mr F. Jenkinson, who once caught a pair *in coitu* and who watched two females at Forres which were laying eggs in dry soil.

Synonymy.—I record this species as *T. arcuata* Lw. because there is no other German species described in Loew's Beitrage ii. which can possibly be it, and I cannot believe that it was unknown to him. Further corroboration is given through Loew's statement that *T. arcuata* is exceedingly variable in the colour of the pubescence, and I think it was the only species in which he spoke of the pubescence on the abdomen being sometimes "rothgelb, fast fuchsroth"; amidst all its variations however he gives as an unfailing character, "arculus infuscatus a nervulo transverso ordinario trans finem cellulæ discoidalis ductus," and unfortunately I am unable to clearly recognise that character in our British specimens; nevertheless in viewing the wing from the wing-tip (whereby the wing-markings become most clearly defined in all species of *Thereva*) I think this arched cloud can be traced; Loew however does not seem to have met with any specimens in which the tarsi were so extensively black as in my description. I cannot trace this species at all in Zetterstedt's writings unless he mixed it up with *T. nobilitata*, nor does it occur in his collection at Lund. *Thereva albilabris* and *T. flavilabris* Meig. may include it, but unfortunately the types were out on loan when I examined the Paris Museum in 1906.

Var. *inornata*. Pubescence light grey or greyish yellow instead of bright tawny. Tarsi as ferruginous as in the allied species.

♂. Described from two specimens only. Pubescence light grey to greyish yellow (when pale) on the face, jowls, lower part of back of head, and pleuræ, but in one specimen becoming rather tawny but not foxy tawny on the upper part of the back of the head and on the disc of the thorax, and pale brownish yellow on the abdomen until the much less conspicuous outstanding black hairs are reached; in the other specimen the pale abdominal pubescence is grey (not at all tawny), but (when seen from above) with numerous black hairs outstanding at the basal corners of all (including even the basal) segments; pubescence on the disc of the thorax and on nearly all the disc of the scutellum extensively black in one specimen. In the male (Aviemore, June 18, 1899) which has a tendency towards tawny pubescence the black markings on the abdomen cover about the same space as in the typical *T. arcuata* but are less defined and the lighter spaces are greyish or greyish yellow (not greyish orange), and in some lights this greyish yellow coloring becomes much more extensive on the fourth segment and thence to the tip of the abdomen, in fact very much so when viewed from behind. Pubescence on the anterior femora greyish brownish yellow with a slight admixture of black hairs near the tip,—in typical *T. arcuata* this pubescence is black and apparently more dense;—hind femora with the pale scales more numerous than in the typical *T. arcuata*; tarsi with all the basal joint except its tip, and the base of the second joint, brownish yellow.

♀. Pubescence and dust grey with a slight yellowish (not tawny) tinge. Frontal callus small and rather more emarginate in front. Hind femora, as in the male, but with more numerous grey scales. Stigma yellower. In a second female the pubescence is rather more orange.

I have seen two males of this form which were taken by Colonel Yerbury at Aviemore on July 10 and 18, 1899, and one or two females taken by him at Golspie in July 1900. He also took a female at Golspie on August 18, 1900, which I consider to belong to true *T. arcuata* and another female in July (which however may be only *T. nobilitata*) and a female at Nethy Bridge on July 29, 1904, in which the frontal callus is small and narrow. The chief distinctions of *inornata* from typical

T. arcuata (as I interpret that form) lie in the colour of the tarsi, and in the shape of the frontal callus in the female; while both forms of *T. arcuata* have the abdomen more conical than in *T. nobilitata*.

Synonymy.—I cannot consider this variety distinct from *T. arcuata*, because Loew expressly referred to the remarkable variations in the colour of the pubescence; Loew however doubted whether his Sicilian specimens belonged to the same species as his northern ones and stated that if the two should prove to be distinct the name *T. arcuata* should apply to the Sicilian form; this looks as if he possessed very few German specimens and those probably belonging to the var. *inornata* because his description applies best to the bright colored form. The capture of a considerable number of specimens is requisite before any certainty can be attained. Kowarz's collection contained two males and one female, of which one of each sex was labelled "Sicilia" and "sec. typ. Lw."; the male is not at all like my first form as it has the main pubescence pale brownish yellow (not tawny), the abdomen blackish with the second and third hindmarginal hems conspicuously whitish when seen sideways or yellowish when seen from above, the next hindmarginal hem very narrow, and no more hems visible, while the yellowish grey abdominal bands are indistinct or absent (but the specimen is in too bad condition for certainty), the legs have the most extensive pale markings, and the fourth posterior cell of the wings is closed and distinctly pedunculate; the female has the frontal callus almost divided into two large circular spots which however just touch at the upper arch where they are rather close to the front ocellus, the third antennal joint rather light brown, the pubescence on the face and lower half of the back of the head white, and the wings with an obvious clouded arc over the last portion of the discal cell which extends downwards across the two cross-veins closing the discal cell, the base of the cubital fork clouded, and the fourth posterior cell slightly pedunculate; Kowarz's other male (from Eger in Bohemia) is in very good condition, and its general pubescence is almost tawny, the thorax rather pale brown with two faint yellowish brown stripes, the yellowish grey bands on the abdomen (before the hindmarginal hems) extensive and conspicuous, the tibiæ and tarsi almost as black as in my blackest form, and the femora apparently thinner and bearing less pubescence and scales but possibly abraded; in many respects this latter male is intermediate between my two forms but is similar to the more tawny specimen of *inornata* which I have described, though it has the blackened legs of the handsome form.

3. **T. nobilitata** Fabricius. Thorax brownish, with long erect black and short depressed usually ferruginous pubescence. Abdomen of the male with large black spots on the bases of the segments, and clothed with yellowish ventral, and more or less black dorsal, pubescence; that of the female mainly golden, and usually with pale hairs on the sides of the fifth and sixth segments but with short rigid black hairs on the last two segments. Frontal callus of the female moderate in size.

A rather broad species of ferruginous or brownish hue in the male, but with the abdomen of the female mainly golden.

- ♂. Face and frons entirely covered with dull yellow or pale greyish dust which becomes paler on the lower part of the face; frons bearing moderately dense long black hairs except for a few yellow hairs quite close to the antennæ; face clothed on the middle part with dense and long yellow or pale yellow pubescence in which a few black hairs occur, but on the sides with black hairs four or five (or even more) wide which extend from the black pubescence of the frons downwards to the lower eyemargin, though the band of black hairs becomes narrower as it descends and is continued very sparingly along under the eyes, but otherwise the yellowish ground dust becomes yellowish white under the eyes and on the lower part of the back of the head and the pubescence there is pale yellow with sometimes a very few black hairs intermixed; on the upper part of the back of the head the ground dust is brownish yellow and the pubescence mainly dull darkish yellow, but about the middle

(where the back of the head is widest in profile) about six strong black bristly hairs are intermixed quite away from the eyes, and on the upper part there is a postocular ciliation of about thirty longer black hairs; the black bristles behind the ocelli long; vertex dull golden and bearing moderate shorter black pubescence and with some inconspicuous pale hairs between the ocelli. Eyes touching for about a quarter the distance between the occiput and the antennæ, but the part of contact nearer to the occiput than to the antennæ; facets very gradually decreasing in size towards the lower part. Antennæ dull brownish black, but with the two basal joints covered with dull whitish yellow dust; basal joint bearing soft yellow hairs about its base, but on the apical third mainly with strong stiff black bristles; second joint with rather dense short black bristles; base of the third joint and tip of the second narrowly brownish orange.

Thorax dark brownish ashy grey, clothed with moderate (sometimes obscure) dark yellow or greyish white fine pubescence of very equal length but subordinated to abundant longer and more erect black hairs whose length is also more regular than in the allied species; chætotaetic bristles normal but not very conspicuous, præscutellar bristles one pair only; pleuræ ashy grey, with rather pale shaggy pubescence but with a few black hairs intermixed under the wing-base and on the metapleuræ; metapleuræ otherwise with conspicuous long dense pale tawny pubescence amongst which a few black hairs occur. Scutellum with pubescence similar to that on the thorax but with a more yellowish tinge about the margin.

Abdomen black, with conspicuous bright yellow hindmarginal hems to the segments which vary but are usually broad on the second and very narrow on the third and fourth segments, and with a greyish yellow (or when seen sideways brownish) cross-band on each segment which is narrow at the middle but widened so much against the sides that only a large rather indefinitely triangular black spot remains, so that each black spot occupies at its base the whole foremargin of the segment and then extends down (usually rather abruptly) at the middle of the earlier segments to rather near the hindmarginal hems, but on the subsequent segments the black band or spot is more remote from the hindmargin, so that on the last segments very little or nothing of the spot remains visible. Pubescence long and erect, dull darkish yellow ventrally and laterally until almost on to the dorsal disc, but on the dorsal disc itself very extensively and obviously mixed with black hairs; on the dorsal middle line (after the basal segment) a considerable number of black hairs occur which can be seen most distinctly when viewed in a very sloping direction from in front or behind, and there is a cross-band of black hairs before the hindmargin of each segment which becomes broader and less defined on each succeeding segment until black pubescence predominates all over the dorsal surface of the last segment. Belly yellowish ashy grey, clothed with long erect yellowish pubescence; second segment with a narrow dull orange hindmarginal hem, and the third and fourth segments with a broad hem; base of the second, third, and fourth segments inside the semicircular row of spiracles rather shining greyish black. Genitalia mainly reddish orange with some orange pubescence, but the upper lamellæ more blackish.

Legs black, with the tibiæ luteous to reddish yellow or reddish brown with just the tip blackish; tarsi with the basal joint (except its tip) and the basal half or more of the second joint reddish brown; front coxæ clothed with long greyish yellow pubescence and with four or five black bristles near the tip which are hidden in the pubescence; posterior coxæ with darker grey pubescence and less pronounced bristles. Pubescence on the anterior femora long and usually yellow about the base posteriorly, but blackish on the rest of the front femora and on most of the middle pair; hind femora almost entirely covered with yellow scaly pubescence. Bristles on the anterior femora limited to two or three inconspicuous antero-ventral, on the hind femora to an irregular row of about ten antero-ventral with about four others more ventral near the base and to three or four small neat postero-ventral close to the tip; front tibiæ with three rows of four bristles; posterior tibiæ with four rows of more numerous bristles except that the postero-ventral row is composed of three strong and two weak bristles.

Wings distinctly tinged with greyish brown or almost reddish or brownish yellow about the base and foremargin; stigma brownish or brownish yellow; veins dark brown, thin, and not intensified when viewed from the wing-tip, but the costal, mediastinal, subcostal, and stem of the postical veins pale reddish or yellowish brown; the veins have no dark clouding except slightly on the portion of the discal vein between the end of the discal cross-vein and the end of the discal cell just above the outer upper angle of the discal cell, and sometimes slightly on the cross-veins and at the fork of the cubital vein. Squamæ (alar) smoky yellowish or brownish glassy; margins brown and rather thick; fringe short and yellowish on the upper curve of the margin but longer on the lower part.

Halteres brown, with the knob paler on its upper part.

♀. Agreeing with the male in general characteristics, but the depressed orange pubescence giving it a golden appearance. Frons (fig. 321) pale brownish orange, but varying from brownish orange to light yellowish ashy grey, and with a moderately large shining black callus across the middle; pubescence on the anterior part black and by no means short but with a narrow band of yellow hairs right across just above the antennæ, the black hairs form a weak band which does not quite extend to the eyemargins and not at all into the anterior emargination of

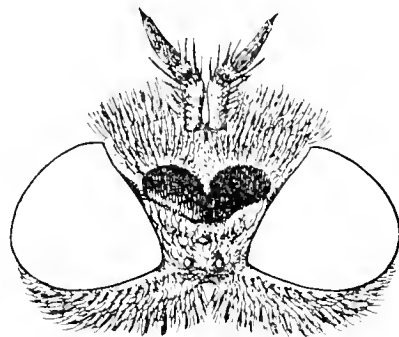


FIG. 321.—*Thereva nobilitata* ♀.
× 16.

the callus, though sometimes they are more abundant and may extend down as far as or even slightly farther than the antennæ; on the upper part the black pubescence is shorter and much more scarce except about the sides, and stray yellow hairs may occur just above the callus; the shining black callus is practically bare and extends across the frons almost from eye to eye, and is not nearly so large as in *T. plebeia* as it seldom occupies a third or even a quarter of the length of the frons and never extends at all near the lower ocellus even though looped upwards at the middle, while it has a deep notch in front. Face and lower part of the back of the head whitish yellow; pubescence on the face dense but not very long, all yellow without any admixture of black hairs (though I have seen one specimen in which about two black hairs occurred on each side and in that specimen the black frontal pubescence was unusually extended); pubescence below the eyes also yellow but usually with one or two black hairs intermixed, though with no approximation to a clump of black hairs; lower part of the back of the head with pale yellow pubescence which becomes longer and denser towards the back part and amalgamates with similar pubescence on the prothorax and on the anterior part of the front coxæ, but the upper part of the back of the head becomes pale brownish orange and bears brownish orange pubescence besides the postocular festoon of about fifteen black bristles and the usual bristles in two irregular rows quite out on the back of the head. Antennæ dark greyish on the two basal joints but dull blackish brown on the third joint, though the end of the second and the base of the third joint are usually ferruginous; basal joint with the usual rather long black bristles on the apical half and a few bristly hairs on the basal half which may be black dorsally but longer and mainly yellow on the underside; second joint with the usual short black bristles, and the third joint sometimes with some tiny black dorsal bristles near its base.

Thorax light greyish brown with two faint narrow pale stripes which are wide apart and often only visible in certain lights; pubescence all over the disc in good specimens composed of depressed almost scale-like hairs which are not dense enough to obscure the ground colour, and of almost equally abundant though very inconspicuous suberect longer black hairs; pleuræ light ashy grey and bearing abundant longer pale greyish yellow pubescence, metapleural tuft almost orange on the upper part and composed of even still more dense and long hairs. Scutellum with very few erect black hairs.

Abdomen shining black at the base of the segments but otherwise almost covered with the dull golden or ashy grey dust; basal segment light brownish ashy grey; third to sixth segments with narrow orange hind-marginal hems of which the one on the third segment is broadest and the one on the sixth segment narrowest; the segments are broadly dull golden in front of these orange hems and on most of the second segment, but the fifth and sixth segments are slightly greyish golden with only the front margin of each segment black; in very good specimens the black basal ground colour is hardly visible on the second and third segments because of the abundant golden pubescence, though usually the middle of each segment is obscurely blackish for about half or two-thirds of the length of the segment, or on the third segment the basal third is left blackish and is rather abruptly though vaguely widened at the middle for quite two-thirds of the length of the segment; the fourth segment has more than the basal third shining black and this band slightly widened about the middle; fifth segment with a similar but narrower basal black band which is more conspicuously widened about its middle; sixth segment similar to the fifth but with the black base narrower still; in all these segments the basal black band is almost equally wide over the sidemargins, though yellow dust (especially on the sixth segment) may obscure the sides a little; seventh and eighth segments shining black, but the seventh segment with some pale dust about the hind corners; ovipositor with the usual circle of shining dark red spines. Pubescence depressed but abundant and dark golden on the two basal segments, altogether shorter on the third segment, and less abundant on the sides and middle of the foremargin, and still less abundant on the fourth segment; basal segment with a conspicuous præhindmarginal fringe of long pale hairs; pubescence on the fourth, fifth, and sixth segments shorter, stiffer, and more erect, usually all orange except for a few black hairs on the middle of the black base, and usually with notable erect orange pubescence standing out from the sides, but less commonly this erect side pubescence is considerably or even wholly black at the sides of the sixth segment and to a considerable extent on even the fifth segment; on the seventh segment the stiff erect pubescence is usually almost all black but with a few yellow hairs intermixed about the basal corners and beneath (but very distinct from the obvious yellow pubescence on this segment in *T. bipunctata*), or rarely all this pubescence on the seventh segment may be quite black; eighth segment with similar short stiff erect black pubescence. Belly dull yellowish grey or grey about the basal three segments, but slightly browner and rather shining on the fourth, fifth, sixth, and especially seventh segments; second and third segments with fairly wide whitish yellow hind-marginal hems, fourth and fifth segments with narrower hems, which are in fact usually inconspicuous on the fifth (and sometimes sixth) segment; pubescence never dense, but rather erect and yellow, with a fairly conspicuous orange fringe on the hindmargins of the fifth, sixth, and seventh segments, and with rigid orange hairs about the hind corners of the seventh segment; eighth segment bright shining chestnut.

Legs with light grey dust on all the femora and with some pale depressed dorsal pubescence, but any pubescence behind or beneath the anterior femora is rather short and inconspicuous; coxal bristles as in the male but more conspicuous on the posterior (especially middle) pairs; bristles on the femora and tibiæ almost as in the male.

Wings and squamæ as in the male but distinctly lighter, which gives the latter a more yellowish tinge. Halteres brownish orange, with the base of the knob darker and the stem paler.

Length about 10.5 mm.

This species varies very much in the male as to the greater or less quantity of black hairs in the pubescence on the upper side of the abdomen and on the anterior femora, and also in the quantity of black hairs on the sides of the face; the pale pubescence varies everywhere in tint of colour, ranging on the thorax and especially on the abdomen from brownish

yellow to tawny or reddish yellow through various shades to greyish white, so that the term "*ferrugineo-hirta*" as used by Zetterstedt is not always quite correct, though it is approximately so in contrast with "*obscura hirta*" as applied to *T. plebeia*. As to the allied British species; *T. bipunctata* is smaller and may be at once distinguished by the more whitish colour on all parts, by the apparently wholly whitish (*not* white) haired abdomen (when viewed from behind), and by the more emphasised veins when seen from the wing-tip; *T. plebeia* is more difficult to distinguish in the male, but has the thorax of a blacker hue and the abdominal pubescence (when viewed from behind) apparently all dull yellowish beneath and all black above, with the sides of the abdomen whitish rather than light brownish grey and the black bases of the segments less suddenly widened at the middle; *T. circumscripta* is a darker species with an appearance of much blacker pubescence generally; *T. arcuata* (if my species be correctly named) has the ground colour of the abdomen deep black with cinnamon bands and usually brilliant alternate foxy red and black pubescence, but I cannot well distinguish Loew's character of a brownish arc over the end part of the discal cell. The female of *T. nobilitata* is more easily distinguished from its allies but varies in the size of its frontal callus (which is never so large as in *T. plebeia*), which may be very small and even occasionally divided into two spots (when I am bound to consider it to be the *T. oculata* of Egger), but even then these spots do not show any relationship is to *T. bipunctata* which is a smaller species with a much more yellow haired seventh abdominal segment; a specimen taken by Colonel Yerbury at Barmouth on June 26, 1902 has the frontal callus separated into two small spots which are well isolated as they are well apart from each other and from the eyemargins, and this same specimen has the frons brown with the black pubescence on the fore part rather extended and has its fifth and sixth abdominal segments yellow haired at the sides; I have seen a female with two præscutellar bristles on one side but only one on the other; the abdomen varies considerably in the distinctness and extent of the basal black bands though they are always much narrower than in *T. plebeia*, and it also varies in individual specimens in the extent of the black pubescence until in a small female taken by Colonel Yerbury at Derrynane in Kerry on July 21, 1901, the fourth segment bears numerous erect black hairs mixed with the recumbent yellow pubescence and has all the hairs on the fifth to eighth segments erect and black, while it also has the wings absolutely unclouded; on the other hand I have seen a specimen with the seventh abdominal segment almost all yellow haired, and any black pubescence on the abdomen very slight; two specimens taken by Colonel Yerbury at Nethy Bridge on July 7, 1903, are small and have the last four (especially the last three) segments black haired and with distinct black bases on the fifth and sixth segments, while in both specimens the fourth posterior cell is wide open; this latter character however is not uncommon, and sometimes a specimen may have the cell open in one wing and closed in the other, while on the other hand this cell is sometimes distinctly stalked; a male taken by Mr F. Jenkinson in his garden at Cambridge on August 10, 1903, has the lowest veinlet from the discal cell of the right wing broken off at half its length but becoming visible again at its end in the wingmargin so as to show that the fourth posterior cell would have

been closed; sometimes the pale abdominal pubescence is brownish orange; the belly may be grey on the three basal segments, then shining and blackish brown on the fourth segment, shining and still darker on the fifth and sixth segments, until it becomes quite black on the seventh segment. The female of *T. bipunctata* is smaller, whiter, and always has the frontal callus separated into two spots and the seventh abdominal segment mainly pale haired; *T. plebeia* has the shining black abdominal bands more extensive than the whitish grey bands, the frontal callus much larger, a clump of black hairs just below the eyes, and the last four abdominal segments conspicuously black haired; *T. circumscripta* has the abdomen with black and almost white bands; *T. arcuata* has the black abdominal bands more sharply defined, wider, and occupying more than half the sidemargins, while the pubescence on the sides of the face and on the fifth to seventh abdominal segments has fewer black hairs intermixed, but (as in the male) I cannot well distinguish any brownish arc over the end part of the discal cell; *T. fulva* has the thorax and abdomen entirely tawny haired, and has two pairs of præscutellar bristles.

T. nobilitata is distinctly the commonest and by far the most universally distributed British species of the genus, but for all that is not what can be called a common fly, though stragglers often occur in gardens where I have found only this species and *T. plebeia*. While writing this description (July 31, 1904) I have about 170 specimens of the species before me and I have seen recently about 50 others; a very large number of these have been taken during the last few years by Colonel Yerbury, more especially at Porthcawl and Barmouth in company with *T. bipunctata* and *T. annulata* but not with *T. plebeia*, and it is mainly through these specimens (which are nearly all in beautiful condition) that I have formed my ideas of the limits of variation. Still, with all this material, I cannot to my own satisfaction distinguish the males in some cases from some males of *T. plebeia*; I do not for a moment doubt their distinctness, as I hardly ever have the slightest hesitation between the females of the two species and all the tawny or orange haired males can at once be known as *T. nobilitata*, but the difficulty lies in the more blackish haired males; in these the browner ground colour of the thorax and brownish orange tinted abdominal bands (when viewed from the sides) seem to distinguish *T. nobilitata* from the blacker thorax and more ashy grey tinted abdominal bands of *T. plebeia*. I have records of *T. nobilitata* from numerous localities which extend from Penzance to Tongue, and consequently I conclude that it may occur anywhere if sought for in June and July. On June 20, 1907, the males were common on the leaves of nettles (*Urtica dioica*) near Sudbourne in Suffolk, but only one female (and that *in cop.*) was seen, but at the same time some rather large flies were executing a wild frantic sort of dance in the air about ten feet from the ground in a manner which reminded me of the dance of the males of *T. annulata* and I have no doubt but that they were the males of *T. nobilitata*. My dates extend from June 6 to August 29, which seem to prove it to be a rather later species than *T. plebeia*. A female specimen in such condition as to render its identification doubtful was bred from a Lepidopterous larva in July, 1897, by Mr C. D. Ash, who also bred a male in June, 1901, from a larva of *Triphaena interjecta* found in Essex, but this specimen is also of rather doubtful identification as the soft pubescence is unusually grey for *T.*

nobilitata, in fact so much so that at one time I mistook it for *T. bipunctata* from which however the wing coloration clearly distinguishes it; Meigen said that he bred this species from larvæ found in old rotten tree-trunks.

Synonymy.—All Fabricius' descriptions of this species are unrecognisable, and consequently it should really date from Meigen's first description in 1804. Specimens in which the pubescence on the abdomen tends towards reddish yellow and in which at the same time the black pubescence is especially extensive would fairly answer to Meigen's description of *T. cineta*. Walker's description of his *T. plebeia* is most likely derived from the female of *T. nobilitata*, but these two species were hopelessly mixed in old British collections. Walker's *T. cineta* Meig. is also most probably only *T. nobilitata*, but with the description mainly derived from the male.

4. **T. plebeia** Linné. Thorax blackish and mainly black haired in the male. Abdomen of the male extensively black and with black dorsal and pale ventral pubescence, of the female mainly black with whitish grey bands and with rigid black pubescence on the last four segments. Frontal callus of the female very large.

A rather broad species of mainly blackish hue, but with conspicuous ashy grey bands on the abdomen of the female.

♂. The following description is made from a representative male taken on the Malvern Hills on May 14, 1899. Face and frons ashy grey, but the frons rather greyish yellow about the middle, and the face shimmering whitish about the sides on especially the lower part, and this shimmering whitish hue extends under the eyes and on to the lower part of the back of the head; pubescence on the frons long dense and wholly black (except close against and around the base of the antennæ), and similar pubescence extends more sparsely down the sides of the face but is reduced to almost a single line of hairs or even practically dies out on the lower quarter, but there is a small clump of black hairs beneath the lower eye-angle; face clothed on the middle part with long whitish or yellowish grey pubescence with some black hairs intermingled; pubescence on the lower quarter of the back of the head mainly pale greyish yellow but with longer black hairs behind, and brownish yellow on the back part of the upper three-quarters, while there is a single postocular fringe of about thirty-five long thin black hairs on about the upper half overhanging the eyes and extending up to their top corner, though the lower part of this fringe is shorter and comparatively sparse; vertex brownish grey, elevated, and bearing numerous black hairs which are less dense and shorter than those on the frons. Eyes touching for a fairly long space, but leaving the vertical longer than the frontal triangle; facets gradually diminishing in size towards the lower part. Antennæ dull greyish black, but yellowish grey on the basal joint; basal joint bearing fine pale pubescence about its base but this pubescence (especially dorsally) soon becoming black, and the apical third of the joint bearing the usual longer stiff black bristles; style short.

Thorax and scutellum greyish black (in comparison with the brownish hue of *T. nobilitata*) and with two very faint pale stripes down the disc; pubescence dense but mixed, being composed of conspicuous long erect black hairs and less conspicuous more decumbent shorter brownish yellow hairs, though when viewed from in front in certain lights the brownish yellow (not ferruginous or tawny) pubescence appears to almost cover the front part of the disc and to be abundant about the sides, on the back part, and on the scutellum, while numerous but less abundant similar hairs occur on the disc; chaetotactic bristles normal, and the præscutellar bristles limited to one pair. Pleuræ more ashy grey, and clothed with tangled long light brownish yellow pubescence, but the dense tufts on the back part of the mesopleuræ and on the metapleuræ largely composed of long black hairs except on the upper part of the mesopleural tuft.

Abdomen black, with yellow hindmarginal hems to the segments and with inconspicuous dark ashy grey cross-bands; the yellow hindmarginal hems are fairly conspicuous on the second to fifth segments but each one is slightly narrower than the preceding one; the grey cross-bands appear to be brownish grey in some lights or light grey when seen sideways, and the first one almost covers the basal segment, but on the subsequent segments each band is placed close against the yellow hindmarginal hem and the anterior portion of the segment is left black; on the second segment the grey band is ill-defined but occupies at its middle about one-third the length of the segment and gradually widens outwards until it occupies fully two-thirds of the sidemargins; on the third segment the grey band is narrower at its middle but widens outwards until it occupies almost all the sidemargins; on the fourth segment the grey band is broader and in some lights occupies at its middle about half of the segment and widens outwards until it occupies almost all the sidemargins; on the fifth segment the grey band occupies about two-thirds of the segment at its middle and almost all the sidemargins, and on the sixth segment it is still wider, while the seventh segment is all brownish grey; the base of the genitalia seems to form a more ashy grey eighth segment. Pubescence dense, fairly long, and slightly tufted on the dorsal ridge when viewed sideways, especially on the back part of the second segment, and the tufts are caused by the more decumbent shorter pubescence on the basal part of each segment being followed by longer more erect pubescence on the middle part while the yellow hindmarginal hems are bare; in the specimen described all this dorsal pubescence is black except quite close to the sides (which distinguishes it at once from *T. nobilitata*), but the dense pubescence all along the sides of the dorsal plates is brownish yellow, and when viewed from behind this pale pubescence extends on the four basal segments slightly up on to the sides of the dorsum. Belly greyish black with broad conspicuous yellow hindmarginal hems, and with rather long erect but not at all dense yellow pubescence; the contrast between the pale pubescence of the sides and ventral part of the abdomen as against the black pubescence of the dorsum is marked when seen from behind, as the few trespassing pale hairs which creep up on to the sides of the dorsum on the basal segments are practically imperceptible; on the three basal segments there is a narrow yellow hem along the exact line between the dorsal and ventral plates. Genitalia knobbed, rather conspicuous; upper lateral plates comparatively small and bearing a moderate number of mainly black hairs but with some tawny hairs intermixed about their ends, where they form a semicircular emargination through which arise two rather small greyish black-brown lamellæ; latero-ventral plates rather large and subquadrate, greyish black with some rather inconspicuous black hairs about their base followed by a large number of conspicuous long tawny hairs which project out beyond the end of the abdomen, while from the hind corners of the eighth abdominal segment a ciliation of shorter tawny hairs extends all across the ventral hindmargin; when viewed from behind some bright chestnut middle processes can be seen at the tip which consist of a pair of rather long narrow outer lamellæ, a pair of shorter inner lamellæ, and a rather long middle piece.

Legs black, but the tibiae except just at the tip reddish orange, and the basal joint of all the tarsi except at its tip and most of the second joint of the posterior tarsi rather obscurely reddish orange. Pubescence behind the anterior femora long and dense, mainly black behind the front pair but with some grey hairs on the upper part, and mainly grey on the middle pair but with some black hairs on the lower part; hind femora greyish black and bearing only a little pale yellow scaly pubescence; two strong black bristles occur beneath the front femora, four beneath the middle, and about nine irregular ones beneath the hind pair.

Wings slightly tinged with a smoky hue; outer veins dark brown and rather thin, hardly intensified when seen from the wing-tip; costal vein until past the end of the radial vein, all the mediastinal and subcostal veins, the small piece of the radial vein between the origin of the cubital vein and the discal cross-vein, all the stem of the postical vein, and the base of the anal vein, brownish orange; discal and lower cross-veins clouded brown, as well as

the small piece of the postical vein between the small cross-vein and its own fork, the discal vein above the upper outer angle of the discal cell, and very slightly at the base of the radial fork; stigma rather conspicuously brownish orange. Squamæ (alar) smoky yellowish glassy, with pale brownish yellow margins and slight obscure yellow fringes. Halteres blackish brown, with the stem rather paler.

Such a specimen would be easily distinguished from *T. nobilitata* by its blackish hue and the well-contrasted pubescence on the dorsal and ventral surfaces of the abdomen, as well as by the pale pubescence having in general a more greyish hue; but *T. plebeia* varies as follows:

Face lighter ashy grey with a slight brownish tinge on the upper part and on the upper part of the back of the head, and the pale pubescence on the face of a more pale brownish yellow tint (in a specimen possibly not conspecific taken at Padstow in July, 1902, numerous black hairs are intermixed on the face); frons equally pale greyish brown all over; lower part of the back of the head with the pubescence well away from the eyes more extensively pale, and at the same time the black pubescence on the frons and face more extended (also Malvern Hills, but on June 8, 1902); vertex covered with light grey dust.

Thorax brownish and with the shorter yellow pubescence abundant, conspicuous, and equally distributed all over; or on the other hand ashy brownish with the shorter pubescence nowhere abundant but more blackish or only comparatively inconspicuous light brownish grey; pleuræ with the ordinary pubescence paler or even whitish grey without any trace of yellow or fulvous, and the mesopleural tuft sometimes more greyish yellow and almost without black hairs, and the metapleural tuft at the same time composed of orange yellow hairs with a fairly conspicuous back fringe of black hairs on the upper part, or sometimes the pleural tufts (especially the metapleural one) mainly black haired.

Abdomen with the pale hindmarginal hems varying very much in breadth and intensity, being sometimes equal and rather broad on the second and third segments, or at other times narrow and equal on the second and next two segments, while often the fifth segment has no hem, or the hems may continue to the sixth segment; the hems are usually pale yellow but may be brownish orange, or even glaring white on the second and third segments and obscure on the others; the ashy grey bands also vary in colour towards having a strong brownish tinge or even sometimes almost blackish, in which latter case they are less distinct and tend to merge into the black basal part of the segments and become less widened towards the sides, and sometimes the ashy grey bands are much narrower (Malvern Hills, June 8, 1902) and the black ground colour very extended (Gravesend, June 11, 1898); sometimes the brownish ashy grey bands are so extended as to cause the black colour to be reduced to the base and middle quarter of the second segment (as is usual in *T. nobilitata*), to the middle two-thirds of the base of the third segment extending about half-way down the segment, and to the middle half of the base of the fourth segment for about half-way down the segment (Aberlady, June 23, 1884); the basal plate of the genitalia which looks like an eighth segment is seldom visible. Pubescence varying in the greater or less sharp distinction between its colour on the dorsal and ventral parts; the ventral brownish yellow hairs sometimes extending upwards gradually round the sides, or on the other hand the ventral pubescence sometimes dull whitish. Belly varying from blackish grey through brownish ashy grey to lighter ashy grey, and its pale hindmarginal hems sometimes narrow and inconspicuous except on the third segment; the narrow lateral pale hem may extend the whole length of the abdomen or may be entirely absent. Genitalia with the dorsal and lateral plates varying from greyish black to dull reddish brown and the pubescence on them less contrasted in colour, as it may be less black about the base of the lateral plates and less tawny on the long hairs on the hind part, while the ciliation across the hindmargin of the last ventral segment may be merged into the general pubescence of the segment.

Legs varying moderately in the amount of obscure reddish orange on the tarsi, and in the colour of the pubescence behind the anterior femora, as the latter may be mainly greyish about the basal half of the front femora, while the scaly yellow pubescence in front of the hind femora is at times much more extensive or at other times very much restricted; the black bristles beneath the anterior femora vary in number, as there may be only one on the front femora and only one or two on the middle femora, while the irregular black bristles beneath the hind femora may vary in number from about eight to twelve.

Wings varying considerably in the intensity but not in the position of the small cloudings, except that the clouding may occasionally be almost reduced to the two cross-veins and the base of the radial fork, while on the other hand the cloudings may be sharply marked though restricted, and rarely even the base of the first posterior cell is clouded slightly brownish close against the discal cross-vein; the stigma may be brownish orange. Squamæ sometimes with dark brown margins. Halteres paler brown.

All these variations may seem to be very slight, but they often tend to cause uncertainty in distinguishing *T. plebeia* from *T. nobilitata*, and I think it possible that an unrecognised species exists between *T. plebeia* and *T. bipunctata*.

- ♀. Not at all like the male and but little variable, so that it can easily be distinguished from its allies. Frons broad at its narrowest part near the vertex, more than a quarter the width of the head, and widening to more than half at the antennæ; frons dusted brownish yellow, with an unusually large shining black callus (fig. 322), in front of which are numerous fairly long black hairs extending across (but not to the eyemargins) in a slight arc but scarcely (if at all) extending down below the antennæ, while in front of them the pubescence is black; the callus is bare and impunctate, looped up behind at the middle as far as the front ocellus and notched anteriorly with a narrow yellow extension of the anterior frons, and almost always reaching the eyemargins for its full width; the frons above the callus is dusted slightly darker than anteriorly, and bears some rather sparse shorter black hairs; face greyish white, clothed

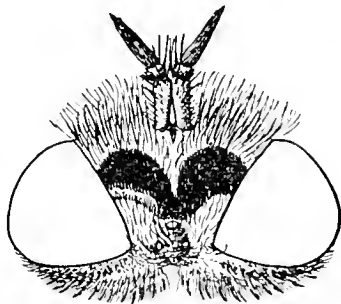


FIG. 322.—*Therava plebeia* ♀.
× 16.*

with dense white or pale yellow pubescence, while similar pubescence extends all over the jowls and lower half of the back of the head without a single black hair intermixed except a distinct small clump of black hairs just below the lowest part of the eyes; back of the head pale greyish yellow, but almost white on the lower part and (when seen from above) more brownish yellow on the upper part, and the whitish lower part bearing dense long white pubescence which completely dies away about the middle of the head, but is succeeded by slighter shorter inconspicuous brownish yellow pubescence, while the usual scattered stout black bristles occur quite out on the back part of the head, and the usual postocular ciliation of about fifteen black bristles extends from the middle of the head to the top angle of the eye, but only the top six or eight bristles are long enough to curve slightly forwards. Eyes comparatively small. Antennæ less pubescent about the base than in the male; third joint usually more decidedly brown.

Thorax dull greyish dark brown, with two moderately distinct widely separated brownish yellow stripes which extend the whole length of the thorax, but which are somewhat vague and widened at each end and almost widen to each other at the hinder end, amalgamating there with the similarly colored hindmargin of the thorax; sides of the dorsum more ashy, and the pleuræ more whitish grey. Pubescence on the disc composed of comparatively sparse but ubiquitous suberect short inconspicuous black hairs, which

* In this figure the frontal callus is somewhat foreshortened, or else it would appear to occupy more of the frons, and the pubescence in front of the callus is given as extending to the eyemargins.

overtop the more conspicuous short adpressed brownish yellow hairs; this brownish yellow pubescence is slightly longer and more greyish tinted about the sides of the dorsum; pleuræ with fairly abundant long greyish white pubescence, which forms the usual dense long tufts on the back part of the mesopleuræ and on the metapleuræ; none of the pubescence on the dorsum or on the pleuræ is quite dense enough to conceal the ground colour; præ-scutellar bristles occasionally in two pairs. Scutellum greyish yellow, with rather longer though still inconspicuous black hairs and with depressed yellowish pubescence.

Abdomen black with the hind part of each segment yellowish ashy grey, usually dull on the black parts though sometimes shining; hindmarginal hem of the second segment often fairly broad and conspicuously pale yellow but occasionally orange, while the hems on the next two segments are very narrow, and sometimes a pale hem is just visible on the fifth hindmargin, or in a large specimen (Wendover, June 9, 1899) the second, third, and fourth segments all have narrow orange hems; basal segment greyish black; next three segments each black with a light ashy grey (slightly yellowish) hindmargin (before the pale hindmarginal hem) which occupies about a quarter of the segment at the middle but widens outwards until it occupies about half of the sidemargins, and the basal corners of the second segment obscurely light grey; fifth and sixth segments usually almost all ashy grey, but sometimes the fifth segment with a comparatively large part of its base and the sixth segment with a narrow portion darkened and both with the actual base shining black, or both may have a fairly broad shining black base; seventh and eighth segments shining black, but the seventh segment may be slightly dusted with grey at the extreme sides and hindmargin; base of the ovipositor blackish chestnut and the ring of spines dark red, while the apical lamellæ are short semicircular and clothed with dense short rigid bristles. Pubescence on the black parts of the second and third segments all very short and black, adpressed and very inconspicuous, but on the sides of the greyish part of those segments greyish white, and conspicuous though hardly forming a hindmarginal fringe, on all the basal segment greyish white and forming a conspicuous long fringe all across the hindmargin; the fourth to eighth segments bear all over rigid little black bristles, but a few short depressed pale hairs may be intermixed about the basal part of the fourth segment. Belly blackish ashy grey with broad obscurely greyish yellow hindmarginal hems to the second and third segments and a narrow hem to the fourth segment, all of which meet the corresponding dorsal hems; pubescence long and thin, though rather sparse and inconspicuous on the three basal segments, and on the other segments composed of rigid little black bristles which however are less dense on the fourth segment than on the others.

Legs colored as in the male, but the pubescence on the femora much slighter, shorter, and less conspicuous, and usually greyish white behind the front femora but sometimes with numerous black hairs near the tip; the still slighter pubescence behind the middle femora whitish with rarely one or two black hairs intermixed; all the femora bear almost all over a whitish adpressed almost scaly pubescence. Bristles beneath the front femora usually two, beneath the middle about five, and beneath the hind pair about nine placed irregularly.

Wings almost as in the male, but sometimes cloudings are visible at the usual places on the cross-veins, on the basal piece of the upper branch of the postical fork, on the veins ending the discal cell, and at the radial fork. Squamæ more hyaline, with a brownish yellow margin and brownish grey fringes which are rather short and coarse on the outer part but long thin-haired and straggly on the inner part. Halteres blackish brown, with the stem paler.

Length about 10.5 mm.

This species varies in many details beyond what has been mentioned above. Two males from Padstow may belong to a distinct species which would come between *T. plebeia* and *T. bipunctata*, but at present I consider them to be only varieties of *T. plebeia* which have numerous black hairs

on the face, exclusively black hairs and two visible stripes on the disc of the thorax, and the pubescence on the abdomen not sharply differentiated in colour though whitish ventrally; a third male taken in company with the other two is less distinct but also has stripes down the thorax, narrow hindmarginal hems on the abdomen, and the ventral pubescence all yellow. The females (though usually rather regular in size) may vary from 9 mm. (Denmark Hill, London, June 21, 1867) to 12 mm. (Bunker's Hill, near Lewes, June 5, 1870). The male is often difficult to distinguish from those specimens of *T. nobilitata* in which the black pubescence predominates, but in my opinion is a slightly narrower blacker insect (especially about the base of the abdomen) in which the abdominal pubescence (besides being rather abruptly contrasted in colour dorsally and ventrally) has the pale hairs without any tawny hue, while ordinarily only a few inconspicuous light colored hairs extend over the sidemargins on to the fore corners of the second abdominal segment. The female can easily be distinguished from *T. nobilitata* by the large and conspicuous black bands on the abdomen, by the much larger frontal callus, and by the short rigid black abdominal pubescence which commences on the fourth segment. *T. arcuata* var. *inornata* is not always easily distinguishable in either sex, but the male is narrower and has the fulvous or greyish pubescence more extended up on to the disc of the basal abdominal segments while the clump of black hairs below the eyes is less distinct, and the female has a much smaller frontal callus which does not extend up at all near the front ocellus, less numerous black hairs below the eyes, the abdomen much more covered with pale pubescence and broader grey bands, the thorax more distinctly striped, and the fifth and sixth abdominal segments less black haired. My description has been made from about fifty British specimens, but amongst them were only about a dozen males in good condition, and it is only on one occasion that I have known a number of specimens to have been taken in company and they were all females.

T. plebeia is not an uncommon British species and is one that may occur in gardens, where it is not quite so common as *T. nobilitata*, though I have taken it both here and at Denmark Hill, while Mr F. Jenkinson has taken it rather freely in his garden at Cambridge. I have numerous records from almost all the southern counties from Cornwall to Kent, and from Suffolk, Cambridgeshire, Oxfordshire, Bucks, Worcestershire, and Herefordshire, while I believe I have seen it from Rannoch and Golspie. It is worthy of note that when Colonel Yerbury was taking very large numbers of *T. nobilitata* and *T. bipunctata* at Porthcawl he did not take a single specimen which could by any possibility be confounded with *T. plebeia*. The dates range from May 13 to August 15.

Synonymy.—Of course *T. plebeia* cannot be fully identified by any of the older descriptions though Linné's description almost fixes it and by tradition the present species has been accepted as the exponent of his name; Loew however called it *T. lugens* and said that it commonly occurred in collections under the name of *T. lugubris*. Walker's description of *T. plebeia* cannot possibly apply to this species but probably to the female of *T. nobilitata*. A very small female of this species which I sent to Loew was returned as "*Thereva* sp? nr. *lugubris*."

5. **T. *circumscripta*** Loew. Rather large species, normally with darkened wing-veins. Male with unusually predominant black pubescence, and even

with numerous black hairs intermingled on the middle of the face and on the jowls. Female with a small narrow frontal callus; abdomen with whitish hindmargins of segments.

The male is the blackest of our British species.

- ♂. This description has been made from a specimen which was caught by Colonel Yerbury at Lyndhurst in the New Forest on June 16, 1897, but as it is partly discolored through grease I have eked out the description by the help of a male from Kowarz's collection which was taken at Marienbad on July 20, 1869.

Face ashy yellowish grey, but slightly whitish shimmering about the lower part and round under the eyes; frons more greyish tawny dusted but narrowly blackened at the sides down to the level of the antennæ (perhaps discolored); pubescence on the frons forming a rather dense black tuft, and similar pubescence extends broadly down the sides of the face and is but little reduced until well round the lowest part of the eyes, and even after that numerous black hairs are intermixed with the dense brownish yellow pubescence on the lower part of the back of the head; pubescence on the middle part of the face brownish yellow and slightly drooping but with more suberect long black hairs intermixed than in any other British species, and similar brownish yellow pubescence extends rather inconspicuously all round the antennæ; the mixed pubescence on the jowls amalgamates with similar pubescence on the front coxæ; close against the lower part of the back of the eyes is a patch of shorter all pale pubescence, and the pubescence on the upper part of the back of the head is shorter and denser but darker brownish orange; the usual black postocular fringe of curved and slightly overhanging hairs begins rather sparsely and rather short at about the middle of the back of the head but soon becomes dense and long, and merges into the shorter thinner black hairs on the vertex; the usual strong black bristles quite out on the back of the head are barely perceptible; vertex covered with greyish orange dust; proboscis brown. Eyes touching for less than one-third the distance between the occiput and the antennæ but the part of contact nearer to the occiput than to the antennæ; facets fairly large on the upper part but steadily though almost imperceptibly diminishing in size to the lower part. Antennæ yellowish grey on the basal joint, but greyer on the second joint, and dull brown (except for its obviously ferruginous base) on the third joint; basal joint with the usual hair-like pubescence on its basal half which is partly black but with long pale hairs beneath near the base, and with the usual stiff black bristles on the apical half; second joint with the usual numerous short black bristly hairs; third joint with two or three tiny black dorsal bristles near the base; style angulated from the third joint, and with a distinct though tiny apical arista.

Thorax blackish (probably from discoloration, or else probably greyish brownish black with two faint paler stripes and the hindmargin paler); pleuræ ashy grey. Pubescence suberect, composed of predominant rather long black hairs with some short inconspicuous yellowish brown hairs intermixed on the disc, but with abundant yellowish brown hairs on the sides and hind part amongst which a few inconspicuous black hairs are intermixed; pleuræ with pale greyish yellow pubescence, but with numerous black hairs intermixed in the large mesopleural tuft and with some on the hind part of the metapleural tuft; chaetotactic bristles almost as in fig. 311 but rather difficult to trace in the long dense black pubescence, two with perhaps a smaller thinner one on the postalar calli. Scutellum greyish orange about the margin, mainly clothed with moderate fine yellowish brown pubescence but with some considerably longer weak black hairs on the disc.

Abdomen discolored in the specimen described but probably blackish with obscure indefinite brownish bands before the pale hindmarginal hems, and with these bands becoming broadly greyish black and more obvious about the sides of the two basal segments; hindmarginal hems dark orange, conspicuous on the second to seventh segments but steadily growing narrower

until the one on the seventh segment can hardly be traced. Pubescence suberect, dense, moderately long, and black on the dorsal part, but in the English specimen broadly brownish yellow all about the sides of the second to fifth segments and on the belly, though when seen from above the long black pubescence forms conspicuous tufts at the sides of the three basal segments and numerous black hairs are intermingled at the sides of the fourth and fifth segments; in a continental specimen the abdominal pubescence is all black except for some brownish black pubescence about the basal corners, and when seen sideways appears rather tufted down the dorsal line because of the gaps caused by the bare hindmargins. Belly in the English specimen ashy grey, with broad but rather obscure hindmarginal hems on the second to fifth segments which unite with the dorsal hems, and it bears long thin straggly dark yellowish brown pubescence on the second, third, and fourth segments and partly blackish pubescence on the next three segments, and all this pubescence is somewhat interrupted at the base of each segment; belly in a continental specimen dull black, with broad conspicuous pale dull golden hindmarginal hems on the second to fourth segments, a rather narrower hem on the fifth segment and a decidedly narrow one on the sixth segment. Genitalia with the upper lamellæ as usual, and the inner ones as well as the underside shining reddish orange.

Legs mainly black, but the tibiæ reddish orange except at the tip of the front pair and slightly at the tip of the middle pair, and the four basal joints of the tarsi obscurely reddish orange except at their tips; trochanters shining; femora with an ashy grey tinge. Pubescence on the coxæ and femora mainly greyish or brownish yellow, but blackish and dense behind the anterior femora, while pale scaly pubescence is abundant all over the hind femora except on the underside; in a continental specimen all this greyish yellow pubescence becomes greyish black; coxæ strongly spinose especially on the front part of the front pair; front femora with about two strong black bristles beneath, middle pair with about five, and the hind pair with about fifteen irregular ones (or fewer in a continental specimen).

Wings in the English specimen rather smoky and without any distinct cloudings, but in a continental specimen much darker with the stigma brown and with a tendency towards cloudings at especially the dip of the discal vein; veins dark brownish in the English specimen, but the stigma, the costal, subcostal, and stem of the postical, veins brownish orange; fourth hindmarginal cell closed. Squamæ brownish orange, with thick darker margins and brownish orange fringes. Halteres brownish black, but brownish orange on the stem.

♀. As I am unable to be certain about the female I give Loew's description.

"Cinerascens, thoracis dorsum vittis tribus nigricantibus interjectis lineis
 "cinerascentibus angustissimis parum conspicuis; abdomen nigrum, segmentis
 "postice albo-fasciatis, fasciis arcuatim excisis lateraliter valde dilatatis;
 "callus frontalis brevissimus ab ocellis separatus, antice distincte emarginatus;
 "alarum nervi transversi fuscine distinctissime marginati."

Face whitish with whitish pubescence, and a clump of black hairs at the lower eye-angles; back of the head dirty whitish haired. Antennæ black. Frons yellowish, beset with fairly dense black hairs, which extend downwards in a small degree on the eyemargins. Frontal callus very short, almost like a cross-band, in front not deeply but distinctly emarginate; behind it does not reach to the front ocellus and has an undulating margin; frons above the callus and on the vertex brown.

Thorax with three more brownish black than slaty grey stripes, which are altogether not sharply contrasted against the narrow grey separating stripes, so that these latter stand out less distinct; the pubescence on the upper side of the thorax consists of rather dense, short, depressed, wholly pale yellowish hairs, between which more erect, longer, blackish hairs occur. Pleuræ rather pale grey, in the Silesian specimen with white, in the South of France specimen with greyish white pubescence. Scutellum blackish grey, paler at the margin.

Abdomen black; basal segment with a large triangular grey spot in each hind angle and with whitish or greyish white pubescence especially obvious

on the sides and on the hindmargin; second segment with a narrow but obvious yellowish hindmarginal hem, and the third segment with a still narrower and less obvious one; on the following segments the extremely narrow hems are hardly obvious; on the second segment there is a greyish white cross-band immediately before the hindmarginal hem which is excised in an arch in the middle, so that it becomes quickly broader from the middle outwards but then from the end of the arched incision extends to the side-margin in considerable, but almost equal breadth; the third segment has a similar, but somewhat narrower band, on which the arched incision is not so sharply defined towards the sides, as the band distinctly widens from its end out to the sidemargins. The same applies in an even greater extent to the band on the fourth segment, which again is rather narrower than the one on the third; the fifth and sixth segments have a somewhat broader greyish white cross-band, which is not very sharply defined anteriorly and is only indistinctly excised on the middle, and not widened at the sides; the seventh and eighth segments are altogether shining black. Belly ashy grey; the front segments rather paler than the hind ones; the second and third segments have a quite distinct very dirty whitish, but the following segments not clearly perceptible, hindmarginal hem; also the pale band which lies quite at the side of the abdomen, and which connects the hindmarginal hems with each other is at least on the anterior segments very distinct. The pubescence is whitish on the upper side of the basal segment, on the sides and on the cross-band of the second and third segments, and also on the underside of the three basal segments, but black and depressed on the black marking of the second and third segments, on the fourth and all subsequent segments it consists of short, erect black hairs on the sides. The femora are black with short whitish pubescence; the tibiæ are more rusty yellow than rusty brownish, and the tip of the front pair to a small extent, of the middle and hind pairs scarcely blackened; tarsi black, the basal half of the first joint of the front pair, and the greater part of the first joint and the base of the second joint of the middle and hind pairs brown. Halteres dark brown, with the middle of the stem paler. Wings hyaline with a brownish tinge, veins dark brown, more rusty brown at the base and foremargin; stigma brown.

Length about 11.5 mm.

This species is not very generally known though probably distributed over a wide area, and but few students have known it in both sexes. The male may be distinguished from *T. plebeia* by its larger size and more universally black pubescence, while the female should be distinguished by its much smaller frontal callus.

T. circumscripta has not previously been recorded as British, but Colonel Yerbury took a male at Lyndhurst on June 16, 1897, and since I distinguished that specimen I have seen another male in the Entomological Club collection mixed up with specimens of *T. nobilitata*, and I think the fragments of a male taken by Colonel Yerbury at Nairn on June 4, 1905, belong to this species but the pale pubescence on all parts of the thorax is whitish grey while that on the head is grey rather than brownish yellow. If *T. circumscripta* and *T. ursina* are synonyms this species is recorded from Lapland to South France and from Central Europe.

Synonymy.—This species was probably first described by Schummel in 1838 under the name of *T. frontalis*, but his description is very uncertain and there was already a *T. frontalis* of Say. Loew in 1846 described the female under the name of *T. circumscripta* and Wahlberg in 1854 probably described both sexes under the name of *T. ursina*. Kowarz in 1883 called attention to *T. ursina* being the male of *T. circumscripta*, but Bezzi in Kertész's Katalog retains the two as distinct species; if they should be distinct we must adopt the name of *T. ursina* for the British species. Wahlberg's diagnosis of the female of *T. ursina* is as follows: "cinerascens opaca brevius et remotius hirsuta supra grisea pilis nigris intermixtis

“subtus albida, vertice flavo-griseo callis 2 parvis nigris nitidis parum elevatis
 “in lineam transversam dispositis, thorace cinereo-albido-bivittato, segmentis
 “abdominis basi anguste subnitidis nigris, apice fascia albida opaca ad latera latiori
 “antice medio retusa, 2 ultimis totis nigris nitidis, tibiis rufis, alis hyalinis fusco-
 “nervosis.—Femina callis verticis parvis in lineam transversam positus, nec callo
 “magno obcordato. Tarsi antici in utroque sexu nigri, vix summa basi rufe-
 “scentes.” From this it would appear that the frontal callus of his female was
 separated into two spots, and the tarsi in both sexes were more extensively black
 than in my description.

6. *T. bipunctata* Meigen. Male with mainly whitish (not brilliant white) pubescence. Female with the frontal callus divided into a pair of spots. Wing-veins very strongly defined when viewed from the wing-tip.

A rather small species with the pubescence of the male more whitish than in any other British species except *T. annulata* and *T. lunulata* but not silvery white as in them, and the frontal callus of the female distinctly divided.

- ♂. Face and frons entirely covered with pale dust; frons yellowish grey with its margin darkened in some lights, bearing long moderately dense black pubescence but that on the fore part and all round the base of the antennæ composed of rather shorter thinner pale hairs which are slightly bent forwards; face light grey, with an almost whitish shimmer near the lowest angle of the eyes and on the lower part of the back of the head near the eyes, clothed with dense long rather drooping yellowish white hairs on the middle part but with more or less abundant more erect black hairs near the eye-margins, and these black hairs usually forming lateral fringes irregularly three or four hairs wide which extend from the black hairs on the frons to almost the bottom of the eyes and are followed after a short interval by a small sparse clump of similar black hairs below the eyes, but these fringes of black hairs may extend only about half-way down the face or on the other hand may be five, six, or even seven hairs wide and be practically continued to the sub-ocular black hairs, and sometimes scattered black hairs intermingle with the yellowish white hairs though not to the middle of the face; under part of the head with long dense dull yellowish white pubescence which amalgamates with similar pubescence on the front coxæ and becomes conspicuous; lower part of the back of the head inflated, greyish yellow (except where shimmering white), and bearing moderately long greyish yellow pubescence with a single inconspicuous row of scattered black hairs near the eyes; upper half of the back of the head hardly inflated and bearing less abundant shorter greyish yellow pubescence, while the postocular black hairs become longer, more numerous (about fifteen), and more conspicuous; the usual few black bristles on quite the back of the head are almost hidden in the pubescence; vertex dusted yellowish and bearing moderate black pubescence. Eyes bare, touching for about a quarter the distance between the occiput and the antennæ; facets all practically equal in size. Antennæ with the two basal joints rather light grey, but the third joint greyish black-brown and sometimes a little ferruginous at the base; first and third joints almost equal in length, second joint short, and style short; first joint bearing pale pubescence about its base but stiff black bristles near its end; second joint with very short black bristles; third joint bare.

Thorax dull dark greyish brown, often with three or five inconspicuous dark lines down the disc of which the two outside the middle one are more conspicuous than the others and seem by contrast to leave greyish lines inside them; pubescence on the disc fairly dense but only slightly obscuring the ground colour, composed of mixed black and pale yellowish hairs of which the black hairs are long and erect while the pale hairs are short and depressed; when viewed from in front the pale hairs become conspicuous but when viewed from behind the black hairs seem to predominate; towards the sides the pale hairs become longer, denser, and less recumbent and consequently more

conspicuous ; black bristles as usual ; pleuræ with dense shaggy dull greyish yellow pubescence, which may become darker yellow or even tawny and more conspicuous on the metapleuræ. Scutellum with rather longer mixed pubescence.

Abdomen obscurely black or blackish brown on rather more than the basal third of the second, third, and fourth segments, though the blackish colour does not quite extend to the sides and is not sharply separated from the brownish grey colour which covers all the rest (including all the sidemargins) except the hindmargins of at least the second and third segments which are rather broadly and conspicuously sharply margined dull yellowish, while the fourth segment also has a similar but narrow hindmargin, and according to Loew these narrow yellowish hindmargins may extend even to the seventh segment. Pubescence in the best marked forms when viewed from behind all pale fawn-colour and of almost equal density on all parts, but more commonly the belly pubescence is dull yellowish white and slightly lighter than that on the dorsal part because more or less numerous black hairs become inconspicuously mingled with the pale hairs about the sidemargins and sides of the hindmargin of the first segment, and also a few depressed black hairs occur on the middle of the second and third segments near their hindmargins, while still more such hairs occur on the fourth segment, and from thence to the base of the genitalia longer more erect black hairs may become numerous on the disc and even extend to the sides of the base of the genitalia ; in ordinary specimens the pale pubescence is long and rather tufted about the sides of the second and third segments, less abundant on the fourth segment, and longer and more erect and less tufted on the next three segments, but rarely (when viewed from above) the first segment may have numerous black hairs intermixed near the sides of the hindmargin and predominating in the lateral tufts, while the second segment may bear some such hairs, and the third segment a few, while slightly tuft-like black hairs may occur on the sides of the next three segments ; hardly any of these black hairs are noticeable when viewed from behind, but the general pale pubescence seems to be a little darkened. Belly blackish grey ; hindmargins of the second, third, and fourth segments conspicuously, of the fifth segment narrowly, and of the sixth very narrowly yellowish. Genitalia usually reddish orange on at least the large lateral plates or about the base and lower part of the plates.

Legs black ; tibiæ luteous but blackened at just the tip ; tarsi with almost all the basal joint and the base of the second joint and sometimes of even subsequent joints brownish yellow. Pubescence on the anterior femora long and pale greyish, (almost whitish), but on the front pair tending to become more or less blackish about the tip beneath and behind ; hind femora with recumbent scaly greyish yellow pubescence ; bristles as usual.

Wings whitish hyaline with a slight brownish grey tint, but pale brownish at the base and fore part ; stigma dark brown ; veins conspicuously blackish brown, very much intensified when viewed from the wing-tip, and then sharply contrasted with the whitish hyaline cells, but slight clouds occur about the end of the submarginal cell and the upper part of the cubital fork-cell, and the veins tend to reddish brown at the base and on the subcostal ; slight blackish seaming may be found about the discal cross-vein and on the discal vein in the dip between the discal and second posterior cells, while the piece of the upper fork of the postical vein which forms part of the middle basal cell is conspicuously blackish. Squamæ smoky with brownish margins, and with the fringes short and greyish white on the lower part but long as usual about the fold. Halteres rather dark brown, stem paler.

- ♀. Frons including the ocellar triangle greyish yellow to brownish orange ; the shining black callus (fig. 323) divided into two fairly large spots which though quite distinctly separated lie near each other and form a moderate arch which is well remote from the lowest ocellus and all but or quite reaches the eyemargins ; frons with short and rather sparse black pubescence on the front part which extends outwards to the eyemargins but does not extend backwards, while a few shorter yellowish hairs occur in front close to the base of the antennæ and sometimes these pale hairs increase in number until they extend almost from eye to eye (and Loew says until they even displace

all the black hairs on the fore part of the frons), the upper part of the frons is the same colour as the fore part and is beset with sparse moderately short black hairs amongst which single pale hairs are sometimes intermixed. Face white, with rather dense and long all white pubescence without any admixture of black hairs except that there is a slight continuation of the frontal

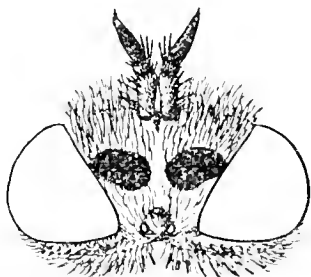


FIG. 323.—*Thereva bipunctata*
♀. × 16.

black hairs at the sides to just below the antennæ, and there are a few black hairs below the lowest part of the eyes though not nearly enough to call a clump; back of the head whitish below and with whitish pubescence there which amalgamates with the similar white pubescence on and in front of the front coxæ, but higher up as the ground colour becomes yellowish grey the pubescence becomes more yellow or orange; there are six to ten black postocular bristles on the upper part and usually two or three more smaller ones nearer the middle of the back of the eye, besides the usual black bristles quite out on the back of the head. Antennæ with the two basal joints light grey and the third joint greyish brown; first joint with the usual black hairs and bristles on the apical half, but with whitish pubescence near the base at the sides and beneath.

Thorax dull brownish, with two more or less indistinct grey stripes and with a short depressed felt-like yellow pubescence intermixed amongst which are almost equally numerous though inconspicuous almost upright longer black hairs, but the ground colour hardly obscured; chætotactic bristles conspicuous as in fig. 311; pleuræ light ashy grey, with the pubescence dense and shaggy yellow on the upper part and back of the mesopleuræ, but longer dense and whitish on the metapleuræ, though occasionally a few black hairs occur on the back part, while there are more sparse and whitish hairs on the lower part of the pleuræ. Scutellum with only a few of the erect black hairs.

Abdomen black, hardly shining, but the grey cross-bands occupying most of the disc, and the hindmarginal hems yellow; these yellow hindmarginal hems are fairly conspicuous and rather narrow on the second segment, narrower or almost absent on the third segment, and hardly visible on the subsequent segments, or the hems may be distinct though narrow on all the segments from the second to the sixth, or again they may be fairly broad on the three basal segments and narrow but distinct on the next three; basal segment usually all rather dark grey; second segment with a broad pale ashy grey cross-band before the yellow hindmarginal hem which is narrowed at the middle to about one-third of the depth of the segment but widened out until it occupies fully two-thirds of the sidemargins; third segment similar but the grey band slightly narrower; fourth segment with the grey band occupying nearly half the segment and more equal in width until close to the sides; fifth segment usually all ashy grey except on a shallow black basal cross-band which scarcely extends to the sides; sixth segment ashy grey with only a slight trace of a basal darkening; seventh segment more shining black with the hindmargin and sides orange grey; eighth segment shining black; ovipositor with the underside of the shining black eighth segment bright shining chestnut and with the usual circlet of dark red spines. Pubescence black and recumbent on the black parts of the disc but yellow on all the rest, and forming a fringe over (not on) the yellow hindmarginal hems; some moderately long and abundant whitish yellow hairs occur on the sides of the basal segment and on the front corners of the second segment; on the fourth segment a few erect hairs occur on the sides, and all the hairs on the next three segments are erect and conspicuously yellow, especially on the seventh segment. Belly pale grey, with sometimes an almost whitish sheen on the four basal segments; the yellow hindmarginal hems conspicuous on the second, third, and fourth segments and just visible on the fifth and sixth; pubescence yellowish, forming a depressed fringe near the hindmargin of the fourth segment and on the hindmargins of the fifth, sixth, and seventh segments, but the other pubescence on these last three segments erect and almost orange.

Legs as in the male, but the pubescence on the anterior femora shorter and the hind pair with only a few whitish scales.

Wings as in the male, or with a more yellowish tinge which makes the veins about the base, on the subcostal, and on the stem of the postical, more orange, and in such cases the stigma is brownish yellow. Halteres brown, stem light brown.

Length about 8 mm.

This species may be known by its small size, by the entirely whitish (not silvery white) haired abdomen of the male and by the intense venation of the wings when viewed from the wing-tip; while the female may be known by its divided frontal callus and the pale haired seventh abdominal segment, and as a rule it is easily recognised by these characters but occasionally specimens occur which are not easily identified. A female sent to me by Nicholas Cooke in 1870 has the pair of frontal calli very small and transverse, while the white pubescence on the front part of the frons is more extensive than usual, and the front part of the frons is paler than the hind part though still darker than the face, the dark parts of the abdomen are brown rather than black and are more extensive than usual until they occupy all the seventh segment, and the pale hind-marginal hem is broad on the three basal segments but narrow and distinct on the next three, the pubescence on the mesopleuræ, metapleuræ, and abdomen is almost brownish yellow, the wings are slightly yellowish, and the veins and stigma pale; it is well distinguished from *T. binotata* Lw. by the segments of the abdomen after the third being pale haired, all those segments in *T. binotata* (from Sicily) being entirely black haired; it can hardly be Zetterstedt's var. *canescens* because that is rather smaller than ordinary *T. bipunctata*, while Cooke's specimen is unusually large. A remarkably large (12 mm.) and stout female taken by Mr C. G. Lamb at Padstow in July, 1902, has the frontal calli unusually large and rounded and only narrowly but distinctly separated and not quite touching the eyes, the frons yellowish grey with rather numerous white hairs across the front part, and the black hairs below the eyes almost forming a clump, the pubescence on the upper part of the head brownish, about twelve black postocular bristles and about four others out on the back of the head away from the eyes, the thorax hardly striped, the abdomen with the ashy grey cross-band on the second segment narrowed to a quarter of the segment at the middle, but the grey band on the third segment wider at the middle, and the grey bands on the fourth and fifth segments occupying fully half each segment, the sixth segment with the basal blackening obscure, the seventh segment with the hindmargin and sides grey (not at all orange); another note on this same specimen says that the black parts of all the segments are more shining black, much more distinct and sharply defined on the fourth to seventh segments, and the grey on the seventh segment is more extended and more conspicuous, the hindmarginal hems are narrow but distinct on the second to sixth segments, the pubescence on the abdomen (exclusive of the white pubescence on the basal corners) is more yellowish with a decidedly yellow fringe near the hindmargin of the basal segment, but the ventral pubescence not at all orange on the end segments, and there are a few erect black hairs on the middle of the front part of the fourth, fifth, sixth, and especially seventh segments, the anterior femora have more abundant whitish pubescence and the hind femora more numerous white scales

which almost cover them, the wings are slightly clouded, the middle of the eubital cell being paler than the rest, and the postical fork especially and the cells near it with slight dark clouds; it was apparently taken in company with normal *T. bipunctata* and with *T. annulata* and *T. nobilitata*, but I do not think it a hybrid though Zetterstedt has recorded the capture of *T. bipunctata* ♂ in cop. with *T. annulata* ♀; a rather similar female was taken by Mr Lamb at the same place in July, 1906, but a male taken at the same time is indistinguishable by me from ordinary *T. bipunctata*. Minor variations occur in the relative contrasts between the black and the grey abdominal bands, which are usually rather undefined in both sexes but sometimes well defined or on the other hand very vague in the female, also slightly in the size and shape of the frontal calli, and in the amount of pale pubescence on the front part of the frons which seems to be more extensive when the calli are small. The male cannot be confounded with any other British species, because *T. plebeia* and *T. circumscripta* have the abdomen almost entirely black haired dorsally, and the lateral and ventral pubescence not whitish; *T. nobilitata* has the abdomen with brownish tawny hairs, and *T. arcuata* in its handsome form has the abdomen with black and tawny bands, or in its form *inornata* has not the slightest tendency to a whitish pubescence. The female is distinguished from all other British species by the almost absolute character of the divided frontal callus, though I have seen this character in a female of *T. nobilitata* but that specimen was at once distinguished by the golden brown pubescence on the face and back of the head and by the black haired seventh abdominal segment. Even now I am inclined to believe that there may be a very closely allied species with much more extended black dorsal pubescence on the abdomen and with the upper part of the mesopleural tuft darker; most (if not all) of the specimens from Golspie and Nairn seem to belong to this darker form, while Porthewl specimens belong to the lightest form. *T. marginula* is closely allied but has a still more intensified venation and has a fairly well defined cloud concentrated into a blotch which is partly in the submarginal cell and partly in the eubital fork-cell.

T. bipunctata is common on sandy banks or dunes, more especially on the coast, but occurs inland in suitable localities. My localities are numerous on the Norfolk and Welsh coasts and extend from Cornwall (Padstow) to Sutherland (Golspie), and from Yarmouth on the east to Barmouth on the west, whilst I have taken it inland at Barton Mills in Suffolk (where however other maritime insects and plants occur). My dates extend from May 30 to August 11.

Synonymy.—Coucke considers this species to be a variety of *T. nobilitata*, from which however it differs "*toto cælo*." Walker's diagnosis is practically a copy from Loew, but his English description applies to some entirely distinct species, probably *T. nobilitata*. Moses Harris' *Sylvicola unicus* is probably a synonym as he refers to two black shining studs on the "frontlet," but otherwise his description is unrecognisable.

7. ***T. lunulata*** Zetterstedt. Similar to *T. annulata*, but the wings with the fourth posterior cell more or less wide open. Thorax with suberect black hairs intermixed in the pale pubescence in both sexes. Halteres blackish. Female with large blackish brown spots (or almost bands) on the abdomen.

Extremely like *T. annulata*, but apparently a more Arctic species.

- ♂. Resembling *T. annulata* but the face altogether smaller and the eyes curving round more on their lower margin; pubescence on the side-cheeks less abundant; postocular festoon more conspicuous because composed of stronger bristles; black bristles quite out on the back of the head fairly numerous. Eye-facets hardly contrasted in size. Antennæ with more obvious black bristles near the base of the third joint.

Thorax with very different pubescence, as when viewed from the side the most conspicuous hairs are all black except on the hind part and on the sides after the suture, the brilliant white pubescence is not quite so dense or woolly, and the black chætotactic bristles stand out conspicuously; there are two well defined pairs of præscutellar bristles.

Abdomen with slightly shorter and less abundant white pubescence. Genitalia very distinct, the large greyish white basal piece being produced into a long triangular lobe on each side, leaving a somewhat quadrate dorsal space between in which some upper lamellæ lie, whilst the lower margin of each lobe slopes back to the base; beneath these come a pair of large long oval lamellæ, rather pointed at the end and bearing there some long black bristly hairs; between these lamellæ some elongate thin brownish orange processes can be seen (when viewed from behind) which are difficult to determine in the single specimen I have seen.

Legs more extensively but less sharply blackish at the tip of the tibiæ, and the tarsi less yellowish at the base. Anterior femora with one rather small black antero-ventral bristle; hind tibiæ with rather more numerous dorsal and postero-dorsal bristles.

Wings without any orange tint, the veins being stronger and blacker; stigma browner; fourth posterior cell wide open though slightly contracted in all the British specimens I have seen, but only moderately contracted in one specimen and almost closed in another specimen in Zetterstedt's collection at Lund. Squamæ not so blackish at the base but with a dark marginal speck just before the fold. Halteres greyish black, but lighter grey on the outside and greyish yellow on the underside; middle of the stem orange.

- ♀. Very much like *T. annulata*, but with a more bluish grey tinge. Frons distinctly narrower at the vertex where it is only about one-seventh the width of the head, with the brown upper part darker brown and bearing stronger black bristles; a slight interval occurs before the bristly hairs on the white part of the frons, and these bristly hairs are more or less black with some thin silvery white hairs intermixed, or *vice versa*, and a large portion of the middle of the white part is bare; the side-cheeks bear less abundant pubescence, and the sides of the mouth are narrower and bear less pubescence; black bristles quite out on the back of the head considerably stronger and more numerous. Antennæ with more numerous bristles on the basal joint.

Thorax greyish black, with two conspicuous pale yellowish grey narrow stripes which start from the front but do not extend quite back to the hind-margin; pubescence on the disc mainly composed of rather thin suberect black hairs, intermixed with which are a few shorter depressed inconspicuous yellow hairs, and these latter become more numerous and longer towards the sides and hind part; the pubescence altogether is very different from the conspicuous short depressed yellowish pubescence of *T. annulata*, and does not at all conceal the ground colour; pleuræ with pubescence similar to but whiter than in *T. annulata*. Scutellum with considerable rather coarse pale pubescence about the margin, but with suberect mainly black hairs on the disc.

Abdomen less conical, with the same silvery sheen on the ground colour but the blackish brown spaces large and forming wide arcs; second segment with a large blackish brown arc which commences close to the basal corners and arches down on the middle until it occupies quite two-thirds of the segment; third segment with a similar but slightly flatter dark arc, which begins still nearer the basal corners and (as the segment is shorter) extends at the middle down three-fourths of the segment; fourth segment

with an equally large but rather less defined dark arc; fifth segment with only an elongate oblong blackish space on more than the middle half of the foremargin which does not extend half-way down the segment; fifth and sixth segments each with a narrow dark brown hindmargin; pubescence longer and more erect about the sides of the three basal segments, whitish and recumbent on the silvery grey parts of the second and third segments, but very inconspicuous and dark brown on the dark parts; on the rest the black stubby pubescence is as in *T. annulata*. Belly wider, all covered with whitish grey dust; second and third segments with a fairly wide but inconspicuous yellowish hindmargin, and the next two segments with a narrow yellow hindmargin; pubescence on the three basal segments all slight short depressed and pale, but on the next four segments rigid and black.

Legs much as in *T. annulata*, but the tibial bristles on all legs and the apical cirlet on the front pair much stronger; coxæ almost silvery white, with snow-white pubescence, and with the black bristles conspicuous; anterior femora without any bristles beneath in the Rannoch specimen, but with one or two strong bristles about the middle in the Nethy Bridge specimens and with one bristle behind nearer the base.

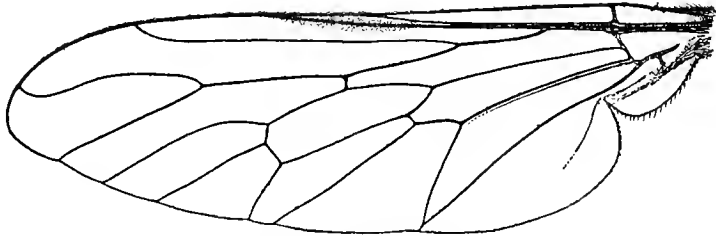


FIG. 324.—*Thereva lunulata* ♀. × 9.

Wings (fig. 324) perhaps rather more hyaline or without the slight yellowish tint which occurs in *T. annulata*; fourth posterior cell nearly always wide open, but sometimes only moderately so. Halteres blackish, with just the top of the knob and the base of the stem rather pale brown.

Length 9.5 mm.

This species might easily be mistaken for *T. annulata*, but the open fourth posterior cell gives a good (though variable) distinctive character; it may moreover be easily distinguished by the blackish halteres, erect blackish pubescence on the thorax, and in the female by the extensive blackish brown cross-bands on the abdomen. It is curious that when Zetterstedt enumerated (Dipt. Scand., xii., 4586) ten species of *Thereva* with a closed fourth posterior cell he omitted to mention *T. lunulata*, though he said "nostratum tantum in *Th. anili* eadem area aperta occurrit."

T. lunulata first became known to me from a female taken by Colonel Yerbury at Rannoch in Perthshire on June 24, 1898, and it was not until 1906 that I came to the conclusion that it must belong to this little known species; soon afterwards however I detected two more females in rather bad condition among his captures at Nethy Bridge in Inverness on June 25, 1905; then in 1906 Messrs D. Sharp and C. G. Lamb found it in fair numbers at Nethy Bridge on the rough stony ground by the edges of water channels which had partly dried up in the summer, but all the captors state that the specimens are exceedingly difficult to catch. It has previously been recorded from only extreme North Europe, where it is apparently not uncommon.

Synonymy.—I have seen the specimens in Zetterstedt's collection at Lund (3♂, 3♀) which all have the fourth posterior cell more or less open, though one male has it only narrowly open. It can hardly be *T. casia* Meig. because that has "Schwinger weiss."

8. **T. annulata** Fabricius. Male entirely covered with silvery pubescence; female without any shining black frontal callus. Halteres whitish. Femora blackish in both sexes. Fourth posterior cell closed.

A common and very distinct species.

♂. Face and frons entirely covered with brilliant white tomentum, and densely clothed with long pure white pubescence except on the upper part of the frons and on the depressed middle part of the face; this pubescence slopes downwards on the sides of the face, and is conspicuously continued quite as long and dense under the eyes (without a black hair being intermixed) and all round the back of the eyes; face and frons slightly produced in profile towards the base of the antennæ, and when seen from in front forming a broad bell-shaped space which is more than half the width of the head; the space below and behind the eyes fairly wide and still covered with white tomentum but gradually diminishing in width as it ascends the back of the head, and on the upper part with a row of (3-7) conspicuous rather overhanging postocular black bristles, but no similar bristles occur on the absolute back part of the head or if there are any they are very small and difficult to detect; vertex brownish, bearing moderately long forwards-sloping black pubescence. Proboscis brownish, rather long and prominent though thin; palpi greyish white, bearing long upturned white pubescence. Eyes quite bare, touching (or only linearly separated) for nearly one-third the distance between the occiput and the antennæ; facets on the upper three-fifths larger than these on the lower two-fifths. Antennæ about as long as the head, dull brownish black, but the two basal joints completely covered with whitish dust and the third joint obscured; basal joint long and cylindrical, not at all incrassated, and bearing the usual circlet of (10-12) black bristles round close to the tip but with long pure white pubescence on the basal part; second joint not a quarter the length of the first, and bearing only a few very short sometimes black bristles; third joint about as long as the first, and bearing at its tip a short thick bent-down style which is terminated by an exceedingly short thread-like arista.

Thorax with a dull greyish black ground colour on which two light grey lines run down the disc and become a little widened where the præscutellar bristles occur, but everywhere obscured by abundant whitish dust and almost white dense equal rather long nearly erect pubescence, though this pubescence becomes faintly brownish white on the front part of the disc (and in a specimen taken by Colonel Yerbury at Porthcawl on May 23, 1903, obviously brown on all the disc), while the strong black chætotaetic bristles stand out conspicuous; pleuræ with equally abundant and rather longer quite white pubescence on a white dusted ground colour. Bristles as in fig. 311 but usually with two pairs of præscutellar bristles. Scutellum clothed with similar dust and pubescence to that on the thorax, and with the usual two pairs of conspicuous slightly converging black marginal bristles; metanotum greyish white and quite bare on the middle part, but with dense side tufts.

Abdomen entirely covered with pure white almost silvery dust and pubescence; pubescence rather long but recumbent on the disc, though long and outspread all down the sides and nearly all equal in length; all the hairs long, silky, and pure white without a trace of a dark hair except the black hairs connected with the genitalia. Belly covered with whitish dust, but not enough to prevent the hindmargins of the segments being yellowish; pubescence long, but very thin and sparse. Genitalia dull orange, beneath with a pair of thin incurved lamellæ which bear black bristly hairs on their apical half, while the ventral hindmargin of the seventh abdominal segment bears a fringe of black bristly hairs which are long at the sides and are conspicuous from almost all points of view.

Legs with the femora all dull blackish though very considerably obscured by white scales; tibiæ dull yellow, except for the narrowly blackish tip; tarsi obscurely dull yellow about the base and after that obscurely dull

blackish; anterior femora with the front side of the notch beneath the tip (into which the base of the tibiæ folds) rather produced downwards. Pubescence on the coxæ, abundant, long, and white, with two or three black bristly hairs near the tip, and on the hind coxæ with one rather conspicuous strong black bristly hair outside near the tip; trochanters almost bare; anterior femora with long shaggy white pubescence beneath and behind, but the hind femora with hardly any similar pubescence except near the base in front. Bristles (black) consisting of two or three antero-ventral on the anterior femora near or rather before the middle, and a row of about eight on the hind femora which do not quite extend to the base; front tibiæ with three dorsal bristles and about five postero-ventral (but two of these very small); middle tibiæ with similar bristles, but the dorsal ones stronger, and with three minute postero-dorsal, the antero-ventral bristles being after the middle and also strong; hind tibiæ with four rows of bristles (dorsal four, postero-dorsal four, antero-ventral four, and postero-ventral four to six very small); apical circlets of spurs on the posterior tibiæ rather strong, but the circlet on the front pair much weaker (except one bristle); basal joint of the hind tarsi rather thickly beset beneath with plantar bristles; front tarsi with some small "touch-hairs" beneath the basal joint. Claws and pulvilli small, brown.

Wings (fig. 325) with a whitish glossy shimmer, and with the costal, end of subcostal, and the basal veins orange, but the other veins blackish and sharply defined; stigma yellow; fourth posterior cell almost always closed,

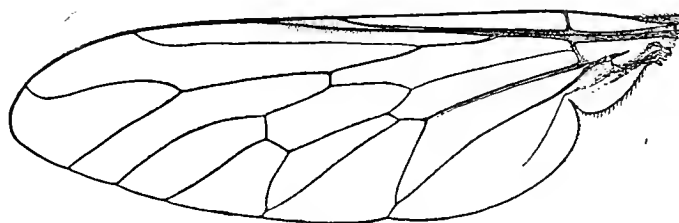


FIG. 325.—*Thereva annulata* ♀. × 10.

or at any rate very much narrowed to the wingmargin. Squamæ (alar) rather large, whitish with a conspicuously black base, and with a short white fringe on the upper part but a long pure white fringe on the lower part; frenum forming only a whitish grey line. Halteres yellow, but the broadened end of the stem blackish.

- ♀. Frons at the vertex less than one-fifth the width of the head, but quickly widening so that at the antennæ it is about half the width of the head, and the eyes continuing to diverge down to their lowest margin; frons rather light brown on the upper two-thirds and bearing there short black bristly pubescence which is directed forwards, but the rest of the frons and all the jowls and back of the head white and bearing long white pubescence similar to (but not so long nor so pure white) as in the male; this pubescence does not commence quite close to the black pubescence on the frons, and on the back of the head is rather greyish white; back of the head much more inflated than in the male because the eyes are smaller, and on the upper part on each side with a postocular row of about nine strong black bristles which are rather bent forwards, while on the upper part of the extreme back of the head are about twenty smaller black bristles. Antennæ with the pale pubescence on the basal joint shorter and less pure white.

Thorax dull brownish black with the light grey lines not always obvious, clothed and obscured with short greyish white decumbent pubescence, intermixed with which are some inconspicuous erect darker hairs, but these together and even with the addition of some grey dust are not quite abundant enough to conceal the ground colour; pubescence longer and more erect above the wing-base, on the postalar calli, and across the hindmargin; pleuræ with very different pubescence composed of thinner more sparse almost silky long hairs, which are numerous only on the prothorax and the metapleuræ and probably the mesopleuræ (but easily abraded). The strong black bristles

just the same as in the male, but more conspicuous because of the shorter pubescence; præscutellar bristles normally in two well-defined pairs. Scutellum with the pubescence greyish white, rather longer and more erect than that on the disc of the thorax.

Abdomen dull greyish white with a slight silvery sheen except on the shining black eighth segment and ovipositor, but the foremargin of the second segment bears a small obscure brownish spot, and each of the third and fourth segments bears a similar but better defined spot; sometimes the darkened marking on the third segment extends along the foremargin to the sides. Pubescence long and rather erect on the basal segment and on the sides of the second segment, but on the rest of the second segment and on all the third segment and on nearly all the fourth segment short, pale, and recumbent, but black, short, rigid, and erect on the fifth, sixth, and seventh segments, and on the sides of the fourth, while the shining black eighth segment bears still stronger short black rigid hairs, and the ovipositor has its usual circlet of stout conspicuous rather blunt black bristles. Belly dull blackish, but all obscured by whitish dust; sidemargins conspicuously revolute, *i.e.*, the dorsum encircles the sidemargins and folds a conspicuously raised margin against the belly leaving only about half of the underside visible as belly, and this sunk portion has the hindmargins of the second, third, and fourth segments pale yellow; pubescence similar to that on the upper side, but the fourth segment and the sides of the third bear the erect rigid black hairs; seventh segment dropped at its hindmargin; eighth segment shining brownish black.

Legs as in the male, but the pubescence on the anterior femora not so long and abundant but still quite enough to be conspicuous; hind femora with hardly any pubescence; bristles as in the male, but the front tibiæ with three or four antero-dorsal bristles on the basal half, three or four postero-dorsal, and three postero-ventral rather low down.

Wings less glassy whitish, and with the blackish veins less sharply defined when seen from above though especially distinct when seen from the tip.

Length about 9.5 mm.

This species is very easily known from all except *T. lunulata* by the uniformly silvery white pubescence of the male and by the absence of any polished callus on the frons of the female. *D. anilis* has the face bare, and the fourth posterior cell wide open, while its female has orange femora. *T. lunulata* Zett. occurs in extreme North Europe, and may be readily distinguished by its blacker halteres, more or less open fourth posterior cell, and by the numerous rather rigid black hairs intermixed with the pale pubescence on the thorax, while the female has the abdomen much more extensively darkened. *T. annulata* varies a little in the number of præscutellar bristles, as I have seen specimens of each sex with two such bristles on one side and only one on the other side, and others with only one pair of such bristles.

T. annulata may be expected to occur wherever there are white-hot sand dunes, and is recorded from Cornwall to Sutherland and from Yarmouth on the East to Barmouth on the West. It naturally is most frequent on the coasts, but I have several inland localities such at Lyndhurst, Barton Mills in Suffolk, Rannoch and other Scotch localities, while Colonel Yerbury found it common on sandhills at Waterville, Co. Kerry, and other Irish localities. The males execute a wild frantic dance in groups numbering up to eight or ten individuals over hot sand in bright sunshine at from four to six feet from the ground, and when I first saw them near Porthcawl in Glamorgan in June 1906 I was greatly interested in their rapid flight and wide swoops. Mr C. H. Mortimer (Entom. Mon. Mag., 1905, 261) records "the beautiful silvery ♀s of *Oxybelus mucronatus* "dragging the bodies of an almost equally silvery (♂) fly . . . to their

“burrows,” this fly being *T. annulata*; this habit agrees with the record made by Dahlbom concerning *Crabro patellatus* and *Dialineura anilis*. My dates range from May 6 to August 26. It is recorded from all Northern, Western, and Middle Europe; I possess several specimens from Cintra.

2. DIALINEURA.

Dialineura Rondani, Dipt. Ital. Prodr., i., 155 (1856).

Face bare; frons hairy (fig. 326). Antennæ with the basal joint conspicuously incrassated. Wings with the fourth posterior cell wide open.

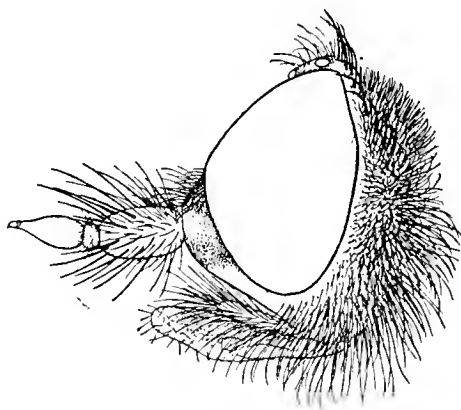


FIG. 326.—*Dialineura anilis* ♂. × 25.

This genus is distinguished from *Thereva* by its bare face and conspicuously open fourth posterior cell (though *Thereva* varies in this latter character), and from *Psilocephala* by its hairy frons and its entirely different “facies,” and from both by its conspicuously dilated basal antennal joint; the frons of the female is also without the shining black bare calli which commonly occur in *Thereva*. The species of *Psilocephala* are elongate oblong flies, while in *Dialineura* the abdomen is conical and densely pubescent like *Thereva*.

Synonymy.—Rondani founded the genus *Dialineura* as follows: “A. Venæ “longitudinales octava et nona sejunctim margini alarum productæ.—Antennæ “articulo primo distincte incrassato.” “Genus I DIALINEURA Mihi.”

The character of the open fourth posterior cell has been found extremely untrustworthy, but Rondani’s second character holds good, and that in conjunction with the entirely overlooked character of the bare face has induced me to retain the genus for *D. anilis* only. Every writer seems to have described the face of *D. anilis* as pubescent, and I can only imagine that they have been misled by the hairy palpi.

1. **D. anilis** Linné. Abdomen of the male entirely clothed with silvery pubescence, but the thorax light brown. Female without any shining black frontal callus, and with the femora all orange.

A very distinct species. Possibly a mimic of *Scatophaga*.

♂. Frons and face forming a bell-shaped space which is broader than high; frons moderately produced to the base of the antennæ, but the face sloping back straight from there to the front lower corner of the eye; frons covered with yellowish brown dust, separated from the whitish yellow face by a more

or less obvious darkened stripe which runs from beneath the base of the antennæ slightly downwards to the eyes, and bearing numerous black hairs except on the produced upper angle and not quite to the antennæ; face bare, but the pubescence long and pale yellow beneath the eyes and on the broadened lower part of the back of the head and without any black hairs beneath the eyes (though I have sometimes detected a stray black hair there); jowls yellowish white; back of the head dull yellow, diminishing in width upwards but never becoming flush with the eyes, and the pale yellow pubescence which is long on the lower part becoming almost brownish yellow and shorter on the upper part with a shorn appearance, while on about the middle part well away from the eyes are several (6-10) black bristles, and on the upper third is a postocular row or festoon of about ten or twelve rather long black bristles overhanging the eyes; vertex rather small and triangular, rather elevated and covered with dull brownish yellow dust, and bearing short inconspicuous forwards-sloping mainly black pubescence. Proboscis large and considerably produced, brown with yellowish coloring near the tip, and moderately pubescent beneath; palpi protruded, thin, brownish yellow, and bearing conspicuous long yellow pubescence. Eyes quite bare, practically touching for more than a quarter of the distance between the occiput and the antennæ but with a brownish yellow line separating them; facets all equal. Antennæ brownish grey, considerably longer than the head; basal joint long and conspicuously incrassated, more than twice as long as broad and as long as the rest of the antennæ, entirely covered with light brownish grey dust, and bearing all over numerous long black bristles or bristly hairs (more numerous and more scattered than in *Thereva*) with some finer pale hairs beneath about the base; second joint very short, and bearing numerous short black bristly hairs; third joint bare and conical but slightly enlarged at its tip, and with a very short terminal triangular style which bears a minute apical arista.

Thorax brown with a slight reddish tinge and with a pair of widely separated pale stripes, which widen posteriorly but barely reach the hindmargin; pubescence brownish yellow, but some slightly longer and more erect black hairs are inconspicuously intermixed on the front half of the disc, and these hairs spread out above the suture as far as the dorsopleural suture; pleuræ whitish grey, and bearing pale yellowish pubescence which forms large shaggy tufts on the mesopleuræ and metapleuræ, and is fairly abundant on the sternopleuræ, but leaves the hypopleuræ quite bare. Bristles black, usually three præsutural and usually two supra-alar (but both sometimes asymmetrical), one large postalar, and two pairs of large præscutellar. Scutellum similar to the thorax in colour, but the pubescence longer, paler, and more conspicuous, and with two pairs of not very long almost straight black marginal bristles.

Abdomen long and conical, entirely covered with silvery white dust and moderately long pubescence, which is more recumbent on the disc than at the sides; not a single dark colored hair is visible on any part of the abdomen. Belly obscured by similar whitish dust and with all the hindmarginal hems whitish yellow; pubescence erect but not nearly so abundant as dorsally, though still all white and fairly conspicuous. Genitalia covered with whitish grey dust; upper basal plate large and bearing rather long pale yellow pubescence (with two small rounded pale brown lamellæ extending from beneath its end), arched and curving over towards the lower lamellæ, which are blackish (or dark orange), long, narrow, and bear long pale pubescence; inner processes brownish orange.

Legs dull blackish but obscured by grey dust, with just the tip of the femora dull orange as well as all the tibiæ except just the blackish tip; tarsi obscurely orange from the base to rather more than half-way through the second joint and after that only obscurely brown; coxæ all covered with whitish grey dust and bearing long greyish white pubescence; trochanters shining black at the tip and almost bare, but the hind pair with some erect pale pubescence. Pubescence behind and beneath the anterior femora whitish, and these femora with scaly adherent whitish pubescence on the upper part; hind femora with but little hairy pubescence except beneath on the basal half, though they bear scaly adherent whitish pubescence all over

except on the bare underside. Bristles on the front coxæ two strong black ones in front near the tip, on the middle coxæ two rather smaller, and on the hind pair some small ones in front almost hidden in the long pubescence with one larger one outside on about the middle; anterior femora without any black bristles (not even any subapical ones), but the hind femora with about six antero-ventral extending over nearly the whole length; front tibiæ more strongly spinose than in *T. annulata*, there being three antero-dorsal bristles, three postero-dorsal closer together near the middle, and three postero-ventral with a smaller one nearer the tip, besides the apical circlet; middle tibiæ with three antero-dorsal bristles on the basal third and one just after the middle, three small posterior, four postero-ventral, three or four antero-ventral (one just after the middle being the longest, and one after that the smallest); hind tibiæ with four rows of bristles of which the antero- and postero-dorsal rows consist of about nine irregularly sized, the antero-ventral row of about six or seven, and the postero-ventral row of two to four or even five not very small bristles; all the spines on the tibiæ black, and the posterior tibiæ have apical circlets of about six spines; tarsi with circlets of small spines at the tip of each of the four basal joints, posterior tarsi with plantar bristles beneath the basal joint, but the front tarsi almost without them; "touch-hairs" distinctly visible beneath the front tarsi. Pulvilli obscurely brownish orange, and also the claws about their base.

Wings with a glittering brownish tint suggestive of *Scatophaga*, but distinctly orange on the costa to the end of the subcostal vein, on the mediastinal vein including the humeral cross-vein, on the cubital vein from its origin to the discal cross-vein, and on the postical vein from its base to its fork; discal cross-vein and the veinlets closing the discal cell rather conspicuously darkened, as well as the first portion of the upper branch of the postical vein, and to a certain extent the basal part of the upper branch of the cubital fork; the other veins are black and sharply defined, especially when viewed from the tip of the wing, with a tilt sideways; fourth posterior cell always wide open because the third veinlet from the discal cell slopes only moderately downwards to the wingmargin. Squamæ (alar) rather large, pale glassy yellow but with the base conspicuously blackish; margins yellow with a long pale yellow fringe on the produced part, but with a short fringe on the part extending thence to the frenum. Halteres orange, but the broadened top part of the stem and the base dark brown.

- ♀. Differing considerably from the male through the absence of silvery pubescence on the abdomen. Frons at the vertex quite one-fifth the width of the head but widening to nearly half the width of the head at the level of the antennæ, entirely covered with yellowish brown dust; there is a distinct though slight narrow middle channel and also a broad vague depression, and the frons bears very short forwards-sloping black bristly pubescence except on the absolute sides and on and about the broad middle depression, though a few bristles near the antennæ are pale; a small blackish inconspicuous spot against the eye occurs rather below the middle of the frons on each side, but there is no trace of the usual polished black callus. Face scarcely widening from the antennæ to the mouth, quite bare of hairs but covered with yellowish dust, very short under the antennæ but sloping straight back at the sides as in the male; back of the head brownish yellow on the upper part, and with the irregular black bristles which occur well away from the eyes more numerous (about 20) and the postocular row or festoon reduced to about eight similar bristles. Palpi prominent, pale brown, and bearing long conspicuous pale yellow pubescence. Antennæ as in the male, but the black bristles on the basal joint shorter.

Thorax colored as in the male, but with very short recumbent yellowish pubescence and short inconspicuous rigid black bristly hairs which cause the black chætotactic bristles to show up more conspicuously; pleuræ and scutellum with similar but shorter pubescence than in the male.

Abdomen light greyish brown with the hindmargins of the second to seventh segments narrowly but obviously yellow, though those on the fifth, sixth, and seventh segments may be more orange; when viewed sideways a slight brownish shallow arc is visible on the middle of the foremargins of the

third to fifth or sixth segments; eighth segment shining black or fulvous; pubescence all whitish yellow until the eighth segment and even then partly yellow at the sides, fairly long and erect about the base but depressed and short on the rest. Belly entirely obscured by pale grey dust, but the sides of the abdomen are considerably revolute so that only about the middle three-fifths of the belly can be readily observed; hindmargins of the segments narrowly yellow, or even orange on the end segments; pubescence slight, pale, and inconspicuous on the basal segments but becoming shorter and more erect on the rest, and especially erect and rigid beneath the seventh segment. Ovipositor fulvous, with the usual circlet of strong black spines, and with a terminal pair of small brownish yellow pubescent rounded lamellæ.

Legs all orange except on the light yellowish grey coxæ and the blackish trochanters, and with the extreme tip of the tibiæ and the gradually increasing tips of the tarsal joints blackish. Pubescence practically absent (except on the coxæ), but the coxal spines almost as in the male though more conspicuous because of the shorter pubescence; all the femora with dense short closely adpressed scaly yellowish pubescence and with very minute sparse black bristles all over, but the anterior femora with no strong bristles beneath; hind femora with the antero-ventral row of bristles irregular and sometimes reduced to about five in number; tibiæ and tarsi with bristles as in the male but rather stronger and more numerous; all the tibiæ with almost dense minute black bristles all over.

Wings almost as in the male, but rather more brownish and the veins very conspicuous when seen from the tip of the wing. Squamæ and halteres almost as in the male.

Length about 9 mm.

This species does not vary much, and the male may be distinguished from any other known European species of *Therevidæ* by its combination of bare face and hairy frons; the open fourth posterior cell, the silvery abdomen of the male, the absence of any shining black frontal callus in the female and the orange femora of the female place both sexes beyond possibility of confusion.

D. anilis appears to be common on sandhills on the coasts of Wales, but I have no British records from elsewhere. I found it rather common at Barmouth (in company with *T. annulata*) in June, 1887, and Colonel Yerbury took it freely at Porthcawl from May 3 to June 30. It seemed to me that the male partly trusted to its silvery abdomen to render it inconspicuous when flying over white sand, and that both sexes imitated a *Scatophaga* when at rest; this imitation was emphasised by their closing the wings closely over each other so that there were apparently darkened cross-veins as in some species of *Scatophaga*. *T. annulata*, which was also common at the same time, appeared to trust its safety entirely to its resemblance to the colour of the sand. It is possible that *Scatophaga* may be distasteful to some enemy, because in the *Syrphidæ* *Brachyopa bicolor* also seems to mimic it for protection. Zetterstedt was informed by Dahlbom that the female of *Crabro patellatus* kills the female of *D. anilis* and stores its nest with it for the nutriment of its larvæ. Colonel Yerbury caught a male *T. annulata* in cop. with a female *D. anilis* at Porthcawl on June 27, 1902.

Synonymy.—*Thereva rufipes* Macq. is represented in the Paris Museum by a female *D. anilis* and by a very rubbed specimen which may be *T. fulva*. Some specimens of *D. anilis* in Dr P. B. Mason's collection were labelled *T. plebeia*.

3. PSILOCEPHALA.

Psilocephala Zetterstedt, Ins. Lap., 526 (1837).

Very closely allied to *Thereva* but with the frons of the male and the face of both sexes quite bare (fig. 327).

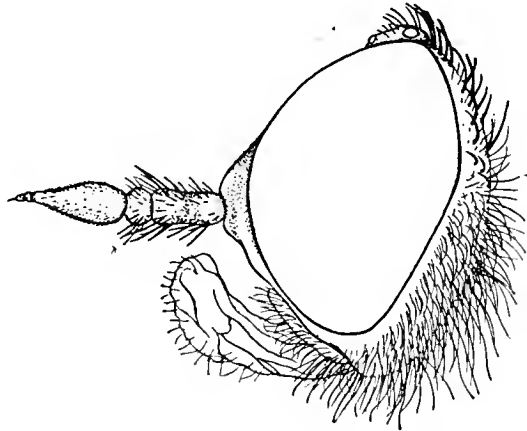


FIG. 327.—*Psilocephala ardea* ♂. × 33.

Frons of the female narrower, without any shining black bare calli, and bearing only very short sloping black bristly pubescence on the upper two-thirds. Antennæ with the basal joint about three times as long as the second joint but not so long as the third.

Thorax with at most only very short decumbent pale thin pubescence and very inconspicuous depressed sparse bristly black pubescence, but with the usual (or more than usual) chætotactic bristles; pleuræ almost bare, but with slight pubescence on the mesopleuræ and the upper part of the sternopleuræ, and with a dense rather long tuft on the metapleuræ.

Abdomen with only short adherent pubescence. Genitalia of the male of a different type to that of *Thereva*, as they are extended out conspicuously beyond the seventh abdominal segment and are composed of at least a large covering dorsal plate and large but shorter side lamellæ besides a complicated lot of internal processes.

Legs similar to those of *Thereva*, but the anterior femora bearing fewer bristles.

Wings as in *Thereva*, and varying as to the fourth hindmarginal cell being closed, contracted, or wide open, and often even differing in the sexes as to the cell being closed (in the male) or slightly open (in the female). Squamæ with only slight fringes.

Psilocephala contains only about seven European species, though five or six more are Palearctic; about thirty-five are recorded from North America and two from South Asia.

1. *P. ardea* Fabricius. Frons of the male and face bare. Abdomen of the male silvery white with the genitalia orange, of the female black with white lateral spots. Wings tinged with yellow. Frons of the female white in front but brown behind.

Distinguished from the other British *Therevidæ* in the male by the bare frons and by the silvery abdomen with long con-

spicuous orange genitalia, and in the female by the black abdomen with conspicuous white lateral spots.

- ♂. This description of the male is made from two German specimens in Kowarz's collection.

Face and frons covered with dense silvery white tomentum, but with no pubescence; sides of the face almost parallel; similar silvery white tomentum extends over the jowls and under the eyes to all the back part of the head, but on the jowls and lower half of the back of the head there is in addition long silvery white pubescence (not connected with any similar pubescence on the front coxæ); lower half of the back of the head considerably inflated from the eyes, but the upper half only moderately so, and on this upper half there is practically no pubescence but about fifteen stout black bristles not far from the eyes which when seen from in front form a postocular ciliation (even slightly bent forwards over the eyes), and a few similar but longer bristles occur more on the absolute back of the head well away from the eyes; vertex more greyish white and bearing numerous very short black bristles on its middle and back parts; collar with a circlet of stout black bristles. Proboscis brown, rather long; palpi light brown, nearly half as long as the proboscis, curved up on the sides of the depressed lower part of the face, and only very slightly pubescent. Eyes touching on the frons for only a short distance as the frontal triangle extends fully half-way up to the vertex and the vertical triangle extends more than a quarter of the way down to the antennæ, front profile of the eye forming an even curve from top to bottom but the hinder side almost straight; facets all equal. Antennæ brown; basal joint dusted greyish and bearing numerous black bristles; second joint only about a quarter the length of the first and bearing only short black bristles; third joint paler brown, about as long as the two basal ones together and tapering to the stout jointed apical style, which further tapers to a point and is about one-third the length of the third joint.

Thorax light (almost whitish) grey with three broad dull black stripes; middle stripe extending to the front but rather greyish there and contracted on the hind quarter to a rather narrow line; side stripes considerably shortened in front and becoming vague on the hind quarter of the disc; pleuræ rather silvery grey. Pubescence very short and inconspicuous being mainly depressed and yellowish or greyish white, but with some still more inconspicuous suberect short thin black hairs intermixed; pleuræ with only short whitish pubescence on the hind part of the mesopleuræ and still fainter pubescence on the fore part of the sternopleuræ, but with a rather dense and long tuft on the metapleuræ. Bristles almost normal as on fig. 311; præsutural only three, and præscutellar two strong pairs. Scutellum greyish, with slight pale pubescence and two pairs of black marginal bristles; metanotum bare, light grey.

Abdomen glistening silvery through abundant but not dense short adpressed white pubescence on a very light slaty grey ground colour; second to fifth hindmarginal hems white (when seen from above), the one on the second segment being conspicuous but the last two rather narrow; when seen sideways the whole abdomen appears more silvery but the white incisures disappear; pubescence on the basal segment longer but still much depressed, as is also the pubescence down the sides to the end of the sixth segment; seventh segment very short. Belly similarly colored and clothed but with a more yellowish hue (especially about the hindmargins) and with only very sparse pubescence; the tubular form of the abdomen appears to cease at the end of the fifth segment. Genitalia conspicuously orange large and long, being as long as the three previous abdominal segments together, and well distinguished from the abdomen; upper plate large and long and rather flattened above but curved over at the sides to half the depth of the genitalia, and prolonged at its end on each side into a process (with a small rounded down-turned lobe at its outer end) so that an almost quadrate opening is left with its basal side a little produced in the middle so as to make it more heart-shaped, but this open space is occupied by another lower middle process, and the side processes sometimes become blackish towards their tip; lower lamellæ

large and broad, rounded oblong, about half as long as the upper plate, and bearing where they approximate ventrally a fringe of long stiff black hairs, while the rest of these lamellæ and also the upper plate bear obvious though not abundant pale yellow stiff depressed hairs; all the inner processes of the genitalia are bright dark orange.

Legs probably blackish brown but the femora rendered light greyish by whitish dust and adpressed pale scaly pubescence, and the end of the femora and all the tibiæ except the blackened tip orange, while the basal joint of all the tarsi except its tip and a good deal of the second joint are also orange; coxæ glossed silvery, with moderately long whitish pubescence, and the anterior pairs with two black bristles in front near the tip, while the hind pair have one black bristle on the outside not quite so near the tip besides two smaller ones in front at the tip; femora without bristles except two or three small black ones beneath the middle pair near the tip and a row of about eight very small black ones beneath the hind pair and about three rather larger antero-ventral bristles also on the hind pair; front tibiæ with a row of about four small dorsal bristles and two posterior ones, besides the apical spines of which an anterior one is the longest; middle tibiæ with four rows of three or two spines besides the strong apical circlet, and the hind tibiæ with similar but more numerous spines; tarsi all with a few short stout black bristles and a circlet of short spines at the tip of the first four joints growing shorter after the basal joint. Pulvilli dull orange; claws small, blackish.

Wings with an obvious yellow tinge which becomes conspicuous about the base and foremargin, but with no cloudings; veins yellowish; fourth posterior and anal cells closed close to the wingmargin. Squamæ glassy, with a broad yellowish white margin on which there is no fringe except a slight pale one at the end which mixes itself up with the metapleural tuft. Halteres orange, but with the base of the knob darkened.

- ♀. Very different from the male. Frons barely one-eighth the width of the head at the vertex but widening to double that width at the antennæ, dark brown on the upper two-thirds and with narrow bare side-channels just before the very narrow orbits and bearing on all this part (except on the channels) rather numerous short black forwards-directed bristles, but silvery on the front third and bare unless two or three of the short black bristles straggle forward on to it, and this silvery part has a very narrow depressed middle line; face all quite bare, silvery with a large middle mouth-opening which leaves only narrow sides and which extends almost up to the base of the antennæ; jowls and lower part of the back of the head with rather long white pubescence as in the male; back of the head more silvery than in the male and more equally inflated from the eyes, and with the black bristles more numerous and arranged in two irregular rows of which the hinder row is well out on the occiput; collar whitish grey, with less strong bristles; palpi larger and bearing more obvious pale pubescence. Antennæ as in the male but more dusted with whitish grey.

Thorax not so light grey, and with the three dark stripes broader and more obvious; middle stripe with a faint very narrow dividing line on the fore part and not so narrowly continued to the hindmargin; pubescence composed of rather more abundant adpressed short black bristly hairs except about the sides, where some similar but thinner and yellow hairs occur, and there is a small tuft of a few longer erect whitish hairs behind the postalar calli; pleuræ with only very short inconspicuous pale pubescence except on the metapleural tuft which is composed of white hairs with sometimes a few stronger black ones on the back part. Scutellum light grey, but greyish black on the disc near the thorax.

Abdomen long and slender, twice as long as the thorax, with eight dorsal segments, of which the last five are almost equal in length, and the last two rather tubular, almost bare, and shining black with five or six pairs of rather silvery white side spots; basal segment greyish brown with the hind corners widely greyish white; second and third segments shining black with a large triangular silvery white spot at each hind corner of which one side runs along more than one-third of the hindmargin and another side occupies all the side-

margin; fourth segment with similar but smaller spots which extend a shorter distance along the hindmargin; fifth and sixth segments with similar spots which slope up from the hindmargin and occupy only the hind half of the sidemargins so that they end in a point rather farther out on the disc than the spots on the fourth segment; hindmargins of segments sometimes showing yellow hems. Pubescence short depressed and whitish on the sides of the two basal segments and on the triangular white spots of the third segment, but adpressed rather sparse and black on the rest, becoming rigid and erect on the last two segments and to a certain extent on the fifth and sixth segments. Belly shining black, with the basal segments more or less silvery grey, and with the hindmargins rather widely yellow on the second and third segments, narrow on the fourth and fifth, and a mere line on the sixth and seventh; pubescence almost absent on the basal segments, though there are a few very short white hairs on the second segment, but rigid and not scarce on the sixth and seventh segments and to a small extent on the fifth; eighth segment absent ventrally because the dorsal plate forms only a covering to the female genitalia which extend right back to the hindmargin of the seventh segment. Ovipositor shining black; terminal lamellæ short, rounded and beset with very short dense rigid bristles, and preceded by the usual circle of stout blunt spines which are black but somewhat lurid at their tips.

Legs almost as in the male, but the hind femora with about five small antero-ventral bristles set wide apart and with any bristles on the underside very small and on the apical half.

Wings with the fourth hindmarginal cell often slightly open; base of the wing and the mediastinal vein rather distinctly orange. Squamæ whitish, with a thick dull yellow margin on which is a short pale fringe.

Length about 11 mm.

This species is not sufficiently known to me to enable me to state anything about its variation, but I think it varies a little in the more or less numerous black bristles on the occiput of the female. The smooth face distinguishes both sexes from *Thereva*, while the moderate basal joint of the antennæ distinguishes it from *Dialineura*, and I do not think that the male can be confounded with any European species, but the female may not be so easily distinguished, as, if a female named *P. fuscipennis* Meig. in Kowarz's collection is rightly determined, that species only differs in having the veins on the base and fore part of the wing conspicuously blacker.

P. ardea is apparently very rare as an English species; it was first recorded by Benjamin Cooke in Entom. Month. Mag., xv., 19 (1878) under the name of *Thereva fuscipennis* Meigen, and was taken by him on the banks of the river Bollin in Cheshire (a locality which he afterwards called Bowdon) in June and July, 1875; he stated that he took one male and five females, and one of those females was given to me by the late Dr P. B. Mason. Since that time two females have been taken in Wyre Forest by Mr R. C. Bradley on July 7, 1889, and June 15, 1890 (from which my description of the female has been made), while two more females were taken in the Monnow Valley in Herefordshire on July 3, 1906, by Dr J. H. Wood, and a male on July 31, 1908.

DIPTERA BRACHYCERA

DERMATINA

Two pad-like pulvilli only. Neither bristles nor pubescence present in the ordinary sense of those terms, but the femora sometimes spinose beneath, and the tibiæ in some *Mydaidæ* with rows of small bristles. Discal vein ending before the wing-tip. Usually leathery looking flies of pedestrian habits or appearance.

Head usually dichoptic, but occasionally (e.g., *Scenopinus fenestralis*) holoptic in the male, and without cephalic bristles; frons and vertex usually sunk; collar or neck distinctly visible though not bristly in *Mydaidæ*, but indistinct in *Scenopinidæ*, and the head not crammed on to the thorax. Face broad, very short in the *Scenopinidæ*, and without the face-beard which is present in many *Asilidæ*; jowls usually very small; ocelli obvious in *Scenopinidæ* but indistinct in *Mydaidæ*. Proboscis usually short and thick, but elongate and thin in some *Mydaidæ*. Eyes quite bare, bulging in *Mydaidæ*, but almost flush with the frons and vertex in *Scenopinidæ*; facets rarely enlarged on the upper or front part in either sex. Antennæ close together at the base and usually rather long; usually very distinct in the two families, as in the *Scenopinidæ* the two basal joints are short and the third elongate but drooping without any apical style or arista, but in the *Mydaidæ* the antennæ are porrect and the basal and third joints are usually elongate, and the third usually ending in a remarkable large long clubbed style; in all cases the antennæ are quite distinct from those of any TROMOPTERA or ENERGOPODA.

Thorax without bristles or conspicuous hairs, but sometimes with moderate pubescence on the disc, and in the *Mydaidæ* usually with coarse pubescence towards the sides of the disc; pleuræ sometimes bare, but sometimes pubescent. Scutellum always unarmed; metanotum large and not at all concealed.

Abdomen without bristles or obvious pubescence unless about the basal corners. Genitalia of the male moderate in size; ovipositor of the female often with a circle of strong spines.

Legs strongly built and apparently adapted for slow walking purposes; femora in the *Mydaidæ* usually spinose beneath, and the tibiæ with rows of small bristles, but otherwise the legs almost always without bristles or pubescence except for one or more apical spines on the hind tibiæ in some *Mydaidæ*; in *Mitrodetus* however the posterior femora bear distinct pubescence. Pulvilli two only; empodium absent or represented by only a thin bristle.

Wings with a peculiar venation, very different in the two families but possessing one remarkable feature in common, viz., the discal vein runs into the wingmargin before the wing-tip. In the *Scenopinidæ* the subcostal vein is very short and quite simple, but in the *Mydaidæ* is very long and receives several of the subsequent veins before its tip; in the *Scenopinidæ* the præfurca is moderately long, but in the *Mydaidæ* extremely short; in the *Scenopinidæ* the cubital fork diverges rather widely in a somewhat triangular fashion, but in the *Mydaidæ* it hardly diverges after its base but is long and often contracted before it ends in the subcostal vein; in the *Scenopinidæ* the discal cross-vein is placed near the middle of the discal cell, but in the *Mydaidæ* (except in *Megasceclus*) near the end of that cell (as in the *Nemestrinidæ*); in the *Scenopinidæ* the discal cell has its lower margin entirely formed by the upper branch of the postical vein, but in the *Mydaidæ* is entirely separated from the postical vein; in the *Scenopinidæ* the fourth (and even third) posterior cell is entirely absent, but in the *Mydaidæ* is present and forms a long conspicuous closed cell lying under the discal cell; in the *Scenopinidæ* the veins are simple and run comparatively straight into the wingmargin, but in the *Mydaidæ* are looped and curved up in a most remarkable fashion; in fact the venation exhibits two extreme contrasts except for the remarkable peculiarity that the discal vein (whether simple or forked) entirely ends before the wing-tip. The venation of the *Mydaidæ* presents features suggestive of the *Nemestrinidæ* in the exceedingly long upper basal cell and up-curved veins, but the similarity is probably caused by the venation being in both cases modified in order to secure great strength in the outer part of the wing, while the opposite cause has reduced the venation in the *Scenopinidæ*; a similar contrast, caused by probably the same motives, exists between the families of *Nemestrinidæ* and *Cyrtidæ*, and in fact the dissimilarity of the venation of *Mydas* and *Scenopinus* is hardly greater than that between *Nemestrina* and *Acrocera*. In both families of the DERMATINA the wings when at rest lie as a rule flat upon the abdomen. Squamæ (alar) comparatively small and ordinarily with only slight fringes, but in the large *Mydaidæ* fairly large and bearing a stiff coarse marginal fringe; thoracal pair practically absent.

The DERMATINA are not easy to place in a natural sequence, because they seem to divide the two apparently allied families of *Theravidæ* and *Apioceridæ*; there can however be but little doubt that the *Scenopinidæ* are allied to the *Theravidæ*, especially in the embryonic stages, and that the

Mydaidæ are allied to the *Apioceridæ*, and by this means the connecting links can be traced. The DERMATINA are easily distinguished from the EREMOCHÆTA by the presence of only two pad-like pulvilli; from the TROMOPTERA by their heavily built pedestrian legs, distinct venation and antennæ, their dichoptic heads, and their general absence of any furry pubescence; and from the ENERGOPODA by their distinct venation (except in rare cases) and antennæ, and by the absence of any chætotactic bristles. They include only two small families, which at first sight seem to have but little in common, the best known *Mydaidæ* being gigantic flies of American origin endowed with a peculiarly complex venation, while the *Scenopinidæ* are small flies which occur in houses and have a very simple venation; a study of exotic forms however produces some connecting links, and Brauer in his exhaustive inquiry into the relationship of *Scenopinus* stated that the *Mydaidæ* with short antennæ show the most undoubted (unzweifelhaftesten) connection with *Scenopinus*. Osten Sacken gave super-family rank to the *Mydaidæ* alone, and apparently reluctantly left the *Scenopinidæ* along with the *Therevidæ* "according to the received opinion."

The larvæ as far as is known are parasitic or predaceous. The name of the super-family is derived from *δερμάτινος*, denoting "the leathery ones." I am aware that there is a genus of Hemiptera called *Dermatinus*, but I agree with Osten Sacken's views (Entom. Mon. Mag., xxix., 149) that the appellations of these larger groups are "not exactly names but designations," and as such are not subject to the laws of generic nomenclature.

IX. SCENOPINIDÆ.

Orthorrhaphous brachycerous practically eremochætous flies of rather small size; distinguished by their narrow oblong shape, dark colour, and peculiar simple venation.

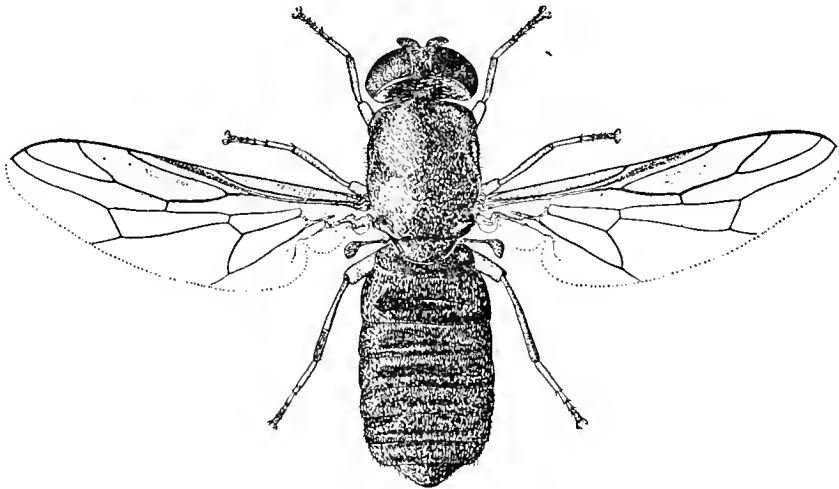


FIG. 328.—*Scenopinus fenestralis* ♀. × 8.

Head semicircular, the arc being slightly flattened in front and almost straight behind, not quite close to the thorax. Face broad but very short, quite bare; frons and vertex almost flush with the eyes, or so slightly sunk that the eyes cannot be termed bulging; ocelli three. Proboscis withdrawn, very short, with broad sucker-flaps; palpi cylindrical or slightly clavate, sparsely bristly at the tip. Eyes bare, usually (but not always) touching in the male, but separated in the female by the wide frons; when the eyes touch the facets on more than the upper half are enlarged; in life they bear colored bands. Antennæ three-jointed, close together at the base; basal joints short, but the third joint elongate strap-shaped, bent downwards, and without any distinct style or arista.

Thorax oblong, being rather longer than broad, rather flattened on the disc and yet appearing humpbacked because the head is depressed; absolutely without bristles, but with very short scaly pubescence on the disc, and with minute pubescence on the pleuræ; metapleuræ without any tuft or shelter hairs. Scutellum broad, short, flat, and unarmed; metanotum rather large but not conspicuous.

Abdomen flattened, with seven or eight segments but each segment bearing an impressed transverse channel across its middle, and the membranes between some of the segments usually bearing narrow white bands in the male. Genitalia of the male rather knobbed; ovipositor concealed.

Legs usually short, stout, and entirely unarmed; tibiæ never spurred, though some small bristles may have a spur-like appearance. Pulvilli two, small but distinct; empodium represented by a thin bristle only.

Wings when at rest lying flat on the depressed abdomen; veins few and simple; costal vein ending well before the wing-tip and not continued as an ambient vein after the end of the discal vein; subcostal vein short and simple; radial vein also short; cubital vein forked, and the fork commencing nearly level with the end of the discal cell; all the veins down to and including the discal vein ending separately and before the wing-tip; discal cell oblong, emitting towards the wingmargin only an upper veinlet and the end of the upper branch of the postical vein, as through the complete absence of the small cross-vein this upper branch of the postical vein forms the whole of the lower margin of the discal cell; posterior cells three only, of which the first slopes upwards and is narrowed or even closed towards the wingmargin and wholly reaches the wingmargin before the wing-tip (in *S. varipes* Loew apparently at the exact wing-tip); discal cross-vein only slightly after the middle of the discal cell and about the middle of the stem of the cubital vein, and conse-

quently the upper basal cell twice as long as the second one unless the second one is lengthened; anal cell closed well before the wingmargin through the sharp descent of the lower branch of the postical fork. Wing membrane smooth, never ribbed, but minutely pubescent. Squamæ (alar) small but fairly well developed and bearing very short fringes; thoracal squamæ almost absent. Halteres in no way concealed, knob large.

The metamorphoses are well known, and the larvæ (which are closely allied to those of the *Therevidæ*) have an obvious head and are amphipneustic, while the pupæ are mummiform. The species used to be called "Carpet Flies" and the larvæ were accused of destroying carpets and more especially stable rugs, &c., but from their affinities it is now believed that they prey upon the larvæ of Fleas (*Pulex*) and Clothes Moths (*Tinea*) which occur in the rugs and that they are consequently benefactors. In some ways the larvæ are said to show tendencies towards those of *Nemotelus* and *Pachygaster*. The flies are not common in the perfect state but sometimes occur on windows, especially in stables and outbuildings.

The *Scenopinidæ* form a very small but very distinct family, which is easily recognised by the eremochætous (in fact absolutely naked) body, there being no true pubescence on the head, thorax, or abdomen; they are distinguished from the true EREMOCHÆTA by the absence of any middle pulvillus or pulvilliform empodium. Girschner says that in the structure of the abdomen, the nature of the wing-membrane (which is smooth), and the legs, as well as in "habit," they bear closer relationship to *Subula* (*Xylomyia*), and especially to the *Xylophagidæ*, than to the *Therevidæ*. In fact the *Scenopinidæ* show so many characters indicating most diverse affinities that great uncertainty has prevailed as to their proper position, but a steadily growing knowledge of the life history has placed them beyond doubt in close relationship to the *Therevidæ*, in fact so close that Osten Sacken joined them at one time with that family, though how he could have associated them with his aërial furry-haired TROMOPTERA seems strange. Brauer in his latest arrangement associated them upon larval characters with the *Therevidæ* in his section "POLYTOMA," though only just previously (1882) he had devoted nearly eleven quarto pages to the question of their proper location and had decided to place them as intermediate between the *Therevidæ* and *Mydaidæ*, though with the more close affinity to the latter. Different though they are at first glance from the *Mydaidæ*, I have found that close examination tends to bring them into intimate connection, and I do not think that I am wrong in uniting them with the *Mydaidæ* in a super-family (DERMATINA) of practically equal rank with the TROMOPTERA or ENERGPODA. The usually complete absence of pubescence and the frequent three posterior cells will distinguish them at a glance from the *Therevidæ*, while the simple venation will at once distinguish them from the *Mydaidæ*. The absence of an ambient vein is shared with the *Stratiomyidæ* and some *Cyrtidæ*, but I do not believe that it shows any affinity. A strong

connecting link between the *Mydairidæ* and *Scenopinidæ* occurs in the Chilian genus *Megascelus*.

The *Scenopinidæ* are composed of very few species (not more than twenty-four) and of only one or two genera, of which only the genus *Scenopinus* occurs in the Palæarctic region; species occur in North America (down to Florida), while one has been recorded from New Guinea, and one from Hawaii.

Type of Venation of the SCENOPINIDÆ.

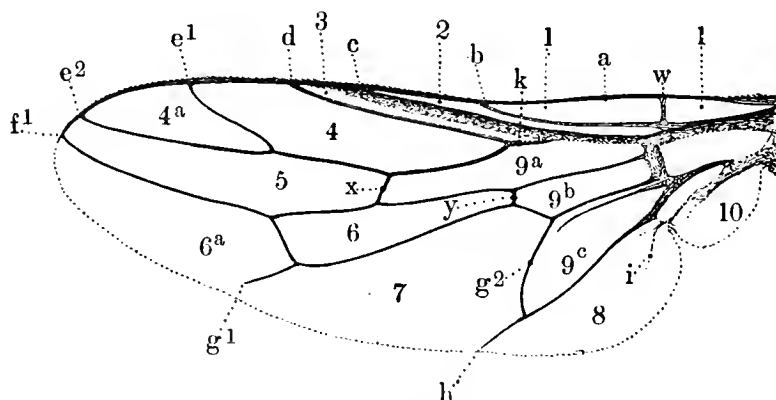


FIG. 329.—*Scenopinus fenestralis* ♀.

Longitudinal (or long) veins.

- a Costa (or costal vein).
 - b Mediastinal (or auxiliary) vein.
 - c Subcostal (or 1st longitudinal) vein.
 - d Radial (or 2nd longitudinal) vein.
 - e Cubital (or 3rd longitudinal) vein.
 - e¹ Upper branch } of the cubital fork.
 - e² Lower branch }
 - f Discal (or 4th longitudinal) vein.
 - f¹ Upper veinlet from the discal cell.
 - g¹ Lower veinlet from the discal cell.
 - g Postical (or 5th longitudinal) vein.*
 - g¹ Upper branch of the postical fork, if that anastomoses with or supplants the lower branch of the discal vein all along the underside of the discal cell.
 - g² Lower branch of the postical fork.
 - h Anal (or 6th longitudinal) vein.
 - i Axillary vein.
 - k Præfurca = the common stem of the radial and cubital veins.
- Ambient vein absent.

Cross (or transverse) veins.

- w Humeral cross-vein.
 - x Discal (or middle) cross-vein.
 - y Lower (or small) cross-vein probably absent, "y" being part of the discal vein.
- Anal cross-vein = g².

Cells.

- 1 Costal (or mediastinal) cell.
- 2 Subcostal cell.
- 3 Marginal cell.
- 4 Submarginal cell.
 - 4^a Second submarginal (or cubital) cell (or cubital fork-cell).

* Vide Corrigenda for a corrected interpretation of this vein.

- 5 First posterior (*or subapical*) cell, in this family really præapical.
- 6 Discal cell.
- 6^a Second posterior cell.
- 7 Postical (*or 3rd, but the normal 5th, posterior*) cell (*or postical fork-cell*).
- 8 Axillary cell.
- 9^a Upper (*or 1st*) basal cell.
- 9^b Second (*or middle*) basal cell.
- 9^c Anal (*or 3rd basal*) cell.
- 10 Alula.

Notes on the Venation of the SCENOPINIDÆ.

The chief peculiarities of the venation lie in (1) the short subcostal vein, (2) the reduction of the discal vein, and (3) the upturned cubital and discal veins.

1. THE SUBCOSTAL VEIN is unusually short, as it extends hardly beyond half the wing, and in this character the *Scenopinidæ* are extremely different from the *Mydaldæ*, though they may show some similarity to their other allies, the *Therevidæ*.

2. THE DISCAL VEIN is more reduced than in any other family of the BRACHYCERA, as its lower branch completely anastomoses into the upper branch of the postical vein, and consequently the discal vein consists of only a simple* continuous vein which throws down two cross-veins to this upper branch of the postical vein and thereby forms the discal cell. THE DISCAL CELL consequently can only have four sides, but is long and narrow and gradually widening from base to end; it emits only one veinlet (besides the upper branch of the postical fork), and that slopes upwards and reaches the wingmargin before the wing-tip.

3. The two branches of the cubital fork and the single veinlet from the discal vein slope (rather than curve) up into the foremargin of the wing, and this peculiarity is limited to this family and the *Mydaldæ* and (to a certain extent) the *Apioceridæ*.

Other points of interest exist in the form and position of the cubital fork; the complete absence of an ambient vein after the end of the discal vein; the position of the discal cross-vein near the middle of the discal cell, so completely different from that of the *Mydaldæ* (except *Megascelus*); the presence of only one posterior cell between the first and the normal fifth (=postical fork-cell). Some writers have professed to see a similarity in the venation to that of *Pachyggaster* or *Beris* or *Xylomyia*, but the complete absorption of the lower branch of the discal vein, the shape of the discal cell, and the single veinlet from the discal cell show very great distinctions.

SCENOPINUS.

Scenopinus Latreille, Hist. Nat. Crust. Ins., iii., 463 (1802).

Rather small oblong blackish flies, with short simple-veined wings, and with elongate drooping antennæ which are without any style or arista.

Head transverse, short semicircular, being flattish behind or slightly excavated there against the vertex, not crammed on to the thorax but with no perceptible neck; frons flush with the eyes or slightly produced; face not produced, very short being mainly occupied by the mouth-opening, bare and broad; jowls very small; ocelli three. Proboscis withdrawn; palpi inconspicuous, cylindrical, and bristly at the tip. Eyes bare, usually but not always touching in the male but well separated in the female, and when the eyes touch the facets on more than the upper half are enlarged. Antennæ close together at the base; two basal joints short and very minutely bristly; third joint elongate but drooping, strap-shaped, and with any style or arista concealed in a depressed pit (fig. 330).

Thorax rather oblong, being longer than broad, rather flat on the disc but appearing to be rather convex because the head is depressed; pubescence practically absent, but the disc of the thorax bears some minute scaly bristles and the pleuræ are minutely pubescent; front part of the mesopleuræ with a rather large depression

* *Vide* Corrigenda.

for the reception of the short thick front femora. Scutellum short, flat on the disc, and quite unarmed; metanotum fairly large but inconspicuous.

Abdomen flattened, more or less elongate oblong, and composed of seven or eight segments, while all the middle segments bear across their middle an obvious transverse depression, and in the male several of the segments have the foremargins white. Genitalia of the male large.

Legs short and stout; front femora especially short and thick; pubescence and bristles absent except for some spur-like bristly hairs at the tip of the tibiæ. Pulvilli two, small.

Wings with a limited and apparently simple venation; costal vein extending to the end of the discal vein and then abruptly ceasing so that the ambient vein is absent; subcostal vein short; præfurca rather short; cubital fork moderately long and rather triangular, with both branches ending in the foremargin of the wing; discal cross-vein placed just beyond the middle of the discal cell, and consequently the upper basal cell nearly twice as long as the lower one; discal vein apparently consisting of a single simple* vein with two cross-veins extending from it to the upper branch of the postical vein and in this way forming the discal cell, and this simple discal vein ends in the wingmargin before (or rarely at) the tip of the wing; discal cell long and narrow, but gradually widening from base to tip; postical vein with a long very wide open fork, of which the upper branch forms the whole lower margin of the discal cell, and of which the lower branch curves down rather quickly and joins the anal vein well before the wingmargin, thereby forming a stalked anal cell; posterior cells three only, the first one being long, narrow, and almost always open; alulæ well developed. Squamæ (alar) small, with very short fringes; thoracal pair hardly developed. Halteres with very large knobs and rather short stems.

This genus has no ally in the Palæartic region, and consequently should be easily recognised. The figure, venation, and antennæ are each by themselves sufficient to distinguish it.

Scenopinus contains but few species, of which only two are known to occur in Britain; from 1845 to 1873 only two other European species were recognised, but since then eight more have been described from the Palæartic region. The genus is recorded from Europe, Egypt, North America, Surinam, and Hawaii. The flies are usually seen resting quietly on windows, and more especially in stables or outhouses, but I once found some on *Asparagus* in my garden. Mr Jenkinson once saw some males dancing in the sun and the white markings on the abdomen made them look like beads of silver.

Table of Species.

1 (2) Legs mainly reddish.	1 <i>fenestralis</i> .
2 (1) Legs blackish, except on the tarsi.	2 <i>niger</i> .

1. **S. fenestralis** Linné. Legs mainly reddish. Frons dull. Eyes of the male touching.

A rather small oblong dull black fly, which often occurs on windows.

♂. Dull black, very densely and coarsely punctate, almost shagreened. Face scarcely existing because the large mouth-opening occupies almost all the space below the antennæ, but the narrow bare side-cheeks are dark greyish and slope down into the epistomal depression, which has its upper boundary distinctly above the antennæ so that the antennæ arise from within it; the eyes rapidly diverge from the top of the frons down to their lowest part where their interval is about twice as wide as at the antennæ; at the back of the mouth-opening is some thin grey pubescence, which extends along the narrow jowls and part way up the shallow back of the head but

* *Vide* Corrigenda.

dies away about half-way up; upon close examination a narrow bare polished eyemargin can be traced all down the sides of the face and round under the eyes to nearly half-way up the back of the head; frons forming a long narrow triangle above the antennæ and extending at its point more than half-way to the occiput, dull roughened black with sometimes a slight middle channel which may even shine in some lights, and bearing sparse short glistening white depressed pubescence; vertex practically bare and forming a rather shining black short triangle. Proboscis short, brownish; palpi fairly long, brown, and bearing slight brownish yellow hairs. Eyes bare,

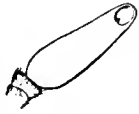


FIG. 330.—*Scenopinus fenestralis* ♂. × 40.

practically touching for about six or eight facets above the middle of the space between the antennæ and the occiput; facets on the larger upper part conspicuously and sharply larger than those on the rather smaller lower part, and the dividing line rather curved. Antennæ (fig. 330) dull brownish black, placed in a pit-like depression as mentioned above; basal joint very short; second joint also short and transverse, almost bare; third joint subulate, about four times as long as broad at base and slightly diminishing towards its tip but still ending very bluntly and with any trace of a terminal style or arista concealed in a sort of pit.

Thorax dull black, almost shagreened, and bearing exceedingly fine but fairly abundant scale-like greyish pubescence; humeri at the extreme hind angle, and the postalar calli more extensively, usually chestnut; pleuræ rather shining because their punctuation is less coarse but with their pubescence longer and more distinct, until the sternopleuræ become still more shining and their pale grey pubescence fairly obvious; pteropleuræ polished black and quite bare. Scutellum similar to the disc of the thorax and usually chestnut on the underside, but all these chestnut markings often very obscure.

Abdomen longer than the thorax, flattened on the disc, shining black especially about the sides; second to fourth segments about equal in width, the first being rather narrower, and the fifth and sixth diminishing in width towards the genitalia though more shelving over at the sides, the seventh short and drawn back dorsally about the middle to allow room for the swollen genitalia; second segment conspicuously long, being longer than any other two together, but the others except the shorter seventh segment nearly equal in length; extreme basal margins of the fourth and fifth segments (or the membrane between them) conspicuously pure white, but the white bands not quite extending to the sidemargins, and a similar band is just traceable on the sixth segment; pubescence composed of such minute black bristles as to be almost imperceptible, except for a slight pale pubescence about the basal corners and some pale hairs on the genitalia. Belly shining black with chestnut reflections, bearing minute black bristles which become increasingly crowded after the second segment; dorsal plate of the abdomen considerably overlapping the ventral plate. Genitalia large, with two large brownish black upper plates which push the sixth and seventh abdominal segments backwards and upwards, and these plates bear on their hind-margins a fringe of rather long pale yellow or brownish yellow hairs, while beneath them are two other large inflated plates which bear a few short pale hairs and which leave a small apical space between them from the lowest point of which a small yellowish pale haired process may protrude.

Legs shining chestnut, but the coxæ and trochanters with blackish reflections, and the femora occasionally, and the tibiæ (especially the hind pair) frequently, with extensive darkened or even blackish markings; tarsi also considerably obscured, but chestnut at the base for at least the basal half of the first joint of the front pair, the basal three-quarters of the first joint of the middle pair, and the three basal joints of the hind pair except at their tips; femora short and thick, front pair most so and hind pair least so; hind tibiæ slightly curved but not at all dilated anywhere. Pulvilli small, brownish orange; claws small, black. Pubescence slight and all pale, forming distinct fringes behind the anterior femora, and a delicate thin fringe of longish pale hairs behind the basal half or more of the hind tibiæ; no spurs present, but bristly almost spur-like hairs exist at the tip of all tibiæ.

Wings with a faint brownish tinge; veins brown and strongly marked,

though the lower one from the discal cell (=the upper branch of the postical fork) and the anal vein do not quite reach the wingmargin; costal vein finishing before the wing-tip and not continued as an ambient vein; upper branch of the cubital fork about two-thirds the length of the lower branch, and ending in the costa about half-way between the radial vein and the lower branch of the fork; subcostal vein stouter than the others and more surrounded with brown. Squamæ (alar) small, blackish grey, with a very short grey fringe; thoracal pair absent. Halteres with the large knob occasionally all white, but more commonly white with the upper part brown, or chestnut brown with the upper part blackish, or all dull orange or brown more or less darkened, but with the rather short stem always darkened.

- ♀. Very similar to the male, but the frons about one-fifth the width of the head; the frons has the narrow sidemargins shining and slightly curved so that it is slightly wider near the antennæ than about the middle, and it is dull black but roughened by coarse punctuation and striæ radiating from the lower ocellus, but sometimes when the punctuation is less dense it is rather shining, and usually bears a depressed middle line which is sometimes slightly shining on its middle part or even for its whole length, and this line may be widened about its middle part though not enough to form a large rounded depression, and the minute pubescence is pale; the eye-collar on the upper third of the back of the head is puffed out and shining black unless occasionally rendered dull by dense grey dust, and no tiny bristles occur down the postocular band; the raised collar is quite distinct from the hollowed-out back of the head, and diminishes downwards until about the middle where it amalgamates with the back of the head, but all the eyemargin round to the jowls still remains puffed out. Eyes with the facets all equal; in life clear brown with æneous reflections and a dark purple band about four facets wide across from almost the front margin just above the level of the base of the antennæ to almost the hindmargin. Antennæ as in the male.

Thorax as in the male, but with even shorter pubescence.

Abdomen flatter and without any white transverse bands; the six segments after the long second one almost equal in length and the third to the sixth with a transverse depression across the middle of each, which is also slightly visible on the sixth segment and on the second near the hindmargin; pubescence very short, but slightly longer and greyish towards the basal corners; the segments are almost parallel-sided until the base of the seventh. Ovipositor small but broad and projecting from the tip of the abdomen.

Legs similar to those of the male, but the fringe behind the anterior femora almost absent though the delicate ciliation behind the hind tibiæ is quite as strong. Pulvilli greyish yellow in life.

Wings with the radial vein sometimes distinctly not extending to the wingmargin, though in individual specimens it may do so in one wing but not in the other. Halteres very variable in colour, being sometimes all clear white, but often white on the underside of the knob or sometimes obscurely whitish for a moderate space on the underside and shining black on the upper side.

Length about 5 mm. ♂, 6 mm. ♀.

This species varies beyond what is mentioned in the above description in the amount of darkening on the legs, the hind tibiæ being often entirely blackish while the other tibiæ may be considerably obscured; large blackish longitudinal spaces also often occur on the femora, or the hind legs may be almost entirely blackish with only the knees rather broadly and the base of the tarsi dark orange; the wings and especially the veins vary towards being more blackish; in two large females in perfect condition taken at Crowborough on June 27, 1903, the rosette of striæ radiating outwards from the front ocellus is conspicuous. A peculiarity of the female lies in the frequency with which the tip of the wing is broken off,

and this happens so often that there must be some regular cause for it; can it be done in pairing? It may easily be distinguished from *S. niger* in the male sex by the touching eyes and simple hind tibiæ, while both sexes may be known by the extensively reddish or brownish legs. *S. glabrifrons*, which has been incorrectly recorded as British, has the eyes almost touching in the male, but has the frons brightly shining and very little (if at all) punctulate in either sex.

S. fenestralis is not uncommon on windows, especially in stables, mills, and such like localities. The larva was at one time supposed to feed on stable clothing and old carpets especially when thrown into a heap and neglected, whence the perfect insect obtained the name of "Carpet Fly." It is now however known to be predaceous and to feed on the larvæ of the Clothes Moth (*Tinea pellionella*) or of the *Pulicidæ* which are the real culprits, and consequently it is a benefactor instead of being injurious; two females occurred in my garden at the end of June, 1901, on *Asparagus*. I have numerous records from Cornwall to Bristol, Herefordshire, Suffolk, and Cambridgeshire, but at present I know of no trustworthy records further north, except that I know a species of *Scenopinus* occurs in Warwickshire; my dates extend from June 5 to August 11. The females are apparently much commoner than the males. It is recorded from all Europe and from North America.

Synonymy.—Although numerous names have been given to various varieties of this species I have nothing fresh to note, except to express a doubt as to the validity of some of the recently described species. I may however state that the specimens upon which I recorded *S. glabrifrons* Meig. as British were only specimens of *S. fenestralis* in which the frons was rather shining; at that time I had never seen the true *S. glabrifrons*, which seems to be confined to Southern Europe.

2. **S. niger** DeGeer. Legs blackish except on the tarsi. Frons rather shining. Eyes of the male widely separated. Hind tibiæ of the male very much dilated.

A rather small very black oblong fly.

- ♂. Frons at the vertex occupying nearly one-fifth the width of the head and gradually widening down to the antennæ where it is nearly one-third the width of the head, shining black, very little punctate but with a very large rather shallow almost circular depression below the middle which almost reaches to the sides, and sometimes with a narrow longitudinal middle furrow in addition; the sides of the depression are slightly roughened; pubescence only microscopical; when viewed from above a whitish band extends on each side of the antennæ down the eyemargin but is only caused by whitish dust reflections; jowls small, but bearing some dark pubescence; back of the head with a shining black raised eye-collar on the upper half which begins very thin about the middle but becomes considerably raised at the upper eye-angle; vertex obviously sunk forward between the eyes, and the ocellar space elevated. Eyes bare; facets all equal. Antennæ brown, practically bare; two basal joints short, about equal in length; third joint nearly three times as long as the two basal joints together and about three times its own breadth, slightly thickened about its middle.

Thorax black, rather shining, but roughly punctate striate. Pubescence ubiquitous but consisting of only exceedingly minute adherent yellowish bristles. Scutellum with more erect pubescence.

Abdomen shining brown or brownish black, with sparse and faint punctuation; the white transverse bands at the hindmargins of the fourth and fifth segments are conspicuous but narrow out before reaching the side-

margins, and a similar but narrower band occurs on the sixth segment and a less conspicuous whitish band on the third segment. Genitalia forming a knob which is less than half the width of the seventh abdominal segment; the pair of brown upper plates are much smaller than in *S. fenestralis* and have an inconspicuous brown fringe on their straight hindmargins; the two lower plates are large and almost overlap behind on the lower part, but leave above an almost quadrate open space which is microscopically fringed, and in the middle of which three tiny pale thread-like processes can sometimes be traced, and of them the two side processes are longer than the whitish middle one. Belly blackish.

Legs blackish, knees very faintly ferruginous, and all the tarsi reddish orange on the three basal joints except at their tips; front femora stout, and the hind femora flattened; hind tibiæ very much dilated and flattened, club-shaped. Pubescence very slight and inconspicuous, but a little pale pubescence occurs behind the anterior femora, and the hind tibiæ bear behind a sparse delicate fringe of longish pale hairs on rather more than the basal half.

Wings decidedly blackish brown; veins (except the subcostal) distinct though not coarse, but in other respects similar to those of *S. fenestralis*; upper branch of the cubital fork undulated, barely half as long as the straight lower branch, and ending long before mid-way between the radial vein and the lower branch. Squamæ (alar) blackish brown with a brownish black margin and with a slight pale fringe. Halteres blackish, but with the top of the knob dark brown.

- ♀. Very similar to the male. Frons shining black, sparsely punctate on the upper part (except at the sides) but not striate near the lower ocellus, and rather wrinkled transversely on the lower half; a large conspicuous rather shallow almost circular depression occurs about the middle; sides parallel on about the upper half but afterwards gradually widening down to the antennæ, though even there the frons is barely one and a half times as wide as at the vertex; a minute furrow runs down to the lower end of the depression, and a polished channelled eyemargin exists on the upper two-thirds of each side; collar at back of upper part of eyes rather narrow, fairly equal, greyish black.

Thorax black, but somewhat obscured by minute dark bristles and transverse striæ on all the disc except on the middle part; humeri not at all chestnut, and the postalar calli only on the front knob. Scutellum roughened.

Abdomen shining black, but not at all brilliant; hind angles of the basal segment with some rather long though inconspicuous greyish yellow pubescence, and the hinder half of the second segment with more extended though shorter more greyish pubescence; pubescence on the rest of the abdomen blackish grey, fairly abundant, and short, though longer and more conspicuous than in *S. fenestralis*.

Legs colored as in the male, or often with only just the base of the anterior tarsi and the three basal joints of the hind tarsi conspicuously brownish orange except at their tips; front femora only slightly thickened, and the posterior femora elongate but hardly thickened; hind tibiæ shorter than the femora, straight, and not at all dilated, but with the usual delicate sparse pale fringe behind; pubescence very slight, pale behind the middle femora. Pulvilli blackish; claws black.

Wings very nigrescent, especially on the front half; upper branch of the cubital fork usually rather undulating and ending in the costa about half-way between the radial vein and the lower branch. Squamæ (alar) small, dark greyish with a distinct dark margin and slight light grey fringe. Halteres blackish brown, with a shining blackish tip.

Length about $4\frac{1}{2}$ mm. ♂, 5 mm. ♀.

This species varies a little in the amount of reddish orange or reddish brown on the tarsi and knees, but never in a way at all approximating to *S. fenestralis*. A female taken by Dr D. Sharp in the New Forest in June, 1902, has the portion of the upper branch of the postical vein which

forms an apparent cross-vein obsolete on its middle in both wings. It is easily distinguished from any other species in the male by the wide frons and the dilated hind tibiæ; while the female may be known by its black legs (except on the tarsi) and by the shining frons which bears a large circular depression on its middle, as well as by its very nigrescent wings. *S. niger* is not a common species in Britain as far as my experience goes. My localities are only from Devonshire (Exeter), Hampshire (New Forest), Surrey (Greenings), Herefordshire (Stretton Grandison), and Elgin (Forres), but Mr Tuck has recorded it from Tostock in Suffolk in May, 1898, and Haliday from Holywood in Co. Down, while a note on *Scenopinus niger*? when occurring near Norwich in June was sent to me by Mr F. Jenkinson who wrote, "Two of them hovered in the sun, and *looked like beads of silver!*" "I could hardly believe I had got the right insect the first time, when we saw another and caught it; and again a black *Scenopinus*. It must be due to the white (china-like) bands which dwindle after death." Walker recorded it as "Generally distributed (E. I.)." My dates only extend from some time in June to July 3. It is recorded from Central and Northern Europe.

X. MYDAIDÆ.

Orthorrhaphous brachycerous almost eremochætous (excepting on legs) flies of gigantic to moderate size, distinguished by their peculiar venation and antennæ.

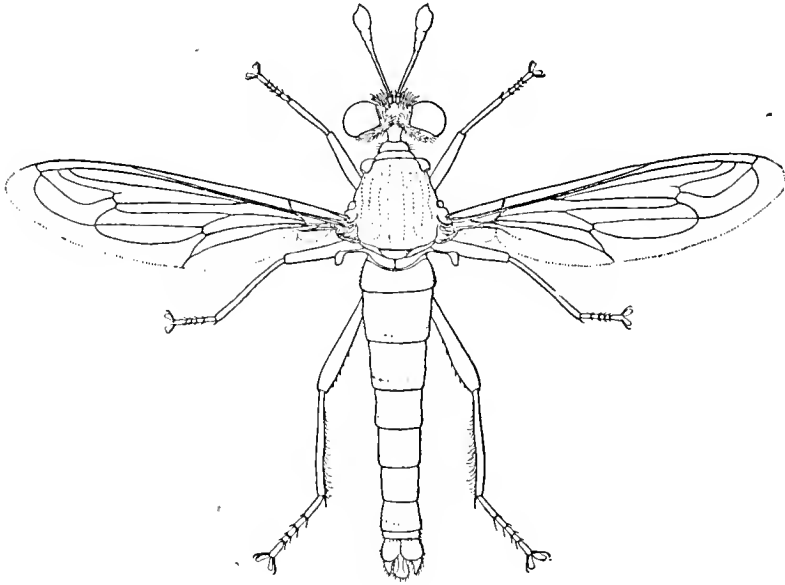


FIG. 331.—*Sylligomydas cinctus* ♂. × 3.

Head broad and short, pubescent but absolutely without bristles, and well separated from the thorax by a narrow neck. Face pubescent, but hardly with a face-beard. Frons and vertex sunk between the eyes; ocelli indistinct, unless on an elevation on the middle of the frons far away from the vertex. Proboscis usually rather thick and with large sucker-flaps, but ranging to very long and thin with scarcely any sucker-flaps; palpi usually apparently absent, but sometimes long, thin, and one-jointed. Eyes bare, widely separated in both sexes, and without any enlarged facets in either sex. Antennæ porrect, approximated or in fact almost touching at the base; two basal joints normal, the first longer than the second and bearing obvious bristles or hairs; third joint usually elongate and bearing at its end a very large and usually long apparently jointed characteristic clubbed style, but sometimes forming a large hatchet-shaped joint which bears no style (*Dolichogaster*).

Thorax rather quadrangular with the humeri strongly prominent, absolutely without bristles, though with coarse pubescence on the sides of the disc or occasionally with moderate pubescence on the disc; pleuræ sometimes with rather abundant pubescence on the pteropleuræ, or sometimes with a tuft of hairs on the metapleuræ. Scutellum small and unarmed, forming a narrow parallelogram which does not project or overshadow the very large metanotum.

Abdomen elongate with seven segments besides the genitalia, and absolutely without bristles or long bristly hairs; basal segment rather broad and often with a projecting hump at each front corner. Genitalia of the male not large nor much produced, and with small foliaceous lamellæ which are often hidden; ovipositor produced but never elongate, and in all European species with a terminal circle of spines.

Legs nearly always strong and stout but sometimes the anterior pairs only moderately so; hind femora usually thickened but occasionally almost slender, and almost always distinctly serrate or spinose beneath; tibiæ often bearing a row of small spines (not spicules as in many TROMOPTERA nor long strong bristles as in ENERGOPODA) either on the hind or middle tibiæ only, or on all the tibiæ, and apical spines sometimes occur on all the tibiæ, while the hind pair usually have a

strong apical spur or two or three apical bristly spines; tarsi with plantar bristles only. Pulvilli two, moderately large and distinct, but the empodium absent and apparently without even any bristle in its place; claws long.

Wings with a peculiar complex venation, which is distinct from that of any other family in the Diptera though somewhat approached by the distinctly chaetophorous *Apioceridae* and by some *Asilinae* near *Erax*, while some of its less obvious peculiarities occur in the *Scenopinidae*. Subcostal vein extremely long, with the radial vein and the upper branch of the cubital fork always curving up into it before its tip (fig. 331); the lower branch of the cubital fork also curving up almost parallel with the upper branch, and often also ending in the subcostal vein, while even the upper veinlet from the discal cell (and sometimes two veinlets, as in fig. 332), after leaving the discal cell curves up in a similar way (almost parallel with the wingmargin) and sometimes ends in the subcostal vein; the upper branch of the postical vein also curves up almost parallel with (but well away from) the wingmargin, so that altogether the curving up of the veins and their running almost parallel with the hind and apical margins of the wing, are most striking; in addition the peculiarity of the two branches of the cubital fork (and sometimes also the veinlets from the discal cell) reaching the wingmargin before the wing-tip is almost unparalleled; præfurca *exceedingly* short; discal cell always present, but remarkably long and narrow and often of trapezoid or most irregular shape, in no way bounded on the lower margin by any portion of the postical vein, and usually appearing to emit one veinlet only which curves up towards (and sometimes runs into) the subcostal vein, and when the (normally) second veinlet is distinct it curves up parallel

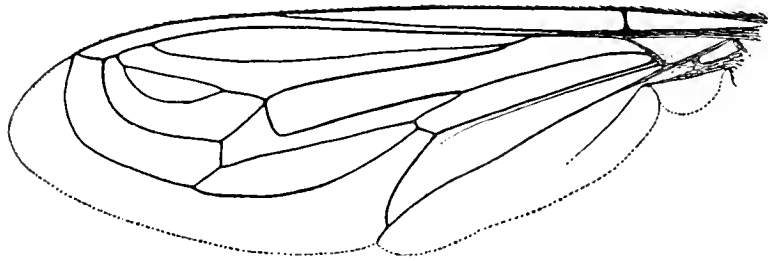


FIG. 332.—*Mitrodectus dentitarsis* ♂. × 8.

with the first but appears to arise from the closed fourth posterior cell, while the (normally) third veinlet bends sharply downwards (unless apparently altogether absent) and closes the (normally) fourth posterior cell (fig. 334); upper branch of the postical fork often running into the discal cell at the end of the latter and never running clear to the wingmargin, but always causing a long closed (normally fourth) posterior cell to lie under and parallel with the discal cell; basal cells long, the upper one being most unusually long through the discal cross-vein being placed near the tip of the discal cell (as in the *Nemestrinidae*) and near the end of the stem of the cubital vein, but sometimes the discal cross-vein ties the longitudinal veins so tightly together that the upper margin of the discal cell is hitched up until it touches the cubital vein at the place where the latter is pulled down; ambient vein complete though sometimes very faint; lower cross-vein always present though short and placed close to the base of the upper branch of the postical fork; posterior cells three (the normal second, third, and fifth being united as in fig. 335), or four (the normal second and third being united as in fig. 334 or the third and fifth as in fig. 332); anal cell closed before the wingmargin; wing-membrane ribbed or rumpled, bare; alulae often large, and overlapping the scutellum when the wings are folded. Squamæ (alar) present, but small and usually without any fringe, or sometimes (in at least *Mydas*) rather large and bearing a stiff very coarse marginal fringe; thoracal pair absent.

This family has long been well recognised through its peculiar venation and antennæ, though for a long time the distinctly chaetophorous *Apiocerinae* were incorrectly associated with it, but it is now almost certain that these latter are more closely related to the *Asilinae*. Brauer was of opinion that

the *Scenopinidæ* were allied to the *Mydaidæ*, because in these two families both branches of the cubital fork and the discal vein end before the wing-tip, and he considered that the antennæ had some affinity; in fact he said that the *Mydaidæ* with short antennæ appear to be the most undoubted stepping-stone to *Scenopinus*. In nearly all the characteristics of the *Mydaidæ* one can trace their intermediate position between the TROMOPTERA and the ENERGPODA; the very long subcostal vein shows close relationship to the *Asilidæ*, the tendency to bristles beneath the hind femora and to a small extent on the tibiæ affords a connecting link between the spicules of the TROMOPTERA and the macrochætæ of the *Asilidæ*, the long thin porrect proboscis of *Triclonus* resembles that of many *Bombylidæ*, while the shorter stouter proboscis of *Mydas* leads to the *Asilidæ*, the eremochætous nature of the head and thorax is shared by some of the *Asilidæ*, even though the latter are considered to be chætophorous, and the genitalia of the male are more distinct than in the TROMOPTERA but less conspicuous than in most *Asilidæ*, while the ovipositor in the female of many species has the peculiar circle of short thick spines which occurs in many *Therevidæ* and *Asilidæ*. Taken altogether the sequence of families is almost certainly—*Bombylidæ*, *Therevidæ*, *Scenopinidæ*, *Mydaidæ*, *Apioceridæ*, *Asilidæ*.

The *Mydaidæ* are said to catch insects with their front legs, but I am unable to trace any positive account of their being predaceous; Colonel Yerbury's experience of a large Ceylonese species and a small Spanish species has caused his opinion to be that they are not predaceous; it may be that the formidable appearance of the large species has given them this reputation; Olivier however stated that an Egyptian species was very predaceous on other insects (*Hymenoptera*) which it caught when flying. About a hundred and forty species have been described, which mainly occur in North, Central, and South America, and in Australia, while about a dozen are recorded from the Palæarctic region, and of these only one or two are known with certainty to occur in the extreme south of Europe. Some of the species which occur in Central and South America are the most gigantic forms that occur in the Diptera. One species is said to be parasitic in the larval stage on *Prionidæ*.

In the characters given for the *Mydaidæ* the genus *Megascelus* of Philippi from Chili has been excepted, because it possesses so many characters differing from the rest of the *Mydaidæ* that Gerstaecker refused to admit it into the family, but it cannot be included elsewhere. It has the head much less transverse; face very short, bare, and retreating; frons and vertex not at all sunk; antennæ with the two basal joints very short, and the third almost circular and without any style but rather produced to where a style would naturally occur (not very unlike *Dolichogaster*); pleuræ with but little pubescence except for a large rather dense long tuft on the metapleuræ; abdomen without any humps at the basal corners; venation (fig. 333) quite distinct in the position of the discal cross-vein; both branches of the cubital fork curving up and joining the

subcostal vein; upper veinlet from the discal cell quickly joining the lower branch of the cubital fork, and the second veinlet joining the same branch just before that joins the subcostal; five posterior cells, the (normally) fourth posterior cell with a blunt end, and the end of each branch of the postical fork rather recurrent; discal cell conspicuously small, pentagonal (the end being blunt); discal cross-vein normal (not placed as in true *Mydaidæ*) and almost upright, only just beyond the middle of the discal cell; small cross-vein distinct, just before the

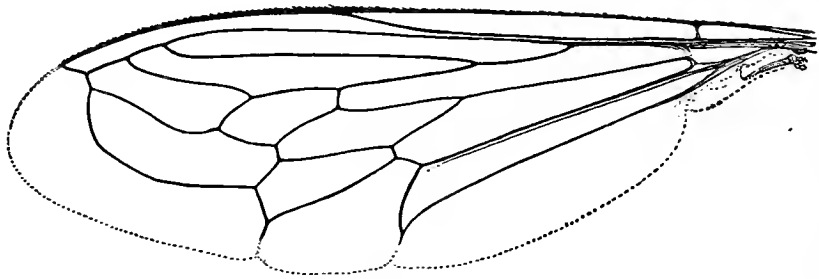
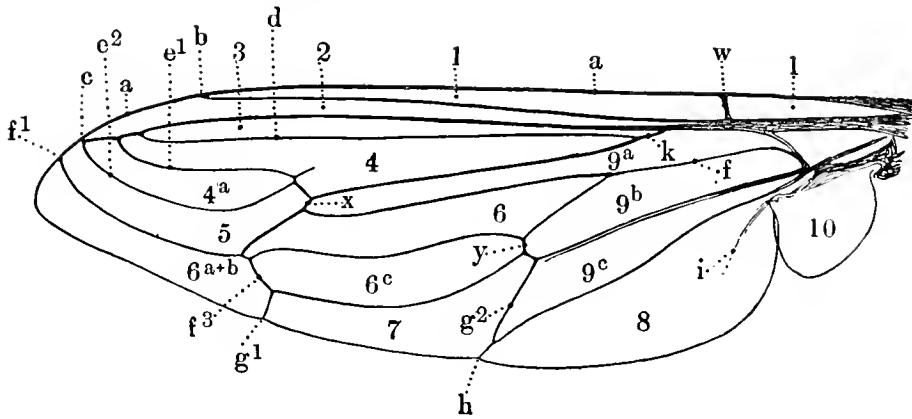


FIG. 333.—*Megascelus nigricornis* ♀. × 14.

middle of the discal cell; præfurca comparatively long; ambient vein absent or very faint after the end of the subcostal vein; alulæ small and narrow. The genus essentially belongs to the DERMATINA and may help to connect the *Mydaidæ* with the *Scenopinidæ*, as it approaches the latter family in size and figure as well as in the antennæ, though it seems to indicate even more affinity to the *Apioceridæ* in the face, antennæ, venation, etc. At present I can only regard it as an aberrant genus of the *Mydaidæ*, to which it is somewhat connected by *Dolichogaster*.

Synonymy.—I am very sorry to add to the controversy over the spelling of the name *Mydas*, but I give my reasons for retaining that word; I am fully conscious of the temptation to consider it a misprint for *Midas*, as the long antennæ give the notion of “asses ears.” Osten Sacken (Berl. ent. Zeitschr., 1895, 345) very carefully considered the orthography and ultimately decided in favour of *Midas*, but I cannot help thinking that his argument was weak when he said, “To justify the spelling *Mydas* Dr Gerstaecker should have proved that it was introduced by Fabricius with a *deliberate intention*, and that it was not a mere *lapsus* ;” it seems to me that the proof should be the other way about, and that it should be proved that *Mydas* was a *lapsus* and not a deliberate intention. I also notice that Fabricius continued to use the spelling *Mydas* in 1805, even though Latreille had altered it to *Midas* in 1796, and as Latreille in 1802 and 1809 reverted to *Mydas* it seems to me that Fabricius refused to be converted by Latreille, and that on the other hand Latreille was converted by Fabricius. I agree with Osten Sacken that “it seems evident that the first impression of Latreille was that *Mydas* was a *lapsus calami* on the part of Fabricius,” but it seems to me that he was ultimately convinced that it was not a *lapsus*. I note also that Rye in Zool. Record, 1877, Ins., 193, said, “The reading *Midaidæ* cannot be supported; *Midas* nom. propr., gives “in Latin gen. *Midæ*. *Midasidæ*, though irregular, preserves identity.” I am unable to dogmatise, but I think if a genitive could be formed for *Mydas* it would be *Mydais* and consequently I use the term *Mydaidæ*. It is also peculiar that Osten Sacken in 1896 regularly used the spelling *Mydaidæ*, though it may be (as he himself considers others have done) through inadvertence. I conclude that the spelling *Mydiadæ* used by Hunter (Trans. Amer. Ent. Soc., xxvii., 121, and in “Contents” of Part) must be a misprint, as he uses *Mydaidæ* on page 153; I am also absolutely unable to accept Bezzi’s spelling “*Mydidæ*” (Kat. Palæarct. Dipt., ii., 99) which he himself corrected to *Mydaidæ*. I do not use the spelling *Mydas* simply because it has priority, as I consider orthography stands before priority.

Type of venation of MYDAIDÆ.

FIG. 334.—*Mydas vittatus* ♂.

Longitudinal (or long) veins.

- a* Costa (or costal vein).
b Mediastinal (or auxiliary) vein.
c Subcostal (or 1st longitudinal) vein.
d Radial (or 2nd longitudinal) vein, always ending in the subcostal vein.
e Cubital (or 3rd longitudinal) vein, always with a long fork of which the upper or both branches end in the subcostal vein.
 *e*¹ Upper branch } of the cubital fork.
 *e*² Lower branch }
f Discal (or 4th longitudinal) vein.
 *f*¹ Upper veinlet from the discal cell, sometimes ending in the subcostal vein.
 *f*² Second veinlet from the discal cell, (absent in *Mydas*, but present in *Mitrodetus* (fig. 332), etc., as a vein curved up from the lower end of *f*³ and running parallel with *f*¹ until it ends in the costa close to the end of the subcostal vein).
 *f*³ Third veinlet from the discal cell, bent sharply back in *Mydas* and closing the fourth posterior cell, but sometimes apparently absent through the upper branch of the postical fork curving up to the end of the discal cell (fig. 335).
g Postical (or 5th longitudinal) vein.
 *g*¹ Upper branch of the postical fork, sometimes ending in *f*³.
 *g*² Lower branch of the postical fork.
h Anal (or 6th longitudinal) vein.
i Axillary vein.
k Præfurca = the common stem of the radial and cubital veins.
 Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (or transverse) veins.

- w* Humeral cross-vein.
x Discal (or middle) cross-vein.
y Lower (or small) cross-vein.
 Anal cross-vein = *g*².

Cells.

- 1 Costal (or mediastinal) cell.
 2 Subcostal cell.
 3 Marginal cell.
 4 Submarginal cell.
 4^a Second submarginal (or cubital) cell (or cubital fork-cell).
 5 First posterior (or subapical) cell.
 6 Discal cell.
 6^a Second posterior cell.

- 6^b Third posterior cell; united with 6^a in fig. 334, and with 7 in fig. 332, but present in fig. 333.
 6^c Fourth posterior cell, always closed in *Mydaidæ*.
 7 Postical (or 5th posterior) cell (or postical fork-cell).
 8 Axillary cell.
 9^a Upper (or 1st) basal cell.
 9^b Second (or middle) basal cell.
 9^c Anal (or 3rd basal) cell.
 10 Alula.

Notes on the Venation of the MYDAIDÆ.

The venation is specially notable in (1) the very long mediastinal and subcostal veins, (2) the remarkable curving up of the cubital and discal veins so that they end in the subcostal vein or at any rate in the costal vein before the tip of the wing, (3) the position of the discal cross-vein which is similar to that in the *Nemestrinidæ*, and (4) the very short præfurca.

(1) THE MEDIASTINAL VEIN is longer than in any DIPTERA except the *Nemestrinidæ*, and the length of THE SUBCOSTAL VEIN is only approached by the *Nemestrinidæ*, *Apioceridæ*, and some *Asilidæ*.

(2) The curving up of the two branches of THE CUBITAL FORK and the end portion of the DISCAL VEIN (whether single or duplicate) and their ending in the long subcostal vein are not indicated in any way in the *Nemestrinidæ*, but are represented in the *Apioceridæ* and to a certain extent in the *Asilidæ*, though in neither of those families to such a remarkable extent.

(3) The position of THE DISCAL CROSS-VEIN is rather similar (except in *Megascelus*) to that in the *Nemestrinidæ* (conf. also *Cyrtidæ*), but altogether distinct from that in the *Apioceridæ* and *Asilidæ*, its position near the end of the discal cell in conjunction with the tying of the veins near the wing-tip to the subcostal vein evidently aims at strengthening the wing power in a similar manner to that in the *Nemestrinidæ*, but it is almost certain that the similarities which occur in the venation of the two families do not indicate the slightest relationship, and are merely the development of the venation in a somewhat similar manner in order to obtain a similar result. Just as the tying-together of the long-veins in the *Nemestrinidæ* through the cross-veins has caused the pulling of the long-veins out of their normally straight course, so in some genera of *Mydaidæ* (*Triclonus*, etc.) the discal cross-vein has pulled the discal vein quite out of its normal course.

(4) THE PRÆFURCA is much shorter (except in the abnormal genus *Megascelus*) than in any family of the BRACHYCERA except the *Stratiomyidæ*, but is very differently placed from where it is in that family as it commences almost opposite the middle of the second basal cell. The continuous line of veins in the *Nemestrinidæ* which is known as the "diagonal vein" is somewhat indicated in the *Mydaidæ*, but only extends from the base of the præfurca to the end of the discal cell, because in the *Mydaidæ* the lower veinlet from the discal cell (if existing at all) is recurrent.

There are numerous other details in the venation of the *Mydaidæ* which are remarkable, but perhaps the strongest one not already mentioned is in the discal vein ending (with the exception of the lowest veinlet from the discal cell) distinctly before the wing-tip; in the *Apioceridæ* the second veinlet from the discal cell is always present and ends considerably below the wing-tip. The only other family in which the discal vein ends before the wing-tip is the *Scenopinidæ*, and consequently, although the venation of the two families appears at first sight to be completely distinct, they have one important feature in common. The peculiar shape of the discal cell and the closed (normal) fourth posterior cell are noteworthy, and the anal cell is always closed well before the wingmargin.

Table of the Palearctic Genera of MYDAIDÆ.

- 1 (2) Third antennal joint remarkably large and "monstrous."
 PERISSOCERUS.
 2 (1) Third antennal joint with an elongate narrow base and a drooping club.

- 3 (8) Both branches of the cubital fork ending in the subcostal vein.
 4 (5) Upper branch of the discal vein ending in the subcostal vein
 (fig. 335). SYLLEGOMYDAS.
 Proboscis short.

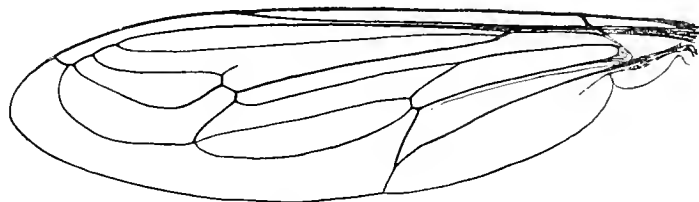


FIG. 335.—*Sylllegomydas cinctus*. × 6.

- 5 (4) Upper branch of the discal vein ending in the costal vein.
 6 (7) Proboscis long. LEPTOMYDAS.
 7 (6) Proboscis short. EREMOMYDAS.
 8 (3) Lower branch of the cubital fork ending in the costal vein.
 RHOPALIA.

I know nothing about the value of these genera, as I have not even seen the description of *Eremomydas* nor have I seen a specimen of *Perisocerus*. I do not believe that the presence of a recurrent veinlet near the base of the upper branch of the cubital fork is of generic value, although it has been used by Gerstaecker to separate *Leptomydas* from *Rhopalia*.

Only one species is satisfactorily recorded and described from Europe (*Leptomydas lusitanicus* from Portugal), but A. Costa described *M. sardous* from Sardinia and I possess a specimen of *Leptomydas* from Corsica which has a few distinct spines under the hind femora; Dufour described *L. lusitanicus* as occurring in Corsica, but stated that that species has no spines beneath the hind femora. *M. rufipes* Westwood is a doubtful species which was recorded with doubt from Sicily.

DIPTERA BRACHYCERA

ENERGOPODA

Two pad-like pulvilli only. Strong bristles occurring on the thorax and legs (unless replaced by dense coarse pubescence). Venation including a long cubital fork, five posterior cells, and a long anal cell. Pedestrian flies of strongly predaceous habits (in at least the *Asilidæ*).

Head always dichoptic, more or less excavated about the vertex so as to give the eyes a bulging appearance. Face in the *Asilidæ* with a face- or mouth-beard, which however is not present in the *Apioceridæ*. Collar usually well developed and bearing strong bristles. Proboscis prominent and horny in the *Asilidæ*, or with fleshy sucker-flaps in the *Apioceridæ*, but never long and porrect. Palpi usually rather long and thin in the *Asilidæ*, but conspicuous and spatulate in the *Apioceridæ*. Eyes always bare, with the facets sometimes considerably enlarged on the front part in both sexes. Antennæ composed of the usual three joints, the third one being never at all annulated but usually with a terminal (never dorsal) style or arista.

Thorax ordinarily with strong chaetotactic bristles besides bristly pubescence, amongst which can be detected the præsutural, postalar, sometimes supra-alar and dorso-central bristles, while the pleuræ frequently have bristles or bristly hairs on the metapleuræ and hypopleuræ, and these latter often form fans, but sometimes the bristles are reduced to a single præsutural and a single supra-alar (*Leptogaster*) or in other cases dense coarse pubescence may obliterate all the bristles (*Laphria*, etc.). Scutellum ordinarily with long strong marginal bristles but otherwise unarmed; metanotum to a large extent under the scutellum.

Abdomen usually rather elongate, often bearing bristles in a row just before the hindmargins of the segments. Genitalia of the male and the ovipositor of the female almost always large and conspicuous, and the latter often with a terminal circle of stout blunt spines.

Legs strong, essentially adapted in the *Asilidæ* for pouncing on and seizing other insects and consequently provided with strong bristles on the tibiæ and tarsi, and with a circle of bristles at the tip of all the tibiæ and of each of the four basal joints of the tarsi, but any bristles on the

femora and tibiæ are sometimes absorbed in dense coarse pubescence. Pulvilli two, the empodium being represented by a bristle; claws usually powerful and strongly curved.

Wings with the full venation of the BRACHYCERA, there being almost invariably five posterior cells, a long cubital fork, a long contracted or closed anal cell, and a very long subcostal vein which usually receives the radial vein before its tip; mediastinal vein unusually long; ambient vein almost always complete; small cross-vein usually present but occasionally just absent; præfurca fairly long. Wing-membrane ribbed or wrinkled in *Asilidæ* but smooth in *Apioceridæ*. Alar squamæ moderately well developed though not large, and usually bearing a soft marginal fringe down to the angle; thoracal squamæ entirely absent, and the frenum bare.

Larvæ in some cases predaceous upon other larvæ and in other cases occurring in earth and then probably carnivorous. Perfect insects never hoverers or even dancers (unless in courtship) and never bloodsuckers, but in the *Asilidæ* always predatory upon other insects. The *Apioceridæ* are said to be not predaceous.

The ENERGOPODA must be allied to the *Therevidæ*, the *Mydaidæ*, and the *Empidæ*, but are distinguished from the two former by the strong chætotaxy and from the latter by the more elaborate venation. Their distinctness is not likely to cause the British collector any trouble.

ARRANGEMENT.

The natural sequence must go from the *Therevidæ* and *Mydaidæ* through the *Apioceridæ* to the *Asilidæ*, and in the *Asilidæ* the *Asilinæ* belonging to the genera about *Erax* must be the most nearly allied to the *Apioceridæ*; consequently a reversal of the usual arrangement of the subfamilies becomes necessary, and this seems more natural because at the other end of the family the *Dasypogoninæ* and *Leptogastrinæ* bear considerable affinity to the *Empidæ* (especially *Hybotinæ*); the *Dasypogoninæ* through their usual absence of pubescence and the reduction of their chætotaxy and the similarity of build between such genera as *Holopogon* and *Hybos*; and the *Leptogastrinæ* through the absence of any hind angle to the wing.

I have restricted Osten Sacken's conception of the ENERGOPODA to a very much smaller limit than he proposed, because I consider that the MICROPHONA form an eminently natural group which is abundantly distinct from the ENERGOPODA.

XI. APIOCERIDÆ.

Orthorrhaphous brachycerous chætophorous flies of rather large size.

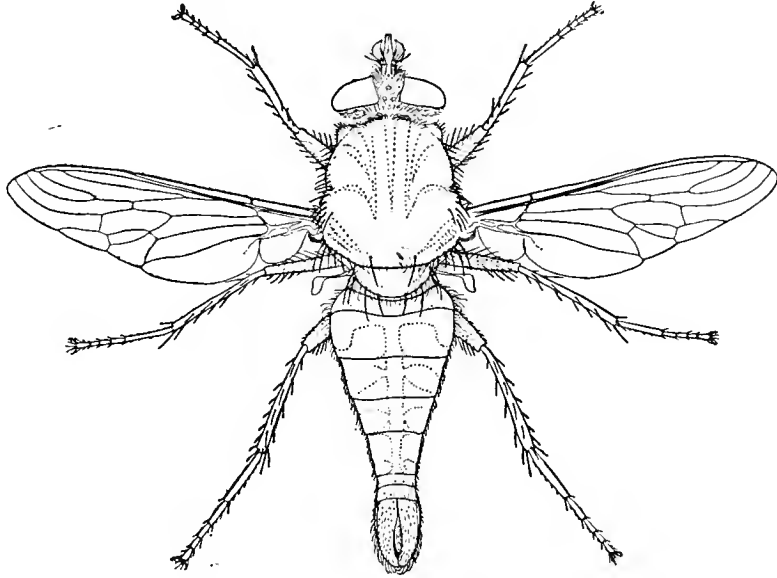


FIG. 336.—*Apiocera macrens* ♂. $\times 2\frac{1}{2}$.

Face very short, and without any face-beard. Palpi one or two-jointed; end joint large and spatulate. Antennæ with a solid oval third joint which bears a short stout terminal style.

Thorax distinctly chætophorous. Scutellum large, concealing the metanotum.

Abdomen (excluding the genitalia) short and conical.

Wings with a peculiar venation suggestive of the *Mydaidæ*.

Head, without bristles except for numerous strong occipital ones, widely transverse when seen from above but less so when seen from in front, always dichoptic but with the eyes of the male rather closer together than those of the female. Face very short and without any trace of a face- or mouth-beard; back of the head rather hollowed out behind the upper part of the eyes; vertex but little excavated between the eyes; ocelli three, wide apart, the front one being in front of the tubercle; collar very short, but bearing numerous strong bristles. Proboscis sometimes rather long and porrect, with fleshy sucker-flaps; palpi one- or two-jointed, the end joint being large, broadly spatulate, and rather sparsely pubescent. Eyes bare, scarcely bulging, flattened anteriorly, but with the anterior facets not enlarged, more approximated in the male than in the female. Antennæ short and stout, placed below the middle of the head; basal joints bearing rather strong bristles; third joint oval, and ending in a very short stout jointed style.

Thorax bearing strong bristles at the humeri, sides of the disc (including *interalia* præsutural, supra-alar, postalar, præscutellar, and sometimes one or two on the anterior subalar callus), and on the margin of the scutellum; pleuræ without bristles, even as a metapleural or hypopleural tuft or fan, but with short soft pubescence, the prothorax however usually with a few strong bristles. Scutellum large and concealing the metanotum.

Abdomen (without the genitalia) short and conical, especially after the second segment, the two last segments being narrowly cylindrical. Genitalia of the male very large, similar to those of some *Asilinae* (especially *Erax*); ovipositor short, and provided with a circlet of short blunt spines.

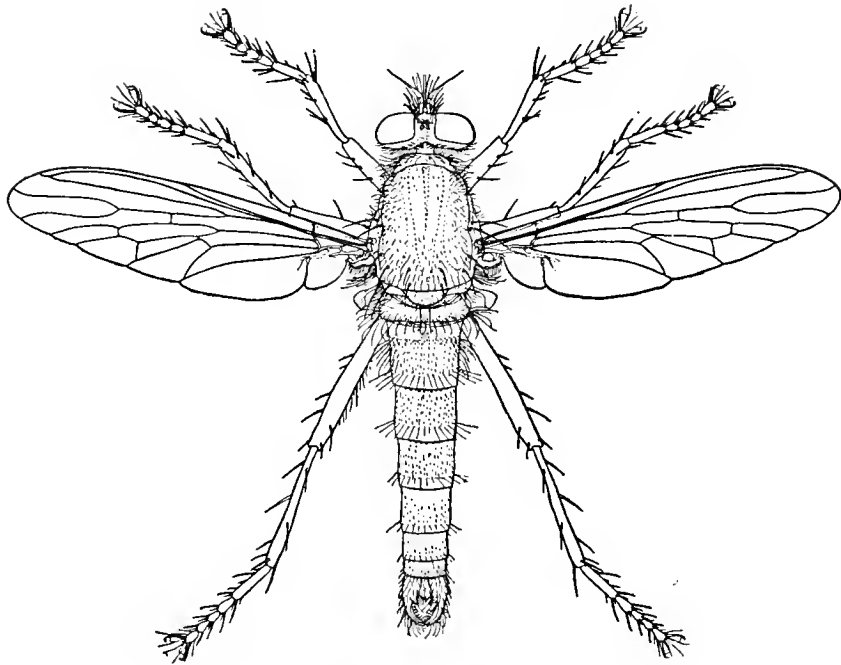
Legs not strong, but provided with numerous bristles on the tibiæ and usually on the femora though sometimes only sparsely on the anterior femora; tibiæ with long apical spurs, and the four basal tarsal joints bearing terminal circlets of bristles, but the tarsi altogether not so stout nor so much armed as in the *Asilidæ*. Pulvilli two, well developed; empodium absent or only represented by a bristle; claws fairly long and strongly curved.

Wings with a venation rather suggestive of the *Mydaidæ*, but very distinct in the position of the discal cross-vein and in the shape of the discal and fourth posterior cells; mediastinal vein very long; subcostal vein also very long, and receiving the radial and (usually) the upper branch of the cubital fork before its tip; upper branch of the discal vein (=upper veinlet from the discal cell) curved up parallel to the branches of the cubital fork, and ending a little before the wing-tip; præfurca moderately long; discal cross-vein almost upright and placed near the middle of the discal cell; discal cell almost pentagonal because the end is blunt; fourth posterior cell bluntly closed and rather small; basal cells all large and long, fully half the length of the wing; posterior cells distinctly five; ambient vein complete. Wing-membrane smooth and practically bare. Alulæ very much developed. Squamæ (alar) long but narrow, and bearing a long dense fringe all along the margin; thoracal squamæ absent. Halteres comparatively small and inconspicuous.

Rather large, elongate, shortly but rather densely though inconspicuously pilose flies of *Thereva*-like appearance or still more resembling some species of *Erax*, but easily distinguished by the peculiar *Mydas*-like venation and by the strong macrochætæ on the sides of the thorax. The family has had a very chequered career, the species having been associated with the *Mydaidæ* and *Nemestrinidæ* through their venation, with the *Therevidæ* through their general appearance, and with the *Asilidæ*; Osten Sacken at one time considered them to be true *Asilinæ* allied to the genus *Erax*, but subsequently considered them entitled to subfamily rank next to the *Asilinæ*; Williston on the other hand has contended strongly that they are distinct from any other family, and I agree with him; they are certainly quite distinct from the *Mydaidæ* and have no relationship whatever to the *Nemestrinidæ*. The long subcostal vein distinguishes them from the *Therevidæ*; the strong bristles on the sides of the thorax distinguish them from the *Mydaidæ*; while the short beardless face, the only slightly excavated vertex, the spatulate palpi, and the short collar distinguish them from the *Asilidæ*.

The *Apioceridæ* are very few in number, only about twelve species having been described; they are mainly recorded from America and Australia, but a species has recently been described from South Africa and a male of a small species in Bigot's collection was labelled "Ceylon"; it is not at all probable that any will occur in the Palearctic region. The perfect insects are flower lovers and are not predaceous; according to Williston the mouth-parts show a much closer relationship to the *Mydaidæ* and *Therevidæ* than to the *Asilidæ*.

XII. ASILIDÆ

FIG. 337.—*Philonicus albiceps* ♂. × 3.

Orthorrhaphous brachycerous chaetophorous "Robber-Flies" of very large to moderately small size. Habits pedestrian and predaceous, and consequently the powerful legs usually provided with long strong bristles. Eyes bulging and widely separated in both sexes. Third antennal joint simple. Venation rather elaborate.

Head broad but short, well separated from the thorax; frons at the vertex more or less deeply sunk between the bulging eyes; face usually produced into a facial knob or with a moderately produced upper mouthmargin, and bearing a conspicuous bristly or coarse-haired face- or mouth-beard or with extensive soft pubescence; cephalic bristles as a rule indistinct, being usually when present mixed up with adjacent hairs, but sometimes a pair of ocellar bristles and another pair rather behind the first pair can be differentiated; a row of occipito-orbital bristles or bristly hairs (forming the "festoon") occurs on the upper part of the postocular region, and according to Osten Sacken these bristles are sometimes plumose; ocelli three, usually on a raised tubercle. Proboscis strong and shortly porrected either horizontally or sloping (rarely perpendicular), but not in any way resembling that of the *Bombyliidae*; sucker-flaps not fleshy. Palpi composed of one or two joints. Eyes bulging from the sunk vertex, always bare, widely and almost equally separated in both sexes, and often with the front facets enlarged. Antennæ porrect, approximated or well separated at the base, three-jointed, the third joint usually more or less elongate but never annulated, and usually (but not in the *Laphrinae*) provided with a terminal (never dorsal) sometimes jointed style or arista.

Thorax narrowed in front, and leaving the head apparently isolated because the prothorax (including the neck) is long, always bearing strong bristles (macrochaetæ) or dense coarse-haired pubescence intermixed in which traces of macrochaetæ may almost always be detected. In the simplest form of bristling (*Leptogaster*) only one conspicuous praesutural bristle and one supra-alar occur (though the latter is placed so far out on the disc that it may be mistaken for an intra-alar bristle); but in the next development of bristles there is an increase in the numbers of the praesutural and supra-alar bristles, which very soon leads on to the presence of postalar, dorso-

central, and marginal scutellar bristles, while a continuation of the supra-alar bristles out on to the disc appears to sometimes show several intra-alar (*Asilus*); the dorso-central bristles form two rows only and are most developed between the suture and the hindmargin, but sometimes dwindle in strength towards the hindmargin and usually extend forwards until about half-way between the suture and the foremargin. Pubescence of the thorax, other than the macrochætæ, often very short but not unfrequently gradually developed into long dense humble-bee-like clothing (*Laphria*, etc.) or into short stubby bristles which extend over most of the disc and usually become longer towards the hindmargin, and in some cases this bristly pubescence becomes longer and may extend along at least the middle stripe right up to the front (*Dysmachus*, *Lophonotus*, etc.) with sometimes a mane-like appearance. Pleuræ never quite bare, though sometimes with only just traces of the metapleural fan but more commonly with slight pubescence on various parts and with the metapleural and hypopleural fans distinct and composed of long more or less bristly hairs or even decided bristles (especially in the *Asilinae*), or in other species the pleuræ may bear dense long pubescence in which all bristles are lost (especially in the *Laphrinae*), and occasionally the metapleuræ and hypopleuræ are quite bare (*Stenopogon*). Scutellum ranging from being quite bare (*Leptogaster*) to bearing slight or even dense pubescence without marginal bristles, or with slight short pubescence on the disc and several long strong upturned marginal bristles; metanotum rather large but considerably overhung by the scutellum when the latter is large.

Abdomen usually elongate, composed (in most species) of eight segments irrespective of the genitalia, but the eighth segment sometimes entirely or partially concealed (at least dorsally) in the male and commonly forming part of the ovipositor in the female. Genitalia usually prominent and conspicuous in both sexes, and in some species a circlet of bristles occurs at the end of the ovipositor similar to that in the *Therevidæ*, etc.

Legs powerful and rather long, but rarely very much elongated, often hairy, and often beset with thorn-like bristles; tibiae with a terminal circlet of spines, and frequently (in the *Dasyopogoninae*) with a curious strong curved thorn placed antero-ventrally and curving underneath the end of the front tibiae; tarsi usually broad and powerful, also armed with a terminal circlet of spines at the tip of each of the four basal joints, and almost always with one posterior bristle near the base of the basal joint of the front tarsi, one anterior and one posterior one near the base of the middle tarsi, and one similar anterior one near the base of the hind tarsi, these four bristles being probably brought together when grasping prey. Pulvilli two, with a thin bristle-like empodium between them (fig. 338), but exceptionally (*Leptogaster*, etc.) the pulvilli entirely absent or only partially developed; claws usually powerful and strongly curved.

Wings usually rather long and narrow, when at rest lying flat and overlapping on the abdomen. Venation always conforming to one type in which but little variation occurs; veins never pubescent nor bristly; subcostal vein very long and in the *Asilinae* and *Laphrinae* receiving the radial vein before its tip, but in the *Dasyopogoninae* not quite so long though still longer than in any other family except the *Apioceridæ* and *Mydaiidæ*; præfurca rather unusually long, starting before the middle of the upper basal cell and far before the base of the discal cell; cubital vein with a long usually rather bell-mouthed fork which usually includes the wing-tip, but sometimes the lower branch of the fork curves up enough to end at or before the wing-tip (fig. 349) and sometimes the upper branch bends down to or below the wing-tip while occasionally the lower branch bends down enough to join the upper veinlet from the discal cell and thereby forms a closed first posterior cell (fig. 350), and sometimes the upper branch of the cubital fork throws back a recurrent veinlet (fig. 350) from near its base which may even extend completely back to the radial vein (fig. 346) and thereby cause the existence of three submarginal cells; posterior cells almost invariably five (two American genera have only four), of which the fourth is frequently closed through the third veinlet from the discal cell bending down enough to meet the upper branch of the postical vein, while individual species occur in which other posterior cells are closed; anal cell either closed near the

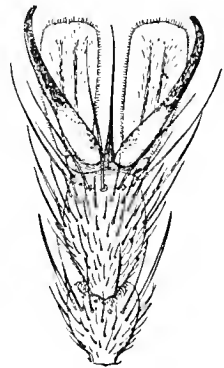


FIG. 338.—*Asilus crabroniformis* ♂.
(End of front tarsus.)

wingmargin or slightly or even considerably (*Leptogaster*) open; discal cell always present, pentagonal, the long upper side being almost a straight continuation of the base of the discal vein; discal cross-vein placed not far from the middle of the discal cell; small cross-vein often present but sometimes absent through the upper branch of the postical fork just touching the lower margin of the discal cell for a short distance, though this character may vary in individuals of the same species; alulae usually distinct and well developed but very small or obsolete in many *Dasypogoninae* and practically absent in *Leptogaster* (fig. 344); wing-membrane ribbed or wrinkled. Squamæ (alar) usually rather small but distinctly developed, with usually a thick margin on which is a longer or shorter delicate or dense fringe, and this fringe frequently becomes longer against the angle and may be even tufted there (*Stenopogon*), in which case the tuft appears to act as a substitute for the usual shelter hairs or bristly fan on the metapleuræ; when the wings are closed the alar squamæ when large may project upwards like lobes (*Laphria*); thoracal squamæ absent or only present as a bare frenum. Halteres normal and not at all concealed.

This family is a very large one and contains some of the largest known DIPTERA, while none of the species are very small. Loew's words in 1847 when he began his elaborate paper, "Ueber die europaischen "Raubfliegen (Diptera Asilica)" were as follows: "The family of the "Robber-flies is so sharply defined on all sides that at present no fly has "been found concerning which it can be doubtful whether it is to be "reckoned in this family or not. Nevertheless it contains a great wealth "of most varying forms which renders their study especially attractive." These words are almost as true now as when they were written, and Loew then laid the strong foundation for the elucidation of this immense family which has well borne the enormous superstructure that has been raised upon it, the *Asilidæ* of the world being now probably better worked out than any other family of Diptera, and this is all the more remarkable when it is recognised that Loew made but little use of the numerous chaetotactic characters. I do not know of any Diptera (except the *Apioceridæ*) having been placed in recent times in the *Asilidæ* which do not belong to them, nor have any true *Asilidæ* been misplaced in other families. As to the *Apioceridæ* (which had been united by many authors with the *Mydavidæ*) Osten Sacken in his enthusiasm for chaetotactic characters went too far, and began by sinking them as only *Asilinae* in the neighborhood of *Erax*, *Promachus*, etc., but subsequently raised them to the rank of a subfamily of the *Asilidæ*; other authors however have properly considered them to be a separate family between the *Mydavidæ* and *Asilidæ*, being distinguished from the latter by their venation, spatulate palpi, absence of face-beard, form of antennæ, etc.

After excluding the *Apioceridæ* the *Asilidæ* form an extremely well defined family. The *Mydavidæ* are easily distinguished by their venation, antennæ, and absence of all bristles; the *Therevidæ* by their aërial habits for which they have thin legs adapted for alighting only, by their usually furry pubescence, and by their short subcostal vein; while the *Empidæ* and *Dolichopodidæ* (with which Osten Sacken associated them) are smaller flies which have a much reduced venation. I am unable to accept Osten

Sacken's superfamily ENERGPODA in his sense, as I consider the MICROPHONA (*Empidæ* and *Dolichopodidæ*) less allied to the *Asilidæ* than the latter are to the *Mydaidæ* and *Therevidæ*. The remarkable circlet of stout spines which occurs at the end of the ovipositor in some *Anthracinæ*, the *Therevidæ*, many *Mydaidæ*, and some *Asilidæ* in all probability shows close affinity.

The *Asilidæ* form the largest family in the BRACHYCERA, as in 1868 Schiner reckoned the number of described species to be 1996, and since then about 1000 more have been described, so that after making requisite allowance for synonymy about 2700 known species must exist. Their size and habits have no doubt attracted collectors, but amongst the smaller and more obscure forms a very large number of unrecorded species must still remain. In the Palæarctic region about 570 species have been described, but in Britain we recognise only 23, of which 21 have occurred in England, 11 in Scotland (including two which have not been recorded from England), and (as far as I know) only one (*Philonicus albiceps*) in Ireland; Walker however included in addition *N. cyanurus*, *E. cingulatus*, and the species which he called *A. foreipatus* (by which I think he meant *E. rufibarbis*) from Ireland, and *Dioctria œlandica* from Scotland. A few more species may occur in Britain, Zetterstedt having described 43 from Scandinavia, and our sandhills on the Welsh coasts might produce even the large *S. diadema*, which is reputed to have been taken near Swansea.

The species are all exceedingly predaceous and are said to always catch their prey upon the wing. I have seen *Neoitamus cyanurus* sitting at the end of leafless twigs ready to dash out and capture the little green Oak Tortrix (*T. viridana*) but not hesitating to seize a comparatively large Geometer; *Asilus crabroniformis* rests motionless on rather bare patches on heaths or pastures, but is evidently keenly alert for any passing insect and is ready to seize any large Dipteron (such as *Sarcophaga*) or even a flying beetle, and when disturbed it only flies a short distance and then settles again motionless. Exotic species have been seen to seize small Dragon-flies (*Agrioninæ*) and Williston states that he once saw a female seize a pair of her own species and, thrusting her proboscis into the thorax of the male, carry off both together. The larvæ have been found in rotten wood, under bark (*vide* note on *Laphria flava*), or in decomposing vegetable matter, where they feed upon the larvæ of other insects, etc., or possibly act as scavengers. Loew long ago (1847) remarked the difference in habits between the quick-flying powerfully armed *Asilinæ* and the slow-flying weaker *Dasypogoninæ*, comparing the former to Road-Robbers and the latter to Bush-Thieves. Prof. Poulton (Trans. Ent. Soc., Lond., 1907) has collected all the details he could obtain as to the prey of the various species and has shown that there is in many cases a considerable (and sometimes remarkable) mimicry between the preyer and the prey, and that certain genera affect special

orders of insects; further notes are given upon these points under the *Dasypogoninae* on page 706.

ARRANGEMENT.—For upwards of sixty years this family has been split up into three subfamilies (*Asilinae*, *Laphrinae*, and *Dasypogoninae*). These three subfamilies may have been somewhat artificial but were at any rate convenient and easily distinguishable, the *Dasypogoninae* being known from the other two through the open marginal cell, while the *Laphrinae* had no style at the tip of the antennæ but the *Asilinae* had a long terminal style or arista. In recent times another subfamily, the *Leptogastrinae*, has been indicated but on somewhat uncertain grounds; Schiner, who first mentioned it in 1868, hesitated whether to limit it to the species which had the alulæ absent (or obsolete) and the hind legs thickened, or to those which had obsolete or abortive pulvilli, and Williston in 1893 distinguished it on the character of possessing (in common with the *Asilinae*) only one-jointed palpi as against the two-jointed palpi of the other two subfamilies; I can hardly follow this latter arrangement because I consider the *Leptogastrinae* infinitely more closely related to the *Dasypogoninae* than to the *Asilinae*, and the character founded on the number of joints of the palpi (even if correctly distinguished) does not appear to be of much value in the allied family of *Mydaidæ*. In 1905 Hermann (Berlin. entom. Zeit., L, 29) pointed out that the character of the open marginal cell is not an infallible one for differentiating the *Dasypogoninae*, as there are one or two species in which that character may differ in even individuals, but still for all practical purposes that character may remain if it be recognised that there are a few *Dasypogoninae* in which the radial vein curves up and joins the costa at practically the same spot as the subcostal vein ends and in so doing causes the end of the subcostal cell to be blunt instead of pointed. The preceding family, *Apioceridæ*, is evidently allied in venation to the *Asilinae* through some species of *Erax*, and consequently it is only natural that the sequence of *Asilidæ* should commence with the *Asilinae* and with such genera as *Erax*, *Promachus*, *Mallophora*, etc., and additional confirmation is given to this arrangement through the circlet of spines which occurs at the end of the female ovipositor in *Therevidæ*, some *Mydaidæ*, and such genera of the *Asilinae* as *Proctacanthus* and *Philonicus*; other genera of the *Asilinae* indicate relationship to the *Laphrinae* (with which they agree in the closed marginal cell), and thence the gradation passes on from the *Laphrinae* through *Laphystia* and those genera of *Dasypogoninae* in which the marginal cell is almost (or quite) closed. Some of the *Dasypogoninae* such as *Microstylum*, *Stenopogon*, etc., seem to show affinity to *Asilinae* in their chaetotaxy and in their large size, while the gradual diminution in size accompanied with a shorter subcostal vein and a diminished chaetotaxy with obsolescent or obsolete alulæ leads on ultimately through *Dioctria*, etc., to the *Leptogastrinae*, in which the abortive alulæ and almost entire absence of bristles indicate the proximity of the *Empidæ*. The nearest allies in the *Empidæ* should exist in the *Hybotinae* with their moderately long anal

cell and humpbacked thorax. The subfamilies of the *Asilidæ* may some day be founded on more natural characters, as *Laphria*-like species occur unnaturally in quite the middle of the *Asilinae* or *Dasygogoninae*, and many abrupt contrasts exist in the present arrangement; the general line of development from *Apioceridæ* to *Empidæ* seems however to be a natural one.

Type of venation of the ASILIDÆ.

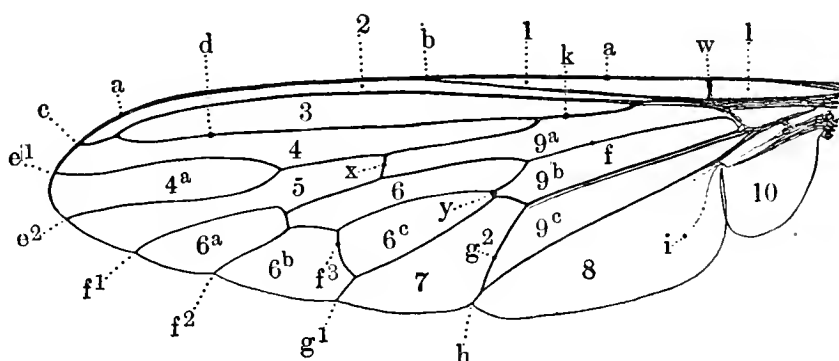


FIG. 339.—*Asilus crabroniformis* ♀.

Longitudinal (or long) veins.

- a* Costa (or costal vein).
- b* Mediastinal (or auxiliary) vein.
- c* Subcostal (or 1st longitudinal) vein.
- d* Radial (or 2nd longitudinal) vein, ending in the subcostal vein in the *Asilinae* and *Laphrinae*.
- e* Cubital (or 3rd longitudinal) vein.
 - e*¹ Upper branch } of the cubital fork.
 - e*² Lower branch }
- f* Discal (or 4th longitudinal) vein.
 - f*¹ Upper veinlet } from the discal cell.
 - f*² Second veinlet }
 - f*³ Third veinlet }
- g* Postical (or 5th longitudinal) vein.
 - g*¹ Upper branch } of the postical fork.
 - g*² Lower branch }
- h* Anal (or 6th longitudinal) vein.
- i* Axillary vein.
- k* Præfurca = the common stem of the radial and cubital veins.
 Ambient vein = the continuation of the costal vein round the hindmargin of the wing.

Cross (or transverse) veins.

- w* Humeral cross-vein.
- x* Discal (or middle) cross-vein.
- y* Lower (or small) cross-vein.
- Anal cross-vein = *g*² = the lower branch of the postical vein.

Cells.

- 1 Costal (*or mediastinal*) cell.
- 2 Subcostal cell.
- 3 Marginal cell.
- 4 Submarginal cell.
 - 4^a Second submarginal (*or cubital*) cell (*or cubital fork-cell*). Sometimes a third submarginal cell is caused through a long recurrent veinlet as in figs. 345, 347, 348, from near the base of e¹ to d.
- 5 First posterior (*or subapical*) cell.
- 6 Discal cell.
- 6^a Second posterior cell.
- 6^b Third posterior cell.
- 6^c Fourth posterior cell.
- 7 Postical (*or 5th posterior*) cell (*or postical fork-cell*).
- 8 Axillary cell.
- 9^a Upper (*or 1st*) basal cell.
- 9^b Second (*or middle*) basal cell.
- 9^c Anal (*or lower, or 3rd basal*) cell.
- 10 Alula.

Notes on the Venation of the ASILIDÆ.

The general "facies" of the venation of the *Asilidæ* is characteristic, and yet presents but few striking peculiarities.

THE SUBCOSTAL VEIN is unusually long and is only paralleled in the *Apioceridæ* and *Mydæidæ*; it very commonly (*Asilinae* and *Laphrinae*) receives the radial vein before its tip as in those two families, but whereas in them it also receives at least the upper branch of the cubital fork it is in only two or three instances that this happens in the *Asilidæ*; it is also very unusual for the veins of any *Asilidæ* to exhibit the peculiar upcurving which is so characteristic of those two families. In the *Dasypogoninae* and *Leptogastrinae* the subcostal vein is not so remarkably long, nor does it (except in rare instances at the absolute wingmargin) receive the radial vein before its tip, but still it is longer than in the *Therevidæ* and ends nearer to the tip of the radial vein than to the tip of the mediastinal.

THE PRÆFURCA is rather long and consequently very distinct from that of the *Mydæidæ* (except *Megascelus*); it starts before the middle of the upper basal cell and consequently far before the base of the discal cell.

THE DISCAL CELL is always present, and is long and pentagonal, the long upper side being almost a straight continuation of the basal stem of the discal vein; it always emits three veinlets (of which one may rarely be misplaced), though the course of these veinlets (especially the lower one) may vary.

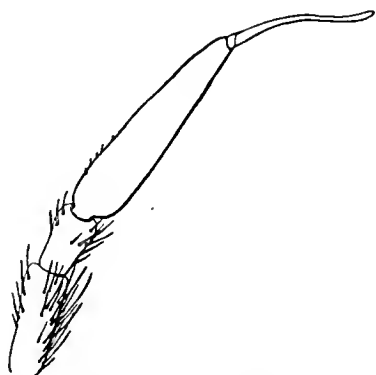
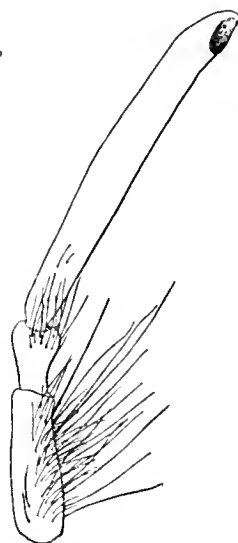
THE POSTERIOR CELLS are always five (except in two small American genera, *Townsendia* and *Leptopteromyia*), usually all open, but all subject to being closed through connection between neighboring veins.

THE SMALL CROSS-VEIN is usually present, but sometimes disappears and then the upper branch of the postical fork touches the lower margin of the discal cell for a short (never long) space.

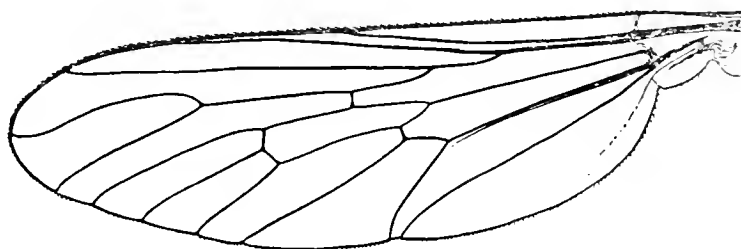
A peculiarity in venation occurs in a few genera (*Promachus*, *Mallophora*, etc.) in which the upper branch of the cubital fork throws back from near its base a recurrent veinlet which actually extends to the radial vein, so that the radial vein appears to be forked soon after the emission of the cubital vein and the base of the upper branch of the cubital fork looks like an ordinary cross-vein separating the second submarginal cell into an inner and outer cell; a recurrent veinlet of a somewhat similar nature is not uncommon in the *Anthracinae* but only as an almost upright branch to the radial vein.

Table of the Subfamilies of ASILIDÆ.

- 1 (4) Marginal cell closed and with a short petiole, the subcostal and radial veins meeting at an almost equal curve (fig. 339).
- 2 (3) Third antennal joint ending in a bristle-like style (fig. 340).
Usually elongate bristly but not hairy flies. ASILINÆ (p. 623).
- 3 (2) Third antennal joint without any style or with only a rudimentary or very short blunt one (fig. 341).
Usually stout woolly haired flies. LAPHRINÆ (p. 692).

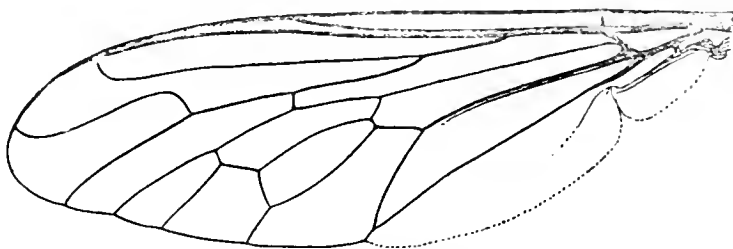
FIG. 340.—*Astilus crabroniformis* ♂. × 22.FIG. 341.—*Laphria flava* ♂. × 26.

- 4 (1) Marginal cell open (figs. 342, 344), or if just closed then the radial vein sharply curved up at its end so as to form a blunt end to the marginal cell (fig. 343).

FIG. 342.—*Dioctria Baumhaueri*. × 10.

- 5 (6) Alula normally developed and hind-angle of the wing present, or if obsolete then the claws and pulvilli normal.

Bristles or pubescence always obvious. Sometimes slender long-

FIG. 343.—*Laphystia sabulicola* ♂. × 15.

legged species but not exceedingly so, and often by no means so. Second posterior cell not pointed at its base (fig. 342).

DASYPOGONINÆ (p. 704).

6 (5) Alula and hind-angle of the wing absent (fig. 344). Claws long; pulvilli absent.

Bristles and pubescence reduced to a minimum. Exceedingly lanky species with elongate clavate hind femora and tibiæ. Second posterior cell pointed at its base (fig. 344).

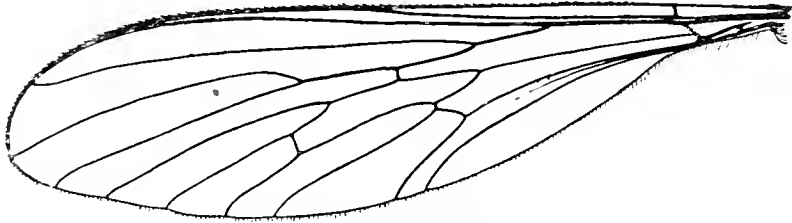


FIG. 344.—*Leptogaster guttiventris* ♂. × 10.

LEPTOGASTRINÆ (p. 748).

Williston (Kansas Univ. Quarterly, i., 115, 1893) separates these subfamilies in the following manner:

- | | |
|-----------------------------|----------------|
| 1 (4) Palpi one-jointed. | |
| 2 (3) Marginal cell open. | LEPTOGASTRINÆ. |
| 3 (2) Marginal cell closed. | ASILINÆ. |
| 4 (1) Palpi two-jointed. | |
| 5 (6) Marginal cell open. | DASYPOGONINÆ. |
| 6 (5) Marginal cell closed. | LAPHRINÆ. |

I do not like Williston's arrangement as I am unable to test the character drawn from the palpi, and I consider the *Dasytrogoninae* closely allied to the *Leptogastrinae*. I am not satisfied with my own distinction between these two subfamilies but hope it may prove workable.

ASILINÆ.

Marginal cell closed (fig. 345). Third antennal joint with a terminal style or arista.

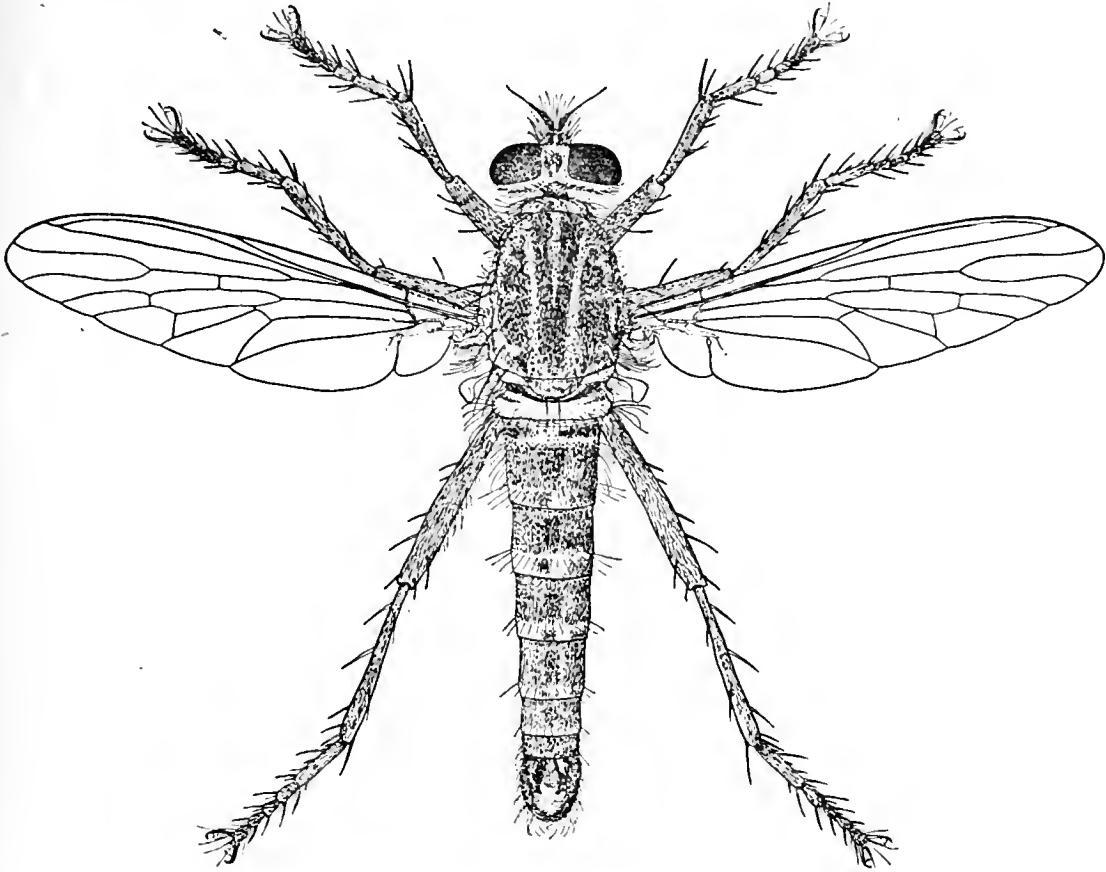


FIG. 345.—*Philonicus albiceps* ♂. × 4.

Head wide and short. Face almost equally broad or gradually widening from the antennæ to the mouth, usually bare on the upper part and against the eyes but with a conspicuous face-beard which practically covers the facial knob (when that is present), or the whole face may bear pubescence quite up to the antennæ and out to the eyes; face-beard composed of long bristles or bristly hairs or even soft hairs which droop downwards on the lower part over the front of the mouth-opening.

Frons almost equally wide in both sexes and the eyes scarcely ever in any way approximated in either sex, deeply sunk at the upper part so that there is a deep depression at the vertex between the top inner eye-angles, and the middle channel of this depression nearly always bare and divided out forwards down each side of the rather elevated ocellar space; several small bristles or bristly hairs occur about the ocelli, and below this part the orbits bear small bristles almost down to the antennæ, but the middle of this part of the frons is always bare. Chin and jowls with long fine-haired dense pubescence. Back of the head bearing pubescence and (with rare exceptions) on the upper half (or thereabouts) a postocular "festoon" of stout usually black bristles near (but not quite close to) the eyes; this "festoon" may be composed of only a few stout straight blunt bristles, or more commonly of a rather conspicuous row of bristles which towards the upper part have their tips bent over forwards and sometimes even bent over reetangularly (*Neoitamus*). Proboscis strong, sloping or almost horizontal; palpi one-jointed distinct though not conspicuous, sometimes with bristly hairs (*Craspedia*). Antennæ porreet; two basal joints comparatively short and bearing short bristles; third joint almost bare, more elongate, and bearing at its end a style or arista which is bare in all European species, but which bears a thin comb-like ciliation in the extensive exotic (or

Palæarctic Asiatic) genus *Ommatius* and its allies ; in all the British species the style is slender and has only a very short indistinct basal joint.

Thorax strong, rather contracted forwards (which causes a contrast with the wide short head) and almost always with certain well defined stripes and markings, and (except in some species of *Mallophora*) with strong bristles of which the præsutural, supra-alar, postalar, and dorso-central are well defined, and of which further details are given in the characters of the comprehensive genus *Asilus*. Pleuræ rarely with conspicuous pubescence except on the metapleuræ and hypopleuræ, and on those the metapleural and hypopleural fans are composed of either long bristly hairs or even strong bristles. Scutellum with long upturned marginal bristles.

Abdomen usually long and in European species narrow, rarely flattened broad and bare on the disc (*Craspedia*), composed of eight segments without the genitalia though the eighth segment may often be very short or even quite concealed, and in the female the end segments of the abdomen (even occasionally beginning with the sixth segment) may appear to form part of the ovipositor. Genitalia of the male conspicuous and always conforming to one type though varying very much in details ; there are a pair of lateral upper lamellæ which end by forming a forceps, and beneath them are the usually much shorter under lamellæ ; female ovipositor long and often compressed laterally, also composed of upper and lower parts and with a pair of terminal lamellæ, though these parts are not so conspicuously separated as in the male ; in several genera (allied to *Proctacanthus*) the ovipositor ends with a circlet of short stubby spines, which seems to show affinity to the *Therevidæ* and *Mydaidæ*. Pubescence and chaetotaxy somewhat variable, but without bristles except when the præhindmarginal ciliation (which crosses each segment) becomes so strong as to form bristles either only near the sides or almost all across, and this band of ciliation generally precedes a quite bare hindmarginal hem on especially the second and usually on the succeeding segments.

Legs strong, seldom very long or very short. Pubescence varying in amount, but strong bristles always occur in circlets at the tip of all the tibiæ and of the four basal joints of all the tarsi, and (though the traces may sometimes be faint) in sparse rows on the tibiæ, while other strong bristles usually occur ; femora commonly with strong spines on the underside, but not unfrequently (especially the front pair) unarmed. Pulvilli two, long and narrow ; claws long and strong but otherwise normal.

Wings long ; subcostal vein very long, extended almost to the wing-tip and joined just before its end by the radial vein so that the marginal cell is always distinctly closed. Venation conforming very much to one type and but little modified in the British species, the cubital fork being always a long simple one with a somewhat bell-mouthed opening, while the fourth posterior and anal cells are always closed ; in some genera (of which there are a few Palæarctic species) the upper branch of the cubital fork throws back from near its base a recurrent veinlet (fig. 350), which may be short or may extend quite back to the radial vein and thereby cause the presence of three submarginal cells (figs. 346-8), and in some specimens of *Promachus leoninus* this recurrent vein (or veinlet) shows a tendency to continue onwards toward the wing-base even after its junction with the radial vein ; the cubital vein is longer between its origin and the discal cross-vein than the præfurca, and consequently the discal cross-vein is placed after the basal third of the discal cell ; the opening of the cubital fork is not always bell-mouthed ; the small cross-vein is often punctiform and on rare occasions the upper branch of the postical fork forms for a very short distance the lower margin of the discal cell ; the first posterior cell is sometimes narrowed or even closed ; veins strong ; wing-membrane ribbed or wrinkled though occasionally only faintly wrinkled. Alulæ well developed, even if sometimes rather small. Squamæ with only the alar pair developed, not large but well defined and with a thickened margin on which is a delicate but fairly abundant fringe ; thoracal pair only represented by a bare frenum. Halteres normal.

Loew in 1848 divided the *Asilina* into three "super-genera" as follows:—

1. *Polyphoni* nov. Gen. Antennal style bare, thick, and extremely short, with its first joint much longer than the second ; middle femora

exceedingly thickened; middle tibiæ armed with a very strong blunt terminal thorn.

2. *Asilus*. Antennal style bare and slender, with its first joint much shorter than the second; middle tibiæ without a terminal thorn.

3. *Ommatius*. The bristle-like antennal style with comb-like hairs on the underside.

Several genera had previously been proposed by Macquart on rather vague characters.

Loew then divided the European *Asilinae* into a number of smaller groups to which in those days he hardly dared to give the rank of genera, but, in accordance with the general trend of scientific nomenclature and the test of experience, all his groups have been accepted by most subsequent writers as good genera, and many additional ones have since been distinguished; Schiner only undecidedly acknowledged these genera in 1862, but accepted them all without hesitation when he dealt with the *Asilidæ* of the world in 1866, and Loew himself to the end of his days defended the retention of all of them. In Britain we have only Loew's "super-genus" *Asilus* to deal with, and it may be contended that these smaller genera provide a separate genus for almost each one of our native species, but an examination will show that several of these smaller genera contain from twenty to thirty European species.

Loew in 1860 (*Die Dipteren-Fauna Südafrika's*, p. 142) wrote "The number of species belonging here is already so great, the difficulty of clearly distinguishing them is so serious, and the task of recognisably describing them is so difficult, that their separation into a larger number of genera is absolutely necessary. . . . If the number of species in one genus has so accumulated, as in the Meigen-Wiedemann genus *Asilus*, which already contains at least 500 described species, if these species are so closely allied that the most exact details on precise but little obvious plastic distinctions are indispensable for their recognition and apparent grouping, if thereby the experience is continually repeated that new species are published without every consideration of these details and that determination from the descriptions given is an almost absolute impossibility, then it is surely the right time to found smaller genera on those characters and so to enforce the necessary attention to those plastic characters, for the advantage of scientific progress and the checking of the ever increasing confusion. If no distinctions offer themselves so material as in other genera, less material ones must be used; if they are only so chosen that true allies are not separated from each other, then such genera should not be censured; if on the other hand it can be shown that the choice of other distinctive characters would have led to more precise and more easy distinction, or to genera which would correspond better with the natural grouping of the species,

“ then the distinctive characters selected by me should be rejected and “ these others substituted.”

While fully recognising the comparative unimportance of the distinctions given at present between several of the genera of *Asilinae*, I retain them for the reasons given by Loew, and though some species cannot be allocated without the knowledge of both sexes yet even then it is a gain to be able to locate a specimen somewhere in (say) one out of two comparatively small genera instead of leaving it in an unarranged genus of several hundred species. In proof of this it may be seen that Pandellé's revision of the French species of the comprehensive genus *Asilus* has left several of his new species *incertæ sedis*, while their identification might have been simple if they had been correctly allocated to the smaller genera. In Kertész's "Katalog" *Philonicus* is retained as distinct from the comprehensive genus *Asilus* on account (I presume) of the circlet of spines on the female ovipositor, but I fail to comprehend why the line is drawn at this single sexual character.

Table of the Palearctic Genera of ASILINÆ.

- 1 (52) Arista bare.
- 2 (7) Three submarginal cells (fig. 346), the third one being formed by the upper branch of the cubital fork throwing back from near its base a recurrent veinlet which extends until it unites with the radial vein so as to make the latter appear to be forked soon after the emission of the cubital vein, while the commencement of the upper branch of the cubital fork resembles a cross-vein.
- 3 (4) Base of the second submarginal cell (= the cubital fork) not nearly reaching back to the end of the discal cell (fig. 346).

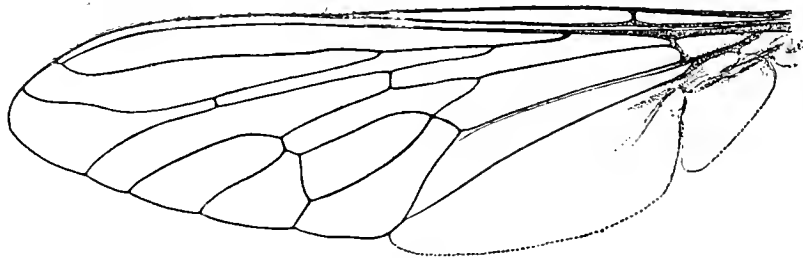


FIG. 346.—*Promachus leoninus* ♂. × 6.

Plump, more or less hairy flies. Abdomen conical, moderately elongate so that the folded wings as a rule hardly reach its tip and only exceed it in the males (genitalia in both sexes excluded). Legs rather strong but not stout. Ovipositor without a terminal circlet of spines.

PROMACHUS.

- 4 (3) Base of the second submarginal cell (= the cubital fork) reaching at least as far back as the end of the discal cell.

- 5 (6) Base of the second submarginal cell (=the cubital fork) nearly level with the end of the discal cell (fig. 347). Ocellar

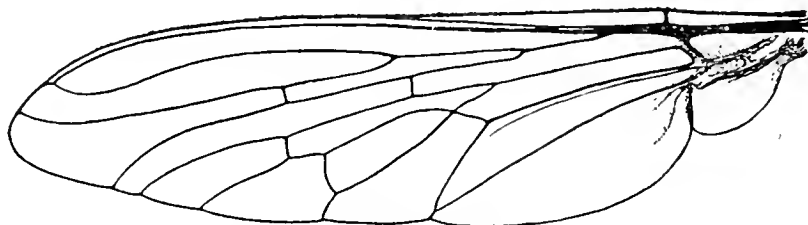


FIG. 347.—*Alcimus ponticus* ♂. × 6.

tubercle prominent. Thorax usually bare on the front half.

Slender bare flies, with long slender legs and very narrow elongate abdomen. Genitalia of the male comparatively small. Ovipositor with a terminal circlet of spines.

ALCIMUS.

- 6 (5) Base of the second submarginal cell (=the cubital fork) distinctly before the end of the discal cell (fig. 348). Ocellar tubercle

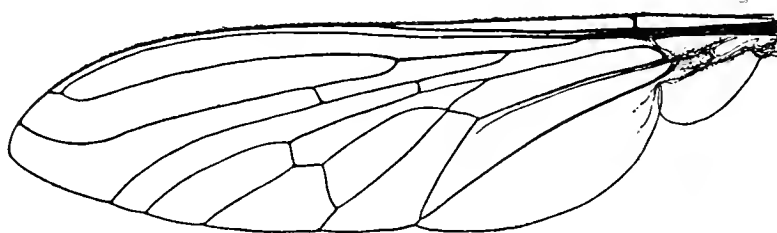


FIG. 348.—*Philodicus javanus* ♀. × 6½.

flat. Thoracic stripes usually hairy up to the front.

Rather bare, true *Asilus*-like flies. Legs slenderer than in *Promachus* and spinose. Ovipositor with a terminal circlet of spines.

PHILODICUS.

- 7 (2) Only two submarginal cells, because the upper branch of the cubital fork is simple or throws back only a short recurrent veinlet that does not extend to the radial vein (fig. 350).
- 8 (11) Lower branch of the cubital fork curving upwards and ending in or before the wing-tip, and consequently the first posterior cell wide open (fig. 349).

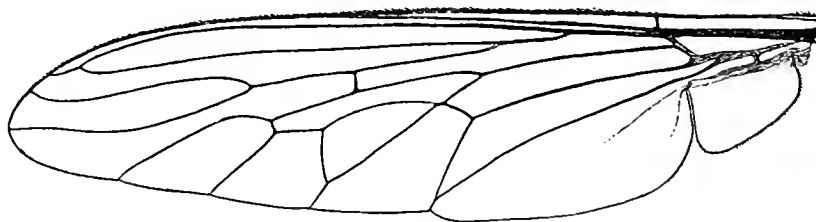


FIG. 349.—*Proctacanthus longus* ♀. × 4.

Large species (conf. *Eccoctopus*).

- 9 (10) Abdomen always conical and much longer than the wings.

Upper branch of the cubital fork often with a peculiar recurrent bend or even with the rudiment of a recurrent veinlet. Face-knob strong. Ovipositor with a conspicuous cirlet of spines.

A large genus of mainly American flies of which three species may occur in Asia and one in South Russia unless these belong to a genus intermediate between *Proctacanthus* and *Polysarca*.

PROCTACANTHUS.

- 10 (9) Abdomen shorter than (or only as long as) the wings, bare, short, and plump.

Veins incomplete towards the hindmargin. Ovipositor without any conspicuous cirlet of spines.

Russian or Transcaspian species only.

POLYSARCA.

- 11 (8) Lower branch of the cubital fork straight, undulating (fig. 353), or bent downwards (fig. 350), but always ending after the wing-tip (except in *Eccoctopus*).

- 12 (13) Upper branch of the cubital fork with a short recurrent veinlet (fig. 350).

First posterior cell usually closed or very much narrowed.

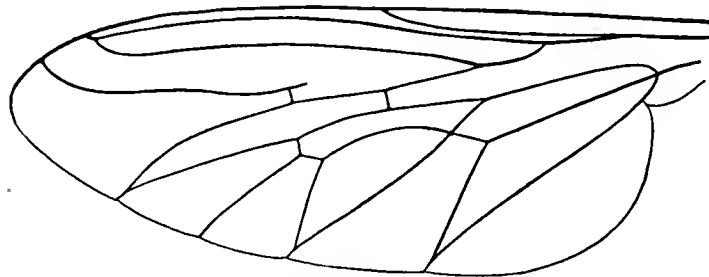


FIG. 350.—*Apoclea femoralis* (after van der Wulp).

though sometimes wide open. Face-knob inconsiderable. Ocelli absent.

About a dozen Palearctic species, none of which are known to occur in Europe.

APOCLEA.

- 13 (12) Upper branch of the cubital fork without any trace of a recurrent veinlet, and without even an unusual bending at the spot where such a veinlet might occur (fig. 353).

- 14 (15) Middle femora very much thickened; middle tibiæ serrulate beneath on the apical third and ending in a short blunt thorn. Style rather short and thick, but with its first joint longer than the short second.

Small cross-vein long and sloping. A single very distinct species, which occurs from Greece to Rhodes.

POLYPHONIUS.

- 15 (14) Middle femora not unusually thickened; middle tibiæ without a terminal thorn. Style thin, with its first joint usually rudimentary and always shorter than the second.

- 16 (17) Ovipositor with an obvious terminal circlet of short stout spines (fig. 351).

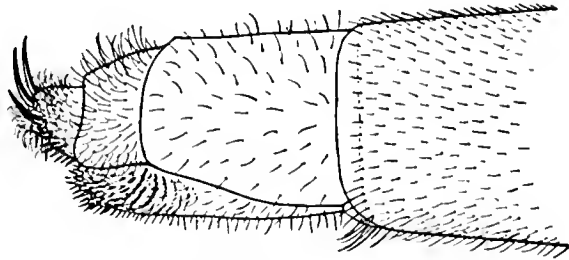


FIG. 351.—*Philonicus albiceps* ♀. × 17.

Light grey species. Only one well-known species in Europe, but with perhaps a closely allied Mediterranean species. The male has bristles against the hindmargins of the abdominal segments, but none beneath the front femora and only one in front of the middle femora. For other distinctions see page 636.

1. PHILONICUS.

- 17 (16) Ovipositor without any terminal circlet of spines.
(*Asilus* sensu lato recentiore).
- 18 (31) Ovipositor flattened or rounded but not laterally compressed.
Legs partly conspicuously reddish orange, except in *Eccoctopus*.
- 19 (28) Abdomen without bristles against the hindmargins of the segments.
- 20 (21) Face-beard composed of fine hairs.
Legs extensively orange.
- 21 (20) Face-beard bristly as usual.
- 22 (27) Abdomen with short decumbent pubescence.
Wings not halved in colour.
- 23 (26) Large brightly colored flies.
- 24 (25) Legs (including the tarsi) of ordinary length and shape.
Wings maculated in European species. Legs mainly reddish orange.

ANTIPHRISSON.

2. ASILUS.

- 25 (24) Legs and especially the anterior tarsi very much lengthened (fig. 352).

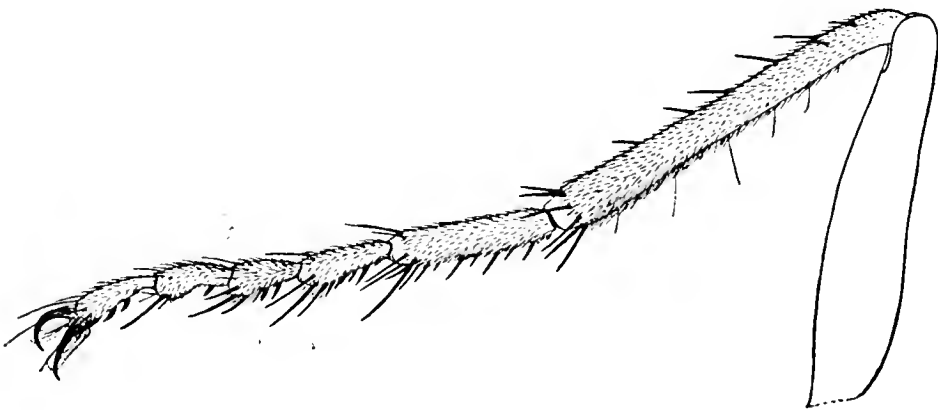


FIG. 352.—*Eccoctopus erythrogaster* ♀. × 10. (Right front leg.)

Thorax and legs black. One Mediterranean and one Persian species.

ECCOPTOPUS.

- 26 (23) Small dark ashy grey flies.

Face shining black. One species only.

3. RHADIURGUS.

- 27 (22) Abdomen with rather long fine outstanding pubescence.

Wings halved in contrasted colour (fig. 353). One species only in Europe, very distinct from any other of the *Asilinae*.

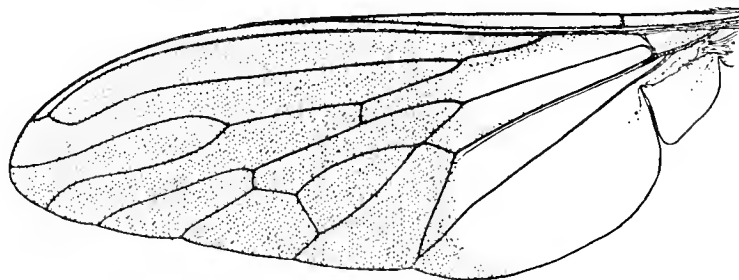


FIG. 353.—*Pamponerus germanicus* ♂. × 6.

4. PAMPONERUS.

- 28 (19) Abdomen with obvious bristles in a row against the hindmargin of each of the four or five basal segments, even if only towards the sides.

- 29 (30) Basal joint of anterior tarsi very short (fig. 354).

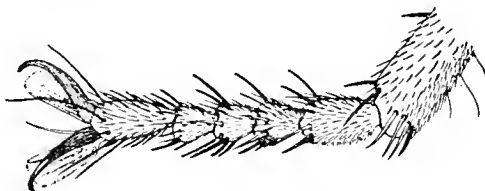


FIG. 354.—*Echthistus cognatus* ♂. × 10.

Front femora beneath and middle femora anteriorly with strong bristles. One well known and one doubtfully distinct European species.

ECHTHISTUS.

- 30 (29) Basal joint of anterior tarsi not specially shortened.

Ovipositor knobbed, and with only dense soft pubescence beneath. Legs black, with the tibiæ red; front femora without, and middle femora anteriorly with very few, strong bristles.

ANTIPALUS.

- 31 (18) Ovipositor laterally compressed.

- 32 (35) Thorax with the two rows of dorso-central bristles extending considerably in advance of the suture and sometimes with specially long and dense pubescence on the middle stripe extending forwards like a hog-mane to the front part.

Abdominal segments with conspicuous rows of præhindmarginal bristles. Eighth ventral segment of the male simple even if with a conspicuous hindmarginal fringe.

N.B.—The character of the bristly hairs on the fore part of the middle stripe of the thorax is not always conclusive.

33 (34) Third antennal joint linear (fig. 355).

Basal joint of anterior tarsi rather short. Face-beard extending almost up to the antennæ. Ovipositor long, narrow, and pointed,

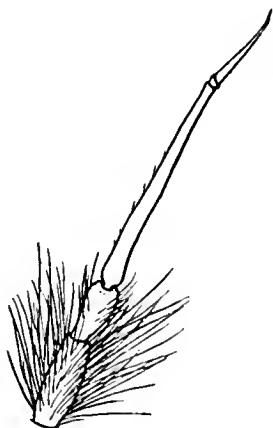


FIG. 355.—*Protophanes punctipennis* ♂. × 22.

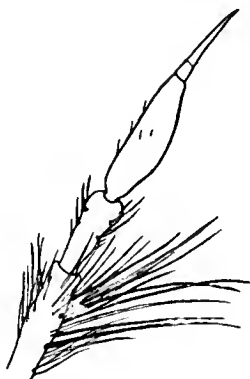


FIG. 356.—*Dysmachus trigonus* ♂. × 22.

with the end lamellæ free. Legs usually with the front femora considerably reddish.

PROTOPHANES.

34 (33) Third antennal joint of the usual long elliptical shape (fig. 356).

Ovipositor (fig. 357) with the end lamellæ wedged in almost as in *Eutolmus*. Moderate-sized or small species. Legs usually black, and at

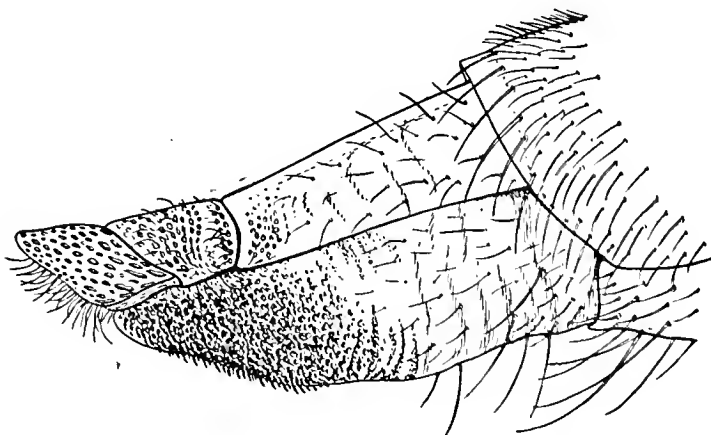


FIG. 357.—*Dysmachus trigonus* ♀. × 10.

most only the base of the tibiæ inconspicuously reddish. A large genus of which some species are not easily distinguished from *Eutolmus*.

5. DYSMACHUS.

35 (32) Thorax with only short bristly pubescence on the fore part of the middle stripe and with the two rows of dorso-central bristles not extending much in advance of the suture.

36 (37) End lamellæ of the ovipositor rhomboidal or egg-shaped, driven in like a wedge between the upper and lower points of the upper piece of the ovipositor (fig. 358).

Male with the eighth ventral segment sometimes produced on the hindmargin like a trowel or lappet. Legs frequently considerably reddish on at least the tibiæ, but not in the British species. Usually rather

large species. Some species are not easily distinguished from *Dysmachus* in the female or from *Machimus* in the male.

6. EUTOLMUS.

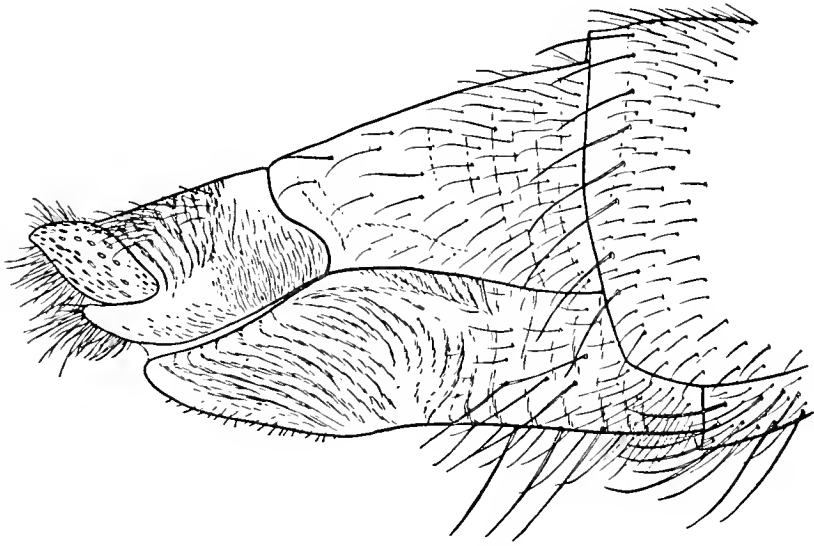


FIG. 358.—*Eutolmus rufibarbis* ♀. × 10.

- 37 (36) End lamellæ of the ovipositor free, almost style-like in shape (fig. 359).

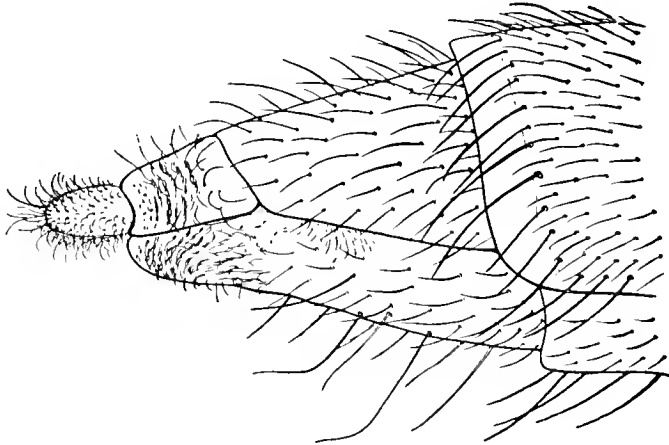


FIG. 359.—*Machimus rusticus* ♀. × 10.

- 38 (39) Eighth ventral segment of the male produced on the hindmargin like a spoon or trowel, or pronged or more or less widened (fig. 360).

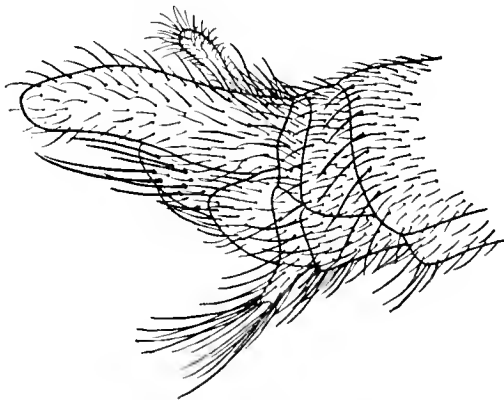


FIG. 360.—*Machimus atricapillus* ♂. × 17.

Legs not mainly yellowish, with not even the tibiæ mainly clear reddish or orange. Abdomen not shining black dorsally or ventrally. A large genus of which some males are not easily distinguished from *Eutolmus*.

7. MACHIMUS.

- 39 (38) Eighth ventral segment of the male not produced or widened.
 40 (41) Legs mainly shining yellow or orange, and with the ground colour not obscured by dust.

Only two very distinct supra-alar bristles. About twenty species known from South or Central Europe, but none from North Europe.

N.B.—If the tibiæ only are conspicuously bright orange compare *Neoitamus* and *Paritamus*.

HELIGMONEURA.

- 41 (40) Legs mainly black, or if yellow the ground colour always (except the tibiæ of *Neoitamus* and *Paritamus*) obscured by dust and consequently appearing dull.
 42 (43) Abdomen shining black both dorsally and ventrally.
 Face-knob large. A very distinct-looking species.

STILPNOGASTER.

- 43 (42) Abdomen grey on both or at least one surface, and in no case shining black.
 44 (45) Yellowish grey or ashy grey flies. Legs striped or ringed with dull orange and of a peculiar brownish grey appearance (in one species nearly all blackish grey).
 Never large species.

9. EPITRIPTUS.

- 45 (44) Blackish grey flies. Legs black, but sometimes with the tibiæ more or less orange.
 46 (47) Dark thoracic stripes bare. Ovipositor very long and apparently including the sixth and seventh abdominal segments.

Male with the sixth and seventh abdominal segments shining. Tibiæ conspicuously bright orange.

8. NEOITAMUS.

- 47 (46) Dark thoracic stripes more or less clothed with minute bristles. Ovipositor not including the sixth and seventh abdominal segments.

- 48 (49) Male genitalia conspicuously swollen. Tibiæ conspicuously bright orange.

PARITAMUS.

- 49 (48) Male genitalia not conspicuously swollen. Tibiæ black, or when pale colored not bright orange from the base to almost the tip.

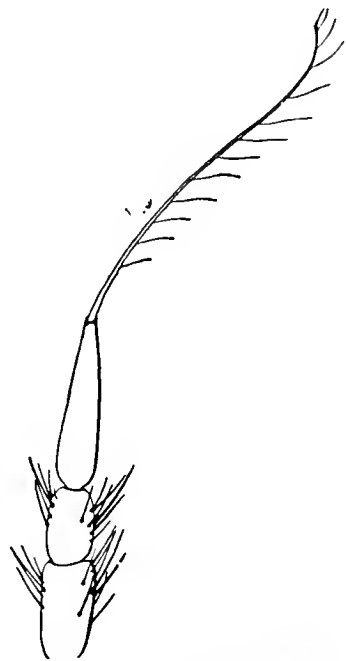


FIG. 361.—*Ommatius chinensis*
 ♂. × 24.

- 50 (51) Facial knob large. Genitalia of the male when seen from above not at all swollen but extending more or less to a point.
 Legs mainly black but obscured by minute pale pubescence. Ovipositor never very long. Third veinlet from the discal cell rather upright; small cross-vein absent.
 TOLMERUS.
- 51 (50) Facial knob small. Genitalia of the male when seen from above more or less blunt.
 Small species. Legs mainly or usually extensively black. Third veinlet from the discal cell unusually sloping.
 CERDISTUS.
- 52 (1) Arista plumed (fig. 361).
 OMMATIUS.

TABLE OF THE BRITISH SPECIES OF ASILINÆ.

As the generic characters of the *Asilinae* are difficult to follow and the British species are often confounded by inexperienced students I have attempted to give a "Table of Species" on more obvious even if more superficial characters.

- 1 (2) Very large, yellow and black, hornet-like fly.
 Wings obviously maculated on the hindmargin. Legs mainly brownish red or orange.
As. crabroniformis.
- 2 (1) Large or moderate-sized flies of inconspicuous blackish or greyish colour.
 Wings never maculated, though with the outer half conspicuously darkened in *P. germanicus*.
- 3 (4) Wings halved in colour (fig. 353), the base being whitish or hyaline and the apex conspicuously (unless immature) darkened.
 Large species. Tibiæ reddish orange. Abdomen without any bristles on the hindmargins of segments.
Pamp. germanicus.
- 4 (3) Wings without any contrasts in colour, though often with a vague gloomy tint about the tip and hindmargin.
- 5 (12) Legs altogether blackish, or at most with just the base of the tibiæ reddish.
- 6 (9) Tibiæ black even at the extreme base.
 Rather large species.
- 7 (8) Light grey species. Bristles mostly whitish, even on the legs and scutellum.
 Scutellum with only two bristles. Eighth ventral segment of the male simple. Ovipositor with a circlet of spines (fig. 351).
Phil. albiceps.
- 8 (7) Brownish grey species. Bristles mostly black.
 Scutellum with more than two (usually black) bristles. Eighth ventral segment of the male with a produced densely bristly process. Ovipositor without any spines and with the terminal lamellæ wedged in (fig. 358).
Eut. rufibarbis.

- 9 (6) Tibiæ reddish at the extreme base.*
Bristles mostly whitish. Scutellum with four (or more) bristles.
- 10 (11) Thorax hog-maned (*i.e.*, the middle line bears a crest of bristly hairs quite to the front). Abdomen with conspicuous rows of whitish bristles all across the hindmargins of segments.
Eighth ventral segment of the male simple. Moderately small species.
Dysm. trigonus.
- 11 (10) Thorax without any conspicuous bristles on the front part.
Abdomen without conspicuous transverse rows of whitish bristles.
Eighth ventral segment of the male with a process and tuft of bristles. Large species.
Mach. rusticus.
- 12 (5) Legs with obvious orange or reddish markings on more than the extreme base of the tibiæ.
- 13 (16) Femora more or less reddish, even the darkest specimens having a reddish præapical ring on the front and hind femora.
Tibiæ with more or less distinct blackish streaks or patches.
- 14 (15) Rather large dark colored species.
Eighth ventral segment of the male with a produced prong. Frons with all hairs black. Bristles mostly black.
Mach. atricapillus.
- 15 (14) Rather small yellowish grey species.
Eighth ventral segment of the male simple. Frons with numerous pale hairs.
Epitr. cingulatus.
- 16 (13) Femora altogether blackish (unless at the extreme tip only).
Tibiæ wholly orange or reddish except at quite the tip in *N. cyanurus* and *cothurnatus*.
- 17 (18) Face shining black on the upper part.
Rather small blackish species. Abdomen without any hindmarginal bristles. Tibiæ often extensively blackish.
Rhad. variabilis.
- 18 (17) Face yellowish on the upper part.
Rather large species, which have the dark stripes on the thorax quite bare. Abdomen with at least traces of hindmarginal bristles near the sides. Tibiæ quite clear orange except at the tip.
- 19 (20) Bristles of the legs nearly all black.
Tarsi hardly orange at the base. Sixth and seventh abdominal segments of the male shining blue.
Ncoit. cyanurus.
- 20 (19) Bristles of the legs to a large extent yellow.
Tarsi obviously orange at the base. Abdomen of the male blackish near the tip.
Ncoit. cothurnatus.

* This character can be relied upon, even though the reddish coloring may be sometimes obscure.

1. PHILONICUS

Philonicus Loew, Linn. Ent., iv., 144 (1849).

Rather large light grey flies, notable from their comparative absence of pubescence and by the female having a circlet of spines at the end of the ovipositor.

Head with but little pubescence on the frons or ocellar tubercle; facial knob and face-beard rather small, leaving the upper half of the face bare; festoon rather inconspicuous though represented by distinct stiff bristles which do not (or scarcely) curve over at their tips. Antennæ normal; style about as long as the third joint, and with its basal joint short and inconspicuous.

Thorax with the usual stripes well defined, and with only very short bristly pubescence on all the front part. Bristles normally two præsutural, two supra-alar, two postalar, and with the dorso-central rows dying down towards the hindmargin and also dying out anteriorly about half-way between the suture and the front; metapleural and hypopleural fans distinct but with not very strong bristles. Scutellum normally with only two marginal bristles.

Abdomen with but little long pubescence, but with long distinct præhindmarginal bristles towards the sides; eighth ventral segment of the male quite simple and not very short. Genitalia of the male rather long but not at all clubbed, the forceps being rather narrow and enclosing a wide space as the claspers are deeply cut back after about half their length; ovipositor long, conical at its extreme base but strongly compressed laterally for the rest of its length, and with a terminal circlet of stumpy but obvious spines (fig. 351).

Legs rather slender, and all black though somewhat obscured by closely adherent short pale pubescence; the longer pubescence scarce, and the bristles practically normal (including the terminal tibial circlets) but few in number; middle femora with only one anterior bristle near the middle; tarsal joints all normal in length.

Wings normal. Alar squamæ with a rather dense marginal fringe.

This genus may be distinguished in the female sex from all other British *Asilinae* by the anal circlet of spines, and from *Proctacanthus* and its allied genera by the absence of any recurrent veinlet or even kink in the upper branch of the cubital fork and by the lower branch of that fork ending after the wing-tip. The distinctive generic characters of the male are not so easily defined; our British genera, *Asilus*, *Pamponcrus*, and *Rhadiurgus* have no præhindmarginal bristles on the sides of the abdominal segments, and moreover bear no resemblance to the light grey *Philonicus*; *Dysmachus* has long bristly pubescence right up to the front part of the thorax; *Machimus* and our species of *Eutolmus* have the hindmargin of the eighth ventral segment produced into a lobe or pair of prongs; *Ncoitamus* and *Epitriptus* have conspicuous yellow markings on the legs.

Philonicus was originally founded upon the common and widely distributed *P. albiceps*, of which the Mediterranean *P. elutus* may be only a variety. *P. dorsiger* Wied. and *P. scaurus* Walk. appear to have the legs colored as in *Tolmcrus*, while *P. areolaris* Bigot from Celebes is probably a *Pamponcrus*, but van der Wulp described two species from South Asia (Celebes and Sumatra) which he considered to belong to this genus.

1. **P. albiceps** Meigen. Light yellowish grey, with the usual darker markings. Legs black. Scutellum with two pale marginal bristles. Ovipositor with a circlet of short spines. (Fig. 345.)

A large yellowish ashy grey fly, resembling *Machimus rusticus* and *Eutolmus rufibarbis* but lighter colored than any British Asilid except the very distinct *Dysmachus trigonus*.

♂. Face broad, densely covered with whitish or pale yellowish grey tomentum ; facial knob small ; face-beard long and drooping, whitish yellow or white but with the uppermost (3-20) hairs black less drooping and more bristly ; upper half of the face and sides of the knob bare ; chin-beard long, dense, and white ; jowl-beards rather shorter, dense, shaggy, hanging straight down, and extending more sparsely nearly half-way up the back of the head ; pubescence above the middle of the back of the head pale yellowish, shorter and sparser (though still abundant) ; festoon represented by about twelve stout yellow bristles which are not quite close to the eyes but which extend all across behind the vertex so that there is only a small gap at just the middle of the postvertical depression, and even the uppermost bristles hardly bent forwards at their tips ; vertex bare on the depressed channel between the eyes and on the forks of this channel which extend down the sides of the ocellar space, but the sides of the frons from the upper ocelli to the antennæ bearing some rather short black bristly hairs at first on the orbits only but lower down more out on the frons itself ; frons greyish white, ocellar space bearing some black bristly hairs, but many of the thinner hairs about and between the ocelli whitish ; sometimes a few thin black hairs occur in front of the postvertical bristles, and sometimes a few thin whitish hairs are intermingled amongst those on the upper part of the sides of the frons ; back of the head lighter grey, with an indefinite dark streak or blotch extending downwards from the postvertical bristles along the space on which the festoon bristles occur ; actual back of the head bearing fine whitish hairs ; collar yellowish grey, bearing on the upper part six or more stoutish yellow bristles (though sometimes one or two of the uppermost of these may be black) besides numerous fine pale hairs. Proboscis shining black, rather long, and bearing short pale pubescence about its tip and long rather sparse pale pubescence beneath on its basal half ; palpi short and thin, bearing porrect pale hairs. Antennæ dull black ; two basal joints tinged with grey and bearing numerous black bristles with sometimes a few pale hairs intermixed on the underside of the basal joint ; third joint hardly so long as the two basal joints together, minutely pubescent dorsally just before its middle ; style quite as long as the third joint, linear with a very short thin tip.

Thorax yellowish ashy grey with the usual dark stripes well defined ; middle stripe blackish, or (if brownish black) with its borders blackish (best seen when viewed from in front or behind), broadened anteriorly but gradually narrowed posteriorly quite to the hindmargin, and split by a lighter yellowish grey line (which in its turn is sometimes forked quite in front) not quite to the hindmargin ; side-stripes large and broad, greyish brown but well contrasted against the yellowish grey ground colour, beginning about half-way between the front and the suture, rather narrowly interrupted at the suture, and continued afterwards as smaller parts which are rounded at both ends, and followed by the usual more blackish brown awl-shaped (sometimes fainter and curved) spots which do not nearly reach the hindmargin ; humeral stripes represented by dark isolated triangular spots. Pubescence (as distinguished from strong bristles) on the dorsum of the thorax composed of small sloping black bristles over nearly all the disc, though sparse above the wing-base and on and about the back part of the postalar calli and absent on the blackish brown awl-shaped spots ; these small bristles are very short on the front half but thence grow gradually longer towards the hindmargin, though they can never be confused with the true bristles unless with the last one or two of the dorso-central rows ; besides these bristles fine short pale brownish yellow or whitish yellow inconspicuous pubescence occurs on the humeri, above the wing-base, on and about the front part of the postalar calli, and in fact sometimes scattered anywhere about the disc. Macrochaetæ or strong bristles varying extremely in colour between black and white ; præsutural normally two long and strong, sometimes both black, but sometimes the hind one or

occasionally both white, while sometimes a smaller third bristle occurs considerably in advance of the other two; supra-alar two (2-3) long and sometimes both black but both varying to white, and the second one (which is far away from the wing-base) sometimes represented by two bristles close together; postalar two on the lower end of the callus, long and usually white but each varying in colour, while sometimes a smaller white one occurs nearer the base of the callus; dorso-central (on the light grey stripes) about four (2-5) postsutural of which the middle two are the strongest and the one nearest the scutellum sometimes so weak as to be almost confused with the finer pubescence, and four or five small præsutural which are obvious only because they occur on the light grey stripes or otherwise they would almost merge into the surrounding small black bristles. Pleuræ yellowish grey but with a large dark indefinite cloud on the middle part of the mesopleuræ; pubescence rather abundant long and pale on the prothorax and on the space between that and the front coxæ and also on the upper part of the sternopleuræ, slight and inconspicuous on the upper part of the mesopleuræ but forming a tuft at the back of the upper part of the pteropleuræ, while the metapleural fan is composed of long strong bristly hairs and some finer hairs, and the hypopleural fan and pubescence are similar but less dense. Scutellum (when seen from behind) light ashy grey, bearing numerous very thin yellowish white hairs with which black hairs are not uncommonly intermingled, and with two long rather thin (almost always) whitish upturned marginal bristles; metanotum ashy grey, bearing a patch of rather short coarse brownish yellow pubescence about each hind corner.

Abdomen (when seen from above) pale yellowish grey with rather lighter grey bare hindmargins of segments, or (when viewed from behind) blackish brown or brown with the bare hindmargins conspicuously pale grey (almost whitish) and the sidemargins less definitely so, but from all points of view with the genitalia shining black. Pubescence on the dorsum short, depressed, and pale yellowish, with sometimes a very few black hairs (of a similar nature to the yellow ones) down just the middle line, but the pubescence at the sides of the two basal segments (especially the first) is long and outstanding, and that across the præhindmarginal crest of the basal segment is but little shorter, while the third segment has a few similar outstanding pale hairs at the sides, and the præhindmarginal line on the second and third and sometimes fourth segments bears a rather bristly fringe all across; the outer two or three hairs on each side of the fringe on the basal segment are strong enough to be called bristles, while on the second segment there are about three similar bristles on each side, and on the third segment about six which die out into the præhindmarginal fringe, and on the fourth segment also about six which however merge still more into the fringe, until on the fifth segment the side bristles become still less distinct, and on the sixth segment any fringe is scarcely perceptible; eighth segment very short, but distinct and concolorous with the seventh. Belly of the same pale yellowish grey colour, with long pale sparse pendent pubescence on the five basal segments; hindmargin of the fifth segment slightly dropped. Genitalia (including the claspers) nearly as long as the sixth and seventh segments together, shining black and not at all clubbed, all bearing conspicuous fairly long but not dense pale yellow pubescence with a few inconspicuous black hairs intermixed on the basal part; claspers (when seen from above) sloping inwards and rather stout for about half their length, but then suddenly and deeply cut back so that the end halves form a pair of rather narrow forceps which enclose an almost circular open space, while the basal halves enclose an ovate space; when seen quite sideways the claspers show but little of the middle enlargement and appear to be long and narrow with a rather bluntly rounded end; lower lamellæ short, rather dusted outside near the base, and with a pair of inconspicuous chestnut processes between them.

Legs black, but the minute recumbent yellowish or almost whitish pubescence causes a greyish appearance, and reddish or greyish orange felt covers the inner (= posterior) apical half (or even the whole) of the hind tibiæ and the basal joint of the hind tarsi as well as the antero-ventral part of the front tibiæ and the basal joint of the front tarsi; coxæ grey or whitish grey like the pleuræ, with fairly conspicuous coarse but not dense almost whitish

drooping pubescence; there is no other pubescence on the legs except a few long pendent whitish hairs beneath the front femora and a few as usual beneath the front tibiæ, but these latter hairs are inconspicuous and much shorter than the postero-ventral bristles. Bristles on the front femora quite absent on the underside, but about three postero-dorsal at and after the middle and one small antero-dorsal near the tip; front tibiæ with about three or four irregular small dorsal bristles, three or four irregular postero-dorsal, and the usual three longer equidistant postero-ventral from the middle to the tip, and with one rather long white spur-bristle in the same row; tip of the front tibiæ with the usual circlet of spurs which vary very much in colour, as sometimes only the long anterior one is black and sometimes only the posterior one white; front tarsi with the long posterior bristle near the base of the basal joint whitish, and the bristles on the circlets at the tips of the three basal joints often with the longer ones white and the rather shorter ones black or sometimes with only the posterior bristle white, but with only black bristles on the two last joints; middle femora with two or three small antero-ventral bristles near the middle, one longer antero-dorsal (almost anterior) just after the middle, while close to the tip are one small antero-dorsal and two small postero-dorsal; middle tibiæ with two dorsal bristles (one at about half the length and the other at about three-quarters), two small anterior bristles just below the corresponding dorsal bristles, two longer ventral nearly opposite the anterior ones, and two or three long postero-ventral, while the anterior spur-bristle is long and black but the rest of the circlet small and white; middle tarsi with the circlets of bristles black except an anterior white bristle on each of the first and second joints and sometimes some other white bristles; hind femora with two antero-dorsal bristles and two smaller anterior near the base (but these four sometimes merging into one row), two small postero-dorsal near the tip, three or four small antero-ventral, and one thin almost ventral just before the middle with two or three long thin bristles or bristly hairs in the same row but nearer the base; hind tibiæ with three conspicuous antero-dorsal bristles (one at about a sixth the length, one at half, and one at three-quarters), and three conspicuous postero-dorsal at almost the same level but the first one usually a little further from the base, two or three less conspicuous antero-ventral at and after the middle, and sometimes one small postero-ventral near the base, and the apical circlet of spur-bristles usually white but sometimes with two long ventral ones black; hind tarsi with the bristles usually all black, but sometimes one white antero-ventral one on each of the first and second joints or even with three white ones on the basal joint.

Wings rather smoky with scarcely any gloominess; veins dark brown but more brownish orange towards the base. Squamæ brownish orange, with the margin yellow and bearing a long white rather conspicuous and abundant fringe. Halteres brownish orange.

♀. Very much like the male but easily distinguished by the ovipositor. Face and frons rather whiter; frons and the underside of the basal joint of the antennæ in some specimens with no pale hairs intermixed with the black ones.

Thorax with the pubescence and bristles very variable in colour, as of two specimens caught on the same day and place (Dyffryn, July 21, 1888) one has all the bristles black while the other has them all white except the front præsutural, and at the same time this latter specimen has the short whitish pubescence on the hinder part of the thorax more obscure than usual; another specimen caught on the same day has all the postsutural pubescence white; sometimes all the bristles on the thorax, even including the front præsutural, are white. Scutellum usually as in the male, but in one specimen the long marginal bristles are black.

Abdomen with the præhindmarginal fringes becoming slighter on the later segments; eighth segment merged into the ovipositor; ovipositor compressed after the base, and with a circlet of rather short and stout but conspicuous black bristles at the tip (fig. 351) (peculiar to this one of the British *Asilinae*), of which usually about three belong to each lamella but sometimes four (or even five, though then some are smaller); beneath this circlet are some more inconspicuous shorter stout bristles, and the whole of the ovipositor bears sparse short pale pubescence which becomes more abundant towards the tip.

Length about 15 mm. but varying from 12 to 17 mm.

This species varies a good deal in size and remarkably in the colour of the bristles on especially the thorax and legs, as mentioned in the previous description. Amongst British species it is liable to be confounded with *Eutolmus rufibarbis* and *Machimus rusticus*, but the female may be at once distinguished from both of them by the anal circlet of stiff bristles; the male may be known from *Eutolmus rufibarbis* by the absence of any ventral process from the eighth abdominal segment, as well as by the much more extensively white pubescence and bristles, while the male of *Machimus rusticus* also has a ventral process from the eighth abdominal segment, the base of the tibiæ obviously (even if only to a small extent) reddish, and the scutellar bristles more numerous. *P. albiceps* is also altogether a lighter grey fly with the face and especially the face-beard and the frons more whitish than in the others, while the fine pubescence beneath the front tibiæ is comparatively short and slight and consequently inconspicuous. The very closely allied *P. clutus* from the Mediterranean region may be a distinct species, as is noted in the synonymical note below.

P. albiceps is an abundant species on sandy coasts, and I have numerous records from Cornwall, North Devon, Dorset, and Hampshire (Christchurch) to Aberlady in Haddington, and Irvine Moor in Ayrshire; Mr C. Morley states that it is very common on coast sands at Lowestoft Denes and Felixstowe in August, and it is noteworthy that while I caught immature *Pamponerus germanicus* at Barmouth on June 10 and 11, 1887, and did not then find *P. albiceps* at all, on July 20 and 21, 1888, I found *P. albiceps* in abundance but no *P. germanicus*. Colonel Yerbury found it common at Waterville and Dooks (Glenbeigh) in Ireland on the sand-hills, and I had an old record from South Tyrone. I believe it also occurs inland on sand-hills and such-like localities. My records extend from June 28 to September 18, and on the latter date in 1907 Colonel Yerbury took a female at Aldeburgh which was feeding upon a female *Platychirus fulviventris*. It is known to occur over Middle and Northern Europe, but such localities as Portugal and Japan require testing as against *P. clutus*. Specimens taken by the late Frederick Smith in North Devon were preying upon Grasshoppers, while Colonel Yerbury records that "A female taken at Dooks was preying on a *Lucilia*, but at "Waterville the usual quarry was *Orygma luctuosum*, though now and "again an Anthomyid was taken. On more than one occasion instances of "cannibalism were met with, and one (at any rate) of these was that of a "female preying on a female."

Synonymy.—It is very probable that Moses Harris' *Asilus delector* (1782) is this species, but his description and figure are far too vague for positive identification. Stephens considered Harris' species (which he incorrectly called *As. delecta*) to be probably the same as *A. cristatus* Meig., by which he undoubtedly meant *Dysmachus trigonus*, but Harris' species would be far too large for that as he says "nine lines." *P. clutus* Loew has the face-beard all white (in a female from Kowarz's collection) or with perhaps one black hair (two females from Bigot's collection), the frontal and ocellar hairs all white except a few small black hairs close to the upper eye-angles; the thorax lighter grey than in *P. albiceps* with the side-stripes less separated from the middle stripe, and with the tiny bristles conspicuously white all over the disc even to the front part; wings whiter, with the veins (in Bigot's specimens but hardly in Kowarz's) to a large extent yellowish; squamæ clearer yellow; halteres clearer orange; a male from Sicily which stood in Bigot's collection under *P. albiceps* is shorter and whiter, and has a more distinct dark dorsal stripe on the abdomen with far more numerous tiny black bristles on it. Pandellé (Rev. d'Entom., xxiv.,

90) considered *P. elutus* to be a variety of *P. albiceps*. I cannot help believing that *P. albiceps* must be the species recorded by B. Cooke (Naturalist, v., 134) under the name of *A. forcipatus* as common on the Cheshire coast, as he surely cannot have overlooked so common a species.

ASILUS (sensu lato nec latissimo).

(Including *Antiphrisson*, *Eccoptopus*, *Rhadiurgus*, *Pamponerus*, *Echthistus*, *Antipalus*, *Lophonotus*, *Protophanes*, *Dysmachus*, *Eutolmus*, *Machimus*, *Heligmoncura*, *Stilpnogaster*, *Epitriptus*, *Ncoitamus*, *Paritamus*, *Tolmerus*, and *Cerdistus*, but not including *Promachus*, *Alcinus*, *Philodicus*, *Proctacanthus*, *Polysarca*, *Apoclea*, *Polyphonus*, or *Philonicus*.)

Asilus Linné, Syst. Nat. Ed. x., T. 1, 605 (1758); v. Hendel, Wien. Ent. Zeit., xviii., 111 (1899).

Style bare, first joint much shorter than the second. Abdomen narrow. Middle tibiæ without any terminal hook-like thorn. Cubital vein without any trace of a recurrent veinlet from its upper branch. Ovipositor without any terminal circle of spines.

Strongly bristled flies of very large to moderate size (never really small), distinguished from the other *Asilinae* by the simple cubital fork, and middle tibiæ and by the unarmed ovipositor.

Head with a strong conspicuous face-beard which leaves at least some space (usually about a third of the face) bare on the upper part as well as the sides; this face-beard may be composed of stiff bristles or soft hairs but is always well defined and droops over the mouth-opening; face sometimes slightly narrower in the male than in the female. Chin and jowls with long dense soft pubescence, while similar pubescence extends some distance up the back of the head, but on the upper part ($\frac{1}{3}$ to $\frac{2}{3}$) is the "festoon," which is composed of a row of stiff bristles near (but not quite close to) the eyes, and these bristles though sometimes comparatively short and stumpy are more commonly long and have the upper ones bent forwards at their tips in a peculiar manner (fig. 362). Frons almost equally wide in both sexes, and deeply sunk between the eyes on at least the upper part or vertex, bare on the channel between the tops of the eyes and on the two forks of that channel which run down the sides of the ocellar space and also on the comparatively large middle space between the ocellar space and the antennæ, but some small bristles begin on the orbits about level with the ocelli, and extend more inwards away from the orbits on the lower part nearer the antennæ; collar (= prothorax) conspicuous and always pubescent, and with a few strong bristles on its upper part. Proboscis prominently produced, usually shining, and with short pubescence about its tip and long straggly hairs beneath on its basal half. Eyes bare, and with a bulging appearance caused by their protuberance from the sunken vertex. Antennæ porrect; two basal joints comparatively short and always bearing bristles; third joint strap-shaped, and sometimes tapering, as long as the two basal ones together, with a terminal thin style which is usually almost as long as the third joint, and this style has a short basal joint and a thin pointed tip.

Thorax strongly built, rather contracted in front so that it stands well away from the head. Pubescence (including short bristling) always extending over almost all the disc and usually composed of short bristles, but thin (usually pale) hairs exist inconspicuously along the sides, e.g., on and about the humeri, over the wing-base, on and about the postalar calli, and often between these parts and on the hinder part of the thorax; the usually short bristles generally increase in length

between the suture and the hindmargin but can seldom be confounded with the strong bristles (macrochætæ), and in some cases (*Dysmachus* and *Lophonotus*) the small bristles on the middle line may be as long as the macrochætæ even to the front part of the disc. Bristles (macrochætæ) following very similar arrangements in all the species though varying in numbers; præsutural usually consisting of two strong ones, though sometimes (*Epitriptus*) there may be only one strong one, while in other cases (*Pamponerus*, *Asilus*, *Dysmachus*, etc.), there may be five or six, and often when there are only two strong ones there may be one or more weaker ones in advance (nearer the foremargin of the thorax); supra-alar (as distinguished from the "postalar" which are placed on the postalar callus) usually about three distinctly supra-alar, but varying from two to five or six and sometimes these bristles are placed so far from the wing-base as to appear intra-alar (*Asilus*, etc.), or the supra-alar bristles may form a sort of row which may extend almost intra-alarly (*Pamponerus*); postalar usually about two strong ones but varying from one to six, with some additional weaker bristles usually present; dorso-central in two well defined rows but varying in numbers, extent, and strength, as they often die down towards the hindmargin so much that they may be lost in the ordinary pubescence, while often they may not extend forwards in front of the suture (*Asilus*) or they may extend as far as the front of the thorax though then they are hardly distinguishable from the long dense bristly pubescence on the middle line. Pleuræ with only moderate and usually inconspicuous pubescence except for the metapleural and hypopleural fans, both of which are always obvious, though the metapleural fan may be composed of long hairs of any degree of strength from soft hairs to stiff bristles, while the hypopleural fan usually has its two or three uppermost hairs or bristles even stronger than those on the metapleuræ but the subsequent hairs or bristles weaker; some soft fine pubescence always exists on the prothorax and on the space between that and the front coxæ, while at least traces of fine pubescence occur on the upper and hind parts of the mesopleuræ, on the pteropleuræ (generally rather more bristly), and on the upper part of the sternopleuræ, besides some fine hairs about the metapleural and hypopleural fans. Scutellum usually with fine pubescence on the disc, but sometimes this pubescence is represented by tiny bristles (*Asilus*), and always with some long upturned marginal hairs or bristles. The colour of the bristles (both small and large) affords some valuable specific distinctions but yet is liable to variation within certain limits, and must therefore be accepted with doubt when applied to individual bristles.

The markings of the thorax are generally persistent in each species, but not so invariably as to provide good specific distinctions in all cases, yet they are so characteristic in some species that they give important means of identification. The most conspicuous marking is as a rule the MIDDLE STRIPE, which begins rather widely quite anteriorly but narrows posteriorly in most species and as a rule does not quite extend to the hindmargin or is carried on only as a narrowing stripe or spot; this middle stripe is usually split (at least in front) by a pale line which is called the MIDDLE LINE. Next to the middle stripe come the (usually distinct) SIDE STRIPES, which however are sometimes entirely absent; when present and complete each stripe is composed of three parts, of which the front part is præsutural but does not extend to the front of the disc, and the middle part is postsutural being separated from the front part by a sloping pale line which follows the suture, while the third part is an awl-shaped spot rather close to the middle stripe and pointing towards though not reaching the hindmargin. There is also usually a dark HUMERAL STRIPE on each side which slopes from the humeral region and may curve round towards the front end of the side-stripe or may extend down alongside the middle stripe. The thoracic markings will be found to vary in colour and shape according to the light and the direction from which they are viewed, and consequently it is necessary when describing these markings to indicate the point of view; the usual point of view accepted for producing the most sharply defined markings is obtained by looking down on the specimen held perpendicularly with its head farthest away and with the light shining from in front.

Abdomen rather long and narrow, without any conspicuous lateral tufts of pubescence; usually with but little pubescence and consequently very different from the humble bee-like *Laphrina*, but with exceptions; the actual hindmargins of the segments (especially the second segment) usually have a more or less narrow bare hem; eighth segment often dorsally or entirely concealed in the male, and often providing valuable distinctive characters in the form of its ventral hind-

margin as mentioned later on in the characters of the belly, while in the female it forms part of the ovipositor. Bristles often entirely absent, but a row of bristles or strong bristly hairs frequently occurs close to the hindmargins of the segments or may be limited to the sides of these præhindmarginal rows, or be limited to the sides of the præhindmarginal rows on the basal segments only; when the bare hindmarginal hems are wide or obvious these bristles are ranged in a row close to the bare hindmargin; no other bristles occur upon any other part of the dorsal surface of the abdomen. Belly often with long pendent sparse fine pubescence on at least the basal segments, and sometimes with minute bristly pubescence on the end segments (*Asilus*), and sometimes with a few bristles just before some of the hindmargins in the male, while the shape of the hindmargin of the eighth segment in the male often gives strong characters and indicates close relationships, as it is sometimes quite straight, sometimes more or less widened, and sometimes produced into a spoon or trowel-like projection upon which considerable bristly pubescence may exist; the hindmargins of other ventral segments are sometimes more or less dropped from the ventral line. Genitalia of the male conforming to one main type, though with manifold variations in the form and size of the various parts. There are two pairs of lateral lamellæ, and one basal ventral process near or enclosing the penis; the upper and larger pair of lamellæ are called the "claspers," and the different forms of their upper, under, and especially inner, sides, afford valuable specific (and perhaps generic) characters. The claspers commonly have a more or less conspicuous dentation on their inner side about their middle, so that when placed in such a position that their points meet they enclose (on the end half) a more or less oval or circular space and this part of the claspers is called the "forceps"; the claspers also before this dentation usually enclose a small oval space, but when there is no middle dentation the two arms of the claspers would together form the forceps. The lower and smaller pair of lamellæ lie under the basal part of the claspers and are merely called the "lower lamellæ"; they either lie against the arms of, or push their curved tips up between, the claspers, and as their shape does not seem to vary much they are not of so much value for distinctive purposes. The basal ventral process may be called the "middle piece," and is a small narrow strap-shaped lamella, which lies between the claspers in a more or less sloping position and usually bears a moderate pale pubescence, but as its form seems to afford but few obviously distinctive characters it has been but little referred to. The penis can seldom be examined without softening and opening the genitalia, but forms a three-pronged fork in which the prongs vary specifically both absolutely and relatively, while sometimes its length and direction are obvious enough to notice. The genitalia of the female are composed mainly of the ovipositor which is formed out of the eighth and ninth abdominal segments and is ended by two small lamellæ which extend out (generally) from the tip of the ninth segment. The simplest and most typical form shows a conical two-jointed ovipositor with two lamellæ projecting from its tip, but as the parts are usually distinctly modified this simplest form occurs but seldom; the terminal lamellæ are usually crooked, and occasionally are of considerable size and bent downwards (*Antipalus*), in which case the eighth abdominal segment does not form part of the ovipositor. The ninth segment is often emarginate or notched at its end, and both the eighth and ninth segments (like the previous ones) are divided into an upper and an under half-segment; as a rule the upper half of each segment is distinctly separated, but the segments of the under half are usually indistinct; in many species the under half of the eighth segment is very much enlarged, especially in those females which have the ovipositor strongly compressed and of the well-known triangular or sabre-shaped figure. It is usually not difficult to distinguish the two separated upper pieces, the terminal lamellæ, and the single under-piece, of which the end part is usually characterised by peculiar sculpture and sometimes by strongly characteristic pubescence. When the upper part of the ninth segment is notched on the hindmargin (fig. 358) the terminal lamellæ are wedged in this notch. The shape, comparative size, and sculpture of all these parts of the female genitalia deserve the closest examination as they provide very positive distinctions. The ovipositor when compressed is often formed of not only the eighth and ninth segments, but also of the seventh, or even of the sixth and seventh segments (*Neotamias*).

The markings of the abdomen are usually less distinct and less characteristic than those of the thorax, and are also difficult to describe because they vary so much according to the point of view; the contrast in different lights is so great that those

parts which appear the lightest when viewed from in front appear the darkest when viewed from behind and *vice versa*; as a rule the most definite markings are seen when the specimen is viewed from behind; sloping lights also give different patterns of colour. Each segment has a skin-like bare hem on its hindmargin which is the membrane uniting it with the next segment.

Legs strong, and normally provided with strong bristles which are probably useful in catching and holding prey. The tibiæ always bear rows of bristles and a circlet of bristles at the tip, while each of the four basal joints of the tarsi is provided with an apical circlet; other bristles also occur on the basal joints of the tarsi away from the tips, while the femora usually bear scattered bristles. Besides the bristles there is often considerable long soft pubescence behind and beneath the anterior femora and to a smaller extent on the hind femora. Another form of clothing exists in the minute adpressed short usually whitish hairs which cover almost all parts of the legs, and which may even modify the ground colour, and dense orange or reddish felt covers considerable spaces on the inside of the front and hind tibiæ and on the soles of the tarsi. Some long thin postero-ventral bristles always occur on the front tibiæ. The bristles are by no means invariable in position or colour, but yet in conjunction with the long bristly hairs they afford useful specific characters.

Wings usually conforming to one type of coloring, and only distinguished notably amongst British species in *Asilus crabroniformis* and *Pamponerus germanicus*; there is however a peculiar but indistinctly margined grey clouding or gloominess on the outer part of the wing which may afford specific distinctions, as its extent may vary in its limitations to grey kernels in the cells or to its leaving the veins with hyaline borders or to its greater connection between the posterior cells and the wingmargin. The intensity of brownish coloring about the veins may vary within the limits of individual species according to the age of the specimen, and the general tint of the wing may vary according to the colour and nature of the earth upon which the specimens exist. Small distinctions may occur in the venation, in the shape of the cubital fork, and especially in the presence or absence of the small cross-vein, but this latter character must always be accepted with doubt in this genus because individual specimens may differ, as in all cases the cross-vein if present is very short and if absent the upper branch of the postical vein only touches the lower margin of the discal cell for a short space.

The characters now given for the extended genus are partly original but mainly adopted from Loew's article in the *Linnæa Entomologica*.

2. ASILUS (*sensu strictissimo*).

Asilus Linné, Syst. Nat., Ed. x., T. 1., 605 (1758) pt.

Asilus (*sensu strictissimo*) Loew, Linn. Ent., iv., 132 (1849).

Large or very large brightly colored flies; wings orange with brownish markings at the tip and spots or markings near the hindmargin.

Face broad; facial knob forming only a rounded projection, and the unicolorous bristly face-beard leaving the upper half of the face bare; face-beard not connected with the jowl-beard; festoon composed of only short hardly curved bristles. Proboscis long and pointed. Antennæ with only short inconspicuous bristles on the two basal joints.

Thorax rather flat, with the usual dark stripes rather faintly defined. Pubescence composed of minute bristles all over the disc except on a narrow middle line, and these minute bristles are strongly contrasted with the strong bristles. Bristles not long or strong but conspicuous; 2-3 præsutural, 3-4 supra-alar or almost intra-alar, 3-5 postalar, 4-6 dorso-central all postsutural; metapleural fan composed of about six long bristles or bristly hairs, and the hypopleural fan of about four stiff hairs. Scutellum with short bristly pubescence on the disc except down a middle stripe, and with 2-6 curved marginal bristles which are neither stout nor strong.

Abdomen long and curved, conspicuously black or partly orange; eighth segment concealed dorsally, but short and simple ventrally. Pubescence mainly composed of minute bristles, but with longer tufts at the sides of the basal segments (occurring on the second segment about the middle of the sidemargins); no hindmarginal bristles. Belly with minute bristles, besides the pendent long hairs on the basal segments. Genitalia rather small; claspers moderately dentate after the middle on the inner side; ovipositor conical and pointed, not at all compressed laterally nor with any terminal circle of spines.

Legs strong, mainly orange; tarsal joints neither unusually long nor short. Pubescence slight, and the usual strong bristles rather numerous but comparatively short.

Wings with a brownish orange tint, and with conspicuous brownish apical and hindmarginal spots or dashes; cubital fork with a very slightly bell-shaped opening; third veinlet from the discal cell *curved* round to the upper branch of the postical vein (fig. 339). Squamæ (alar) with a single fringe on the upper part of the margin but a dense outspread pubescence on the lower part.

This genus is very distinct from any other European one, but such a vast number of species have been described under the term *Asilus* that it is not easy at present to define its limits. It needs no comparison with any other Palæarctic genus.

Asilus in its most limited restriction includes in Europe only two well known species, of which one (*A. barbarus*) is confined to the Mediterranean district, but a considerable number of species are recorded (perhaps not truly congeneric) from North America and South Asia.

Synonymy.—Linné's conception for this genus in his *Systema Naturæ*, Ed. x., 605 (1758) included twelve species of which six are recognised as well-known species of the *Asilidæ*, and three others are believed to be true *Asilidæ*; his first species *A. maurus* has not been recognised, but as he compared it with *A. crabroniformis* the latter may well be considered the type of the genus.

1. ***A. crabroniformis*** Linné. Abdomen basally black but orange after the third segment.

A large handsome fly with a light brown thorax, black basal half and orange apical half to the abdomen, and maculated hindmargin to the wings.

♂. Head nearly as broad as the thorax and more than twice as broad as long; frons near the antennæ when seen from above not sunk between the eyes. Face broad (one-third the width of the head) and very little wider at the mouth than at the antennæ, but the frons slightly widening out just above the antennæ though very slightly contracting again towards the vertex; face and frons covered with golden tomentum; lower half of the face down to the upper mouth-edge produced into a rounded projection which can hardly be called a facial knob, and on this projection with a long strong drooping face-beard composed of bristle-like yellow or deep orange hairs, and these hairs extend down the sides of the mouth for more than half-way to the lower mouth-angle, but the upper half of the face and the lateral thirds are bare; after the face-beard ceases there is a bare rather blackish interval before the commencement of the long dense pale yellow pubescence which occurs on the back of the head and round under the chin; this pale yellow pubescence is long for about one-third the way up the back of the head, but after that becomes shorter (though still long) and extends as almost a single-line bristly festoon quite up to the vertex, but is all the way well set back from the eyes by the intervening broad orange eyemargin, though on the eyemargin itself some shortish inconspicuous yellow pubescence exists close to the bristly fringe; near the vertex this festoon widens out into three or four bristles wide and the bristles on the front part usually curve a little forwards at their

tips towards the upper eye-angles, but the postvertical channel is bare and causes an interruption; the hairs of the fringe on the upper half of the head are really bristles as they are stout and strong, but they are hardly long enough or curve over enough to call them a festoon; actual back of the head all orange and bearing some pale pubescence on its upper part; frons bare on the middle and all above the ocelli, but some small yellow bristles occur on the sides level with the ocelli, and soon after the lower ocellus some stronger yellow bristles occur on the sides in about three irregular rows, and these bristles slope very much forwards and continue until level with the upper part of the antennæ, but the wide middle part of the frons between the ocelli and the antennæ is bare, and the somewhat diamond-shaped depression extending across just above the antennæ is black; ocellar space not much elevated, bearing a few small orange bristles of which occasionally the upper pair are black. Proboscis long, shining black, with the basal half on the underside reddish and with some short weak obscurely yellowish pubescence about the tip and some long pale yellow hairs beneath near the base; palpi short (not a quarter the length of the proboscis), thin, and brownish orange, and bearing mixed black and orange rather porrected bristly hairs. Collar brownish orange, with abundant yellow pubescence and with about four inconspicuous yellow bristles on the upper part. Antennæ (fig. 340) with the two basal joints reddish orange but with the third joint black; basal joint bearing short adpressed bristles which are mainly orange on the upper part but more or less black beneath; second joint with only very short inconspicuous orange bristles; third joint elongate strap-shaped but attenuated towards its tip, four or five times longer than broad; style black, thin but not hair-like, about half as long as the third joint and turned outwards.

Thorax brownish orange with faint slightly browner broad nearly coalescing stripes on the hinder two-thirds, but with the middle stripe continued as a split blackish brown stripe right up to the front part and widened there; the brownish orange line which splits the middle stripe is continued faintly quite through to the hindmargin; back part of the humeri usually bright chestnut. Pubescence composed of minute bristles all over the disc except on the narrow brownish orange middle line, and these bristles are black on the disc but yellow on the sides and turn to rather longer thinner hair-like pubescence on the humeri and just above the wing-base and on the base of the postalar calli. Bristles not very long or strong but very conspicuous, because there are no long bristly hairs near them and because they are bright whitish yellow in contrast to the brownish orange ground colour; usually two (2-3) præsutural, three or four supra-alar almost intra-alar, three or more (3-5) postalar, and from four to six (often not symmetrical) dorso-central which are all well after the suture. Pleuræ with the ground colour obscured by reddish orange dust; prothorax and part of the space below (near the front coxæ) with abundant rather long pale yellow pubescence; mesopleuræ with whitish hairs about the hind top corner and some indistinct black bristly hairs about the front top corner and down the hindmargin mixed with some whitish yellow hairs; sternopleuræ with several black hairs on the upper back part; pteropleuræ with some long yellow bristly hairs on the middle of the upper part; metapleuræ with a fan of about six long bristly hairs or bristles and numerous shorter hairs, varying in colour from all black to sometimes all yellow or sometimes partly black and partly yellow; hypopleuræ with an imperfect fan composed of about four long bristly hairs (of which the top one or two may be yellow). Scutellum brownish black, but in some lights obscured by reddish orange dust, and bearing numerous short black bristles except down a rather broad middle stripe, and with about four (2-6) upturned curved yellow marginal bristles which are rather long but not stout or strong; metanotum shining black, with the humps at its sides brownish orange and bearing at their lower back part some very dense brush-like rather short black bristly pubescence.

Abdomen long, not quite so broad as the thorax but one and a half times as long as the head and thorax together, with the three basal segments dull deep black and the next four bright orange or occasionally reddish orange with blackish reflections on the sides when seen from above; eighth segment not visible dorsally; second segment with elongate dull whitish (in some

lights glistening) quite bare hind corners; third segment often with a dark orange rather narrow bare hindmargin which becomes rather whitish at the extreme hind corners, and sometimes with the extreme front corners reddish. Pubescence mainly minute and formed of tiny bristles which follow the ground colour and which give a glistening appearance to the orange segments; basal segment with a rather large tuft of hairs on each side which is rather long and yellow on the lower part but shorter and black at the extreme front corner; second segment with a tuft of hairs on about the middle of each sidemargin, which is usually nearly all black but with the innermost hairs (those towards the disc) yellowish (at least at their tips) and with these longer hairs curled back, but sometimes the yellow hairs predominate; third segment with a shorter tuft of black hairs on each sidemargin; fourth segment with short black bristles on the extreme sidemargins and these bristles becoming rather longer close to and at the hindmarginal corners; all the other pubescence is minute and even the fringes at or near the hindmargins are scarcely perceptible; the hindmarginal hems are bare on the four basal segments only. Belly reddish brown or darker on the three basal segments, but rather paler on the fourth and orange on the last four, the eighth segment being visible ventrally even though short; hindmarginal hems bare, but the second and third (and to a small extent the fourth) segments with some outspread longish pale hairs, though not on the middle part, as on the middle part of the second segment there are a few short inconspicuous black bristles, while on the third segment there are still more numerous similar bristles which grow longer against the bare hindmarginal hem, and on the fourth segment these little black bristles occupy most of the disc but leave some of the longer pale hairs and some (about four) rather long bristly yellow hairs towards each side of the hindmargin; fifth segment with all tiny black bristles except for numerous inconspicuous yellow bristly hairs which occur near the hind corners or all along the hindmargin; sixth, seventh, and eighth segments with tiny all yellow bristles which form slight fringes along the hindmargins; ventral hindmargins of the fifth and sixth segments a little dropped. Genitalia comparatively small; claspers long, tapering towards the tip but with a rounded tip, and (when seen from above) dilated about the middle part so that when closed they include a short ovate basal space (from which the narrow pubescent brown middle piece stands up) and after the swelling a smaller narrower ovate space, but the basal ovate space has more shelving margins; the claspers are reddish brown and bear short pale yellow pubescence which becomes rather bristly beneath the tip; under lamellæ reddish brown, rather small, upturned between the basal part of the claspers, and bearing bristly yellow pubescence; basal under plate brownish black with some short golden hairs, and all the middle part when seen from below reddish brown.

Legs brownish red, with a blackish tinge on the femora, and the tibiæ brownish orange with a blackish tinge outside the hind pair and sometimes a blackish tinge inside the middle pair, and the tarsi dull orange with occasionally the upper side of the basal joint of the hind pair darkened; coxæ dusted brownish orange. Pubescence on the front coxæ abundant, long, drooping and yellow on all the front part, with the hairs of stout texture; and on the middle coxæ similar but the stout yellow hairs more confined to the apical part, while just before them on the outside are a few shorter hairs (which may be either orange or black) and outside on the disc nearer the base are two long yellow bristles, and on quite the back part are a few stout black bristles; the hind coxæ bear round the tip a few black bristles and one orange one, and a few long bristly black hairs outside amongst which is a longer stouter orange bristle or two on the middle of the disc; trochanters all polished chestnut, bare except for a little yellow pubescence on the front of the middle pair, and some minute golden hairs and about three long orange bristles on the dusted hind part of the hind pair. Bristles on the front femora consisting of three orange postero-dorsal placed well apart on about the apical half, and a row of about four stout and five or six weak (hair-like) black bristles on the underside; front tibiæ with three long postero-ventral, of which the uppermost is near the middle, and about five short yellow dorsal which require the help of a few irregular rather antero-dorsal small yellow bristles to complete the upper

end of the row, and with a little long pubescence beneath, and the apical circlet yellow; front tarsi with the usual bristles all strong and yellow, but with the plantar ones black and with those at the end of the fifth joint hardly divergent; middle femora with two anterior bristles (one before and one after the middle), about four antero-ventral near the middle, about ten very small bristles beneath, and one or two inconspicuous orange postero-dorsal subapical, while the minute pubescence is adpressed and mainly black but is golden on the upper part; middle tibiæ with only short orange bristles, two antero-dorsal, three postero-dorsal, four or five antero-ventral, and two or three postero-ventral, and with the apical circlet short; middle tarsi with black plantar bristles beneath each joint besides the longer orange bristles, and with the minute adpressed pubescence orange but becoming slightly longer and more erect on the underside; hind femora with about three (3-5) antero-dorsal bristles of which one or two rather near the base may be either black or orange, one just after the middle black or orange, and one or two nearer the tip orange with the last one longer, rather numerous antero-ventral bristles, about four ventral, and the usual subapical; hind tibiæ with one bristle near the base just antero-dorsal, two quite antero-dorsal (one at the middle and one at three-quarters), four or five antero-ventral of which two or three are after the middle, one just postero-dorsal at one-third the length, and with the apical circlet very short on the upper side; hind tarsi with a few black plantar bristles, and with black or orange bristles at the tips of the joints. Pulvilli long and almost oblong, dull orange; empodium represented by a long orange bristle; anterior claws very long and thin, nearly straight for two-thirds of their length but then sharply curved, orange about the base but becoming black on at least the apical half, hind claws more evenly curved.

Wings with a brownish yellow tinge and with conspicuous brownish kernels to all the submarginal and posterior cells, of which the one in the first posterior cell forms a long unequal stripe; discal cell with a small brownish isolated spot near the end of the cell; axillary cell with a rather large spot which extends to the wingmargin but not to the anal vein; fork of the cubital vein not so much bell-shaped as usual because the branches run nearly parallel and do not conspicuously diverge at the wingmargin; third veinlet from the discal cell curving round into the upper branch of the postical vein. Squamæ (alar) small, brownish orange, with a long single fringe on the outer part, but with a dense brush-like outspread brownish yellow pubescence on the broad lower margin; thoracal squamæ quite absent, though a peculiar brilliantly shining knob is visible on each side near where the base of each should be. Halteres orange, with blackish knobs.

♀. Very much like the male. Thorax sometimes with the stripes rather darker and the pale line dividing the middle stripe more conspicuous.

Abdomen tapering from the fourth to the seventh segment (inclusive), but those segments not decreasing in length; eighth segment very short and (being shining black) appearing to form part of the ovipositor and bearing numerous short rigid black bristles, though sometimes with a narrow greyish hindmargin; sometimes the tufts on the sides of the second segment are all black haired. Belly with erect short stiff black hairs on the apical half of the seventh segment, and with the short stiff black hairs on the sixth and fifth and even fourth segments more conspicuous than in the male. Ovipositor shining black (or with lurid red reflections), forming a long sharp triangle nearly twice as long as its base is broad and distinctly longer than the seventh abdominal segment, not at all compressed and bearing no apical circlet of bristles but with very short erect sparse black hairs; terminal lamellæ very short and bearing short pale pubescence. Sometimes the sides of the orange part of the abdomen show blackish reflections (when viewed from above) as in the male.

Legs with rather more numerous bristles; front femora with four or five postero-dorsal, and seven or eight black ventral bristles on the basal half, while the postero-ventral long bristles or hairs seem to be longer and stronger; posterior femora with more numerous (about 14) black bristles beneath in two irregular rows which do not nearly extend to the tip.

Length about 24 mm.

This species is one of our largest and handsomest British flies, and has no ally in Europe except the Mediterranean *A. barbarus*.

A. crabroniformis is much more common in the southern part of England than is commonly imagined. It may seem strange but it is nevertheless true that so large and conspicuous an insect is not easily seen; on commons or pastures it flits from bare patch to bare patch without waiting to be closely approached and harmonises very much with the ground upon which it rests. I have records from Cornwall (The Lizard and St Ives), Devonshire (Plymouth, Holne, and Tor Cross), Dorset (Canford Common, Swanage), Hampshire (Lyndhurst, Bourne-mouth, and Freshwater in the Isle of Wight), Sussex (Eastbourne, Lewes, etc.), Suffolk (Newmarket, where it used to occur in a pasture which is now part of my garden,* Fritton, Tostock, Assington Thicks, and Bentley Woods), Berkshire (Tubney), Oxfordshire (Shotover, etc.), the neighborhood of Bristol, and according to B. Cooke the Cheshire coast, while in many of these localities it is comparatively common. It preys on remarkably large insects, as I saw it feeding on *Sericomyia borealis* and on a very large *Sarcophaga carnaria* on Canford Common in August 1904. My dates make it out to be a rather late species as they extend from July 18 to September 30. It is recorded from all Europe and the greater part of Asia, while Walker (probably incorrectly) recorded it from Australia (List. Dipt. Brit. Mus. Suppl. 680) though a specimen from Bigot's collection is labelled "New Holland."

3. RHADIURGUS.

Rhadiurgus Loew, Linn. Ent., iv., 133 (1849).

Greyish black flies of rather small size, distinguished from all other European *Asilinae* by the shining black face.

Face shining black, with whitish eyemargins and with whitish tomentum on the facial knob; facial knob large and well defined; face-beard bristly; postocular festoon well developed, but the stout bristles not long and not much bent forwards at the tip; frons at the vertical part rather deeply sunk between the eyes and the ocellar knob correspondingly elevated, moderately wide but not widening out at all at the upper eye-angles. Antennal style long and rather thin.

Thorax with the ordinary short pubescence all well distinguished from the long bristles; dorso-central rows of bristles ending anteriorly abruptly just in front of the suture; metapleural and hypopleural fans fairly distinct. Scutellum clothed with inconspicuous soft upturned pubescence, and with from two to four upturned marginal bristles.

Abdomen rather flat, unusually bare and without any bristles against the hind-margins except a few indistinct ones near the sides of the basal segment; eighth segment of the male concealed dorsally, but short and simple ventrally, concolorous with the preceding segment. Genitalia of the male long but not knobbed; claspers with a large strong tooth on the inner side; penis most unusually long; ovipositor short, blunt, and conical or rather depressed, but in no way laterally compressed, ending in a pair of ovate lamellæ and without any terminal circlet of spines; eighth abdominal segment of the female depressed and appearing to form the base of the ovipositor.

Wings normal. Alar squamæ with only moderate fringes.

Legs moderate in shape and length, black with the tibiæ and tarsi partly dull red.

* A specimen was seen on September 3, 1908, after a lapse of about twenty-eight years.

This genus was suggested by Loew in 1849 for a single North European species and consequently the limits of the generic characters are rather uncertain. The conical, by no means laterally compressed, ovipositor and the absence of any hindmarginal bristles on the abdominal segments seem to ally it to *Pamponerus* or *Asilus*, but its small size and dark coloring differentiate it strongly from them; the shining black face distinguishes it from any other European species of the *Asilina*, while *Philonicus*, *Dysmachus*, *Eutolmus*, and *Machimus* of the British genera all possess obvious hindmarginal bristles on at least the sides of the abdominal segments, and if any doubt should arise about *Neoitamus* that genus may be known by the mainly bright orange tibiæ and bare dark thoracic stripes, while *Epitriptus* has conspicuous irregular orange markings on the legs and is a yellowish grey species; *Neoitamus* and *Epitriptus* are easily distinguished in the female sex by the compressed ovipositor.

Synonymy.—Although two or more species have been described since its establishment as belonging to this genus I am unable to give any further particulars about it, and no suggestion has ever been made for its submergence into any of the allied genera (or subgenera). *R. leucopogon* Williston from North America cannot possibly (according to its description) belong to it, but there is a reported South Asiatic species.

1. *R. variabilis* Zetterstedt. Face shining black. Legs black, with the tibiæ and tarsi partly dull red.

A rather small blackish species, with the face and frons shining black and the legs partly dull reddish.

♂. Face shining black on the bare upper third, but with distinct yellowish white tomentum on the upper two-thirds of the rather well defined eye-margins, and in some lights with comparatively sparse whitish tomentum extending over the face-knob; face-knob of medium size but well elevated and bearing the face-beard which is mainly black but whitish below on the middle part only, as the black bristly hairs extend down outside the whitish hairs and along the sides of the mouth; chin and jowl beards long and snowy white; back of the head with rather long whitish sparse pubescence and with a postocular festoon on the upper third of about ten (8-12) stout black bristles, which dip away from the vertex, and of which only a few bend over forwards at the tip; frons moderately shining black, but with a little ferruginous or grey dust about the sides, deeply sunk between the eyes and with the ocellar knob correspondingly elevated, hardly widening out at the upper eye-angles; bristles on the ocellar knob and on the sides of the frons black, moderate in length and rather thin. Proboscis shining black, nearly horizontal, and bearing the usual short pale pubescence at the tip and the usual long hairs beneath on the basal half; palpi short, black, and bearing black bristles. Antennæ normal in shape; two basal joints with the usual short black bristles (longest on the underside of the basal joint); style with an obvious short basal joint, not quite so long as the third joint and scarcely placed at an angle to it.

Thorax dark ashy grey; middle stripe distinct, rather broadened anteriorly but contracted after the suture until almost reduced to a point or two points about half-way between the suture and the hindmargin or continued narrowly thence to the hindmargin, and this middle stripe is split by a narrow dark grey line; side stripes composed of three somewhat variable spots, of which ordinarily the front one (level with the humeri) is small and sometimes indistinct, the next one large and occurring just in front of the suture and with its lower end extending inwards, and the third one (immediately after the suture) outwardly nearly as large as the previous one but not extending half-way to the hindmargin; after that and on the inner side of the last pair of spots are the usual

two elongated dark spots which almost extend to the hindmargin; humeral stripes short but distinct. Pubescence short and black, slightly longer after the suture when mixed with the long bristles (especially towards the hindmargin) but even then only about half as long as the bristles; a little thin-haired whitish pubescence occurs all along the sides from the humeri over the postalar calli and also along the hindmargin. Bristles black; two strong præsutural with sometimes an additional small one in advance; two strong supra-alar and sometimes one weak one lower down; one very strong post-alar, or two with the upper one weak, or even three with the third one weak; about five (4-6) dorso-central postsutural (of which the two or three hindmost may be rather weak) and one or two præsutural quite near the suture but with no sign of others as the dorso-central rows then cease abruptly anteriorly. Pleuræ covered with ashy grey dust, sometimes rather brownish on the upper part of the mesopleuræ; prothorax and the space under it clothed with long not dense whitish pubescence; mesopleuræ with slight short whitish but inconspicuous pubescence along the top part, while similar pubescence occurs on the upper part of the sternopleuræ and on the pteropleuræ; metapleuræ with scarcely any pubescence except the fan of about four (4-6) rather strong and about four weak hair-like bristles of which the strong ones may be all black or only the middle ones black and the rest yellow; hypopleuræ with one strong black bristle at the top of a fan-like row of about three weak yellow ones. Scutellum ashy grey, bearing rather abundant not short though not very conspicuous soft whitish pubescence (though sometimes a few of the hairs near the base are black) which is rather sloped forwards and with two or three or four rather strong upturned black marginal bristles; metanotum rather dusted whitish but almost shining black on the middle, with the side humps covered with whitish grey tomentum and with a little blackish pubescence on their lower part.

Abdomen black, slightly shining, but with grey hindmargins of segments; when viewed from in front it has a blackish or brownish black appearance with distinct light grey bare hindmarginal hems. Pubescence short depressed and black on the middle of the disc, but pale down the sides and with the pale hairs extending somewhat on to the disc near the hind corners of the segments; the short black pubescence scarcely forms fringes against the bare hindmargins, but the basal segment bears longer, more erect, and more conspicuous pubescence which is bent over the hindmargin like a fringe, while about two (0-3) of the hairs near the sides of the hindmargin may form bristles, though none of the subsequent segments show any trace of side-bristles. Belly blackish grey, bearing delicate rather long pale pubescence on the three basal segments and some shorter more depressed pale pubescence on the fourth segment, but on the remaining segments the pubescence is short, depressed, black, and bristly except for inconspicuous pale fringes on the hindmargins; eighth segment short, and of the same colour as the seventh, with a straight but slightly dropped hindmargin. Genitalia long but not large, shining black; claspers (when seen sideways) appearing long but narrow and somewhat bent downwards at the blunt end, but when seen from above the inner margin of each clasper has a very large dentation so that a short sharp tooth stands out and nearly divides the opening between the claspers into a long ovate basal open space with broad margins which slope down inwards and a large almost circular end opening (when the long sickle-shaped points of the claspers just touch), and this end circular space is much broader than, though not so long as, the oval basal space; lower lamellæ moderately broad at the base but soon narrowing into a rather long bare prong which has a ferruginous tip; these under lamellæ have a few long black bristly hairs on their underside; the claspers have (usually) black pubescence at their base and on their outer side but whitish pubescence on the inside and about the tip; the middle prong of the penis is thread-like and exceedingly long.

Legs black, with the tibiæ and tarsi partly dull dark red; front coxæ covered with greyish white dust and bearing anteriorly rather abundant drooping long whitish pubescence; posterior coxæ less grey and bearing less abundant pale pubescence; front tibiæ usually brownish red at just the base, but often inconspicuously so; posterior tibiæ dull red, with only the tip rather indeterminately black; all tarsi with the basal joint dull red except at

the tip, and the other joints reddish at the base ; sometimes the dull reddish coloring of the legs tends towards brown on the front side of the posterior tibiæ. Pubescence almost all whitish but the ubiquitous minute adpressed pubescence nearly all blackish with pale grey hairs intermixed so that the ground colour is not affected unless by the reddish felt which occurs on the inner side of the hind tibiæ and the apical half of the front tibiæ ; front femora with some long pubescence beneath which is black on the apical part but whitish and thinner haired on the basal half, and the middle femora with slight pubescence near the base, while the front tibiæ bear a delicate one-rowed ciliation beneath. Bristles all black ; front femora with only about three postero-dorsal after the middle ; front tibiæ with the usual long postero-ventral, the short dorsal, and two short antero-dorsal near the base ; middle femora with one rather strong antero-dorsal at two-thirds of the length and one at one-third besides sometimes a third one near the latter, two postero-dorsal close to the tip, about six irregular antero-ventral, and four weak postero-ventral near the middle ; middle tibiæ with two strong antero-dorsal, two or three small postero-dorsal (the two lower ones being nearly level with the two antero-dorsal), four postero-ventral and two or three antero-ventral on the apical half ; hind trochanters with one or two spines ; hind femora with about six antero-dorsal (almost anterior), about seven antero-ventral (mostly small), and about three postero-ventral (one after the middle and fairly strong) ; hind tibiæ with about three (2-4) antero-dorsal (if three, one near base, one near middle, and one at three-quarters ; if four, the other one is at about one-third the length), two (or one) postero-dorsal (if one only near the middle), and three antero-ventral after the middle ; the strong bristles are all black in every specimen I have examined, but Loew states that there are rare exceptions. Pulvilli brownish orange ; claws black, but brown at the base.

Wings with a greyish brown gloom (except perhaps at the base and nearly up to the middle of the foremargin) which includes all the veins and wing-margin, but the wings are rather orange about the base of the anal vein ; wing-membrane very conspicuously ribbed especially in the marginal cell. Squamæ (alar) dull glassy, with the margin brownish orange but pale yellow underneath, and with fairly abundant whitish yellow fringes ; thoracal pair only represented by a bare brownish frenum. Halteres yellowish brown or brown.

♀. Very much like the male. Face-beard frequently all black, and always with the pale hairs much reduced in number.

Thorax as in the male. Scutellum with the short pubescence sometimes all black.

Abdomen with the grey hindmargins narrower, whiter, and more sharply defined ; pubescence on the sides all black except for a few pale hairs on the basal segment and still fewer on the second segment and possibly a very few on the third, but the hindmarginal fringe on the basal segment tending to form about four bristles near each side which range from all whitish to all black, and the extreme sides of the other hindmargins have indications of two or three small bristles of which those on the second and third segments may be whitish. Belly with the pubescence on the last few segments all black, and with some long black bristly hairs beneath the eighth segment (=basal part of the ovipositor). Ovipositor shining black, with the flattened eighth abdominal segment appearing to form its basal part, short, conical, and depressed, but not in the least compressed, bearing black hairs, and ending in a pair of unusually long free lamellæ.

Legs with only one middle postero-dorsal bristle on the hind tibiæ.

Wings, etc., as in the male.

Length about 12 mm.

This species has no close ally in Europe, and may be distinguished from all the other *Asilinae* by the shining black bare parts of the face and frons. Zetterstedt probably gave the species its name from (what he then thought) the variability of the colour of the face-beard, but he seems to

have subsequently learned that the face-beard of the male is never wholly white, and in fact the species varies but very little. An unusually large female taken at Nethy Bridge on July 4, 1905, has two black bristles on the hypopleuræ, and the front coxæ with one black bristly hair mixed in the white pubescence.

R. variabilis has been taken in considerable numbers by Colonel Yerbury in North Scotland; he first took it at Forres in Elgin in 1899, and at Nethy Bridge in Inverness in 1900, but has since taken it freely at Nairn and Brodie; his dates range from June 18 to August 20, and he and Mr C. G. Lamb have told me that it is common on stones on bare ground. It is recorded from all Northern Europe and Asia, but when it occurs as far south as North Germany it appears to prefer mountain districts.

4. PAMPONERUS.

Pamponerus Loew, Linn. Ent., iv., 135 (1849).

Large dark colored flies, with considerable soft rather long straggly pubescence but with only weak bristles on the thorax and practically none on the abdomen. Wings darkened on the outer half.

Head with the facial knob unusually large and the face-beard extending almost up to the antennæ; festoon extensive and rather bent over forwards on the upper part.

Thorax with only short pubescence on the front part. Bristles more numerous than usual, there being three or four præsutural, three to five supra-alar with apparently some small intra-alar, numerous postalar (about six besides smaller bristly hairs), and numerous not very distinct dorso-central which scarcely extend anterior to the suture; metapleural and hypopleural fans almost hair-like. Scutellum with only a few weak marginal bristles.

Abdomen more hairy than in *Rhadiurgus* or *Asilus*, and with practically no præhindmarginal bristles as even the two or three bristly hairs near the sides can hardly be called bristles; eighth segment almost invisible both dorsally and ventrally. Genitalia of the male of moderate size; claspers deeply dentate after the middle so as to leave comparatively narrow short forceps; ovipositor conical, short, not in the least laterally compressed nor with any terminal circlet of spines.

Legs black, with the tibiæ reddish orange; femora not thickened; tarsi with the joints of normal length. Pubescence not at all scarce; bristles absent on the front femora but unusually numerous on the posterior legs.

Wings with about the basal half strongly contrasted in colour with the dark apical half; upper branch of the cubital fork only slightly upturned at its end (fig. 353). Squamæ (alar) with thick margins on which is an abundant rather long fringe.

This genus may be known by the peculiarly contrasted coloring of the wings, by the absence of bristles but the presence of soft outstanding pubescence on the abdomen, by the abundant bristles on the femora, and by the face-beard being continued almost up to the antennæ; the black femora and the bright orange-red tibiæ also afford useful characters.

Pamponerus was originally founded upon the single European species *P. germanicus*, and as far as the Palæarctic region is concerned that is still the only known species, as *P. helveticus* of Mik is hardly more than a local variety. I think that *Philonicus arcolaris* Bigot from Celebes belongs to *Pamponerus*, while the little known *Asilus armatipes* Macq. from North

China should form a new genus intermediate between *Pamponerus* and *Polyphonus*. Two or three species of *Pamponerus* have been recorded from South Asia.

1. *P. germanicus* Linné. Wings pale on nearly the basal half but conspicuously darker on the rest. Tibiæ and tarsi mainly bright orange.

A very distinct large fly.

♂. Blackish brown with indistinct greyish yellow markings on the thorax. Face moderately narrow at its upper part but gradually widening downwards until it is quite twice as wide at the mouth; frons with the usual slight dilatation above the antennæ but soon contracting to the same width as at the antennæ and widening but very little round the upper eye-angles; face blackish on all the middle part but with minute orange tomentum under the face-beard, and covered with brownish orange tomentum on all the (otherwise) bare sides, and even the bare space just under the antennæ rather orange dusted when seen sideways; knob very large and rounded, occupying fully three-quarters of the face (when seen sideways), shelving back to the lower mouth-edge and leaving about the upper fifth of the face quite free and bare; face-beard occupying the whole of the face-knob, long and rather drooping, composed of black bristly hairs on the upper part (just the uppermost hairs being rather shorter than the others) and rather thinner yellow bristly hairs on the lower part quite away to the lower mouth-angle, but the hairs quite close to the lower mouth-angle are shorter and very thin, and sometimes the black bristly hairs of the upper part extend a little way down outside the yellow hairs; jowls small; chin and lower third of the back of the head clothed with long coarse yellow hairs, and the pubescence on the lower part of the back of the head extending close up to the eyes; about the middle of the back of the head at some distance from the eyes a postocular row of strong but not very long black bristles commences which extends up to the vertex but is widely separated by the postvertical channel from the corresponding row on the other side; these bristles form the festoon and (at any rate the upper ones) are rather bent over forwards at their tips, and about the middle part of the head some thin yellow pubescence occurs between these black bristles and the eyes, but otherwise the space on the upper part between the bristles and the eyes is bare and greyish yellow; longer dense yellow pubescence exists behind the festoon, while near the vertex some of these hairs are strongly bent forwards; frons blackish and shining on the raised ocellar space and on the depressed middle part just below the ocelli, and the raised ocellar space bearing numerous long thin black bristly hairs which radiate rather forwards but of which the anterior hairs are rather the shorter; sides of the frons (below the ocellar space) bearing greyish yellow tomentum and some black bristly hairs which soon become more numerous (about four wide) and longer as they extend down towards the antennæ, and these hairs are bent forwards. Proboscis black, with the usual short orange brown pubescence about the tip and long pale hairs beneath on about the basal half; palpi upturned and rather short, bearing some rather sparse long pale hairs. Antennæ rather long and thin, dull black or with the two basal joints sometimes reddish brown; basal joint slightly longer than the second, cylindrical, bearing a little grey dust, and with long black bristly hairs beneath but short ones above; second joint rather cup-shaped, and bearing shorter black bristly hairs; third joint almost as long as the two basal ones together, strap-shaped but rather tapering, quite bare; style about two-thirds as long (or as long) as the third joint, distinctly two-jointed, the basal joint being short but the second joint long rather thin and pointed.

Thorax greyish yellow with (when viewed rather sideways) three broad brownish black stripes; middle stripe considerably widened out anteriorly and indistinctly split all down its length by a greyish line, but not reaching the hindmargin; side stripes long ovate, beginning about half-way between the front and the suture and continued to about midway between the suture

and the hindmargin (but almost interrupted at the suture), and followed by the usual rather more dorsal awl-shaped blackish patches which point backwards but do not reach the hindmargin; humeral stripes distinct though short. Pubescence black not scarce nor very short, about equal and rather sloping backwards from the front part to behind the suture, but after that rather longer and more erect as it mixes with the longer bristles, while there is as usual a little thin pale pubescence about the front part of the humeri and on the sides, and more especially just before and on the front part of the postalar calli. Bristles composed of about four præsutural; (3-5, of which sometimes 1-2 smaller ones are more forward and wide apart); three long strong and two smaller supra-alar, besides two or three almost intra-alar continued in a sort of row towards the lower part of the disc; numerous postalar (about six, besides smaller bristly hairs); several dorso-central which are not very strongly distinguished from the long bristly hairs near them, but with about five (5-8) postsutural (not extended back to near the hindmargin) and about two rather indistinct præsutural close to the suture are fairly distinct. Pleuræ yellowish grey on the upper part of the mesopleuræ but rather dark ashy grey on the rest; pubescence long and yellowish on the prothorax and on the space below it, on the upper and back parts of the mesopleuræ, extensively on the upper part of the sternopleuræ, and less conspicuously on the upper part of the pteropleuræ, while the metapleuræ bear a fan of about six almost hairlike bristles and numerous shorter hairs, and the hypopleuræ bear a fan composed of about four long thin straggly hairs and several shorter ones. Scutellum blackish grey, but shimmering lighter grey in some lights, with sparse not short black pubescence on the disc and sometimes two or three longer hairs, and about four (2-4) weak upturned black marginal bristles; metanotum grey, but rather shining blackish on the middle part, and with some slight brownish yellow pubescence on the humps at the hind corners.

Abdomen shining black, with a slight bluish tinge; the bare hindmarginal hem of the second and third segments (and sometimes of the fourth) shimmering greyish white at the sides (and in some lights narrowly all across), while the base of the second segment is obscurely greyish in some lights, and the whole sidemargin from the base to the end of the fifth segment is greyish. Pubescence on the disc short black depressed and bristly, but on the three basal segments long silky scattered outstanding and reddish orange, and this latter pubescence extends to the sides of the fourth and fifth segments and nowhere shows any approximation to bristles even though it forms fringes against the bare hindmarginal hems and is rather longer and stiffer at the sides of the basal segment, unless the two or three strong orange hairs near the sides of the hindmargins of the fourth and fifth segments can be deemed strong enough to be called bristles. Belly dull greyish black, with long pendent orange pubescence on the five basal segments which is more conspicuous on the dropped (when seen sideways) hindmargins of the fourth and fifth segments; the pubescence on the sixth and seventh segments is black and stiffer and almost forms tufts at the hindmargins, especially on the seventh segment, and these black hairs are rather sloped towards the genitalia, but a few tawny hairs occur on the disc of the sixth segment, while on the fifth segment some of the dorsal black pubescence becomes rather longer towards the sides and extends over ventrally; the hindmargin of the sixth segment is also dropped like that of the two preceding segments, but that of the seventh segment is straight and quite normal; eighth segment so short as to be indistinct both dorsally and ventrally. Genitalia comparatively small, shining black; claspers (when seen sideways) long, equal, and sloping straight downwards until they gradually shelve off to the lower angle, and this angle is prolonged and curved inwards as described when seen from above; the claspers bear moderately long stiff black pubescence, with a few orange hairs about the tip; when seen from above, each clasper has at about two-thirds of its length a strong inward projection so that ordinarily these projections meet and enclose a large oval space, while the claspers open out after the projections and enclose a smaller rounded space which is closed at the tip by the incurved and ordinarily overlapping narrow ends; all round this circular end enclosure is a moderately long not

very conspicuous tawny pubescence, and in the larger oval enclosure the broad flat oblong middle piece arises and bears only short slight pubescence; lower lamellæ rather small, broad at the base, but quickly narrowing to a point and curving up between the claspers and bearing moderate black pubescence; there is no basal plate and apparently no eighth abdominal segment.

Legs black and orange, the tibiæ being bright orange except for the rather sharply defined black tip; tarsi orange on all the basal joint, on more than half the second joint, and on less than half the third joint, while the last two joints are brown at the base. Pubescence comparatively slight; all the coxæ grey, and the front pair with dense long greyish yellow pubescence in front, the middle pair with similar pubescence on the apical half in front, and the hind pair with a little long straggling pubescence; front femora with fairly abundant black pubescence beneath (rigid and rather dense near the base) and rather scarce very thin haired orange pubescence behind; middle femora with moderate black pubescence beneath on the basal half; hind femora in all the English specimens I have seen with only short pale pubescence behind, but with a little longer pale pubescence in continental specimens; front tibiæ with a few long orange hairs beneath. Bristles usually all black; none on the front femora unless one postero-ventral one near the tip be strong enough to notice; front tibiæ with six dorsal bristles extending over the whole length, six postero-dorsal (the one near the base strong), and three or four thin (almost hair-like) postero-ventral, and with the usual terminal cirlet; front tarsi with the usual bristles; middle coxæ with usually one strong black bristle in front and often several about the tip; middle femora with about eight rather crowded bristles in front, about five antero-ventral, one slightly postero-dorsal just after the middle, and about two postero-dorsal near the tip; middle tibiæ with about five postero-dorsal bristles in a row (four near the middle and one nearer the tip), about five rather irregular postero-ventral, and about two almost ventral after the middle, and the terminal cirlet and tarsal bristles as usual; hind trochanters with about four bristles which are inconspicuous when orange but conspicuous when black; hind femora with about seven small anterior bristles extending over nearly the whole length, about ten antero-ventral, and about ten small postero-ventral; hind tibiæ with about four (4-7) slightly postero-dorsal bristles, one slightly antero-dorsal near the base and another at about three-quarters the length, two antero-dorsal near the middle but wide apart (and sometimes three of which the lower two are after the middle), two or three antero-ventral of which one is after the middle and the other two (or three) near the tip; hind tarsi with the usual bristles but with a few of the anterior bristles of the terminal circlets sometimes orange. Pulvilli broad oblong, dull orange; empodium represented by an orange bristle which is much shorter than the pulvilli. Claws black but brown at the base, hardly curved on the basal half.

Wings milky white at the base or at least on the whole of the axillary cell and alula, but with rather more than the outer half blackish brown, and the two colours separated almost straight across the wing, but in immature specimens the contrast is not so great as the base is less milky and the tip less darkened; mediastinal and subcostal veins and often the stem of the postical yellowish, but the other veins blackish, though the hindmarginal ambient vein is white; upper branch of the cubital fork only slightly upturned at its end; alula and its marginal vein white and with only a minute fringe. Squamæ (alar) dull orange, with thick orange margins on which is an abundant rather long dull orange fringe except near the alar end; thoracal pair only represented by a bare orange membrane. Halteres orange.

- ♀. Very much like the male. Abdomen with the tawny pubescence more extended and more conspicuous, and with large triangular yellowish grey hind corners to the segments; seventh segment but little shorter than the sixth; eighth segment concealed; ovipositor not in the least compressed, about as long as the sixth abdominal segment, with its basal part shining black above but below with an equally large greyish black ventral plate (=eighth ventral segment?), and after that with two or three short joints and a short blunt

terminal joint; the ventral plate bears some moderate black bristly pubescence near its end but thinner shorter and partly pale pubescence near its base; the end joint with very short brownish orange pubescence.

Legs with the black pubescence beneath the front femora more crowded and most bristly close to the base.

Wings with the basal part less milky white.

Length about 16 mm.

This species is easily distinguished from any other European species of the *Asilinae* by the hairy pubescence and peculiarly colored wings, unless the var. *helveticus* Mik should prove to be distinct; that variety has the abdomen steel blue and the bristles on the hind tibiae mainly orange, and in the only specimen I have seen the praesutural bristles were yellow and the thoracic middle stripe was not split; English specimens may vary a little in the exact number of bristles on the femora and tibiae but not much otherwise, though in a small female the face-beard and some of the antero-dorsal bristles about the middle of the hind femora are mainly black; continental specimens show the black pubescence near the base of the underside of the front femora more like a clump of bristles, and also always seem to show longer pale pubescence behind the hind femora especially towards the base, while the middle femora seem to have longer and stronger bristles on the underside.

P. germanicus appears to be dying out in England, as recent captures are very few, though it used to occur in old collections. I found eight specimens on the sand-hills at Barmouth on June 10 and 11, 1887, and Colonel Yerbury took five specimens near there on June 27, 1902—I believe the exact 1887 locality was built over in 1902—and he has also taken a few specimens since at Porthcawl in Glamorgan, and Mr P. H. Grimshaw has recorded it from Irvine Moor in Ayrshire on the authority of Mr A. Adie Dalglish. My specimens were immature, but Colonel Yerbury's specimens (taken about sixteen days later) were quite mature, while on July 20, 1888, I was unable to find a single specimen (*P. albiceps* having taken its place); I am therefore of opinion that it occurs for only a short period during the latter half of June and the beginning of July; one of Colonel Yerbury's specimens was preying upon a red *Aphodius*. Curtis recorded it from Devonshire.

5. DYSMACHUS.

Dysmachus Loew, Dipt. Sud-Afrik., 143 (1860).

Grey rather bristly flies of medium or rather small size.

Head sometimes (as in our British species) unusually pubescent. Face with a rounded produced face-knob which does not extend to the upper third of the face, and consequently the face-beard (which is composed of long and abundant bristles and hairs) leaves about the upper third of the face bare. Festoon composed of irregular long bristles or bristly hairs, of which at least some are rather curved forward. Antennae normal, the third joint being of the usual elongate oval form (fig. 356) though sometimes only very narrowly ovate but never so linear as in *Protophanes* (fig. 355).

Thorax with dorso-central bristles (or dense bristly pubescence on the middle line) extended to the front part, or at least the dorso-central bristles continued conspicuously much in advance of the suture, while sometimes the long bristly pubescence on the middle line is extended conspicuously and mane-like right up to the front, and in such cases the dorso-central bristles are almost merged into this bristly pubescence. Bristles (macrochætæ) consisting of three or more praesutural (including a more or less strong anterior one), about six (rarely only two) supra-alar

(partly almost in a clump and partly extending down the light grey interstice), about four (4-5 or rarely only 2) postalar, and numerous (up to 18) dorso-central; pteropleuræ bristly or pubescent; small præalar callus (*v.* fig. 388) frequently bristly; metapleural fan composed of few bristles (about 5) or more numerous bristly hairs (about 10); hypopleural fan with about two long bristles or bristly hairs besides some long hairs and pubescence, while some (1-3) bristles on the hind coxæ continue on in the same line as the two previous fans. Scutellum showing great variation in the marginal bristles, as there may be numerous marginal hairs of which a few (4-10) may be termed bristles or (*D. spinifer*) there may be two conspicuously strong bristles; metanotum always with some short bristly hairs or pubescence about its lower outer corners.

Abdomen in our British species unusually short and conical (especially in the female), but not so much so in the generality of species; distinctly bristly, and with more or less entire rows of pale præhindmarginal bristles on the segments; eighth ventral segment of the male neither widened, nor produced in any way, nor with a pencil-like tuft of bristles, but frequently with a wide fringe of rather stiff hairs. Genitalia hardly widened but sometimes very elongate (very short in our British species); claspers and lower lamellæ varying in shape, and both providing important specific distinctions; ovipositor (fig. 357) conspicuously laterally compressed and with the eighth ventral segment prolonged so that the ovipositor is elongate-triangular or peculiarly sabre-shaped when viewed sideways; terminal lamellæ wedged in beneath the point of the upper piece as in *Eutolmus*.

Legs black, or at most with the base of the tibiæ inconspicuously rufescent, and with the recumbent short pubescence somewhat obscuring them; pubescence comparatively small in amount; bristles perhaps rather more numerous than usual, though usually absent beneath the front femora.

Wings with a normal venation; small cross-vein almost or quite punctiform. Alar squamæ strong on the basal part and with a thick margin.

Loew originally included *Dysmachus* in Macquart's genus *Lophonotus*, and distinguished it from other *Asilinae* through the character of the bristles on the middle stripe of the thorax extending to the front part; the distinctive generic character was founded upon the absence of a facial knob in *Lophonotus* and its presence in *Dysmachus*. Subsequent discoveries proved that the character of the bristles on the front part of the thorax was not so good a distinction as had been originally believed, and in 1871 Loew (*Beschr. eur. Dipt.*, ii., 142) wrote, "It is not quite easy to give a sharp boundary line between the particolored-legged species of *Dysmachus* and *Eutolmus*. As all true species of *Dysmachus* agree with the species of *Eutolmus* in the position of the terminal lamellæ of the ovipositor, the distinction of the two genera lies entirely in the difference of the bristling and pubescence on the disc of the thorax. In the typical species of *Dysmachus* the middle stripe of the thorax is beset with long hairs up to the front, and the bristles also extend to near the fore part; in the typical species of *Eutolmus* the pubescence on the middle stripe of the thorax is short and the bristles are restricted to the hinder half of the disc. Outside these typical species however there is a whole row of intermediates upon the location of which there may well be uncertainty. These intermediates consist partly of those in which the pubescence is only very sparse or only short while the bristles extend far forward, or partly of those in which the pubescence has a notable length or great density while the bristles extend only to about the middle of the disc. If the two genera are distinguished merely by the difference in the pubescence of the thorax, the boundary line between them is not only difficult to find but it separates the species in a manner but little corresponding to their mutual affinities. Altogether a rather natural

“division can be attained if these middle forms be brought into the genus *Eutolmus*, with the exception of those whose near affinity to species of *Dysmachus* is so unmistakable that their generic separation would be “unnatural.” This distinction is very unsatisfactory, and has led Hendl (Wien. Ent. Zeit., xviii., 111) to the reactionary opinion that nearly all Loew's genera formed out of *Asilus* are untenable; I cannot however agree with this opinion, though I admit that there exist occasional species which may be difficult to locate with absolute certainty.

Taking the three genera, *Dysmachus*, *Eutolmus*, and *Machimus*, it cannot add to the ease of naming a specimen if all be included in one genus, because the difficulties will still have to be surmounted. On the other hand when both sexes of a species are known a very large number can be at once allocated and only a very few left in doubt between two genera (one genus being always eliminated and one-third of the difficulty overcome); for instance a female *Machimus* can at once be distinguished from the other two genera by its free anal lamellæ, while a male *Machimus* cannot be confounded with *Dysmachus* because of the produced eighth ventral segment; a female may be difficult to allocate between *Dysmachus* and *Eutolmus*, and a male with a produced eighth ventral segment may be a *Machimus* or a *Eutolmus*, while one with a simple eighth ventral segment may be a *Eutolmus* or a *Dysmachus*. In most cases a *Dysmachus* may be distinguished in either sex from a *Eutolmus* (apart from the anterior bristling or strong hairs of the thorax) by its smaller size and by its black legs with at most only the base of the tibiæ reddish, and consequently a large species with a good deal of reddish colour about the legs must be a *Eutolmus*.

Dysmachus consists of about thirty Palæartic species, of which the great majority have been well distinguished, but only two are known to extend to Northern Europe and at present only one has been found in Britain. One or two species are said to occur in South America, but such records must remain doubtful until the distribution of the genus has been worked out by someone competent to recognise its characters.

1. **D. trigonus** Meigen. Light grey with darker markings. Thorax with long bristles on the middle line quite to the front part. Legs slightly reddish at the knees. Genitalia short (♂), sabre-shaped (♀).

A very bristly species, with numerous very conspicuous white bristles on the abdomen.

♂. Face moderately wide and gradually widening downwards until it is nearly twice as wide at the mouth as near the antennæ; above the antennæ the frons widens out very slightly but soon becomes slightly narrower again and remains so up to the vertex; face covered with whitish grey dust, which is however less dense on the facial knob, and which may have a faint yellowish tinge; the upper third of the face (when measured from the uppermost margin of the mouth) and also about the side thirds are bare, but the broad sides of the mouth make the face appear to be longer and nearly the two-thirds of those mouth-sides next to the eyes are bare; facial knob rather large and rounded but not very prominent; face-beard covering the whole knob, long, drooping, and abundant, mainly white or yellowish white or even pale orange but with black bristly hairs down its outer edges (though not at the topmost part), and the bristly hairs on all (or more than the lower half of) the sides of the mouth exclusively black; the black hairs on the prominent part of the

face-knob are less drooping than the whitish ones ; jowls rather broad ; chin and jowl-beards dense, whitish or yellowish white or pale orange, and extending half-way up the back of the head ; postocular margins slightly inflated and covered with greyish white dust, while behind them the postocular festoon begins at about the middle of the head because the whitish beard-like pubescence of the lower part merges there into long brownish yellow bristly hairs which are curved a little forwards and downwards and which may extend almost to the upper eye-angles, but more commonly the upper bristles are black and shorter and more curved forward, or one or two smaller black bristles occur close to the eyes near the top ; the postvertical interval is occupied by a long dense fawn yellow or pale yellow pubescence which extends considerably and even almost to the top ocelli ; frons yellowish grey at the sides but darker (though not blackish) on the middle part, and with several almost erect not short black rather bristly hairs on the sides in about two irregular rows, while on the lower part some thinner less erect whitish yellow hairs occur between the black hairs and the eyes ; ocellar space not much elevated, blackish grey, and bearing numerous fairly long erect black bristly hairs ; collar greyish, and bearing fairly abundant brownish yellow pubescence on the upper part, in which are about two stronger but inconspicuous bristles. Proboscis shining black, with short brownish orange pubescence about its tip, and long pale hairs on its underside from the base to beyond the middle ; palpi very short and small, bearing some yellowish hairs. Antennæ (fig. 356) dull brownish black ; basal joint cylindrical, hardly longer than the second, and bearing numerous brownish yellow bristly hairs, and usually (but by no means always) with the long stiff forwards-directed bristly hairs on the underside black ; second joint beginning more slender than the first, but distinctly cup-shaped and bearing very short yellowish hairs on the apical half ; third joint strap-shaped but rather attenuated at its tip, or slightly widened about the middle, about as long as the two basal joints together ; style shorter than the third antennal joint, with a short almost transverse basal joint and a minute almost hair-like tip, but otherwise equally and moderately thin.

Thorax whitish grey, sometimes with a tinge of yellow, and (when seen from above) with the usual dark stripes almost confluent so that a blackish brown or brown disc is surrounded by whitish grey stripes but the dark disc has some patches of light grey in it ; middle stripe broad, blackish brown or brown and not much widened forwards, and with its middle dividing line indistinct or even darker and denoted by the abundant bristling on it ; side stripes complete (*i.e.*, the larger piece above the suture apparently connected with the smaller piece after it) though not nearly extended to the front or hind margin, and slightly shining in some lights ; an anterior darkened patch is blackish and (when seen from above) is distinctly pushed in between the middle stripe and the front part of the side stripes (*vide* var. below), so that it is divided from the latter by a rather bowed greyish white line ; on each side of the middle stripe is a light grey space in front of the side stripes, and by tilting sideways the side stripes can be seen to be divided by the grey suture, but then the præsutural markings appear to be united ; the dark stripes leave each sidemargin entirely and conspicuously whitish grey and appearing like a stripe extending from the front to the hindmargin, and the dark stripes widen out to the hindmargin and the adjoining sidemargins ; the side stripes seem when seen from behind to lengthen out to quite the foremargin but only to extend back to about midway between the suture and the hindmargin, after which they are followed by the small narrow awl-shaped dark spots, and the side stripes are separated rather widely from the middle one by pale yellowish grey dusted stripes. Pubescence and bristles not always easy to distinguish apart, but fine pale pubescence occurs on the humeri and the adjacent sides, above the wing-base, on the postalar calli, and (usually) abundantly and unusually long on the hind part of the disc, while short scattered very inconspicuous rather depressed yellow hairs occur all over the disc in amongst the longer black bristly pubescence ; the black bristly pubescence (as distinct from the regular bristles) is long, dense, and rather mane-like down the front part of the middle line and continues (though shorter and less abundant) between the dorso-central bristles right through

to the hindmargin, but becomes more widely spread and more dense and less distinguished from the dorso-central bristles as it approaches the hindmargin, and shorter sparser black bristly hairs occur over the rest of the disc but are shortest and sparsest on the dark side stripes. Bristles usually all yellowish about the sides but black on the dorso-central rows; præsutural three or more long and yellowish with sometimes one or two smaller black ones more towards the disc; supra-alar about six long and yellowish; postalar about four very long and yellowish; dorso-central numerous, usually black, and not always easily distinguished amidst the long bristly pubescence but certainly extending forwards to half-way between the suture and the front and becoming weak and dying out well before the hindmargin; several of the bristles on the dorso-central rows may be yellow in a most irregular manner, and in varieties mentioned later on some supra-alar and postalar bristles may be black, and the usually abundant pale pubescence on the hind part of the thorax may disappear. Pleuræ not very densely covered with yellowish grey dust and with all the pubescence or bristly hairs yellowish; prothorax and the space below with fairly abundant short pubescence; mesopleuræ with a tuft of long pale pubescence on the upper part; sternopleuræ with rather sparse pubescence on the upper part; pteropleuræ with a large tuft on the upper hind corner; metapleuræ with numerous rather long fine hairs and with a fan of about ten long hairs of which some of the lowermost are extra long; hypopleuræ with a continuing fan composed of about two long hairs, which are sometimes so strong as to be absolute bristles but at other times hardly stronger than the others, and about three other long hairs near which are two or three others not in the row. Scutellum bearing rather abundant and rather long delicate yellowish white (occasionally partly black) pubescence on the disc, and with numerous comparatively weak upturned marginal hairs of which some (4-10) may be called bristles; metanotum almost covered with yellowish grey dust, and with brownish yellow pubescence on the hind part of the side humps.

Abdomen comparatively short conical, greyish white in the pale forms but yellowish grey in others, with (when seen from behind) a dorsal row of large broad rather well-defined blackish grey triangular spots, the broad base of each of these spots lying against the foremargin of each segment and broadening out band-like there on the front segments but less so on the hind segments, and consequently the hindmargin of each segment is light yellowish grey or pale ashy grey to a rather narrow extent (about half) about the middle but more so outwards until nearly all the sidemargins are light greyish; the four basal segments have broad bare hindmarginal hems (indistinct on the third and fourth segments when the abdomen is short and turned up at the end). Pubescence (as distinguished from bristles) longer, more erect, and more ubiquitous than usual, extending over all the sides and especially abundant and long across the præhindmarginal crest of the basal segment but hardly to be considered bristly except for two or three of the longest hairs towards the sides; pubescence yellowish white or almost white or with a faint tinge of brownish yellow, very short on the dark triangles and on the basal half of the second segment and on most of the disc, but indistinctly black on the middle dorsal line of the sixth and seventh (and sometimes fifth or even fourth) segments. Bristles numerous, white and conspicuous all across the præhindmarginal line of each of the second to fifth segments as rows (except on just the dorsal line) of about fourteen long but not stout radiating bristles, while hindmarginal rows of similar bristles occur towards the sides of the sixth and seventh segments but do not extend so much on to the dorsal part; eighth segment short and without any hindmarginal ciliation. Belly light grey, bearing long pendent whitish not at all dense pubescence. Genitalia rather shining black and unusually small, bearing all over rather coarse pale pubescence; claspers small and simple, with the inner curve so gradual that the arms of the forceps enclose scarcely any space, and when seen sideways appearing almost bluntly rounded at their tips; lower lamellæ short, and with a much longer chestnut middle piece between them.

Legs almost entirely black though the posterior femora appear greyish black through the abundant minute recumbent pale pubescence; base

of the tibiæ always to a small extent (so small as to be easily overlooked) reddish brown. Pubescence (as distinguished from bristles unless included under bristles) on the front coxæ abundant coarse drooping long and whitish, on the middle coxæ similar but limited to the apical half, and on the hind coxæ only moderate, while a short depressed pale pubescence occurs all over the legs though less depressed longer and yellower on the front femora, and some long pubescence occurs on the back and underpart of the front femora, moderately beneath the middle femora and sparsely beneath all the tibiæ. Bristles on the front femora limited to a row of (about six) long black bristly hairs beneath, and a few subapical ones of which four or five are small orange antero-dorsal and three insignificant black postero-dorsal; on the front tibiæ one or two small orange or black slightly antero-dorsal near the base, about five black postero-dorsal on the apical three-fifths with frequently a slight row of (3-4) of rather shorter black bristles just posterior to them, about six (=more than usual) long orange postero-ventral in an irregular row on the apical three-fifths, and the usual apical circlet of orange bristles (unless two small dorsal ones be black); on the front tarsi the bristles all strong and yellow except a few black plantar and one or two others on the third and fourth joints; on the middle femora three or four long antero-dorsal (almost anterior), about five rather smaller antero-ventral on the basal three-fifths, a few small præapical of which one postero-dorsal is conspicuous, and eight to ten rather long postero-ventral (almost ventral) thin hairs of which the last two or three may merge into the præapical postero-dorsal bristles and be black; on the middle tibiæ are numerous mainly yellowish bristles in rows, there being about five usually pale dorsal (none near the base), three antero-dorsal (the uppermost a long one at the middle), about three antero-ventral after the middle, five postero-dorsal (nearly posterior), and about ten long thin postero-ventral hairs of which two are extra long and sometimes blackish or all may be blackish; on the middle tarsi are long and conspicuous bristles, mostly yellowish white but one or two black ones occur in the apical circlets of the third and fourth (or even first and second) joints and one posterior one on the third joint; on the hind femora are five to seven yellowish black anterior bristles of which the last two become rather antero-dorsal, five (or more) yellowish antero-ventral, six or seven almost hair-like postero-ventral, and a præapical circlet of about six yellowish bristles; on the hind tibiæ are two dorsal after the middle and one almost in the same row near the base (or even one or two more in the same row) which are sometimes all black, four or five antero-dorsal, one long postero-dorsal near the middle with sometimes others (not quite in the same row) before and after it, about four antero-ventral not extending to the base, a ciliation of partly blackish thin ventral hairs, and the all yellowish apical circlet; on the hind tarsi the bristles are mostly yellowish, but usually each of the four basal joints has one apical antero-ventral black, and the third and fourth (or even second) joints one postero-ventral black. Pulvilli elongate oblong, brownish orange; claws long and dull black, but dull reddish orange about the base.

Wings hyaline, but rather brownish orange about the base and in old specimens with a distinct brownish yellow suffusion and then with the veins (except about the base) darkened, but without any trace of the peculiar greyish "gloom" which occurs in so many species about the tip and hindmargin; cubital fork-cell proportionately rather short and broad with a wide bell-mouthed opening. Squamæ (alar) brownish white on the muscular basal part but whitish or yellow on the disc and on the thick margin; fringes whitish, rather long and abundant, but ceasing at the angle. Halteres brownish orange.

♀. Very much like the male except for the conspicuous ovipositor.

Face-beard sometimes with more black hairs on especially the upper part. Thorax with the anterior præsutural bristles more frequently black.

Abdomen still more conical. Ovipositor (fig. 357) black, strongly compressed, and of a very characteristic broad triangular sabre-shaped figure which is produced so that the upper margin is rather concave but the under margin strongly convex; the basal upper piece bearing dense minute bristles about

its end (making it appear punctate), while the second piece is more than a third the length of the first and also bears dense minute bristles; the terminal lamellæ are inserted like a wedge between the two end points of the outer upper piece, but the lower one of these two points is so long and narrow as to be easily overlooked; the large under piece is as long as the upper pieces and bears very dense short bristles on its end part; pubescence rather long and pale beneath near the base, and rather abundant short and pale beneath the terminal lamellæ.

Length about 13 mm.

This species varies very much in the colour of the pubescence and bristles, and in the amount of reddish colour at the base of the tibiæ, while I believe it has a tendency to develop into local races. A male taken by Colonel Yerbury at Christchurch on July 4, 1897, looks very distinct, as it is larger and has a longer straighter abdomen and I suppose the straightened-out abdomen causes the hindmargins of the second to fifth segments to be widely bare and when seen from behind to appear more blackish grey and in no light conspicuously light grey; this specimen (which is probably over-mature) has other peculiarities, the basal joint of the antennæ being not longer than the second, and the junctions of the basal and second joints and conspicuously of the second and third joints being ferruginous, while the basal joint has long stiff black bristles beneath and only very slight yellow bristles dorsally, the bristly middle line of the thorax is darker than the sides of the middle stripe, and the side stripes extend further forwards without being disturbed by the humeral stripes, so that there is no light grey space in front of the side stripes, the innermost (towards the disc) præsutural, supra-alar, and postalar bristles are black, the seventh abdominal segment has no hindmarginal bristles, the claspers seem to be broader in proportion to their length, the postero-ventral hairs on the front femora are so strong as to be practically bristles, the postero-ventral hairs on the middle femora are almost all black, the hind tarsi have no black bristles on the apical circlets of the joints, the wings are conspicuously orange about the base, and the base of the costa bears some obvious pale hairs, while the squamæ and their margins are orange; another male taken by me at Felixstowe in Suffolk is peculiar, as it has scarcely any pale hairs on the hind part of the disc of the thorax or on the disc of the scutellum, while the black hairs on the face-beard and the black bristles on the underside of the basal joint of the antennæ are more numerous, and several of the supra-alar and postalar bristles are black; a male taken at Southbourne (which is in the same district as Christchurch) on August 10, 1904, has a strong tendency towards the Felixstowe specimen but appears very different from the Christchurch specimen. My description has been mainly made from a number of specimens taken at Barmouth (in which the pale bristles and hairs are unusually whitish); continental specimens practically agree, but may differ a little in the bristles on the legs. *D. trigonus* belongs to a small group of about five very closely allied species which have the thoracic middle line with conspicuous mane-like bristles almost up to the front, no bristles beneath the front femora, the male genitalia short and simple, and the female ovipositor sabre-shaped, but none of the other species are likely to occur in Britain as they are only known from Spain. Its squat figure and numerous conspicuous white bristles distinguish it at once from any other British species of the *Asilina*.

D. trigonus is common and widely distributed over Britain in suitable localities; it seems to prefer scrubby ground on sandy sea-coasts, but also occurs freely on similar ground inland. I have numerous English records from Penzance to Malvern, while Colonel Yerbury has taken it at Kingussie in Inverness and it is recorded from Irvine Moor and Troon in Ayrshire; my dates range from May 23 to August 29. Mr R. C. Bradley caught a specimen at Barmouth preying on a *Philonicus albiceps*. It is recorded from almost all Europe, but Loew has granted specific rank to some Spanish forms which I can hardly distinguish.

Synonymy.—There can be no doubt about this species being the *Asilus* (*Lophowotus*) *cristatus* of Walker's Ins. Brit. Dipt., vol. 1., p. 50, as it is the only British species in which the thorax is "bristly to the front," but it cannot be recognised with certainty from Walker's description.

6. EUTOLMUS.

Eutolmus Loew, Linn. Ent., iii., 459 (1848).

Dark grey flies of rather large or medium (not small) size, which have a strong outstanding face-beard on the lower two-thirds of the face.

Face covered with greyish or yellowish dust; face-beard strong and outstanding but leaving the upper third of the face bare; bristles on the lower part of the sides of the frons comparatively strong; postocular festoon usually regular and hardly bent forward.

Thorax with only short bristles on the fore part even on the middle line and with dorso-central bristles extending from the back part up as far as the suture and sometimes rather beyond but never to the fore part; the usual bristles are about three (1-3) præsutural of which the anterior one may be fairly strong, about three (2-4) supra-alar almost in a row, two or three postalar with sometimes some additional small ones, about four dorso-central postsutural and sometimes (but not always) three or four smaller præsutural ones rather close together but not extending half-way to the front; metapleural fan not very strong though composed of numerous bristly hairs. Scutellum with about six (4-6) upturned marginal bristles; metanotum with a tuft at each hind corner.

Abdomen elongate, with ashy grey or greyish yellow (rarely black) reflections; hindmargins of the segments bearing rather weak though obvious bristles towards the sides of the four or five basal segments. Genitalia of the male rather small, seldom swollen but yet not compressed; claspers always simple, with at most only a small more or less semicircular excision on the inner margin, and not indented about the middle so as to form a forceps; eighth ventral segment of the male sometimes produced at the middle of its hindmargin like a trowel or prong, but often quite simple; ovipositor moderately long and strongly compressed, bearing at its end a pair of lamellæ which are not elongate or stylate but which are always rhomboidal or oval or elliptical and more or less wedged in between the points of the upper piece of the ovipositor (fig. 358).

Legs black, rather obscured by short close pubescence, and in many species the tibiæ (and in some even the femora and tarsi) more or less reddish; front femora sometimes spinose beneath.

Wings normal. Squamæ with rather long fringes.

Loew when founding this genus thought that both sexes could be easily distinguished from *Dysmachus* by the dorso-central bristles as well as the bristles or bristly pubescence on the middle line dying out before the front part of the disc, but he subsequently discovered that there were several species of *Dysmachus* in which these bristles died out in a similar

manner, and consequently he ultimately admitted that the distinctness of the two genera was difficult to maintain, but (as has been noted under *Dysmachus*) he gave the best characters he could find; no difficulty can arise between our British species, because *D. trigonus* exhibits the thoracic distinction very conspicuously when compared with *E. rufibarbis*. In general it may be accepted that any doubtful species which is large, or has the legs with more reddish coloring than just the base of the tibiæ is a *Eutolmus*, and if a male has no projection from the middle of the hindmargin of the eighth ventral segment it must be either a *Eutolmus* or a *Dysmachus* but not a *Machimus*; the females of *Machimus* are easily distinguished by the free anal lamellæ, but it must be admitted that there are a certain number of cases in which it is difficult to assign a male to *Dysmachus* or *Eutolmus*, or to *Eutolmus* or *Machimus*, and a female to *Dysmachus* or *Eutolmus*. The distinctions are dealt with in more detail under the description of the genus *Dysmachus*.

Our British species of *Eutolmus* belongs to the group in which there are no strong bristles beneath the front femora. Rather more than twenty European species of the genus are well distinguished and eight or ten others are more or less imperfectly known; the genus is otherwise only doubtfully recorded from North America.

1. *E. rufibarbis* Meigen. Legs wholly blackish and with almost all their bristles black.

A large fly which resembles *P. albiceps* and *M. rusticus*.

♂. Face moderately broad, gradually widening down to the mouth; frons rather abruptly arched out above the antennæ but soon contracting to a narrower width than the face, deeply sunk between the eyes on the upper part; face densely covered with dull yellow dust; facial knob fairly large and well defined, and the face-beard covering the lower two-thirds of the face but leaving the upper third and the sides widely bare of pubescence; hairs on the middle part of the face-beard and along the sides of the mouth orange, but those on the upper part and along the sides down to the upper angle of the mouth black, and the black hairs down the sides are shorter and less conspicuous than the orange hairs on the middle part of the face-beard, while the upper hairs hardly droop but the others droop more and more as they approach the mouth; chin- and jowl-beards quite distinct from the face-beard, being closer, thinner-haired and denser, all orange and extending (though becoming sparser) up the back of the head; on the upper part of the back of the head the pubescence behind the black postocular festoon becomes slight and is pale yellowish grey; hindmargin of the eyes looped back a little at about a quarter from the lowest part and with an apparently bare rather wide pale greyish yellow postocular rim which becomes gradually wider on the upper part and really bears a soft yellow pubescence; postocular festoon composed of about five well defined rather strong black bristles on the upper quarter of the head, of which the uppermost are rather bent forwards, while the festoon is continued downwards by about five less strong and rather orange bristles which are less conspicuous and rather bent downwards; the uppermost black bristle of the festoon is level with the top corner of the eye, and the actual postvertical channel is bare; postocular space with a slightly blackish elongate streak near the upper corner of each eye; frons covered with greyish or rather brownish yellow dust, but only sparsely on the ocellar knob and on the middle part below; several rather irregular moderate bristly hairs occur on the widened sides of the frons between the lower ocellus and the antennæ, and about eight slightly longer bristly hairs occur on the ocellar knob; collar yellowish brown and bearing

fine brownish yellow pubescence and two brownish orange inconspicuous bristles on the upper part. Proboscis normal, with the long hairs beneath the basal half orange; palpi moderately long and thin, and bearing numerous porrect orange hairs. Antennæ dull black, but with the base of the third joint narrowly and obscurely ferruginous, and the two basal joints slightly obscured by greyish dust; basal joint with short blackish yellow hairs and beneath with longer black bristly hairs; second joint with shorter black bristly hairs; basal joint slightly longer than the second; second joint only slightly cup-shaped on its apical half; third joint long and strap-shaped, quite as long (without the style) as the two basal joints together, very slightly tapering on the apical quarter; style hardly as long as the third joint, at its base nearly as thick as the tip of the third joint and continuing to taper slightly to its tip, but with its own basal joint short though slightly longer than broad.

Thorax yellowish ashy grey; middle stripe blackish with deep black outer margins, or (when viewed from behind) blackish with a broad dark greyish brown middle part, broadening anteriorly but tapering posteriorly until it ends in a point just before the hindmargin, or (when viewed from behind quite horizontally) the end part and in fact the whole middle stripe may be very obscure; the true middle line is yellowish and very narrow, and exists on the front part only; side stripes broad, hardly so dark as the middle stripe but faintly shining, restricted to the usual length and scarcely interrupted at the suture, while the usual awl-shaped spots which follow not extending to the hindmargin; humeral stripes indicated by faint dark patches well in advance of the side-stripes. Pubescence (as distinguished from bristles) on the disc short, bristly, and black, not dense but extending over (though sparse on) the side-stripes, and becoming longer and thinner haired after the suture but not in the least confused with the dorso-central bristles, while fine-haired mainly black pubescence occurs on the humeri and on the sides after the suture, but becomes whitish yellow on the postalar calli and sparsely so across near the hindmargin. Bristles strong, some black and some orange or yellow; præ-sutural three, long and strong, all black or probably varying in colour, and one placed well forward; supra-alar three in a row along the side of the side-stripes, varying irregularly in colour; postalar two, yellow; dorso-central all black, about four being postsutural and well distinguished on the ashy grey stripes, and about four præ-sutural smaller and closer together and dying out anteriorly at about one-third the distance between the suture and the front. Pleuræ ashy grey, with practically all the pubescence and bristles yellow; pubescence normal on the prothorax and the space beneath; mesopleuræ with thin hairs on the upper part and longer hairs (with perhaps one or two black ones intermixed) down the hindmargin; sternopleuræ with rather sparse and long hairs on the upper part; pteropleuræ with a tuft of hairs on the back part; metapleuræ with fine-haired pubescence and with the usual fan represented by about six (or more) very long bristly hairs which are hardly in a row; hypopleuræ with very inconspicuous pale pubescence and with a continuing fan composed of several very long thin hairs. Scutellum ashy grey, bearing thin-haired upturned yellowish pubescence and about two long and three or four shorter upturned marginal bristles which are irregular in colour; metanotum greyish black, but rather densely covered with greyish yellow dust on the sides, and bearing abundant brownish yellow pubescence on the lower part of the lateral humps.

Abdomen (when seen from above) brownish yellow, or (when seen side-ways) yellowish on the disc of the second, third, and fourth segments but yellowish ashy grey on the rest, or (when seen from behind) blackish brown with conspicuous rather broad bare hindmarginal hems and sidemargins. Pubescence mainly composed of short adpressed rather conspicuous yellowish hairs (though Loew stated that small patches of black hairs sometimes occur down the dorsal line, and that such patches when seen from in front are darker and sometimes even cause an indistinct dark dorsal stripe); rather long outstanding yellowish pubescence occurs on the sides of the two basal segments, and præhindmarginal rows of bristly hairs and bristles occur on the segments, the one on the basal segment being composed of hair-like bristles across the middle but of five or six long thin bristles towards each

side, while the one on the second segment is similar, but the one on the third segment has fewer and less conspicuous bristles towards the sides, and these bristles become less and less defined on the subsequent segments until on the rather short seventh segment only inconspicuous bristly hairs occur of which however some on the middle part are black; eighth segment very short and bearing on the middle part (which is all that is visible) some short black bristly hairs; sidemargins of the dorsal part arching over and partly enclosing the belly. Belly dark ashy grey, bearing long thin-haired pendent not at all dense pale pubescence; hindmargins of the sixth and seventh segments dropped but straight; eighth segment shining black and produced into a long rather narrow process which is quite as long as or longer than the seventh segment, and which is rather densely clothed with bristly hairs of which a few strong ones are black but most (especially near the tip) are tawny and conspicuous. Genitalia shining black, comparatively small but with long claspers and with rather rigid but not at all dense and by no means short pale brownish yellow pubescence almost all over, while a few rather longer black hairs occur about the middle of the upper side of the claspers; claspers when seen sideways long, straight, and narrow, about five times as long as broad, with the upper angle of the tip rounded off but the lower angle slightly dropped, and when seen from above shelving off inwardly without any notable dentation and enclosing a long pointed ovate space; lower lamellæ curving up and hardly more than half as long as the claspers.

Legs black, rather shining, without any trace of reddish or orange, but the coxæ covered with ashy grey dust, and the femora and tibiæ rather obscured by depressed short orange pubescence; anterior femora rather thickened. Pubescence (as distinguished from bristles or bristly hairs) mainly short and depressed and almost entirely pale brownish yellow all over and so conspicuous as to give the legs a greyish black appearance, but the front coxæ have abundant rather coarse drooping yellow pubescence on all the front part, and the femora long outstanding yellowish pubescence posteriorly and ventrally, while some long sparse black postero-dorsal pubescence occurs on the front femora; front tibiæ with a long mainly blackish ciliation beneath and a rather long yellowish postero-ventral ciliation, both these ciliations being rather sparse, but quite as long as the two long postero-ventral bristles; middle tibiæ with a mixed (but mainly yellow) ciliation beneath; a tiny depressed felt-like reddish orange pubescence covers most of the inner side of the front and hind tibiæ and the underside of the basal joint of the front and hind tarsi. Bristles practically all black; front femora with only two or three small subapical bristles as none of the postero-dorsal hairs are strong enough to be called bristles; front tibiæ with one rather small dorsal and one or two smaller slightly antero-dorsal bristles close together near the base, about four more small dorsal bristles at or after the middle, two others slightly postero-dorsal, and two long postero-ventral near the middle with a shorter one near the tip; middle femora with two anterior bristles (one at one-third and the other at two-thirds), one antero-ventral about the middle preceded by about three longish hairs, and about three subapical (one small antero- and two rather larger postero-dorsal); middle tibiæ with two rather small dorsal bristles (one at and one after the middle), two larger antero-ventral nearly level with the dorsal two, four posterior of which the uppermost (at one-third) and the lowermost (at two-thirds) are longer than the other two, one rather long postero-ventral after the middle with a long black hair at the middle, and two or three rather long thin white anterior hairs; hind femora with three or four antero-dorsal bristles (equidistant and not near the base or tip), three antero-ventral (two rather small ones near the middle and one a little lower down), one inconspicuous ventral near the middle, and three or four subapical (one or two small antero- and two longer postero-dorsal); hind tibiæ with two slightly postero-dorsal bristles (one at a quarter and one at a half) of which the lower and stronger one is orange, one dorsal near the base, two or three rather antero-dorsal (one near one-third and the other near two-thirds with sometimes a smaller one at the middle), and two antero-ventral (one at a half and one at three-quarters); all the tibiæ and the four basal joints of all the tarsi with the usual apical circlets of strong black bristles. Pulvilli

brownish, long and narrowly oblong, empodium represented by an orange bristle; claws long and blackish, but brown about the base.

Wings subhyaline with a yellowish tinge and with an obvious extensive greyish gloom about the tip and hindmargin, and this gloominess has a fairly distinct boundary as it occupies all the wing-tip back to the base of the cubital fork and extends stripe-like much more towards the wing-base in the submarginal and marginal cells, and while occupying most of the posterior cells leaves the veinmargins of the second to fifth of those cells hyaline, while the axillary cell is also considerably gloomed; veins brown, but the mediastinal and subcostal veins and the stem of the postical yellowish brown. Squamæ (alar) pale yellow with an orange margin and with a rather long whitish or pale yellow fringe on the lower margin. Halteres dull orange or yellow.

♀. Very much like the male except for the ovipositor. The pale hairs of the face-beard yellow to reddish orange; chin- and jowl-beards and the pubescence extending up the back of the head yellow or orange; top bristle of the postocular festoon orange; collar with more numerous but indistinct orange bristles on its upper part.

Thorax with the middle stripe narrowly reaching the hindmargin. Bristles (except the postalar) sometimes all black. Scutellar bristles longer and stronger and all black.

Abdomen (when seen from above) yellowish grey, or (when seen from behind) dull black with conspicuous well defined rather broad pale hindmargins of segments and the sidemargins broadly of the same colour; this coloring is remarkably distinct, but the tint of the pale coloring may range from pale yellowish to brownish yellow; the short pale pubescence which occurs all over the abdomen may also vary to a similar extent in colour, but the hindmarginal bristles are more conspicuous than in the male; eighth abdominal segment merged into the ovipositor. Ovipositor (fig. 358) shining black, remarkably deep, about as long as the two previous segments of the abdomen together, straight along its upper margin and slightly convex but undulating beneath because there is a slight concave curve near the middle; when seen from above the basal part is moderately compressed, but more than the end half is so much compressed as to appear linear; the second upper piece is unusually large, being distinctly more than half as long as the first and bounded against that in an S-like line, coarsely rugose on the upper apical third but finely rugose on the rest, sharply excised at the end so that the end lamellæ are wedged in between its upper and lower points; end lamellæ rather large, rhombic rather than ovate, sparsely but coarsely punctate, pointed at the end, and bearing moderately long ciliation; the large under-piece extending quite to the base of the lamellæ and deeply wrinkled on the apical third; pubescence of the ovipositor short and sparse, but some rather long sparse pale yellowish or black hairs occur near the base of the under-piece and on the upper sides of the second upper-piece.

Legs with the bristles as in the male but in addition the middle femora sometimes bear three anterior and two antero-ventral bristles; middle tibiæ sometimes with three anterior bristles after the middle; hind femora with rather more numerous subapical bristles; hind tibiæ with three antero-dorsal bristles.

Length about 15 mm.

This species belongs to the group in which no bristles occur in either sex on the underside of the front femora, and to that section of the group in which the legs are entirely black; it is the only one of the genus known to occur in Britain and as the generic characters are rather indefinite it may be confounded with *Philonicus albiceps* and *Machimus rusticus*. From *P. albiceps* the male may be at once known by the prolongation of the eighth ventral segment, and the female by the absence of any circlet of spines at the end of the ovipositor; *P. albiceps* is also a much lighter grey

species with far more numerous white bristles on the thorax and legs, short inconspicuous fine ciliation beneath the front tibiæ, and only two long white bristles on the scutellum. *M. rusticus* has the tibiæ rufescent at just the base, and has also far more numerous white bristles on the thorax, scutellum, and legs, and also more abundant long pale pubescence on the back part of the thorax, while in the female the end lamellæ of the ovipositor stand out clear and free from the apex of the upper piece of the ovipositor (fig. 359).

E. rufibarbis appears to be rare in Britain, though the old collections of the British Museum and the late J. C. Dale contain several specimens. I caught a female at Weybridge in Surrey on June 29, 1872, and Colonel Yerbury and Mr C. J. Wainwright have since taken about four specimens in the New Forest; Colonel Yerbury and Mr J. E. Collin caught a male and two females at Tangham Forest in Suffolk at the end of August, 1907; one of Mr Dale's specimens was labelled "Coombe Wood, August 18, 1817," and Mr J. E. Mason has recorded it from Mumby Chapel in Lincolnshire. My dates extend from June 24 to August 29. It is recorded from Middle and North Europe.

Synonymy.—This species stood under the name of *A. forcipatus* in the collections of the British Museum and Mr J. C. Dale, and also under the name of *A. fimbriatus* in the British Museum.

7. MACHIMUS.

Machimus Loew, Linn. Ent., iv., 1 (1849).

Rather large flies of blackish or brownish grey colour. Males with a process from the eighth ventral segment.

Face rather broad (except in *M. atricapillus* and its close allies); face-beard long and rather strong, but leaving at least the top quarter and the side thirds of the face bare; postocular festoon present, though the bristles may be few in number and only slightly bent forwards at their tips; frons with small bristles or hairs at the sides; collar with some stout bristles on the upper part. Antennæ normal; basal joint with long bristles beneath, but the second joint with only short bristles; third joint elongate narrow elliptical, and terminated by a long thin jointed style.

Thorax with very short bristles rather than pubescence all over the disc, including all over the stripes. Bristles; two strong præsutural (with often a smaller third one), two or three supra-alar, two or more postalar, about four (3-6) well defined dorso-central postsutural and sometimes about three somewhat indistinct præsutural extending not more than half-way between the suture and the front of the thorax. Pleuræ with no special pubescence, but the metapleural fan composed of long and distinct bristles or even fine hairs and the hypopleural fan also distinct. Scutellum pubescent, and bearing (2-8) strong upturned marginal bristles or bristly hairs.

Abdomen with moderately strong but conspicuously contrasted hindmarginal bristles (sometimes reduced to one) near (but not extending far away from) the sides, which however become very few or die out after the fifth segment; eighth ventral segment produced at the middle of the hindmargin into a more or less trowel-like prolongation (which is pronged in *M. atricapillus*) on which the pubescence usually becomes long and bristly, and this valuable generic character (though not always very conspicuously developed) is very obvious in our two British species. Genitalia of the male of moderate size, neither compressed nor swollen; claspers usually simple; ovipositor pointed triangular, sometimes rather elongate but never linear, distinctly compressed laterally, and with two rather long free almost style-like lamellæ at the tip (fig. 359) but with no cirlet of short spines.

Legs rather stout (though not much so in *M. atricapillus*); femora more or less

thickened, and the front pair with more or less long and dense pubescence; legs sometimes entirely black, or sometimes reddish on just the base of or on the whole of the tibiæ or even on part of the femora. Bristles strong on the posterior femora and on all the tibiæ and tarsi, and in some species also beneath the front femora (though sometimes in the female only), but in our two British species without any bristles beneath the front femora in either sex.

Wings normal. Alar squamæ with long conspicuous dense fringes.

This genus is most closely allied to *Eutolmus*, and in some cases the males cannot be generically distinguished; in fact it requires the knowledge of both sexes to locate a species with certainty in this genus. Any species in which the male has a produced hindmargin of the eighth ventral segment and the female has free anal lamellæ is a *Machimus*; but if the male only be known it must be searched for in *Machimus* or in those species of *Eutolmus* in which the eighth ventral segment is produced; while if the female only be known it may be distinguished at once from *Eutolmus* and *Dysmachus* by the free anal lamellæ, from *Neoitamus* and *Paritamus* by the less sharply defined orange colour on the tibiæ, the normally formed and less elongate ovipositor, the greyer colour, the presence of bristles on the thoracic stripes, and the shorter simpler postocular festoon, and (as far as British genera are concerned) from *Epitriptus* by its larger size and darker coloring; these and other distinctions are mentioned under the descriptions of the allied genera.

Machimus contains about twenty-five Palæarctic species of which only two are known to occur in Britain, and in fact only these two are known with certainty to occur north of Central Europe. The genus is hardly known outside the Palæarctic region.

Table of Species.

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|--|-------------------------|
| 1 (2) Legs black, with only the extreme base of the tibiæ reddish.
Bristles mostly whitish. | 1 <i>rusticus</i> . |
| 2 (1) Legs considerably reddish. Bristles mostly blackish. | 2 <i>atricapillus</i> . |

1. **M. rusticus** Meigen. Legs black, with only the extreme base of the tibiæ reddish. Strong bristles on the thorax, scutellum, and legs nearly all whitish.

A large greyish species, resembling *E. rufibarbis* and *P. albiceps*.

- ♂. Dark ashy grey with an admixture of yellowish. Face rather broad, with the ground colour greyish yellow, but dull golden on the bare parts; facial knob large; face-beard rather large, but leaving about the upper quarter and the side thirds of the face bare, composed of long bright pale yellow or orange hairs on its lower two-thirds but with the equally long black hairs of the upper third extending down outside the pale hairs to a little beyond the most prominent part of the knob, while a straggling black hair or two may occur still further down; chin, jowls, and back of the head with abundant long yellow or pale yellow hairs; a few black bristly hairs (sometimes rather thin) against the upper eye-angle represent the remnants of the usual festoon, and are slightly curved forwards at their tips, and an irregular row of stout bristly hairs extends from them down the back of the eyes, and these bristly hairs are usually inconspicuously yellow but are sometimes black, though all

the other hairs on the back of the head, even to those just behind the vertex, are yellow and fine and long; bristles about the ocelli rather long and black, but those at the sides of the brownish yellow frons shorter and arranged in two irregular rows, and the uppermost ones black but the others usually soon becoming almost all pale yellow; frons on its middle part bare and blackish; coilar yellowish, bearing pale pubescence and about two (2-6) strong though inconspicuous yellow bristles on its upper part which (when numerous) form a strong *chevaux de frise*. Proboscis shining black, with short obscure pubescence round its tip and very long yellow hairs beneath near its base; palpi with long nearly all yellow hairs. Antennæ dark brown, but the two basal joints rather obscured by grey dust; basal joint with short sparse depressed pale yellow hairs above and numerous long bristly hairs beneath which may be all yellow but which are usually partly black; second joint with only short pubescence which is mostly pale with black hairs intermixed or *vice versa*; third joint about as long as the two basal ones together, and bearing a few short black bristles above soon after the base; style set at an angle with the third joint, and from about half to two-thirds its length.

Thorax yellowish grey with the usual dark stripes; the blackish brown middle stripe very distinct, widening anteriorly, and with an evident (though sometimes faint) grey middle line which may be anteriorly as broad as the dark sides of the stripe, and the sides of the middle stripe may have still blacker outer margins, but posteriorly the middle stripe contracts rather suddenly into a narrow dark brown line at about midway between the suture and the scutellum; side-stripes most perceptible when viewed from behind when they contrast with the yellowish grey stripes, and these yellowish grey stripes almost coalesce soon after the suture; humeral stripes only visible at their front end as small dark brown spots; humeral space covered with whitish grey dust which extends over, and to just below and behind, the humeral knob; in fresh specimens the side stripes are very indistinct, but in older specimens they become more distinct through being rubbed and then they sometimes have darker margins on their inner side; when seen from above the side-stripes usually appear broad (though sometimes very vague), beginning about half-way between the front and the suture and extending (in some lights) broadly but vaguely to the hindmargin. Pubescence on the disc short, all black, and not very bristly but becoming longer and thinner-haired towards the hind part, while pale yellowish thin-haired pubescence occurs on the humeri, just before the wing-base, between the wings and the scutellum, and on all the postsutural part of the disc. Bristles conspicuous; præsutural two strong and yellow and a smaller remote black anterior one; supra-alar three, all yellow; postalar two long and yellow; dorso-central about four postsutural rather strong and yellow but only distinct through the black spots from which they rise as otherwise they are liable to be mixed up with the surrounding long pubescence, while any præsutural are small and black and hardly distinguishable from the neighboring bristly hairs. Pleuræ yellowish grey, with pale pubescence on the prothorax and the space beneath it, on the upper part of the mesopleuræ, and sparsely on the upper part of the sternopleuræ and pteropleuræ, while the metapleural fan is composed of rather dense very long and rather strong (but not bristly) hairs and the hypopleural fan of four or five similar long hairs. Scutellum bearing rather short dense whitish yellow pubescence, and with several (4-8) long conspicuously pale yellow marginal bristles which are erect or rather curved forwards; metanotum light grey, and bearing some short pale pubescence on the side humps.

Abdomen (when seen from above) grey with dark reflections along the sides, or (when seen from behind) greyish black or greyish brown, with pale yellowish grey or whitish grey hindmargins of segments and sidemargins, and (in certain lights) with a slightly darkened dorsal stripe; the pale hindmargins are narrow about the middle but curve up towards the broad whitish or yellowish grey sidemargins; when seen from in front the abdomen appears to be all yellowish grey down to the blackish genitalia; pubescence on the disc short and all pale except for sometimes some black hairs about the middle of the hindmargin of the last segment; basal segment with a præ-hindmarginal fringe of pale hairs which become almost long bristles at the

sides; second segment with moderate thin pale pubescence on the side-margins and with præhindmarginal pale bristles very sharply defined and rather numerous towards the sides though not very strong, and the subsequent segments with similar bristles which however become reduced to one or two near each side of the sixth segment and to one small one on the seventh, though a præhindmarginal fringe of short pale bristles runs across the disc of these segments and exists though less perceptible on the basal segments; eighth segment very short dorsally and almost concolorous with the seventh. Belly grey, with long thin straggling pendent almost sparse pale yellow hairs on the four basal segments, but with shorter pubescence on the next three segments (which according to Loew have sometimes a few black hairs intermixed near the tip); the five basal segments are almost level but the sixth and seventh are slightly dropped at the hindmargin; the eighth segment is rather darker and bears pale pubescence all over, while its hindmargin is widened out into a blunt triangular grey projection which has a very broad base and which bears a long terminal pale yellow or orange ciliation. Genitalia shining black, moderate in size and clothed all over with coarse pale yellow pubescence in which sometimes some black hairs are intermixed on the upper side; claspers simple, shining black, arched on their upper side, long but stout being hardly three times as long as their deepest part (the middle), and clothed all over with rather abundant pale pubescence, with their upper margin curving over inwards to the rounded hindmargin, and the hindmargin with its lower angle rather drawn back; claspers beset on their inner side at the tip with very short bristly orange pubescence, and the two arms (when they touch at their tips) enclosing on the upper side a simple long narrow oval space without any dentation about the middle; lower lamellæ about half as long as the upper pair, and bearing strong orange hairs but no apical bristles; middle piece broad and spoon-like, faintly indented at the tip; prongs of the penis short but of equal length.

Legs shining black, but obscured all over by dense almost adpressed short pale pubescence which gives them a greyish black appearance; extreme base of the tibiæ always distinctly even if inconspicuously reddish; anterior coxæ yellowish grey, with dense long yellow drooping pubescence, but the hind coxæ with much less and shorter pubescence. Femora all rather thickened, and all with abundant long pale yellow pubescence even about the tip of the front pair; anterior tibiæ with abundant long mainly postero-ventral and ventral pale yellow pubescence, which is much longer than the postero-ventral bristles; hind tibiæ with very sparse shorter antero- and postero-ventral pubescence; basal joint of the front tarsi with long pale posterior pubescence. Front femora with a few (1-4) postero-dorsal bristles neither near the base nor extending to the tip, and a few small subapical; front tibiæ with one rather small black dorsal bristle and one antero-dorsal near it (both near the base), a row of about six small black postero-dorsal (almost dorsal) of which none are on the basal third, the usual three long yellow postero-ventral, and a not very strong apical circlet of which the ventral bristles are black; front tarsi with a pair of long yellow bristles (one anterior and one posterior) at the tip of each of the four basal joints and one posterior near the base of the basal joint, and also with a pair of shorter more forwards-directed curved black bristles at the tip of those joints (one antero-ventral and one postero-ventral). Middle femora with three strong anterior bristles wide apart, and sometimes with two small ventral near the base, and with two or three subapical postero-dorsal; middle tibiæ with two inconspicuous antero-dorsal bristles (one at and one after the middle), three small black or yellow postero-dorsal, three strong black ventral (one near the middle, one at three-quarters, and the other near the tip), and three weaker postero-ventral after the middle; middle tarsi with bristles similar to those on the front pair but with one yellow anterior bristle in addition near the base of the basal joint. Hind femora with about six (4-6) antero-dorsal bristles in a long row, two or three subapical postero-dorsal, about four (4-6) antero-ventral not near the base or tip, and one or two ventral near the middle; hind tibiæ with three strong yellow antero-dorsal bristles (the one near the base being the smallest, the second just before and the third a little after the middle), one postero-dorsal just before the

middle and a small one near the base, and two strong antero-ventral close together at about three-quarters the length; hind tarsi with the yellow apical bristles on the four basal joints shorter than in the anterior pairs, and with only a long anterior bristle near the base of the basal joint. Pulvilli long, dull orange; claws long, black but obscurely reddish at the base.

Wings slightly brownish, with dark brown veins and extensive faint grey "gloom" at the tip and hindmargin, and with this tint filling all the cubital fork-cell (except just the base) and reaching much further back as a small stripe in the marginal and submarginal cells, and entirely enclosing the veins near the wing-tip (leaving other veins with a hyaline margin), but continuing uninterruptedly along the wingmargin; the closed fourth posterior cell with a large grey kernel and the fifth and sixth with small kernels, while even the discal cell sometimes was a dull grey tip. Squamæ pale yellow with a dark orange margin and with a long conspicuous dense whitish fringe along the lower part. Halteres dull dark orange.

♀. Extremely like the male. Postocular festoon composed of about three strong black bristles.

Abdomen with a rather more brownish tint to the yellowish grey colour, the pale hindmargins less conspicuous but the pale bristles there rather more numerous, and the grey sidemargins narrower except as triangles on the hind corners of segments; pubescence on the disc short and all pale except near the hindmargin of the sixth segment and on nearly all the disc of the seventh, and any stronger bristles on the seventh segment black. Belly with some long pendent hairs on the basal segments, and often with more or less numerous black hairs on the apical segments. Ovipositor (fig. 359) shining black, strongly compressed laterally, obviously shorter than the two preceding abdominal segments together, and (when seen sideways) of pointed elongate triangular shape; pubescence very sparse, black but with a few pale hairs on the sides, and with some longer hairs beneath not far from the base which are black with a few pale hairs intermixed or *vice versa*; the second upper piece of the ovipositor not half so long as the first and impunctate, but with an inconspicuous circlet of thin pale hairs not far from its end; the small lamellæ entirely free and coarsely punctate (especially above).

Legs with the long pale pubescence sparser than in the male and much shorter on the tibiæ, but otherwise similar except that the black bristles on the middle tibiæ may be reduced in number.

Length about 16 mm.

This species varies considerably in size, and as usual the small specimens are darker than the large ones; a small male from Lewes has the postocular festoon composed of about ten stiff black and no yellow bristles, while the small bristles on the sides of the frons are all black, the collar has about six strong yellow spines, the bristles on the middle of the disc of the thorax are black, and the scutellar bristles only four in number, and not very much upturned, the tip of the process from the underside of the eighth abdominal segment bears three or four black bristly hairs, while the claspers are hardly so thick and have a few black hairs above near the tip. If attention be given to the almost entirely black legs and the great predominance of pale bristles (especially on the scutellum and legs) no confusion can arise between this and any other known European species of *Machimus*. *Eutolmus rufibarbis* is very similar but may be distinguished by the absence of any rufescent base to the tibiæ, by the bristles on the thorax, scutellum, and especially the legs being nearly all black, by the much longer fine pubescence on the front tibiæ, which moreover extends to the basal joint of the tarsi, and by the short pubescence on the hind part of the thorax being mainly black, while the female of *E. rufibarbis* has the end lamellæ of the ovipositor wedged into an excision in the

end upper-piece (fig. 358). *Philonicus albiceps* might possibly be confused with *M. rusticus*, but the female of *P. albiceps* may be at once distinguished by the terminal circlet of spines to the ovipositor, and the male by the absence of any process at the end of the eighth ventral segment and the absence of long pubescence on the anterior legs, while *P. albiceps* in both sexes is a much lighter grey insect and has only two long white marginal bristles on the scutellum.

M. rusticus is known to me as British from only a very few specimens. Mr J. H. A. Jenner took a small male in the Coombe, Lewes, on August 9, 1886; Mr H. W. Andrews took a pair *in cop.* at Freshwater in the Isle of Wight on August 13, 1903; two males were in the Rev. O. Pickard Cambridge's collection which were probably taken on the coast of Dorset or Hants; Mr Charbonnier has sent me a record from Henbury in Gloucestershire, and I have seen a female in the Entomological Club collection.

Synonymy.—I have very little faith in any old British records of this species; for instance I found three supposed representatives in C. W. Dale's collection at Oxford which proved to be one *M. atricapillus* and two *Dysmachus trigonus*.

2. *M. atricapillus* Fallén. Femora and tibiæ with reddish stripes. Eighth ventral segment of the male produced into a two-horned lobe. Bristles on the thorax, scutellum, and legs nearly all blackish.

A moderate-sized brownish grey species with blackish brown thoracic stripes, which is easily distinguished from any other British species of *Asilinae* (except *E. cingulatus*) by the colour of the legs, and from almost all known species by the two-horned process from the ventral margin of the eighth abdominal segment of the male.

♂. Face narrow but widening downwards, greyish yellow with the middle of the space between the upper end of the facial knob and the antennæ blackish but not shining black; facial knob large, strongly arched, and bearing a strong face-beard which leaves the upper and outer thirds of the face bare but which extends outwards at its lower part in a line towards the jowls; face-beard composed of long strong black hairs with numerous whitish hairs on the middle of the lower part (though Loew states that sometimes these are missing); jowls, chin, and lower part of the back of the head bearing abundant long whitish pubescence, and the upper third of the back of the head with the postocular festoon (rather irregular on its upper part) of about sixteen strong black bristles of which most are slightly curved forwards at the tip and which are strongest on the upper part just before the gap caused by the vertical channel, and this festoon is continued a little way downwards about the middle of the head by about four similar but yellow bristles; a few short thin yellow hairs occur between the festoon and the eyes, and some long thin yellow hairs behind it at the vertex; the bristly hairs about the ocelli and those on the sides of the blackish orange or grey frons are black and rather long, but the vertex is bare between the eyes and above the ocelli and is all orange or yellowish grey in some lights or blackish with sparse golden dust in other lights; frons blackish and bare on the depressed middle part; collar yellowish grey, with fine pale yellow pubescence and about four rather strong black bristles on the upper part. Proboscis shining black, with short obscure pubescence round the tip and very long pale pubescence beneath the basal half; palpi thin and black, with long black and whitish (or

all black) hairs. Antennæ brownish black ; two basal joints rather obscured by grey dust ; basal joint with numerous rather short yellow dorsal bristles and with fewer much longer black bristles beneath ; second joint with more equal but shorter black bristles ; third joint about as long as the two basal ones together ; style about as long as the third joint and hardly set at an angle to it.

Thorax yellowish grey, with the blackish brown middle stripe widening anteriorly but steadily contracting after the suture until it becomes rather narrow when it reaches the hindmargin, and the middle stripe has on its broad anterior part a more or less distinct narrow dividing grey middle line ; side-stripes normal (best defined when seen sideways), being interrupted at the suture and extended about half-way from the suture to the hindmargin and then followed by the usual triangular dark spots ; humeral stripes (when seen from in front) sloping inwards on to the disc in front of and inside the front part of the side-stripes, while a slight stripe runs down outside the front part of the side-stripes. Pubescence (as distinguished from strong bristles) represented by small black not dense bristles all over the disc among which sometimes a very few pale ones are intermixed on the anterior part of the middle stripe, though rather short thin pale hairs occur on the humeri, above the wing base, on the ridge of the postalar calli, and across the hindmargin. Bristles mostly black ; præsutural two very strong, with sometimes a smaller third one well anterior ; supra-alar two very strong, placed on the yellowish grey ground colour ; postalar two strong, with sometimes one or two weaker ones near ; dorso-central about nine (7-9), of which about six (4-6) are postsutural and about three (2-5) præsutural, but the præsutural ones quickly merge into the short black bristles of the disc though two or three smaller ones may continue to indicate the dorso-central rows ; the dorso-central bristles are rather conspicuous owing to their being placed on the yellowish grey stripes just outside the middle stripe. Pleuræ yellowish grey with (in some lights) a dark stripe down just behind the middle of the mesopleuræ, and with two dark spots in front ; pubescence mostly pale yellow, long and rather conspicuous on the prothorax and the space between that and the front coxæ, rather long on the upper and back parts of the mesopleuræ (sometimes partially or even wholly black), rather slight on the upper part of the sternopleuræ (where I have seen one rather strong black bristly hair in one specimen), a little on the back part of the pteropleuræ (where one rather small black bristly hair occurred in the specimen just mentioned) ; metapleuræ with numerous pale hairs, and a fan of about eight (3-8) long bristly hairs which are usually yellow but sometimes dark orange or even occasionally mostly black ; hypopleuræ with some long pale hairs on the middle part, and a fan of about eight long pale bristly hairs of which the lower four may be weaker than the others. Scutellum grey, bearing rather abundant upright (or slightly forwards-bent) greyish white pubescence in which a few black hairs sometimes occur, and with (normally) four long black widely divergent upturned subapical marginal bristles which are slightly bent forwards, but the number and symmetry of these bristles vary so much that they may be three or five in number and consequently more on one side than on the other, but the two nearest the tip are always placed well apart ; metanotum greyish black, bare on the middle but with numerous pale or sometimes black hairs on the back part of the side humps.

Abdomen when seen from behind very dark but when seen sideways brownish grey, with conspicuous whitish or yellowish grey hindmargins which occupy from a sixth to a quarter of the second to fifth segments, and with similar shimmer on just the sidemargins which widens out a little at the base and end of each segment and which covers the basal segment and the base of the second segment ; eighth segment very short dorsally. Pubescence short black depressed and bristly on the disc of all the segments, but long less bristly and whitish on the sides of the two basal segments and the base of the third, and some short pale inconspicuous depressed pubescence also occurs on about the front third of the fourth to sixth segments ; basal segment with a long depressed black fringe on its hindmargin and with about five long yellow bristly hairs mixed in the fringe on each side ; second segment with a slight row of shorter

bristly præhindmarginal hairs and with about two of this row towards each side (but not near the sidemargin) forming long yellow bristles; third segment with a similar fringe but with the yellow bristles weaker and with some of the smaller bristles nearer the middle of the hindmargin also yellow; fourth segment with a small black better defined fringe and with about four yellow bristles on each side which are smaller than those on the third segment; fifth segment with a fringe similar to that on the fourth but with fewer yellow bristles; and sometimes the yellow bristles are altogether missing on the fourth and subsequent segments; these fringes on the second to fifth segments are placed well away from the actual hindmargin so that the broad hindmarginal hems are quite bare. Belly ashy grey, with a blackish splash on each segment from the third onwards; when viewed sideways the line of the belly is level for the four basal segments, but the next three segments have their hindmargins tilted so that they project beyond the base of the next segment and each of these segments has distinct sloping black hairs which become longer and more conspicuous at the hindmargins of the sixth and seventh segments, while even the third and fourth segments have a few short inconspicuous sloping black bristly hairs on their discs; the segments from the fourth onwards diminish in length; pubescence long straggly thin-haired and whitish from the base to the fifth and sixth or even seventh segments, but bristly and black even before the lobe on the eighth segment; eighth segment with its hindmargin produced into a conspicuous process which has a deep curved emargination at its end so that it has two conspicuous horns or sharp outer angles which bear long black bristly pubescence, and the surface of this lobe which is nearest the belly is shining black and bare but rather rough. Genitalia (fig. 360) comparatively small, shining black; claspers (when seen sideways) long, rather narrow, and nearly straight, with the upper end angle produced and pointed, but (when seen from above) showing a large dentation about the middle so that they enclose two long scarcely separated ovate spaces from the basal one of which the small upturned almost linear (with rounded tip) pubescent inner lamellæ usually protrude; the claspers bear pale pubescence on the basal half outside and also to a certain extent on the apical half of the inside, but the hairs on the rest are mostly black though with pale hairs intermingled; lower lamellæ about half as long as the claspers, shining black but dusted about the tip and usually bright orange-red at quite the tip, and bearing on the outside some mixed black and yellow moderate bristles and about three (3-6) strong black bristles, but when seen from beneath the lower lamellæ tend to approximate at their ends and partially enclose a heart-shaped space in which are some bright shining orange-red processes; basal ventral plate of the genitalia dusted and bearing numerous moderate black bristles.

Legs black and reddish orange; femora black with reddish streaks of varying extent and distinctness, as a well-marked specimen has the front femora reddish orange on the upper and postero-dorsal surfaces and on a ring near the tip, and the posterior femora with similar but less definite markings, while an obscurely marked specimen may have the reddish markings so much darkened that only the præapical ring can be distinctly traced; the front tibiæ may be reddish orange with the tip and an anterior streak (widened at the tip) blackish, the middle tibiæ with similar but less definite markings and the blackish anterior streak disconnected with the black tip, and the hind tibiæ with still less definite markings and the anterior streak obscure, or the anterior tibiæ may have the dark streaks larger and more complete while the hind tibiæ may have the basal two-thirds indistinctly black; the tarsi are usually reddish orange with the tip of the basal joint darkened and each subsequent joint more blackened at and near the tip until the last joint is practically all black, or the tarsi may be blacker on especially the basal joint of the hind pair and on the tips of the other basal joints. Pubescence (as distinguished from long or strong bristles) mainly pale yellow; long and whitish on the anterior coxæ, but most abundant on the front pair; very long beneath the front femora and with a few black hairs near the tip, and moderately long posteriorly but minute and adpressed anteriorly; also very long but blackish or greyish beneath the front tibiæ but mainly minute and adpressed elsewhere and varying in colour except

for some black bristly antero-dorsal hairs and the orange felt-like pubescence on the apical two-thirds of the inner side; front tarsi with minute black bristly hairs and with some orange felt-like pubescence on the soles; pubescence on the middle femora long and sparse beneath but minute pale and depressed elsewhere except for some black bristly hairs about the tip, on the middle tibiae much sparser than on the front pair and with the minute bristles mainly black on the dorsal part but forming a dense short sloping pubescence on the underside; pubescence behind and beneath the hind femora slight and pale, but minute depressed pale hairs occur on the other parts, and the hind tibiae bear mixed minute depressed bristles and have orange felt-like pubescence all down the inner side, and this felt-like pubescence extends to the sole of the basal joint of the tarsi with a slight trace on the second joint. Bristles black (with rare exceptions); front femora with three or four postero-dorsal on the apical half; front tibiae with one rather strong dorsal close to the base and one small antero-dorsal close to it, about seven (3-7) often unequal slightly postero-dorsal, about three (2-4) long postero-ventral of which the uppermost one (just before the middle) is the longest, and the usual apical circlet of about six bristles; front tarsi with the usual circlet of six bristles at the tip of each of the four basal joints and with the usual long posterior bristle near the base of the basal joint, besides the plantar bristles; middle femora with one strong anterior just after the middle and sometimes with another one near the base, three or four smaller antero-ventral in a sort of row near the middle, and the usual subapical bristles; middle tibiae with two small antero-dorsal (one near and one after the middle), two thinner postero-dorsal near the antero-dorsal, about three longer and more hair-like postero-ventral, and two long antero-ventral of which one is just after the middle and the other at about three-quarters the length; middle tarsi with bristles similar to those on the front pair but with a strong anterior as well as posterior one near the base; hind trochanters with about two (2-4) posterior bristles; hind femora with two postero-dorsal near the tip, five or six anterior or antero-dorsal almost equally separated (excluding the rather isolated subapical one), about seven (5-7) slightly antero-ventral extending over nearly the whole length, one rather strong postero-ventral (dark orange or black) just after the middle with a smaller inconspicuous one a little before it and two inconspicuous yellow ones near the base; hind tibiae with one quite dorsal near the base, three slightly antero-dorsal near the middle (the middle one small or absent), one postero-dorsal at the middle, two antero-ventral at about three-quarters the length, and the usual apical circlet; hind tarsi with the usual apical circlets to the four basal joints, a strong anterior bristle near the base of the basal joint, and the plantar bristles. Pulvilli long, brownish orange; claws long and rather thin, especially curved near the tip.

Wings hyaline with blackish brown veins and with an extensive brownish grey "gloom" at the tip and hindmargin; this "gloom" fills the second submarginal cell and forms broad stripes in the first submarginal and in the marginal cell where it extends back about as far as opposite the base of the discal cell, and it also occupies the wing-tip, the third posterior cell except close to the veins, and the whole of the hindmargin, while it forms large kernels in the closed fourth posterior and anal cells and a narrow stripe in the discal cell. Squamæ brownish yellow; alar pair with rather long abundant outspread whitish fringes, but the thoracal pair practically absent. Halteres brownish, with the top of the knob rather orange.

♀. Very similar to the male except for the ovipositor.

Thorax with the metapleural and hypopleural fans more distinct.

Abdomen rather broader and more pointed, when seen from behind more greyish black with large black dorsal spots on the second to sixth segments; pubescence very slight on the sides of the third segment and the yellow bristles towards the sides of the præhindmarginal fringes not extending beyond the fifth segment. Belly with soft long white pubescence on the four basal segments, but with more rigid erect black bristly hairs on the next three and to a small extent on the hindmargin of the fourth segment. Ovipositor elongate triangular (when seen sideways) and apparently formed

in conjunction with the eighth abdominal segment as both are shining black and very much compressed, rather longer than the two preceding segments together; upper end piece not half so long as the basal piece, and both bearing very sparse pale hairs; end lamellæ elongate and almost oblong, quite free and bearing more numerous pale hairs.

Legs with the bristles slightly more numerous, there being usually three antero-ventral on the hind tibiæ, and about six antero-ventral on the hind femora.

Length about 12 mm.

This species may be easily distinguished from all known species (unless *M. calceatus* Meig. be distinct) by the peculiar two-horned process from the eighth ventral segment of the male; Loew in 1849 dealt exhaustively with all the varieties which he could distinguish and gave details of their local distribution over Europe, and doubtfully came to the opinion that *M. calceatus* might be distinguished by its more yellowish grey colour and its paler face-beard and general pubescence. Loew also stated that in dark specimens a large amount of the usual pale pubescence on the legs and especially of the femora becomes black, but I have observed but little variation in our British specimens except in size and in the coloration of the legs as mentioned in the foregoing description and in the two extreme forms mentioned which were taken at the same place and time (Chippenham Fen, August 22, 1892). It is not likely to be confounded with the only other British species of the genus, as *M. rusticus* is larger and has far more numerous pale bristles on the body and legs, while the legs have only the extreme base of the tibiæ reddish, and in the male the process from the eighth ventral segment is much more simple. *Epitriptus cingulatus* is more likely to be mistaken for it because of the somewhat similar coloring of the legs, but may be distinguished by its smaller size, yellower appearance, more pale haired frons, and simple eighth ventral segment of the male.

M. atricapillus is one of the commonest species of the *Asilinae* in the southern half of England as I have met with it in numerous localities from Cornwall to the Midlands, but the most northerly records I know are the Forest of Dean, Painswick, Stokenchurch, Tarrington, Wyre Forest, Sutton Coldfield, and Dolgelly (in all of which localities I believe it is uncommon), while it is fairly common in Cambridgeshire. Colonel Yerbury once took a female in the New Forest preying upon a male *Chrysops cacutiens*. My records extend from June 7 to September 30. It is common over all North and Central Europe, and is not uncommon in the Alps, but that seems to be almost its southern limit.

8. NEOITAMUS.

Neoitamus Osten Sacken, Cat. Dipt. N. Amer., ed. ii., 82 (1878).

Itamus Loew, Linn. Ent., iv., 84 (1849), nec Schmidt-Goebel (1846).

Blackish grey flies of moderate or rather large size, which have the tibiæ conspicuously clear orange without any striping, banding, or even dusting. Ovipositor very long.

Head with the usual pubescence and bristles; face unusually narrow; facial knob occupying the lower part of the face so that the long and strong face-beard

leaves nearly the upper half or third and the sides of the face bare; ocellar bristles rather well defined; postocular festoon long and extended, but with its bristles rather thin and erect until the upper quarter where they bend forwards on their top half almost rectangularly (fig. 362). Antennæ with the basal joint thin and twice as long as the almost globular second joint, and the two basal joints bearing long bristles (especially on the underside); third joint tapering so much that it ends as thin as (and seems to merge into) the base of the style; style long and thin.

Thorax rather unusually blackish grey, because the strongly marked dorsal stripes are blacker than usual and are quite bare of pubescence; pubescence otherwise fairly long and growing still longer posteriorly until it becomes almost as long as the dorso-central bristles. Bristles long, strong, and numerous, four or five præ-sutural, about five irregular supra-alar, about five (3-5) postalar, and about twelve dorso-central (becoming weak posteriorly and not extending anteriorly more than half-way between the suture and the front); metapleural and hypopleural fans composed of numerous long bristly hairs. Scutellum with about four (2 or 4) strong marginal bristles.

Abdomen long, rather narrow, and dark colored, with large genitalia; eighth segment in the male not much shorter than the seventh. Pubescence rather long and conspicuous, becoming of a bristly nature towards the sides of the præhind-marginal fringes on the second, third, and fourth segments, where a few (about four) of the long hairs become stout and strong. Genitalia of the male large and complicated, shining black; ovipositor laterally compressed and appearing to be very long because the sixth and seventh abdominal segments seem to form part of it.

Legs black, but with the tibiæ (except at the tip) bright orange and not obscured by any close short pubescence nor by any striping or banding; tarsi often also more or less orange about the base. Bristles normal; front femora without any bristles on the underside.

Wings normal; cubital fork with a decided bell-mouthed opening. Squamæ (alar) with only a moderate marginal fringe which is neither so dense nor long as usual.

The generic characters now given apply only to Section A of Loew's genus *Itamus*, as I believe that there are sufficient reasons for giving generic (or subgeneric) rank to the species in his Section B for which I here propose the name *Paritamus*.

This genus as now restricted may be distinguished from any *Asilinæ* known to me by the remarkable ovipositor and by the bare thoracic stripes. The ovipositor is very much laterally compressed and is very long, as it appears to include the sixth and seventh abdominal segments so that the ordinary abdomen seems to be reduced to five segments. Other notable characters exist in the narrow face, the rectangularly bent postocular festoon, the tapering third antennal joint, the numerous thoracic bristles, the complicated male genitalia, and the bright orange coloring of the tibiæ. *Paritamus* has the face less narrow and only its upper quarter bare, the postocular festoon less bent forward, the third antennal joint not more tapering than usual, the thoracic stripes considerably covered by the tiny thoracic bristles, the male genitalia conspicuously swollen, and the ovipositor normally formed so that the abdomen has the usual seven segments, irrespective of the ovipositor.

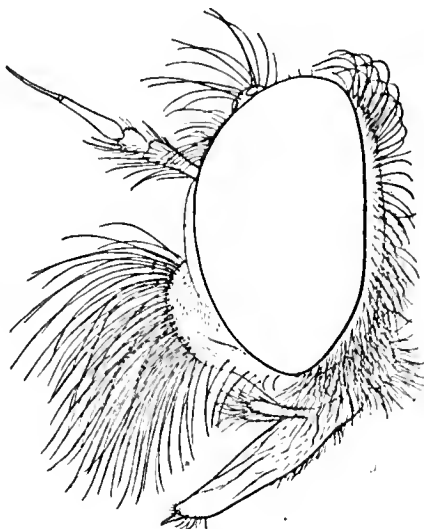


FIG. 362.—*Neoitamus cyanurus* ♀. × 13.

Neoitamus contains only three well-known European species, but those three are widely distributed and will probably all be found in England; two doubtful species have been recorded from Greece, and two or three occur in China and Japan; the genus undoubtedly occurs also in Algeria and has been recorded from North America, South Asia, and New Zealand.

Synonymy.—The genus *Itamus* was founded by Loew in 1846 as a subgenus of *Asilus*, but the name having been preoccupied three years earlier in the *Coleoptera* by Schmidt-Goebel, Osten Sacken proposed the name *Neoitamus* in order to preserve the old name as much as possible.

Table of Species.

1 (2) Bristles of the legs nearly all black.

Sixth and seventh abdominal segments in the male steel-blue.
Tarsi orange at only the extreme base.

1 *cyanurus*.

2 (1) Bristles of the legs to a large extent yellow.

Sixth and seventh abdominal segments in the male black. Tarsi considerably orange at the base.

2 *cothurnatus*.

N. socius is most allied to *N. cyanurus* but has the tarsi more orange about the base and has the male genital claspers shorter and more triangular.

1. **N. cyanurus** Loew. Bristles of the legs nearly all black; tarsi with only the extreme base orange. Abdomen of the male shining blue on the sixth and seventh segments, while in the female those segments appear to form a part of the ovipositor. Male claspers elongate oblong.

A rather large dark elongate species.

♂. Face unusually narrow near the antennæ but widening downwards until it becomes nearly three times as wide at the mouth, while the frons above the antennæ is nearly twice as wide as the narrow part of the face but contracts again slightly towards the vertex; face covered with dense pale yellow tomentum on the part above the face-beard but with less tomentum on the bare sides, and with the blackish ground colour showing up considerably on the facial knob; facial knob (fig. 362) of medium size, occupying only the lower half of the face, and bearing the long strong face-beard, of which the upper part is black and the lower part yellow or orange but with the black hairs extending partially downwards outside the yellow ones and continuing in almost a single line to the jowls; the face-beard leaves nearly the upper half and the side thirds of the face bare; chin- and jowl-beards moderately long and silky whitish, but this pubescence becoming scarcer and dying out about half-way up the back of the head, though a short inconspicuous whitish pubescence remains close to the eyes on about the middle third of the greyish yellow eyemargin; the black festoon begins at about a quarter the way up the back of the head and continues as a row of rather thin black bristles all round the upper three-quarters of the head without absolute interruption at the vertex, though the strongest bristles occur near the upper eye-angles and the space behind the vertex bears less strong bristles; the festoon bristles are nearly erect until the upper quarter of the eyes, after which they begin to have their tips bent over forwards and this bending over increases so much that at the upper eye-angles their top half is bent forwards at right angles to the lower half; upper part of the actual back of the head grey, with some shorter black bristles near the festoon but otherwise bare. Frons covered with not very dense yellowish grey dust which leaves the middle depression between the ocelli and the antennæ almost black, deeply sunk between

the eyes above (but not much below) the ocelli; sides below the ocelli with fairly numerous moderate black bristly hairs; ocellar knob with several longer black bristly hairs of which the upper four turn outwards but the rest (as well as the hairs on the sides of the frons) slope forwards; collar grey, with a row of about eight to ten bristles which may be either blackish orange or black. Proboscis black with the usual long pale hairs beneath on the basal part, but with very slight pubescence at the tip; palpi short, thin, and black, with long blackish (or sometimes pale near the base) hairs directed forwards and with one extra long curved one at the tip. Antennæ greyish black; basal joint thin and cylindrical, twice as long as the short almost globular second joint, and both these joints bear black bristly hairs (longest on the underside); third joint long, thin, and tapering so that it is not easy to detect where the joint ends and the style begins, about as long as the two basal joints together; style jointed with the basal joint short, about equal in thickness with the tip of the third joint and continuing so for about the length of the third joint but then ending in a tiny point.

Thorax ashy grey; middle stripe deep black but conspicuously split by an ashy grey middle line, and broadened anteriorly but contracted posteriorly until it ends in two (still well separated) blunt points about mid-way between the suture and the hindmargin, though in some lights these two points appear to coalesce and continue as a narrow indistinct greyish black stripe to the hindmargin; side-stripes sharply defined, and each forming a large elongate ovate stripe of which the greater part is before the suture, and when seen from in front the grey suture separates that part from the smaller part below the suture; the front end of the side-stripes turn rather outwards to a point near where the humeral stripes ought to occur; after the ends of the side-stripes narrow awl-shaped rather small dark spots extend towards but do not reach the hindmargin; humeral stripes hardly extended. Pubescence black, fairly long and slightly bent backwards, comparatively sparse or certainly nowhere abundant, quite absent on all the dark stripes and only occurring as a single line on each side of the narrow grey middle line; the pubescence is longer and less bent backwards towards the hind part of the thorax when mixed with the long bristles, and in fact it becomes almost as long as the hindmost bristles; humeri with only rather long thin pale yellow hairs, but no further trace of pale hairs occurs along the sides except perhaps the short pubescence on the extreme outer side of the postalar calli. Bristles; four or five long strong præsutural and about two weaker more anterior ones; about five long and strong supra-alar; about four long and strong postalar; about twelve dorso-central (there being no apparent interruption at the suture) neither extending back near to the hindmargin nor forwards to the front third of the thorax, but these bristles become shorter and weaker towards the hindmarginal end of the rows and merge before the hindmargin into the general bristly pubescence. Pleuræ ashy grey, but the lower front part of the sternopleuræ blackish; prothorax and the space below it with not dense greyish white pubescence; mesopleuræ with a few normally black hairs near the upper and hindmargins and about the lower hind part, but many of these hairs may be pale; sternopleuræ with more numerous though inconspicuous pale thin hairs on all the upper part; pteropleuræ with some stronger almost bristly dark orange hairs on the back part and with some longish thin pale hairs; metapleuræ with a dense fan of about twelve long dull yellow bristly hairs, near which are some almost equally long thin yellow hairs; hypopleuræ with a fan of about four still stronger dull yellow bristly hairs and several equally long yellow thin hairs. Scutellum ashy grey, with numerous erect thin hardly short yellow hairs on the disc, amongst which a rather stronger black hair or two may sometimes occur, and with about four strong upturned black marginal bristles; metanotum greyish black, but lighter grey at the sides.

Abdomen narrow, black with (when seen from behind) a rather obscure greyish hindmarginal hem to each of the first five segments and with this greyish coloring widening out at the hind corners and extending along the sides; abdomen very gradually tapering and the seventh segment still slightly narrower, while the sixth and seventh segments are shining steel blue. Pubescence comparatively long and conspicuous, chiefly fawn yellow or

yellowish white and tending to form bands across the second and third segments (more especially the second) a little before each hindmargin; it is long and outspread at the sides of the two basal segments, and also to a less degree at the sides of the third, and is faintly traceable at the sides of the fourth, and a short black pubescence extends broadly down the middle of the sixth and seventh and more narrowly on the fourth and fifth segments; close against the bare hindmarginal hems of the three basal segments are fringes of yellow depressed hairs which become longer and include towards each side of the row on the basal segment about six (4-6) long bristly hairs intermingled with the thinner hairs, on the second segment about four such bristly hairs, on the third segment about four, on the fourth segment about two which are rather more distinct because there are only shorter yellow hairs near, and against the remaining hindmargins three or four weak bristly hairs near each side; eighth segment distinct and not much shorter than the seventh. Belly dark ashy grey, with scattered long yellowish white or fawn yellow pubescence which becomes more black haired on the rather swollen shining black eighth segment. Genitalia not very large nor very much swollen, shining black and black haired except on the bare ferruginous under parts, the hairs becoming rather rigid near the inner ends and apical halves of the claspers; claspers (when seen sideways) moderately stout and long, being nearly three times as long as deep, but when seen from above their inner margin is almost straight and their upper surface is considerably excavated before the middle, they are more widened out above than below so that the lower angles at the tip may touch while the upper angles are somewhat separated, and consequently the claspers (seen from above) enclose a long narrow ovate space which is not quite closed at the tip; lower lamellæ short and black, with a pair of large crescent-shaped ferruginous bare lamellæ inside them and between those is the long prong-like bare ferruginous middle organ.

Legs black and orange; the orange colour being limited to all the tibiae except the tip, and frequently even the underside of the tip rather brown, while in dark specimens the whole underside of the tibiae is said to be dark brown (though I have not seen it so), though sometimes the base of the tarsi is narrowly orange; coxæ covered with light grey dust, and with abundant drooping long whitish or fawn yellow pubescence on the front part of the front pair, and with similar but less abundant pubescence on the outer side of the posterior pairs; femora shining blue black. Pubescence of the legs altogether very slight, there being scarcely any long pubescence except that hereafter mentioned in connection with the bristles, while the usual short depressed pubescence is mostly pale, but is black on the upper side of the front femora, on most of the middle femora, and on the front of the hind femora, and dense felt-like orange pubescence occurs on the apical two-thirds of the anterior side of the front tibiae, on the apical half of the posterior side of the hind tibiae, and beneath the basal joint of the hind tarsi; the ordinary short pale pubescence behind the hind femora is abundant and not so short as usual but still not nearly so long as in continental specimens mentioned later on. Bristles almost all black; front femora with one or two anterior subapical and with about six long bristly hairs beneath on the basal two-thirds, postero-dorsal bristles absent; front tibiae with three or four long postero-ventral bristly hairs, about three (2-5) rather small slightly antero-dorsal bristles and one rather longer dorsal near the base, and a few long fine hairs beneath; middle femora with a few bristly hairs beneath similar to those on the front pair or with from three to five stouter bristly hairs there, two or three strong anterior bristles, three or four strong antero-ventral not after the middle, and one curved postero-dorsal near the tip; middle tibiae with two or three antero-dorsal bristles near the middle, two small postero-dorsal near the middle, and about three (3-5) long almost hair-like postero-ventral and two stouter antero-ventral after the middle; hind femora with about five long rather weak bristles beneath and one specially long thin hair near the middle, three or four antero-ventral before the middle, three or four anterior near and before the middle (the one near the middle being orange or sometimes all of them blackish orange), one rather long antero-dorsal near the tip, and

one postero-dorsal near the last but blackish orange and less conspicuous; hind tibiae with three rather strong antero-dorsal (one being near the base, one at one-third, and one at two-thirds the length) and sometimes one or two smaller bristles in between, about three (3-5) almost equidistant nearly postero-dorsal, and two antero-ventral after the middle; the usual circlets of bristles occur at the tip of all the tibiae and each tarsal joint, and the other usual tarsal bristles are present. Pulvilli long, blackish brown; claws dull black, but brown at the base.

Wings hyaline with an indistinct greyish "gloom" over all the tip and the hindmargin, which includes all the veins and the wingmargin there but whose inner limit is indefinite; wing-veins blackish brown. Squamæ brownish yellow, but clearer yellow at and near the margin, and with a moderate pale yellow marginal fringe which is neither so dense nor so long as in many *Asilinae*; thoraeal squamæ only represented by a bare membrane. Halteres ranging from dull yellow to yellowish brown.

- ♀. Very similar to the male except in the very distinct ovipositor. Abdomen with the sixth and seventh segments deep black, very much compressed, and apparently forming part of the ovipositor, the remainder of the ovipositor being similar and about as long as the seventh segment; end piece of the upper part about a quarter the length of the basal piece, with a terminal pair of neither specially long nor specially small lamellæ. Bristles beneath and in front of the middle femora rather stronger and slightly more numerous.

Length about 13 mm.

This species may be distinguished in the male sex from all except *N. socius* by the shining steel blue sixth and seventh abdominal segments. *N. socius* has quite distinct genitalia, the claspers being shorter and when seen sideways elongate triangular rather than oblong, while there are no ferruginous processes against the lower lamellæ, and the genitalia are altogether more knobbed and more black haired on both themselves and on the sixth and seventh abdominal segments; the face knob is smaller, the narrow dividing line down the thorax less distinct, and (most easy of all to notice) the tarsi are distinctly more reddish orange at the base; *N. socius* is almost certain to occur in Britain but has not been detected at present, though this is not surprising as it was not distinguished from *N. cyanurus* until 1871, even though it is common over North and Middle Europe. *N. cothurnatus* is easily distinguished by its more abundant yellow pubescence and its longer mainly yellow bristles on the legs, by the paler base of the tarsi, and by the distinct genitalia and black sixth and seventh abdominal segments of the male. *N. cyanurus* varies a good deal in size, and I think that our British specimens average a larger size than those from the continent, but I have not noticed any other important variation in British specimens; I have observed however that continental specimens from Eger and Marienbad have much longer pale pubescence beneath the hind femora on especially the basal part, while the claspers seem to be more pointed and the penis shorter, the metapleural and hypopleural fans and pubescence entirely yellow, and the halteres pale yellow. The sharply defined yellow coloring on the tibiae will distinguish *N. cyanurus* from the British species of any other genus.

N. cyanurus is sometimes abundant in woods, and I remember seeing it in considerable numbers in Darent Wood in Kent on June 18, 1868, when specimens were sitting motionless on the ends of leafless twigs until *Tortrix viridana* flew past, when they would swoop down from their coign of vantage and bring their prey back to the twigs for consumption; they however did not hesitate to pounce upon fair-sized *Geometrae*. I have

other English records from Devonshire (Plymouth, Dunsford), Hampshire (Lyndhurst), Sussex, Kent (St Mary Cray), Surrey (Weybridge) Suffolk (Bently Woods, Ipswich), Oxfordshire (near Oxford), Herefordshire, and Sherwood Forest, whilst it has occurred in Wales at Dolgelly and Barmouth, and in Scotland at Forres and Spey Bridge. My dates range from June 1 to August 7, but I think it is mainly a June species. It is recorded from all North and Middle Europe and even from Italy.

Synonymy.—The reasons given by Loew in 1849 for the suppression of any earlier name for this species seem to me to be perfectly good. It is the *A. æstivus* of Walker's Ins. Brit. Dipt., and a specimen in the Hope Museum at Oxford was labelled "*æstivus* Schra." It is also probably the *Asilus tipuloides* of Moses Harris (1782), which had been identified by Stephens as *Asilus forcipatus* L., but the colour of the legs would at once distinguish it from that, besides the fact that *Dysmachus forcipula* Zell. (which is probably *A. forcipatus* L.) is not known as a British species. It is however not at all impossible that *N. cyanurus* was included under Linné's *A. forcipatus* when in Syst. Nat., Ed. x., p. 605, he said "Varietas major Tibiis ferrugineis."

2. *N. cothurnatus* Meigen. Bristles of the legs to a large extent yellow; tarsi obviously orange at the base. Abdomen of the male with the seventh and eighth segments black without any steel blue reflection, and in the female with these segments appearing to form part of the ovipositor. Male claspers short and stout.

Very similar to the preceding species.

♂. Face narrow near the antennæ but widening downwards until it becomes nearly twice as wide at the mouth, covered with greyish white tomentum which may have a faint yellowish tinge on all the bare parts; facial knob rather large, occupying almost the lower two-thirds of the face; face-beard dense and long, not quite extending to the chin-beard, black on the upper part and with a single row of black hairs extending down its outside for about its upper two-thirds, leaving the upper third of the face and the fairly wide sides quite bare; chin- and jowl-beards white or pale yellowish; back of the head light grey, but with a large blackish patch near each upper eye-angle, and with the pubescence on the lower half pale yellowish or whitish and that on the upper part all black even right across the back of the vertex; the black bristly haired postocular festoon beginning (in several rows) below the middle of the head but becoming longer and stronger near the upper eye-angles and having its bristly hairs there remarkably bent over forwards at the tip at fully a right angle from the base; frons partly covered with yellowish grey dust and with black hairs on the sides which are nearly as long but not so strong as those on the ocellar prominence, and sometimes with a very few pale hairs close to the antennæ; the upper hairs on the ocellar prominence not turning upwards; middle part of the frons bare and less obscured by dust; collar blackish grey, with a little thin pale pubescence and a row of about ten rather inconspicuous black bristles across its upper part. Proboscis shining black, considerably sloped downwards, with short pale pubescence about its tip and with long whitish pubescence beneath its basal half; palpi short and black, with some black and some whitish bristly pubescence and at the tip with a few extra long porrect black bristly hairs. Antennæ black; basal joint rather long, nearly twice as long as the second joint, and the two basal joints bearing long black bristly hairs beneath and rather short black ones above; second joint less globular than in *N. cyanurus*; third joint tapering almost enough to make its tip as narrow as the base of the style; style nearly as long as the third joint and with a very short basal joint.

Thorax pale yellowish grey; middle stripe dark brownish black and split

by a faint narrow grey dividing line, indistinctly widened anteriorly but contracted posteriorly on the last quarter and continued so to the hindmargin; side-stripes well defined and almost black, each forming a broad almost quadrate spot before, and a broad triangular one after, the suture, with the usual narrow awl-shaped continuing spot which does not extend to the hindmargin; humeral stripes short but sometimes almost reaching to the outer front corner of the broad side-stripes, and the broad front part of these side-stripes sometimes confluent with the middle stripe. Pubescence black, rather sparse but unusually long, but the blackish stripes and spots are quite bare except on the broadened front part of the middle stripe and for a row of hairs on each side of the middle dividing line, and these rows extend to the foremargin but are bent back on quite the front part; some inconspicuous thin haired pale pubescence exists on the front part of the humeri, above the wing-base, and to a very small extent on the postalar calli. Bristles almost as in *N. cyanurus*, but the rows of long dorso-central bristles extend rather more distinctly both forwards and backwards, the foremost bristles being long and distinct and about half-way between the suture and the front. Pleuræ ashy grey with the lower middle part of the mesopleuræ and the lower part of the sternopleuræ blackish grey; mesopleuræ with rather long sparse black pubescence on the upper part and with some pale hairs on the hind part; sternopleuræ with some pale hairs near the hind upper corner; pteropleuræ with numerous rather long pale hairs on the upper back part; metapleuræ with numerous pale hairs, amongst which about ten longer but only moderately bristly hairs form the metapleural fan; hypopleuræ with less pubescence but with a fan of about four long orange bristly hairs. Scutellum ashy grey, with very fine pale pubescence (bent forwards) on the disc, and with about six (4-6) long upturned black marginal bristles; metanotum ashy grey, with fine pale pubescence on the hind part of the side humps.

Abdomen dull black, with the hindmargins of the segments distinctly yellowish grey (but sometimes so narrowly as to be easily overlooked) and with inconspicuous yellowish grey triangular patches on the hind corners of the segments; seventh and eighth segments rather shining black but without any steel blue shimmer; eighth segment short dorsally but obvious ventrally. Pubescence tawny and long at the basal corners and down the sides and also on the hindmarginal fringe across the basal segment (except about the middle), while short pale pubescence extends across the second segment, broadly about the sides of the third, to a certain extent on the fourth, but only slightly on the fifth and sixth segments, the remaining pubescence on the broad middle part being short and black and the rather bristly pubescence on the short seventh and eighth segments mainly black; in addition to the hairy pubescence some long tawny bristles occur near the hindmargins towards the sides, a small clump near each hind corner of the basal segment, from four to six well differentiated in a row near each side of the next three segments, being strongest on the third and fourth hindmargins, while only about two shorter and weaker bristles occur on each side of the fifth segment, and scarcely any are noticeable on the sixth segment. Belly dark ashy grey, with long rather sparse pendent tawny pubescence and with two strong tawny bristles close to the hindmargin of the fourth segment; seventh and eighth segments with numerous black bristly hairs. Genitalia rather large but short, shining black; claspers unusually short and proportionately very broad, slightly broader than long and apparently broadly rounded at the end, but when seen from above with an obvious broad process (with a neat little black fringe on its inner side) near each inner end angle, and just under this inner angle there is an emargination, and then the lower angle protrudes almost like a broad blunt tooth and is fringed with stout black bristles, while outside and below this is a large pit-like depression, and there is rather conspicuous longish pale pubescence on the underside; when seen from above the claspers enclose a long narrow almost equally broad space; lower lamellæ very short and blunt, only about a third the length of the claspers, and enclosing a dark orange (almost black) middle piece.

Legs black, but bright orange on the tibiae except on the externally well defined black tip, and orange on the extremest tip of the front femora, on

more than the basal half of the first joint and on the base of the second joint of the anterior tarsi, and usually on the base of the first joint of the hind tarsi. Pubescence on the coxæ (which are covered with whitish grey dust) pale yellowish, long, and abundant on the front pair, but less noticeable on the middle pair, and only slight on the hind pair; front femora with some long pale pubescence behind, and with the usual short pubescence which is black above but tawny in front and behind, and with about six irregular thin tawny posterior bristles extending from near the middle to near the tip, about six rather long black hairs beneath on the basal half, a row of about ten antero-ventral rather short erect inconspicuous black hairs extending the whole length, and an inconspicuous subapical circlet of small mainly orange bristles; front tibiæ with one black dorsal bristle near the base (the longest dorsal bristle on the front tibiæ), four small black postero-dorsal bristles not far from the middle, about the usual four long thin tawny postero-ventral and a few thin longish black hairs beneath, while the short dense decumbent pubescence is orange anteriorly but mainly black dorsally, and the apical circlet has two long orange anterior and one ventral spurs, while two or three shorter bristles near the upperside and some near the underside are black but others are orange; front tarsi with two postero-dorsal bristles and the long anterior bristles of the circlets on the basal joint orange but the rest black, and the usual bristle near the base sometimes orange; middle femora with about four strong orange anterior bristles not near the tip or base, about four (3-5) rather less strong black antero-ventral, the last one (the one nearest the tip) being longer than the rest, some fairly long but sparse almost postero-ventral tawny pubescence, one or two orange postero-dorsal subapical and two or three smaller anterior ones; middle tibiæ with one black dorsal (slightly postero-dorsal) bristle before the middle, two long orange antero-dorsal well apart but near the middle and one small one nearer the base, three strong black antero-ventral from the middle to near the tip, about five long thin orange postero-ventral, and the apical circlet mainly orange but with one rather long black spur beneath; middle tarsi with the apical circlets black dorsally, but with one long anterior and one long posterior bristle orange on the three basal joints; hind femora from quite the base with rather abundant long yellow postero-ventral pubescence in which are about four (2-4) remarkably long hairs, the short dense bristly pubescence mainly black dorsally but elsewhere almost all yellow, subapical circlet all black except one orange anterior bristle, about five obscurely blackish orange anterior bristles, and about seven black antero-ventral (almost ventral) not extended to near the tip; hind tibiæ with one long black dorsal bristle near the base, two black antero-dorsal (one at one-third and one at two-thirds), one long thin black postero-dorsal at one-third the length with one smaller one just after the middle and one small one near the base, two black antero-ventral after the middle, and the apical circlet all black; the tiny bristles on the posterior tibiæ nearly all black except that the hind tibiæ bear (on all except the base) obvious ventral and postero-ventral orange felt; hind tarsi with similar orange felt on the basal joint, but with the circlets of bristles all black. Bristles all mentioned above in the description of the pubescence. Pulvilli elongate oblong, dull orange; claws long and dull black but reddish brown at the base.

Wings pellucid, but with a distinct brownish grey "gloom" about the tip and hindmargin which includes the whole of the wing-tip and a fair amount of the front and hind margins, the inner margin of this "gloom" is fairly definite, and there is a vague but obvious gloomy kernel in the fourth and fifth posterior cells and a faint streak in the discal cell; veins blackish brown. Squamæ (alar) brownish orange with a moderate dull pale yellow fringe which is very short except near the angle. Halteres brownish orange.

♀. Very similar to the male except for the extremely different genitalia.

The black postocular festoon mainly limited to the upper part of the head.

Scutellum with the marginal bristles varying in colour, sometimes some being black and some whitish.

Abdomen with the sixth and seventh segments shining black, rather compressed, and taking part in forming the base of the very compressed

ovipositor ; ovipositor very narrow and long, and the part following on from the sixth and seventh abdominal segments nearly as long as those two segments together, and therefore the ovipositor as formed from the sixth segment onwards quite as long as the third, fourth, and fifth segments together ; the end lamellæ longer than usual ; pubescence of the ovipositor very sparse but comparatively long and to a large extent black.

Legs with the pubescence on the upper part of the femora all short, but longer beneath and behind, and practically all pale ; in fact the pubescence is all yellow or tawny but the bristles are mainly black ; tarsi rather blacker than in the male.

Length about 13 mm.

This species is easily distinguished from *N. cyanurus* by the less shining (not steel blue) sixth and seventh abdominal segments, by the shorter more clubbed genitalia of the male, and by the longer and much more extensive yellow pubescence and bristles on the legs, while perhaps the handiest distinction of all lies in the rather conspicuous orange base of the anterior tarsi, but before depending upon this character specimens should be compared with *N. socius*.

N. cothurnatus was caught by Mr W. Holland at Stow Wood near Oxford on June 10, 1895, and was taken by him again at Tubney Wood in Berkshire on June 2, 1901 ; on the first occasion he took one male, and upon the second occasion one of each sex, and upon one occasion he took also a male of *N. cyanurus* in the same wood ; it is probably not uncommon in the Oxfordshire and Berkshire woods if the right time and place can be found, but subsequent searches have so far produced only *N. cyanurus*. It was reputed as British by Walker in his List of Diptera in the British Museum, i., 467 (1849), and is recorded from Middle Europe up to Sweden and Finland.

9. EPITRIPTUS.

Epitriptus Loew, Linn. Ent., iv., 108 (1849).

Yellowish ashy grey or greyish yellow species of moderate or almost small size (for *Asilinae*). Legs ringed or streaked with orange.

Face not specially narrow ; facial knob well developed and bearing a coarse-haired or bristly face-beard, which leaves the upper and outer thirds of the face bare ; festoon varying from being practically absent (*E. inconstans*) to being well defined and composed of rather short stout bristles which are scarcely curved forwards (*E. cingulatus*). Antennæ normal ; third joint hardly tapering to a point ; style normal.

Thorax with the usual short bristly pubescence all over the disc (including the dark stripes), which is (though longer towards the hind part) very distinct from the large bristles. Bristles consisting of two strong præsutural with a weaker one more forward, one (or two) supra-alar, two postalar, about six dorso-central of which about four (4-6) are postsutural and one or two præsutural, the last dorso-central being about as strong as the others ; metapleural and hypopleural fans distinct, but usually rather hair-like ; in noting the bristles it may be observed that commonly there is only one strong supra-alar and sometimes only one strong postalar. Scutellum with from two to four upturned marginal bristles.

Abdomen with bristles at the sides just before the hindmargins of the segments, and these bristles are often reduced to two isolated ones on each side of each segment, but sometimes (*E. cingulatus*) there are several rather strong hairs of which two or three on each side are just strong enough to be termed bristles ; eighth ventral segment of the male with a straight hindmargin. Genitalia of the

male comparatively small, rather pointed at the tip; claspers usually quite simple and seldom with any projection on even the inner margin; ovipositor compressed, pointed, and triangular, with the terminal lamellæ quite free.

Legs ringed or streaked with orange markings, and with a peculiar greyish brown appearance caused by abundant depressed short pale pubescence, but in one European species the legs have a blackish grey appearance with only the base of the tibiæ brownish. Pubescence moderate; bristles rather few in number, but the postero-ventral bristles on the tibiæ stronger than usual; hind tibiæ with only one postero-dorsal bristle.*

Wings normal. Squamæ (alar) with a dense moderately long fringe which does not extend below the angle.

This genus is closely allied to *Tolmerus*, but the species may be distinguished by their pale yellowish grey appearance and by their orange striped or ringed legs. *Ncoitamus* and *Paritamus* have the tibiæ sharply bright orange except at the tip. The female of *Machimus atricapillus* may easily be confounded with *E. cingulatus* but should be distinguished by its darker colour and entirely black haired frons, while the males of the genus *Machimus* are easily distinguished by the produced or setose hindmargin of the eighth ventral segment.

Epitriptus is composed of about fifteen Palæarctic and two or three American species; only about six European species are well distinguished, and our *E. cingulatus* is the only one known to occur north of Central Europe.

1. *E. cingulatus* Fabricius. Tibiæ with black and reddish orange bands. Small species.

The smallest species of the British *Asilinae*; easily distinguished from all others except *Machimus atricapillus* by the colour of the legs.

- ♂. Dull yellow or yellowish grey. Face moderate in width, hardly one and a half times as wide at the mouth as near the antennæ, and the frons considerably arched out above the antennæ but contracting again towards the vertex until it is as narrow there as the upper part of the face; face and frons all densely covered with dull golden (or on frons dull orange) tomentum except on just the depressed middle part between the ocelli and the antennæ; face-knob moderately large, occupying the lower two-thirds of the face, and bearing the face-beard which is more or less black on the upper part and sides but yellowish on the middle and lower parts, but a little before the mouth the side black hairs diminish in number, and usually merge into the yellow hairs, though only black hairs occur along the sides of the mouth; nearly the upper third and the sides of the face are quite bare; after the hairs on the sides of the mouth comes a gap before the whitish or yellowish white chin- and jowl-beards, and the latter extends half-way up the back of the head; postocular festoon composed of about eight (5-8) stout but not long and hardly curved-forwards black bristles near the upper eye-angle, which when numerous are irregularly placed and more crowded than a postocular row of about eight thinner yellow bristly hairs extending down to the middle of the head; the black bristles of the festoons usually do not meet behind the vertex unless through bristles set further back on the back of the head, and these intermediate bristles may be either orange or black; back of the head all covered with similar dull golden tomentum and with a few rather long yellow hairs behind the upper part of the festoon; frons with several rather long radiating stiff black hairs on the ocellar prominence, and with some

* If my specimen of *E. arthriticus* be correctly named I think it must be placed in some other genus, as it does not agree with the other species of *Epitriptus* in either the coloring or bristling of the legs.

hairs down the sides which are more or less black on the upper part but quickly become yellow and which form about two irregular rows; collar dull golden, bearing abundant long pale pubescence and about two stout black or orange bristles on the upper part. Proboscis black as usual, and bearing the usual pubescence; palpi thin, black, and bearing porrect black bristly hairs with sometimes some pale hairs intermixed. Antennæ dull brownish black; second joint cup-shaped on only its apical half, twice as long as its broadest part; basal joint bearing short mainly yellow bristly hairs above and longer stouter black ones beneath; second joint with similar but much shorter hairs; third joint elongate very narrow ovate; style rather more than half as long as the third joint and not placed at an angle to it, not very thin (except at just the tip) but much thinner than the end of the third antennal joint, and its basal joint very short.

Thorax dull yellow or yellowish grey, with the distinct middle stripe dark brown and split all the way down by a narrow rather inconspicuous yellowish grey line; the broad middle stripe widening but little anteriorly and contracting posteriorly to a point near the hindmargin; side-stripes (when viewed sideways) comparatively small but distinct and with the yellowish grey suture conspicuously separating the larger fore part from the smaller hind part, while the usual awl-shaped dark spots follow but do not extend to the hindmargin; humeral stripes continued narrowly downwards outside the front part of the side-stripes. Pubescence sparse, black and bristly on all the disc (even on the dark stripes), but pale and hair-like on the humeri and mixed with the black bristly hairs near the humeri and all along the sides and across near the hindmargin. Bristles black; two long and strong præsutural and one weaker one more forward; one long and strong (very rarely a second) supra-alar; two long and strong postalar; about six (4-6) strong equidistant post-sutural dorso-central and about two (1-4) præsutural, and the hindmost of these dorso-central bristles practically as strong and long as any, so that the pubescence (which is rather longer on the hind than on the fore part of the disc) is scarcely half as long as the bristles. Pleuræ of the same dull golden colour as the thorax, bearing fairly conspicuous pale pubescence on the prothorax (rather dense) and on the space below, on the upper and hinder portions of the mesopleuræ (sparsely), on the upper back part of the sternopleuræ (sparsely), on the upper back corner of the pteropleuræ, on the metapleuræ, on the back part of the humps at the sides of the metanotum, and slightly on the hypopleuræ, while the metapleural fan of long hairs is distinct but only the lowest two or three hairs are at all strong, and the hypopleural fan has only the uppermost bristle strong, long, and orange, with the lower three or four hairs still long and yellow but only thin. Scutellum of the same dull greyish yellow colour, bearing short upturned (or even forwards-bent) yellow pubescence on the disc amongst which some black hairs often occur about the middle, and with two or four or sometimes three unequal strong black (or rarely lurid reddish) upturned marginal bristles; metanotum rather shining greyish black, with the side-humps pale yellowish grey and bearing fine pubescence.

Abdomen in some lights gilded brown with pale golden hindmarginal hems, but when viewed from behind more yellowish brown with faint traces of three dark interrupted stripes or rows of spots, of which the dorsal row is the most evident. Pubescence on the disc short, depressed, and almost all yellow, but black to a small extent down the middle of the disc (especially about the base of the segments and partly on the middle part of the longer hindmarginal fringes); pubescence long, yellow, and outstanding on the sides of the puffed-out crest on the basal segment, and also to a moderate extent at the sides of the second segment, and slightly so at the sides of the third, while the side-margins of the next four segments bear more bristly black short pubescence; scarcely any of the long hairs near the hindmargin of the basal segment can be called bristles, but one or two of those near each side of the second segment are practically bristles and three or four other hairs are rather strong, while the third segment has one or two rather distinct bristles and about two other weaker bristles near each side; fourth segment with bristles almost similar to those on the third but one or two of the strong bristly hindmarginal hairs near each side are sometimes black; similar but less strong bristles occur on

the fifth and sixth segments; eighth segment dorsally very short or even concealed beneath the seventh. Belly greyish yellow dappled with darker grey, bearing long pale pendent pubescence on the three basal segments and shorter more bristly black pubescence on the next four with some inconspicuous shorter pale hairs near the sides; fifth and sixth or sixth and seventh segments with the ventral hindmargins rather dropped but straight; eighth segment very short and with a straight hindmargin. Genitalia rather small and narrow, brownish red or more chestnut brown or blackish brown with the claspers sometimes blackish brown; claspers altogether simple, narrow, pointed and gently bent downwards at the tip, about four times as long as broad, enclosing an elongate ovate depression, and bearing pale pubescence; on the underside is a comparatively large basal plate; under lamellæ rather short and stout, rounded at the end and bearing rather rigid comparatively long pale pubescence.

Legs black and reddish orange, rather stout; front femora orange-red (sometimes rather darkened) but black beneath and anteriorly and just beneath the tip; middle femora more widely black but with nearly all the hind part obscurely reddish and with a reddish orange ring near the tip; hind femora blackish brown (sometimes partly obscurely dark reddish) with an orange ring near the tip; front tibiæ reddish orange with the apical eighth black and with a rather incomplete broad black band about the middle, but this band may be obsolete posteriorly and continues anteriorly until it unites with the black tip; middle tibiæ similar to the front pair but with the black markings rather more defined and extended; hind tibiæ slightly dilated a little before the middle, brownish orange but slightly darkened at the tip and broadly so on the middle part; anterior tarsi with the basal joint orange except at just the tip, as well as the second joint on its basal half, the third joint on its basal third, and the other two joints on only their necks; hind tarsi darker, the basal joint except at its tip and the next four joints with only their necks brownish orange; coxæ clothed with greyish yellow dust, the front pair bearing anteriorly abundant drooping, and the posterior pairs less abundant, pale yellow coarse pubescence. Pubescence of the femora and tibiæ almost wholly composed of abundant unusually long depressed short hairs, *i.e.*, the usual minute pubescence is so long and abundant as to become conspicuous enough to dull the ground colour, but still longer outstanding pale pubescence occurs beneath the anterior femora (sometimes a little black towards the tip of the front pair) and to a moderate extent beneath the basal half of the hind femora, while some long ciliation beneath the anterior tibiæ is noted below in the description of the bristles; the short bristly pubescence (not the real bristles) on the tarsi is often black except sometimes on the hind tarsi and beneath (and sometimes dorsally slightly about the base of) the basal joint of the anterior tarsi. Bristles practically all black; front femora with three or four (sometimes hair-like) postero-dorsal of which none are near the base or tip, and one antero-dorsal præapical; front tibiæ with the usual long postero-ventral (conspicuously strong and black), one dorsal and one slightly antero-dorsal near the base, about five small slightly postero-dorsal of which none are near the tip, and a fine ventral ciliation of about eight long hairs which are shorter than the postero-ventral bristly hairs; front tarsi with the usual postero-ventral bristle close to the base rather unusually long; middle femora with one anterior bristle after the middle and sometimes one nearer the base, one or two antero-ventral bristles near the middle, two postero-dorsal near the tip, and one antero-dorsal and two postero-dorsal præapical; middle tibiæ with two antero-dorsal (one at half and one at three-quarters the length), two shorter postero-dorsal near them and two long antero-ventral also near, two long postero-ventral (one at and one after the middle), and about four longish hairs and several short ones forming a ventral ciliation; hind femora with three anterior bristles (one, often orange, at a quarter, one at three-eighths, and one at half the length), merging into two antero-dorsal (one at three-quarters the length and one close to the tip), and two postero-dorsal near the two antero-dorsal, five antero-ventral (the last one being the longest), and one long postero-ventral (often orange) near the middle; hind tibiæ with one long postero-dorsal bristle at or just before the middle, one antero-dorsal near it

and one near the base and sometimes one at about three-quarters, three antero-ventral after the middle and about three shorter hairs before the middle. Pulvilli elongate oblong, brownish yellow; claws dull black.

Wings hyaline with a somewhat greyish tint and with very extensive brownish grey "gloom" all about the tip and hindmargin, even to occupying almost all the axillary cell down to the anal angle, but leaving the margins of the branches of the postical fork and all the veins enclosing the fourth posterior cell hyaline, and with a dark fold all along the middle of the upper basal cell. Squamæ (alar) brownish yellow, with yellow or orange margins which bear a dense rather long yellowish white fringe not extending downwards beyond the angle. Halteres dull yellowish brown.

♀. Very much like the male except for the ovipositor. Palpi almost always with some pale hairs; antennæ with the third joint stouter. Thorax with the middle stripe less split and extending at about half its width to the hindmargin. Abdomen with the pubescence and bristles or bristly hairs shorter and less obvious; ovipositor formed for more than half its length out of the shining black eighth abdominal segment so that it forms a long flat-sided triangle which ends in the small elongate free lamellæ and bears very few short hairs; pubescence on the last abdominal segments including many more black hairs.

Length about 11 mm.

This species is rather variable in regard to the distinctness and extent of the black or blackish markings on the femora and tibiæ, and Loew states that the East European specimens are larger and bear longer denser pubescence on the legs which gives them a stouter appearance. The nearest British species in coloring is *Machimus atricapillus* from which it is distinguished by its smaller size, sandier colour, and to a large extent pale haired frons. *Neoitamus* may be distinguished by the sharply defined shining yellow coloring on the legs.

E. cingulatus is fairly common and widely distributed in Britain, as I have records from Cornwall (Penzance, The Lizard, and Boscastle), Devonshire (Lynton, Torcross, Dartmoor), Dorset (Purbeck), Somerset (Taunton), Gloucestershire, Hampshire (New Forest, Freshwater), Sussex, Surrey, Middlesex, Suffolk (Southwold, Orford), Norfolk (Hunstanton), Worcestershire (Malvern Hills), Merioneth (Aberdovey), Nairn, Elgin (Forres, Culbin Sandhills), Aberdeen. My dates extend from July 11 to September 9. It is recorded from all Europe except the extreme North and perhaps the extreme South, though it extends a long way through Italy and to Constantinople.

Synonymy.—I have no doubt but that this was the *Asilus maculosus* of Moses Harris (1782) as he said the legs "are spotted, or clouded like tortoise-shell," and I do not think that character would apply to any other British species; as however his description and figure are otherwise hopelessly unrecognisable I cannot adopt his name; Stephens attempted to recognise *Antipalus varipes* in Harris' description but I do not think the size (four lines) would allow that, and moreover I have never seen a British specimen of *A. varipes*. An exceedingly small male of *Neoitamus cyanurus* was placed under *E. cingulatus* in C. W. Dale's collection at Oxford. Two males from Lozoncz in Hungary which represented this species in Kowarz's collection have the femora all blackish except about the tip, and the frons wholly black haired.

LAPHRINÆ.

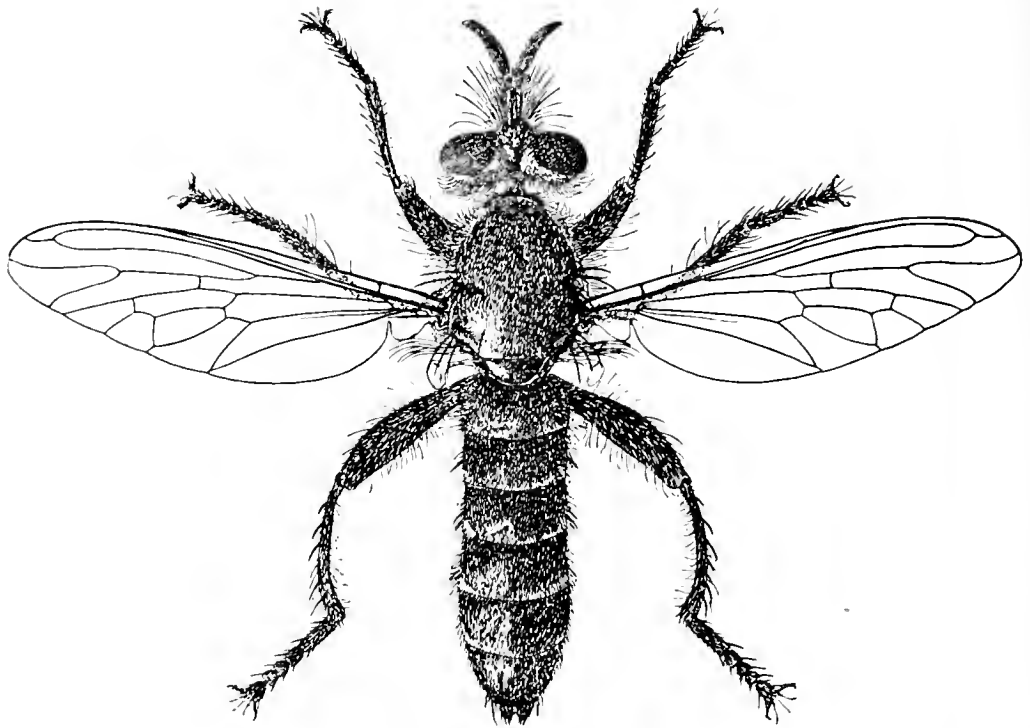


FIG. 363.—*Laphria marginata* ♂. × 6.

Marginal cell closed but not blunt at its end (fig. 363). Third antennal joint without a terminal arista (fig. 368).

Face usually bearing pubescence or bristles all over even to the eyemargins and the base of the antennæ. Eyes flattened on the front part in both sexes and with the facets on that part very much enlarged. Antennæ normally with no style or arista, but sometimes with a rudimentary or short and blunt style.

Thorax usually densely or moderately pubescent and often without distinct bristles.

Abdomen often without bristles or even bristly hairs.

Legs often without strong bristles or with small and indistinct bristles hidden in dense pubescence; the usual apical circlets of bristles on the tibiæ and on the four basal joints of the tarsi often small and inconspicuous.

Wings with the marginal cell pointed and distinctly closed through the radial vein joining the long subcostal at an almost equal angle, *i.e.*, the radial does not turn up rather abruptly and join the end of the comparatively short subcostal vein as in fig. 343; first posterior cell often very long and narrow, and not unfrequently narrowed or even closed before the wingmargin; fourth posterior and anal cells closed in all known Palæarctic species. Squamæ with only slight fringes.

It will be observed that almost all the characters are indefinite and that in fact only the diagnostic characters are definite, while even these are not very precise. Originally the characters of

“Marginal cell closed. Antennæ without a style or arista”

were supposed to differentiate all *Laphrinæ*, but it is now usually admitted that certain genera such as *Laphystia* and its allies may have the marginal cell closed close to the foremargin of the wing, *i.e.*, the point of junction so close to the end of the subcostal vein that it is difficult in some cases to determine whether there is a junction or not, and yet

these genera belong to the *Dasyopogoninae*; this difficulty may however be surmounted by recognising that in all these cases it is the sub-costal vein which is shorter than in normal *Laphrinae* and the radial vein curves up so abruptly at its end that the marginal cell is thereby closed and the end of the cell is blunt instead of pointed; if therefore an Asilid be found which has no antennal style or arista but in which the marginal cell is bluntly closed or almost closed through the sudden upturning of the radial vein that species should be sought for in the *Dasyopogoninae*. The character of "Antennæ without a style or arista" is not quite accurate, as although there may never be an arista yet sometimes there is a rudimentary or short and blunt style, but in practice this character never causes any doubt as to whether a species belongs to the *Laphrinae* or *Asilinae*.

The *Laphrinae* form a fairly homogeneous group in themselves, but still some species of *Dasyopogoninae* and even *Asilinae* appear as if they naturally belonged to them; until however some more natural classification is defined we must accept the present status of the subfamily. They are usually stout oblong flies clothed with dense coarse pubescence and with only indistinct chaetotactic bristles, but in many cases the pubescence is much reduced in amount or may even be absent, while at least some chaetotactic bristles may be developed.

Only two species of *Laphrinae* are known to occur in Britain, and of these the grand *L. flava* was only discovered in the Northern Highlands of Scotland as recently as 1873, while the other species is apparently limited to the south of England.

Table of the Palæarctic Genera of LAPHRINÆ.

The genera of *Laphrinae* have never been sufficiently contrasted and consequently the following table may be imperfect.

- 1 (2) Cross-veins closing the discal cell and the fourth posterior cell practically in a continuous line (fig. 364).

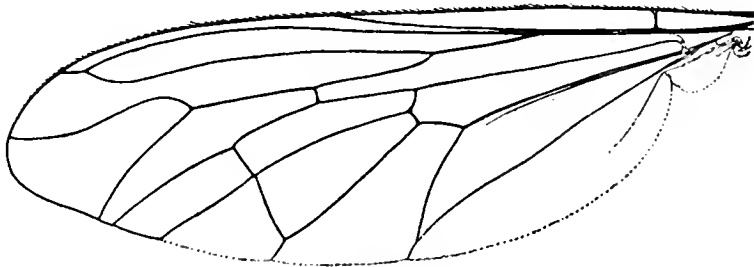


FIG. 364.—*Atomosia rufipes* ♀. × 10.

Discal cross-vein near the middle of the discal cell; first posterior cell comparatively broad at its middle part. Small flies.

ATOMOSIA.

A genus containing a large number of species from North and South America, and Southern Asia, but with only one Palæarctic species recently described from South Russia.

- 2 (1) Cross-veins closing the discal cell and the fourth posterior cell by no means in a continuous line (figs. 365-367).

Discal cross-vein before the middle of the discal cell; first posterior cell often long and narrow. Often large flies.

- 3 (4) Ambient vein absent, and the posterior long-veins hardly reaching the wingmargin.

Face arched and produced but without any knob; ocellar knob and upper part of festoon with remarkably long strong bristles. Thorax with numerous long strong bristles on the sides and hind part. Abdomen conical, short haired but with remarkable bristles at the middle of the sidemargin of each segment. Femora bearing bristles but scarcely thickened. First posterior cell contracted or closed. *Asilus*-like flies.

DASYTHRIX.

One species from South Russia, two from Egypt, and one or two others from Eastern Asia.

- 4 (3) Ambient vein entire, and the other veins reaching the wing-margin.

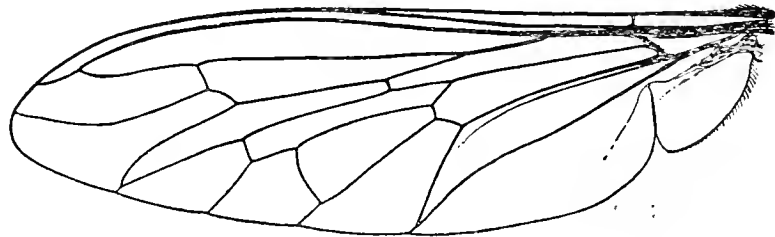


FIG. 365.—*Pogonosoma maroccana* ♂. × 5.

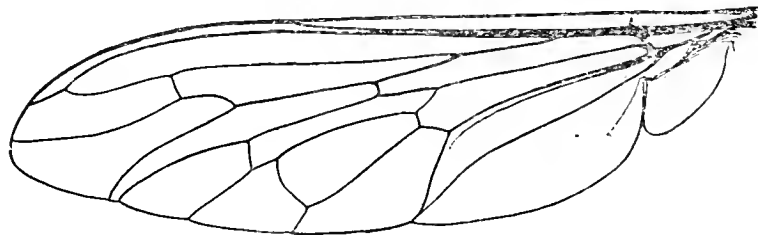


FIG. 366.—*Pogonosoma maroccana* ♀. × 4.

- 5 (6) Submarginal cells three, owing to the upper branch of the cubital fork being connected with the radial vein (figs. 365, 366).

First posterior cell always long and narrow, sometimes closed in the male.

POGONOSOMA.

Two closely allied South European and two Asiatic species.

- 6 (5) Submarginal cells two only (fig. 367).
7 (8) Veinlet closing the fourth posterior cell almost parallel with the wingmargin (fig. 367).

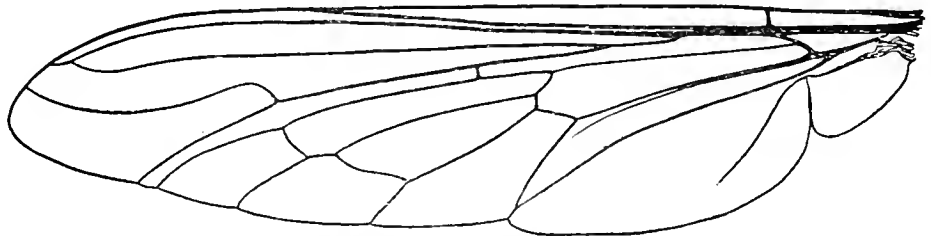


FIG. 367.—*Lamyra vorax* ♀. × 4½.

Proboscis remarkably long, bristly dorsally; palpi long, densely bristly. Thorax with only sparse short bristles in place of pubescence on the disc, but with numerous lateral bristles. Hind femora more or less club-shaped and not spinose beneath, but the legs with scattered strong bristles and very little pubescence. First posterior and discal cells long and narrow. Large *Dasyppogon*-like flies.

* LAMYRA.

8 (7) Veinlet closing the fourth posterior cell by no means parallel with the wingmargin.

9 (12) Antennæ rather short, the third joint club-shaped.

First posterior cell usually closed.

10 (11) Pubescence rather slight and suberect.

Face produced on the lower part; bristles on the back of the head all weak and not forming a festoon. Scutellum densely bristly haired about the margin. Femora and tibiæ almost without bristles.

ANDRENOSOMA.

11 (10) Pubescence conspicuously coarse and adpressed on the thorax, abdomen, and legs.

Face without any prominence or bristles though with dense pubescence. Thorax with supra-alar and postalar bristles; scutellum with dense marginal bristles.

CTENOTA.

12 (9) Antennæ rather long, the third joint not club-shaped.

First posterior cell usually open.

10. LAPHRIA.

There is an inclination at the present time to divide *Laphria* as follows.

1 (2) Thorax woolly haired and quite without bristles.

Proboscis short and thick. DASYLLIS.

2 (1) Thorax with inconspicuous dorsal pubescence and with traces of lateral bristles. Proboscis prominent and only moderately thick. LAPHRIA.

This division would place *Laphria flava* and its allies in *Dasyllis*, but *L. marginata* and its allies in *Laphria*. Loew however with a full knowledge of the European species, formed the genus *Dasyllis* for *L. hæmorrhæa* Fabr. and some well-known American species, with which he united some doubtfully congeneric African ones, in which the first posterior cell is closed.

10. LAPHRIA.

Laphria Meigen, Illig. Mag., ii., 270 (1803).

Moderately large to very large robust flies of blackish or reddish colour, often densely clothed with bright and handsome pubescence.

Head broad but short; face on the upper part level with the eyes but produced into a distinct facial knob, and the pubescence on this knob usually of a more

* Not truly Palearctic, though included in Kertész's Katalog.

bristly nature than that surrounding it; the whole of the face from the antennæ to the jowls and from eye to eye clothed with long dense pubescence in the hairier species of the genus (*L. flava*, etc.), but in the barer species the flat upper part of the face may be almost bare; jowls and lower part of the back of the head clothed with dense pubescence, and though in the larger species the pubescence on the upper part may resolve itself into a postocular fringe it hardly forms a festoon, while in the hairier species it merges into the long dense pubescence; vertex considerably sunk between the eyes so that the latter bulge out considerably; frontal orbits bearing abundant long pubescence; ocellar triangle elevated, with a pair of remarkably long diverging bristly hairs standing out from between the ocelli. Proboscis rather longer than the head, porrected horizontally or rather drooping; palpi small. Eyes in both sexes flattened on the front part and with the facets there very much enlarged. Antennæ (fig. 368) approximated at the base, hardly longer than the head; basal joint cylindrical, much longer than the rather short second one; third joint slender and strap-shaped, but slightly widened about the middle and without any terminal style.

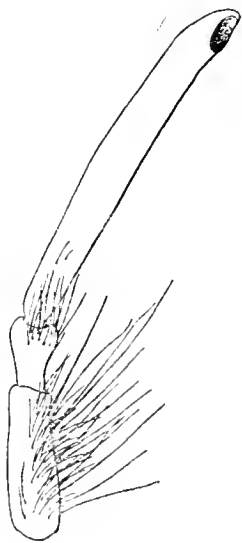


FIG. 368.—*Laphria flava*,
♂. × 26.

Thorax rather arched, oval, usually covered with dense pubescence, in which case bristles are very indistinct, but when the pubescence is short or almost absent præsutural, supra-alar, and sometimes postalar bristles become distinct; metapleural pubescence ranging from a long dense conspicuous tuft to a fan of rather numerous long bristly hairs. Scutellum with some long upturned marginal hairs; metanotum bare, almost concealed under the scutellum.

Abdomen sometimes broad and ovate, but more commonly elongate oblong in the smaller barer species, never at all conical; pubescence sometimes long and dense, but even when short and comparatively sparse forming bands of light colored hairs; bristles absent; the ground colour of the abdomen is conspicuously reddish in some of the small bare species, and such species seem to mimic (or be mimicked by) some of the similarly colored species of *Xylota*. Genitalia of the male usually large and somewhat bent down (*v.* Snodgrass, *Psyche*, 1902, 399, but I cannot imagine why Snodgrass considered the genitalia inverted, as the claspers or upper lamellæ are in their usual dorsal position), but of the female ending in a short pointed ovipositor.

Legs strong; femora thickened, and the hind pair longest; tibiæ curved. Pubescence usually long and abundant all over the femora and tibiæ and then as a rule all bristles absent or at any rate very inconspicuous, but in the barer species the pubescence is much less abundant and then distinct bristles occur on the tibiæ and occasionally even on the posterior femora; the circlets of bristles at the tip of the tibiæ and of the four basal joints of the tarsi are usually inconspicuous, and are sometimes replaced at the end of the hind tibiæ by a short blunt spur which may occur as a male character only.

Wings often but not always broad and long; marginal cell closed and petiolate with the subcostal and radial veins meeting at an equal curve; discal cross-vein before the middle of the discal cell; first posterior cell wide open, fourth bluntly closed and petiolate, others open; anal cell closed; small cross-vein distinctly present. Wing-membrane very much rippled, minutely pubescent. Squamæ (alar) small and without (or with only a slight) fringe; thoracal pair absent.

The metamorphoses of *L. flava* have been observed by Dr D. Sharp at Nethy Bridge; he found the larvæ living in the burrows of large wood-feeding Coleopterous larvæ, where he believes they act as scavengers by promptly devouring any recently deceased larvæ. The perfect insects, like all *Asilidæ*, are predaceous upon other insects.

Synonymy.—When Loew founded the genus *Dasyllis* he was well acquainted with both the American and European species of *Laphria*, and consequently he could not have intended his new genus to include the densely haired *L. flava*, etc.

Table of Species.

- 1 (2) Very large handsome species, clothed with long dense pubescence. 1 *flava*.
 2 (1) Moderate-sized dull species, clothed with short inconspicuous pubescence. 2 *marginata*.

1. **L. flava** Linné. Black; densely clothed with mainly yellowish hairs amongst which black hairs are intermixed on the head, front part of the thorax, and femora, but not on the scutellum or abdomen. Hind tibiæ of the male with a short stout spur.

One of our largest and most distinct flies.

♂. Face and frons obscurely shining black though bearing very little dust, and the eyes almost equally separated from the vertex to the mouth; face-knob comparatively small, rounded, and bearing a few rather porrect stiff hairs, while the surrounding pubescence on the face is yellowish, more drooping, and more abundant; the yellow hairs near the antennæ are also shorter and are more porrect at their base but droop towards the tip, and several inconspicuous black hairs occur quite close to the antennæ; all the hairs on the upper part of the face are of completely different texture from those in *L. marginata* and its allies; chin- and jowl-beards outstanding and sometimes all whitish grey, or at other times the rather small jowls may bear blackish pubescence close against the eyes; back of the head considerably puffed out from the eyes, and bearing on its lower part dense outstanding obscurely greyish yellow or greyish white pubescence (black close against the eye-margin); upper half of the back of the head clothed with dense black pubescence which becomes shorter as it approaches the vertex (unless rusty about the upper eye-angles), and this pubescence forms a dense postocular frill, but hardly a festoon because there is no sign of bristles; close against the hindmargin of the eyes is a slight shimmering greyish band; frons bearing thin rusty hairs on the upper part, but abundant longer stiffer black hairs on the lower part near the eyes; ocellar knob very little elevated, and bearing a few very long hairs of which the two middlemost are extra long and thin and almost invariably orange—I have once seen one hair black; collar clothed with blackish rather rigid pubescence. Proboscis long and rather thin, black, rather drooping, and bearing short obscure pubescence about its tip and unusually long and abundant yellowish white pubescence beneath on its basal half; palpi very short and small, but bearing long porrect black hairs. Eyes conspicuously flattened in front, and the facets on that flat part remarkably enlarged. Antennæ (fig. 368) black; basal joint cylindrical, three times as long as broad, and bearing abundant mostly dark orange hairs which are longest on the underside; second joint short, hardly cup-shaped, only a little longer than broad, and bearing short mostly black bristly hairs; third joint dull and bare, nearly half as long again as the two basal joints together, strap-shaped but rather narrowed towards the base.

Thorax shining black, clothed with dense suberect pubescence which at first glance appears to be blackish on about the front third because numerous black hairs occur on that part, but mixed with them are still more numerous but less conspicuous slightly shorter thin brownish orange hairs, though when seen sideways the pale hairs may appear to predominate; the black hairs disappear about the middle part and the brownish yellow hairs become more dense, while on the hind half the hairs are distinctly longer and all pale yellow and are so dense that they obscure the ground colour, and at the hindmargin they rather overhang the scutellum; all the hairs are black about the humeri and from there back to the wing-base. Bristles practically absent, but there may be indications of them in the strength of some hairs which occur in the usual places for præsutural and supra-alar bristles. Pleuræ mainly clothed with dense black pubescence, but some of the long hairs at

the lower hind corner of the mesopleuræ are yellowish, and the large tuft (hardly a fan) on the metapleuræ is formed of very long and conspicuous orange hairs with sometimes some of the front line of hairs black. Scutellum shining black, bearing shorter sparser less erect pale pubescence on the disc and about twenty long radiating almost upright yellow marginal hairs; metanotum almost shining black, quite bare.

Abdomen shining black, but the last three or four segments dulled by abundant pubescence; pubescence on the basal two or three segments rather pale yellow, almost erect, and not quite abundant enough to hide the ground colour, but on the last four or three segments denser and more orange or even handsomely reddish orange and (through being less erect) hiding the ground colour; there is no trace of bristles or black hairs. Belly glistening black, bearing long sparse greyish yellow pubescence. Genitalia very large, shining black, and rather bent downwards; claspers very large and long, three times as long as their base is broad, and (when seen sideways) extending downwards on their end half with a large sickle-shaped margin and with the tip sloping upwards to a slightly acute angle, but when seen from above the basal half of each clasper is gently excised inwards and a long ovate interval is left between the two; the basal under-piece is large and swollen, curves up between the margins of the sickle-shaped claspers, and bears at its end a tuft of rather short yellow pubescence; the rest of the under-piece and the claspers bear rather long black pubescence.

Legs shining black, clothed with exceedingly abundant long pubescence; femora all considerably dilated, but the hind pair slender about the base and becoming most dilated at about three-quarters of their length; anterior tibiæ with about four strong though short dark reddish spurs on the underside; hind tibiæ strong, curved, slightly flattened, and with a short blunt apical spur on the underside. Pubescence on the front coxæ and beneath the base of the front femora yellowish or greyish white, but on almost all the rest of the front femora abundant and black with however some of the pubescence on the underside grey and some of the hairs extra long; front tibiæ with shorter denser orange red or light brown or brownish yellow pubescence, and with longer rather less dense outstanding postero-ventral greyish yellow pubescence, and some black dorsal pubescence intermixed with which are some inconspicuous black bristly hairs, while in addition the apical half is covered antero-ventrally with short reddish orange felt-like pubescence; front tarsi with similar reddish orange felt-like pubescence on the underside, and with a pair (one antero- and one postero-ventral) of strong drooping reddish bristles on each joint and one similar posterior bristle near the base of the basal joint, whilst some still longer almost erect thinner black or orange bristly hairs occur on the upper side and at the tip; middle femora with pubescence similar to that on the front pair; middle tibiæ with still longer pubescence, the anterior or antero-dorsal pubescence being longest of all though some postero-ventral is almost as long, pale brownish yellow except on the underside where it is black or at least dark, with about six very long thin hairs standing out from the long dense pubescence on the underside; middle tarsi with bristles almost as on the front pair, but with an anterior bristle near the base of the basal joint; hind femora with dense long black posterior pubescence which sometimes becomes rusty, but with the anterior pubescence composed of long brownish yellow and denser shorter black hairs with three or four short but strong antero-ventral bristles after the middle which are almost hidden in the longer dense pubescence; hind tibiæ with very long and abundant outstanding pubescence which is apparently brownish yellow but which may be considerably black on the underside and on the apical half or more, and in which about six reddish orange antero-dorsal bristles can be traced on the basal half, while some rather inconspicuous reddish orange felt-like pubescence covers the hinder side of the tibiæ and the underside of the tarsi. Pulvilli large and oblong with broad blunt tips, brownish yellow; claws black, but brownish yellow at the base.

Wings strongly tinged with brown all about the veins, but paler on the basal part though blackish at quite the base; costa with some inconspicuous short reddish orange felt on the basal part and in fact the whole costal margin bearing some minute reddish felt; cubital fork not uncommonly with a slight

recurrent veinlet near the base of the upper branch. Squamæ (alar) very small and blackish, with practically no fringe. Halteres dull orange or yellow.

♀. Rather like the male, but the abdomen broader and rounder and the general pubescence more equally greyish yellow or greyish orange.

Head with much more black pubescence, the face-beard being mainly black though the tips of the hairs may be rusty and several long hairs on the lower part are brownish yellow, or it may be said that the porrect hairs are almost all black but the long drooping hairs pale, while the eyemargins on the upper half of the face are narrowly brownish yellow and bear brownish yellow hairs; chin- and jowl-beards all black, as well as almost all the hairs on the back of the head and on the frons, but the two very long hairs on the ocellar space remain yellow (or rarely one of them black). Proboscis with blackish or rusty black pubescence beneath its basal half. Antennæ with nearly all the hairs on the basal joints black except two long ones beneath the tip of the basal joint.

Thorax almost as in the male.

Abdomen broader, rounder, and with the pubescence more equal both in colour and in texture, that on the segments after the second or third being neither so long nor so dense. Belly with thin erect hardly scarce black hairs and a few rusty ones near the base, while beneath the sixth segment the hairs are longer and stronger. Ovipositor (including the seventh and eighth abdominal segments) small, shining black, elongate triangular and bent downwards, and composed of three segments of which each is narrower than the preceding one, while the last one ends in almost a point at which there is porrect brownish yellow pubescence, and the two basal segments (=seventh and eighth abdominal segments) with sparse black hairs on their sides.

Legs with more extensive black pubescence, especially on the front coxæ; hind tibiæ without the short blunt spur but with an orange bristle-like spur.

Wings almost as in the male, but in all the British specimens I have seen the upper branch of the cubital fork throws back a recurrent veinlet of varying length from near its base, and in one case this recurrent veinlet is connected by an adventitious cross-vein with the stem of the cubital cell so that a small quadrangular cell is formed. Halteres darker.

Length about 18 mm. (16 to 20 mm.).

This species does not vary much in British specimens except in size and in the variation of the colour of the pubescence from pale greyish yellow to ruddy orange. At one time the European species was thought to be very variable, but it is now believed that several closely allied species exist. I find however that continental specimens of the true *L. flava* vary in having no black hairs on the jowls against the eyes or on the lower part of the back of the head while the short pale hairs on the front half of the thorax may be so obscurely brownish yellow as to be almost imperceptible even when seen sideways, the male genitalia may bear a few stray yellow hairs, the pubescence behind the anterior femora may be pale and that beneath the front tibiæ may be all reddish orange, the longer bristles on the front tarsi may be yellowish, the middle tibiæ may have entirely pale yellow pubescence even beneath the tip, and the hind femora may have scarcely any black pubescence. A Sicilian male has all the pubescence on the femora black except a few long straggly antero-dorsal hairs on the hind pair, and all the pubescence on the hind tibiæ black, and even (which is still more remarkable) the drooping side bristles on the tarsi all black. *L. gibbosa* and *L. ephippium* are two allied species which may possibly occur in the Scotch Highlands.

L. flava was first taken in Britain by Mr W. A. Vice at Strathdon in Aberdeenshire in August 1873; the next record was of two specimens

taken near Banchory in Kincardine in September 1889; Colonel Yerbury took a specimen at Aviemore in Inverness in 1898 and another in 1899, and then took two specimens at Nethy Bridge in 1900, while in 1904 and 1905 he found it not uncommon at Nethy Bridge, and Brodie, though the females were scarce, and a male in the Royal Scottish Museum was taken at Rothiemurchus in 1905. In 1906 Messrs Sharp and Lamb found it at Nethy Bridge and discovered the larvæ, which live in the burrows of large wood-feeding Longicorn Coleopterous larvæ in Scotch Firs (*Pinus sylvestris*), where they act as scavengers, as they will not attack living larvæ nor do they care for rotten larvæ but they immediately suck the juices of a recently dead specimen. Colonel Yerbury took a male as early as June 18 and the species continues until September.

Synonymy.—For a hundred years the two Linnean species, *L. flava* and *L. gibbosa*, and for eighty years the Fabrician *L. ephippium*, were well known European species, and, although it was known that very little structural distinction could be found between the three, the remarkably distinct arrangement of coloring in the pubescence and the absence of intermediate forms prevented there being any doubt as to their distinctness. In 1861, however, Gerstaecker named three new forms which also showed a striking structural similarity to *L. flava*, and since then other forms have been detected which have been described as new species; Portschinsky in 1877 came to the conclusion that all these forms were only varieties of *L. flava*, but I have studied representatives of *L. hecate* and *L. auriflua* of Gerstaecker and several specimens of what I believe to be *L. varia* of Loew, and I am not inclined to unite them with *L. flava* while I certainly would leave *L. gibbosa* and *L. ephippium* as distinct species. In all these species, and in these only, the hind tibiæ of the male are provided with a short but distinct stout spur.

2. *L. marginata* Linné. Black, but the abdomen tinged with golden pubescence. The porrect face-beard black. Thorax with a whitish shimmering spot on each side on the humeri. (Fig. 363.)

A very distinct fly in which the black colour has a tendency towards violet.

- ♂. Face covered with dense orange to yellowish white decumbent coarse pubescence all across the middle part though near the eyes the pubescence has a whitish shimmer, but the upper part of the face close to the antennæ is rather puffed out and bears inconspicuous long nearly erect black hairs, while the rounded face-knob (which occupies nearly the lower half of the face) bears a face-beard composed of numerous outstanding black bristly hairs; both the yellow pubescence and the black face-beard extend from eye to eye; shorter and finer black hairs extend along the sides of the mouth, and all the lower part of the face and the sides of the mouth are black with microscopical specks of grey dust; face moderately broad and only slightly curved out to the mouth-sides; jowls very small, but bearing abundant yellow pubescence which extends nearly half-way up the back of the head; back of the head with a whitish postocular margin near by up to the rounded upper eye-angles, behind which the head is clothed on more than the upper half with dense long strong black hairs except on the broad bare shining black postvertical channel, but these black hairs are too numerous and too widely extended to form a festoon even though the foremost hairs all have their tips obviously bent over forwards. Frons wider than the face, shining black but greyish in the channels which extend forwards and outwards from the sides of the elevated ocellar prominence to the eyemargins at almost the level of the antennæ, while the ocellar prominence (which is placed below the middle of the frons) bears numerous short black hairs and two extra long outstanding ones between the ocelli, and the black postocular hairs continue (though

shorter) all round the upper eye-angles and then form a barely-more-than-double-rowed rather longer ciliation down the orbits, but otherwise the frons is bare; collar with a dense rather rigid black fringe but without bristles. Proboscis long, thin, horizontal, and with the usual pubescence; palpi very short and linear, bearing rather long porrect black hairs. Eyes with the facets on the comparatively small flattened front part very much larger than, and rather abruptly contrasted with, the small facets. Antennæ dull black; basal joint long and cylindrical, about six times longer than broad and three times longer than the second joint, bearing long but not dense black bristly hairs and about two extra long strong black hairs on the underside near the tip; second joint rather cup-shaped, bearing shorter black bristly hairs; third joint bare (or with a tiny dorsal bristle at about a quarter from the base), usually longer than the two basal joints together and beginning hardly so broad as the tip of the second joint but gradually increasing to almost double that width and then again gradually decreasing, or sometimes rather more club-shaped and then only as long as the two basal joints together.

Thorax blue-black, moderately shining and with an elongate sloping shimmering whitish spot (hardly visible in some lights) on the upper half of each humeral knob; pubescence composed of rather sparse decumbent brownish yellow or grey hairs and some longer sparser more erect (though still sloping) black hairs, but the humeri bear only rather more dense black hairs; amongst this pubescence are indications of four or five præsutural bristles, about five (5-6) supra-alar, about three postalar, and about four very weak postsutural dorso-central. Pleuræ in most lights shimmering greyish white almost all over; prothorax with only a few black hairs near the lower margin, but the space below it rather conspicuously white-haired; mesopleuræ with rather sparse black pubescence all over and at least one rather strong black bristle near the middle of the hindmargin; sternopleuræ with faint traces of pale pubescence; metapleuræ with numerous extra long hairs which represent (but hardly form) the fan of mixed black and orange curled hairs, of which none are at all bristle-like; hypopleuræ with only faint traces of pale pubescence. Scutellum bearing short brownish yellow pubescence on its disc similar to that on the thorax but rather less recumbent, and about eight long upturned orange or blackish marginal hairs (hardly bristles); metanotum quite bare, hidden by the overhanging scutellum except at the sides.

Abdomen shining blue black, with rather short but conspicuous tawny recumbent pubescence which in some lights is apparently (though not really) absent from the large basal corners of the second to fourth segments (the basal segment being very short and inconspicuous with a little pale pubescence near its sides), and this tawny pubescence grows longer and denser at the sides of the basal segments and at the hind corners of each segment and appears to form broad lunules which curve up and unite broadly on the middle of the disc; a few tiny black almost bristly hairs occur on the middle of the disc of the seventh segment and about three orange bristly hairs can be found amongst the tawny pubescence near each front corner of the second segment, and about three more on the third segment in a row near the middle of each side, and two similar bristles on each of the next two segments, while the sixth and seventh segments bear an indistinct similar bristle on each side; eighth segment very short and only just visible dorsally. Belly glistening black, very sparsely and finely punctate, with each punctuation producing a rather long thin grey hair; hindmargins of segments rather widely but obscurely orange. Genitalia shining black, rather more than half the width of and about as long as the last abdominal segment, but when viewed sideways apparently much larger through being composed of one large solid swollen underpart which extends back beneath the last abdominal segment, and this swollen underpart slopes upwards so as to nearly reach the tip of the upper lamellæ and bears numerous short stiff black hairs and near the tip a few longer black bristly hairs, while after them on the small elongate apical pieces are a few shorter pale hairs; upper lamellæ (when viewed from above) separated at the base but soon touching and bearing similar short stiff black hairs and on the upper side near the tip denser longer stouter bristly hairs.

Legs black; femora stout and shining; hind femora considerably club-

shaped, more so than in most of the allied species; hind tibiæ curved; front coxæ shimmering whitish grey and bearing anteriorly abundant whitish yellow pubescence; middle coxæ similar, but with less pubescence, and the hind coxæ with but little pubescence. Pubescence varying in strength and density, black and fairly abundant on the upper side of all the femora, but longer, finer, and pale yellow or whitish grey behind and beneath the anterior pairs, while usually all the pubescence on the hind femora is black except sometimes some yellow pubescence beneath; all the tibiæ have fine short usually rather conspicuous yellowish or whitish grey pubescence except on the apical half of the hind pair (where it is black) and have a ciliation of long thin black hairs beneath the front and hind pairs and an orange or yellowish ciliation beneath the middle pair; pubescence on the tarsi short, almost bristly, and nearly all black; front tibiæ on the inside (=front) and the soles of the basal joints of all the tarsi clothed with orange felt-like pubescence; some bristles and long hairs of a bristly nature occur in addition to the above pubescence, but the only bristles on the femora are one more or less indistinct antero-dorsal on the middle pair after the middle and a trace of one or two postero-dorsal near it, and one orange or black antero-ventral on the hind pair at about three-quarters of the length with traces of some dorsal bristles rather near it; the front tibiæ bear the usual few long postero-ventral hair-like bristles, about five small black dorsal, and about four weaker but longer postero-dorsal; middle tibiæ with about four (2-4) long antero-dorsal not far from the middle, about eight weaker postero-dorsal along the whole length, and three rather long almost hair-like anterior bristles (of which one or two may be orange), and two long hair-like antero-ventral (one at a third and one at three-quarters) with a small intermediate yellow one and two orange spurs beneath the tip; hind tibiæ with about four moderately strong nearly equidistant curved antero-dorsal but no other distinct bristles, though about two antero-ventral hairs stand out rather distinct from the other pubescence; the circlets of bristles at the tip of all the tibiæ are absent or indefinite though three or four bristly hairs occur there, and the usual bristles on the tarsi and the circlets at the ends of the joints are rather weak, but some of the stronger bristles forming the underpart of the circlets are orange.

Wings almost hyaline on the basal two-fifths, but after that with an obvious blackish brown tinge in which are usually subhyaline kernels in the posterior cells; costal vein beset with short whitish or yellowish hairs from the base to near the humeral cross-vein; subcostal vein and the stems of the principal veins yellowish brown; anal cell closed just before the wingmargin. Squamæ (alar) small, obscurely yellowish to blackish orange with a pale yellow to brownish orange margin on which is only a very slight fringe. Halteres canary yellow to dark lurid reddish.

♀. Very much like the male. Eyes flattened and with much enlarged facets on the front part as in the male.

Abdomen with the tawny or yellow pubescence usually conspicuous towards the sides of the hindmargins of the segments, and the last segment with considerably extended black dorsal pubescence; ovipositor small and (unless exerted) triangular and bearing some long porrect black bristly hairs on its underside.

Legs with the long black hairs and bristles on the anterior (especially the middle) tibiæ more distinct, and the hind tibiæ with about seven distinct antero-dorsal and four small postero-dorsal bristles; hind femora less clavate.

Wings so much less hyaline about the base that they become more equally tinged with blackish brown; costa with no whitish or even pale hairs about its base.

Length about 11 mm. but varying from 10 mm. to 12 mm.

This species seems to vary but little in British specimens except in size and in the tawny or pale grey pubescence, but some rather distinct races may exist in Europe in which the basal antennal joint is only three times as long as the second, or the short pubescence on the thorax, scutellum, and three basal abdominal segments may be whitish, etc. Loew also

stated that the lower half of the face-beard is sometimes brownish yellow, and that some of the hairs on the underside of the basal joint of the antennæ may be also brownish yellow, while apparently continental specimens have the last segments of the abdomen with more extended black pubescence. There is no Asilid in Britain at all allied to this species, but some European species of *Laphria* are rather near it and I am unable to satisfactorily distinguish *L. dioctriæformis*.

L. marginata is not uncommon in large woods in the southern half of England. My records are from Hampshire (New Forest), Sussex (Plashett and Abbott's Woods), Kent (Darentli), Essex (Leigh), Suffolk, Berkshire (Tubney Wood), Herefordshire (Stoke Wood, etc.), and Nottinghamshire (Treswell Wood), from June 14 to August 18; B. Cooke recorded (Naturalist, v., 134) a pair from the Cheshire coast. A female in the Hope Museum at Oxford is labelled as having been bred from the refuse of a hornet's (*Vespa crabro*) nest. It is recorded from almost all Europe.

DASYPOGONINÆ.

Marginal cell open (fig. 369), or rarely just closed through the radial vein curving up so suddenly as to cause the marginal cell to end bluntly (fig. 385). Pulvilli and claws normal, or if abnormal then the alula and hind angle of the wing fully developed. Antennæ with a style, but (in Palæarctic species) without an arista.

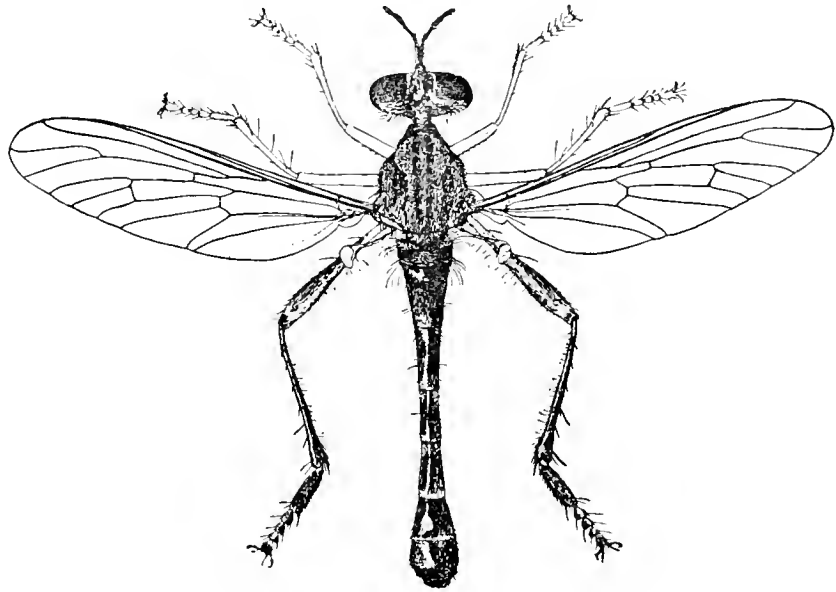


FIG. 369.—*Dioctria linearis* ♂. × 5.

Palpi two-jointed. Antennæ with a terminal style, which may be two-jointed but which never approximates to an arista (except in *Damalis*).

Thorax ranging from having bristles and very little pubescence (*Dioctria*, etc.) to being coarsely pubescent and without bristles (*Isopogon*); metapleuræ sometimes quite bare (*Stenopogon*, etc.), sometimes with a large dense tuft of long pubescence (*Cyrtopogon*, etc.), or sometimes with a fan of bristles near the hind margin (*Lasiopogon*); when the metapleuræ are bare the alar squamæ are provided with a long tufted fringe which may act as a substitute shelter to the metathoracic stigma.

Abdomen normally elongate with almost parallel sides and without conspicuous pubescence, but occasionally stout and densely pubescent. Genitalia of the male of very diverse types, one form (*Dioctria*) having a large dorsal plate which covers the lamellæ while another form (*Lasiopogon*) has large lateral lamellæ which form forceps as in the *Asilinae*.

Legs provided with bristles and with terminal circlets on the tibiæ and four basal joints of the tarsi, but the bristles seldom very powerful; front tibiæ often provided with a powerful curved thorn or claw at the tip. Claws and pulvilli normal or when abnormal then the alula and hind angle of the wing well developed.

Wings with the subcostal vein comparatively short and consequently with the radial vein ending simple in the costa, but in a small group of genera the radial vein is bent up rather suddenly and reaches the subcostal vein at or very close to its end so that in such cases the marginal cell has a blunt end and may be just closed; discal cross-vein varying in position but never far from the middle of the discal cell, usually upright but occasionally (*Microstylum*) very sloping; discal cell long, emitting three veinlets from its end, though sometimes (*Microstylum*) the upper two veinlets start close together from the top corner so that the upper one curves out into the first posterior cell, and the third veinlet may be sufficiently recurrent to run back parallel with the wingmargin until it meets the upper branch of the postical vein well before the wingmargin, while the upper veinlet sometimes meets the lower branch of the cubital fork before the wingmargin and thereby closes the first posterior cell; small cross-vein sometimes absent but in such cases the upper branch of the postical vein only just touching the lower margin of the discal cell;

anal cell ranging from being closed at a fair distance from the wingmargin to being well open, though of course considerably contracted towards the wingmargin. Alula and hind angle of the wing usually well developed, and distinctly so in those cases in which the claws are abnormally long and the pulvilli absent. Squamæ (alar) fairly large, sometimes provided with a long tuft in the fringe near the fold which seems to act as a substitute for the metapleural fan (*Stenopogon*, etc.); thoracal pair absent.

The character of "marginal cell open" was for a very long period the only one used for distinguishing the *Dasyopogoninæ* from the rest of the *Asilidæ*. In recent times however two or three different attempts have been made to distinguish the *Leptogastrinæ* (which will be dealt with further on), and it has been urged that it may be better to include in the *Dasyopogoninæ* a few species (which had previously been included in the *Laphrinæ*) in which the marginal cell is closed at the wingmargin through the more or less abrupt up-turning of the radial vein at its end, and the blunt ending of the marginal cell caused thereby; perhaps the most distinctive character of the *Dasyopogoninæ* lies in the comparative shortness of the subcostal vein, so that in this subfamily it is only through an effort (so to say) that the radial vein occasionally succeeds in uniting itself to the subcostal vein, while in the *Asilinæ* and *Laphrinæ* the subcostal vein is so long that the radial cannot help ending in it. I would also call attention to the usual absence of any pubescence (or at any rate bristles) from the hypopleuræ as compared with the continuance there of the metapleural fan in the *Asilinæ*, while possibly some unexamined characters remain to be investigated in the development of the prothoracic collar.

The boundary line between the *Dasyopogoninæ* and *Leptogastrinæ* is not yet definitely settled. I have laid stress on the character of the claws and pulvilli because it cannot cause any doubt in our British species, but it may not be satisfactory in all cases, as in *Stenobasis* the pulvilli are obsolete on the posterior tarsi but almost normally developed on the front tarsi; the characters of the elongated body, very long hind legs, and rather clubbed hind femora seem to be insufficient as a distinction, while I am unable to follow Williston's character of one-jointed palpi in *Leptogastrinæ* as a distinction from the *Dasyopogoninæ* with two-jointed palpi; any character derived from the development or degradation of the alula and hind angle of the wing seems to be undecisive but yet may be worth further investigation. Perhaps the extremely limited chætotaxy of the *Leptogastrinæ* may afford a distinction, but then *Dioctria* and allied genera come very close.

The *Dasyopogoninæ* are usually elongate rather bare species, and (in at any rate the forms near *Dioctria*) are weaker and more sluggish than the *Asilinæ*. They include some very large flies, though only rarely reaching the size of the largest *Asilina* or *Laphrina*, and on the other hand they include the smallest species of the whole family. The chief prey of *Dioctria* is *Ichneumonida*, though they capture insects of various other orders, and the predatory habits of the family have been dealt with in considerable detail by Prof. Poulton in his article on "Predaceous

Insects and their Prey" (Trans. Ent. Soc. Lond., 1907, pp. 323-409); many interesting particulars are given in that paper, and it is to be hoped that it will lead to more observations upon not only the prey of these flies but upon the method by which the victims appear to be instantaneously killed by some unknown poison injected from the proboscis of the Asilid. The courtship of some species is interesting, as apparently the male takes his life in his hands when tendering his addresses to the female, unless the latter is occupied with prey. Prof. Poulton says:—"In one case both sexes
 " were resting on a leaf, the female absorbing the juices of a small ♀
 " Ichneumonid, *Pimpla (Itioplectis) pomorum*, which was soon sucked dry.
 " She then deliberately withdrew her proboscis from the victim and
 " dropping it upon the leaf faced round upon her suitor in a menacing
 " manner. The male, as if realising the danger, at once became far more
 " cautious and wary in courtship." Cases have been noticed in which the female has been captured while devouring the male of her own kind, and in one case a female was observed preying upon another female of the same species. Both sexes are almost equally predatory, but I do not think that any case has been recorded of a male preying upon a female of the same species, though this may be partly accounted for by the female being the more powerful. I can scarcely credit the report that the males of some species of predatory flies have been seen to present captures to the females in order to distract their attention during the time of the amatory advances of their suitors.*

ARRANGEMENT.—The *Dasyopogoninæ* do not place themselves readily in any sequence from the *Laphrinæ* to the *Leptogastrinæ* and *Empidæ*, though the latter part of the way may be fairly obvious as the small hump-backed species like *Holopogon* seem to tend towards such *Empidæ* as *Hybos*, while the dying out of the alula in *Stichopogon*, *Dioctria*, etc., points the way to *Leptogastrinæ* and *Empidæ*. On the other hand the general shape of the body and the strong bristles round the hinder part of the thoracic dorsum in *Stenopogon*, etc., seem to show affinity to the *Asilinæ*, while *Pycnopogon* may be considered to connect with the *Laphrinæ* because of its villosity, or *Hoplistomerus*, etc., because of the closed marginal cell.

Table of the Palearctic Genera of DASYPOGONINÆ.

1 (10) Front tibiæ with a terminal claw (fig. 370).



FIG. 370.—*Dasyopogon teutonius* ♂. (Front leg.)

Alulæ fairly well developed.

* It appears to be conclusively proved that the males of some species of *Empidæ* do supply a victim (sometimes living) to the female in order to keep her engaged during the period of pairing (*v. Ent. Month. Mag.*, 1907, p. 229, and 1908, p. 181).

- 2 (3) Thorax hairy but without strong bristles. Abdomen comparatively short and plump.

Legs short and thick. Moderate-sized species.

11. ISOPOGON.

- 3 (2) Thorax with strong bristles, there being at least a præsutural and a supra-alar. Abdomen elongate, more or less slender.

Legs long and not very robust.

- 4 (7) Face-beard limited to the mouthmargin and usually composed of very few bristles, but occasionally with slight short pubescence above it (fig. 371).

N.B.—This character may be misleading in some species of *Saropogon* until experience has rendered it intelligible, but with practice it becomes a very convenient distinction.

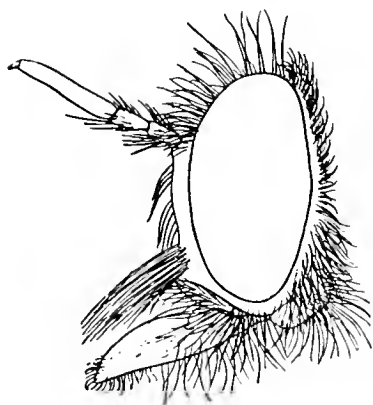


FIG. 371.—*Saropogon comosus* ♂. × 12.

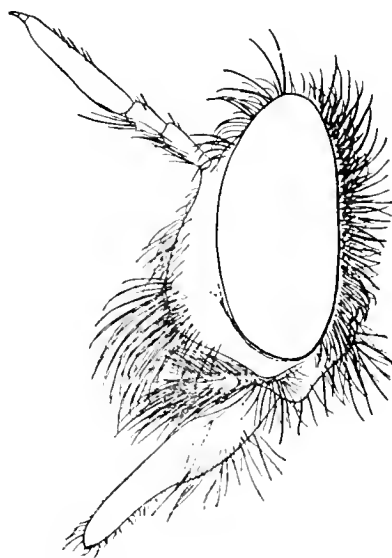


FIG. 372.—*Dasyvogon teutonius* ♂. × 12.

- 5 (6) Scutellum with marginal bristles. Collar moderate in length and bearing bristles.

Species more stoutly built and more bristly than in *Cenopogon*. Face-beard composed of several bristles. Metapleural fan of bristles well developed. Femora without bristles on the underside.

SAROPOGON.

- 6 (5) Scutellum without any bristles. Collar elongate and without bristles.

Species very elongate and bare. Face-beard composed of two bristles.

N.B.—I do not unite this genus with *Laparus*, because I believe a number of allied genera will be formed out of the species now placed in that genus.

CENOPOGON.

- 7 (4) Face-beard dense and extending up to at least the middle of the face (fig. 372).

- 8 (9) Fourth posterior cell closed (fig. 373); wing-membrane ribbed.

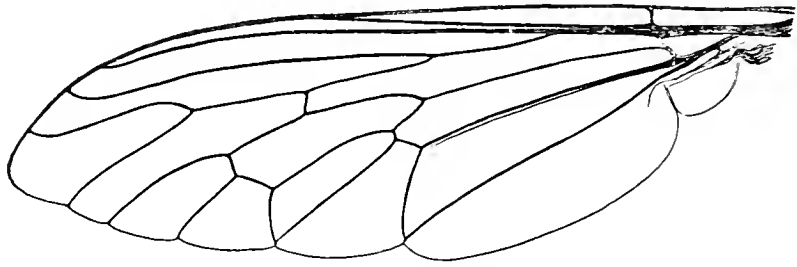


FIG. 373.—*Selidopogon diadema* ♀. × 6.

Scutellum with four or more strong marginal bristles. Bristles on the collar strong, but the ocellar bristles weak; metapleural fan strong. Squamæ with a rather long fringe on the lower part.

SELIDOPOGON.

- 9 (8) Fourth posterior cell open (fig. 374); wing-membrane wrinkled.

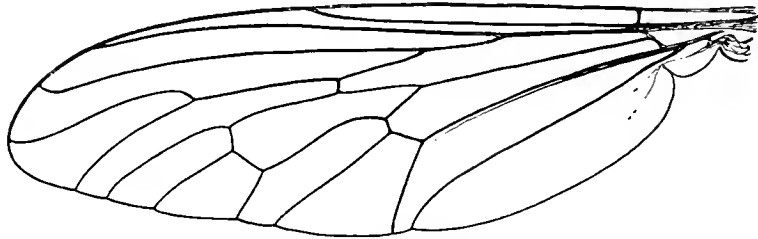


FIG. 374.—*Dasyopogon teutonius* ♀. × 6.

Scutellum (in European species) without any marginal bristles. Dorso-central bristles near the scutellum present though small; ocellar bristles strong; metapleural fan weak and accompanied with pubescence. Femora with small bristles. Squamæ rather large, with a neat short even fringe.

DASYPOGON.

- 10 (1) Front tibiæ without a terminal claw.

- 11 (12) Second posterior cell (6^a) pushed up almost entirely into the lower outer part of the first posterior (fig. 375).



FIG. 375.—*Microstylum fusciventris* ♀. × $4\frac{1}{2}$.

Third veinlet from the discal cell very recurrent so that it runs back for a long distance almost parallel with the wingmargin and closes the fourth posterior cell, with the result that the amount of wingmargin occupied by the third posterior cell is nearly three times as much as that occupied by the second; small cross-vein almost or quite absent. Style absent. Thoracic bristles numerous. Alulæ large. Large flies.

N.B.—The genus *Megapollyon* of Walker may be distinct; Walker

says it is distinguished by its "stouter body, thicker mystax, shorter wings and some other peculiarities." The "other peculiarities" may include a peculiar plate-like process at the end of the middle tibiæ, which occurs in some very large species.

MICROSTYLUM.

- 12 (11) Second posterior cell almost level with the upper part of the discal cell (fig. 376).

Third veinlet from the discal cell (even when closing the fourth posterior cell) not long and parallel with the wingmargin.

- 13 (16) Metapleuræ quite bare. First posterior cell closed or obviously contracted towards the wingmargin (rarely only slightly so).

Thorax with numerous bristles extending from the præsutural down the sides and across the hindmargin. Head usually narrower than the thorax and inclined to be spherical; face narrow and becoming still narrower on its upper part, with a prominent almost keel-shaped knob. Alulæ large. Alar squamæ bearing a tuft of long hairs. Large or rather large flies.

- 14 (15) First posterior cell open (fig. 376).

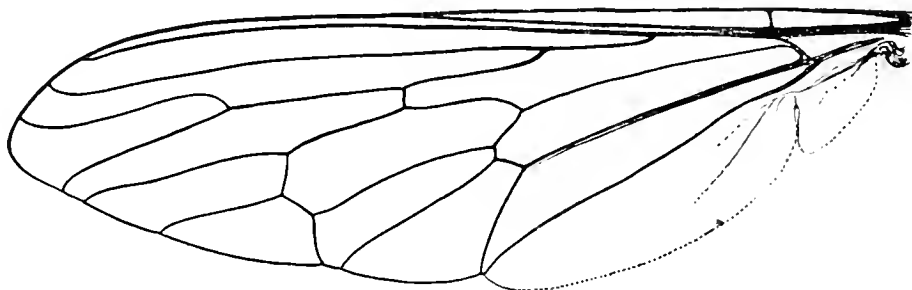


FIG. 376.—*Stenopogon xanthotrichus* ♂. × 6.

Fourth posterior cell either open or closed. Similar to *Scleropogon* (*sensu meo*), but the third antennal joint longer and its style shorter. Hypopleuræ quite bare.

STENOPOGON.

- 15 (14) First posterior cell closed (fig. 377).

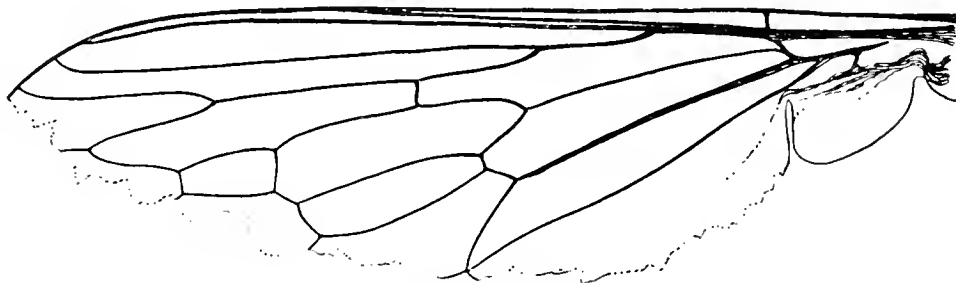


FIG. 377.—*Scleropogon heteroneurus* ♀. × 5.

Fourth posterior cell closed. Similar to *Stenopogon*, but the third antennal joint shorter and its style longer.

SCLEROPOGON.

N.B. 1.—The figure given here is taken from the (probable) original type of *Dasyopogon heteroneurus* Macquart, and differs from Loew's description of *Scleropogon* in having the second posterior cell closed as well as the first and fourth.

N.B. 2.—Coquillett (*Pr. Ent. Soc. Wash.*, vi., 179, 1904) states that *Scleropogon* has the hypopleuræ pubescent and bristly; if that be the

case the genus may be not Palæartic, and those species from the Palæartic region which have been included in it may be relegated to a section of *Stenopogon*.

16 (13) Metapleuræ conspicuously pubescent or bristly.

17 (26) First posterior cell closed (fig. 378) or very much contracted.

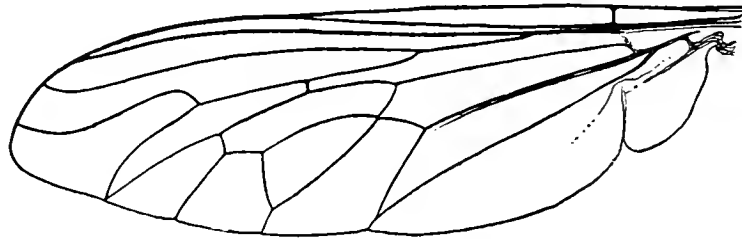


FIG. 378.—*Triclis olivaceus* ♀. × 9.

Face broad, without any prominent knob or bristly face-beard. No obvious dorsal bristles on the thorax or scutellum except some rather indistinct præsutural, supra-alar, and postalar; metapleural fan strongly developed. Alulæ large.

18 (25) Claws and pulvilli normal (*conf.* fig. 382).
Fourth posterior cell bluntly closed.

19 (24) Hind femora not spinose beneath.

20 (21) Marginal cell fairly wide open.

Radial vein more or less curved upwards. Scutellum without marginal bristles. Style blunt.

N.B. 1.—It is often difficult to determine where the subcostal vein ends.

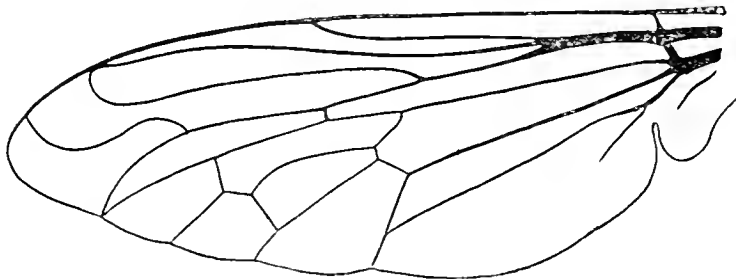


FIG. 379.—*Perasis sareptana* ♂. (After Hermann.)



FIG. 380.—*Perasis sareptana* ♂. (After Hermann.)

N.B. 2.—Several more genera could be formed out of *Triclis*, if the antennal characters given as distinctive of the two next genera be considered of generic value.

TRICLIS.

21 (20) Marginal cell closed or only very slightly open (fig. 379).

Radial vein rather abruptly curved upwards. Style with a short bristle at its end.

22 (23) Scutellum with two strong marginal bristles.

Style bent outwards, two-jointed, with a fine bristly tip; basal antennal joint with an evident knob on the underside (fig. 380).

PERASIS.

- 23 (22) Scutellum without any marginal bristles.

Style short, blunt, and cylindrical, with a very short bristle at its upper angle (fig. 381). Hind femora thickened; hind tibiæ ending in a hooked thorn.

STROBILOTHRIX.

- 24 (19) Hind femora strongly thickened, and beset with spines on the underside. Marginal cell obviously closed.

Pubescence very short. Face knob absent. Third antennal joint narrow and bare.

HOPLISTOMERUS.

- 25 (18) Claws elongate; pulvilli absent.

Ambient vein absent.

SISYRNODYTES.

- 26 (17) First posterior cell wide open.

- 27 (32) Claws elongate; pulvilli almost or quite absent.

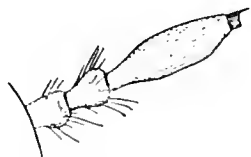


FIG. 381.—*Strobilothrix albipila* ♀. (After Becker.)



FIG. 382.—*Dioctria Baumhaueri* ♂. (Right front tarsus.)

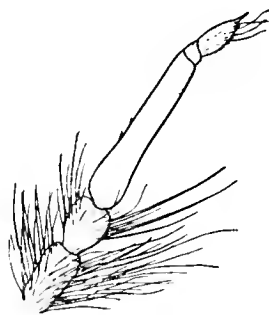


FIG. 383.—*Crobilocerus megilliformis* ♀. × 22.

- 28 (29) Antennæ very wide apart at the base.

Thorax with bristles extending like a mane up to the front. Fourth posterior cell open. *Asilus*-like flies.

ANAROLIUS.

- 29 (28) Antennæ close together at the base.

- 30 (31) Thorax with bristles extending like a mane up to the front.

Pubescence slight. Fourth posterior cell closed at the wingmargin.

RHADINUS.

- 31 (30) Thorax without mane-like bristles.

Pubescence similar to that of *Isopogon*, but with traces of præ-sutural, supra-alar, and postalar bristles; metapleural tuft large. Head very broad and short. Femora without bristles. Fourth posterior cell open. Stout bee-like flies.

ACNEPHALUM.

- 32 (27) Claws and pulvilli normal (fig. 382).

- 33 (38) Abdomen short and robust.

Alulæ distinctly developed though not large. Face without any distinct knob. Thick hairy flies of bee-like appearance and of medium size.

- 34 (35) Antennæ ending in a tuft of bristly hairs (fig. 383) in place of a style.

CROBILOCERUS.

- 35 (34) Antennæ ending in a pointed two-jointed style (fig. 384).
 36 (37) Pubescence rather long and dense on the thorax, abdomen, and legs, with a tendency to form lateral tufts on the abdomen.

Præsutural, supra-alar, and postalar bristles existing though indistinct, also slight marginal bristles on the scutellum; metapleural tuft very large and long. Femora with long dense pubescence but no bristles. Fourth posterior cell either open or closed.

PYCNOPOGON.

- 37 (36) Pubescence shorter and less dense, and without any tendency to form lateral tufts on the abdomen. AMPHISBETETUS.
 38 (33) Abdomen moderately or decidedly long, and always rather slender.
 39 (54) Alulæ distinctly developed though sometimes small (fig. 385) (conf. *Eriopogon*).
 40 (41) Fourth posterior cell bluntly closed (fig. 385) (*v.* notes below).

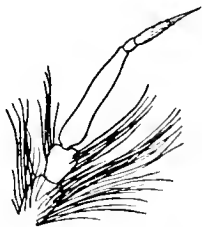


FIG. 384.—*Pycnopogon fasciculatus* ♂. × 22.

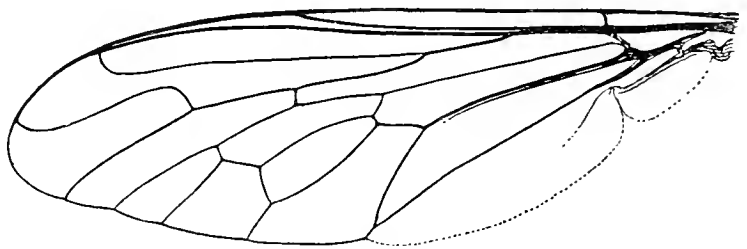


FIG. 385.—*Laphystia sabulicola* ♂. × 14½.

Antennæ with the basal joint provided with a more or less compact knob on its underside; style bent downwards, two-jointed. Face broad and evenly pubescent without a knob. Proboscis horizontally porrect. Scutellum arched in normal fashion, pubescent but without any distinct marginal bristles.

N.B. 1.—*Ancylorrhynchus* sometimes has the fourth posterior cell closed, but may easily be known by its recurved proboscis; *Scylaticus* also often has this cell closed, but may be distinguished by the bare upper part of the face and by the bare flat disc of the scutellum round which are strong marginal bristles.

N.B. 2.—*Laphyctis* has its face-beard limited to the mouthmargin (as in *Saropogon*). *Laphystia sexmaculata* Herm. (nec. Say) appears to be a *Trichis*.

LAPHYSTIA.

- 41 (40) Fourth posterior cell wide open or only moderately contracted (*v.* notes under preceding genus).
 42 (45) Face with a distinct knob. Palpi long.

Rather densely pubescent flies; dorso-central bristles absent or indistinct; metapleuræ with a long dense tuft of pubescence (rather like a fan in *C. lateralis*). Face-knob extended up to the antennæ. Alulæ small but obvious.

N.B.—*Cyrtopogon tenuibarbus* has no face-knob.

- 43 (44) Antennæ (fig. 386) not elongate; style less than half the length of the third joint and usually pointed (but not in *C. fulvicornis*).
CYRTOPOGON.

- 44 (43) Antennæ (fig. 387) elongate; style short, spatulate, and rounded at the tip.
HYSTRICHOPOGON.

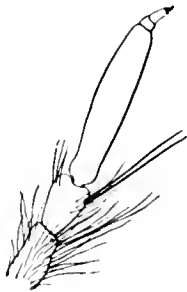


FIG. 386.—*Cyrtopogon maculipennis* ♂. × 22.

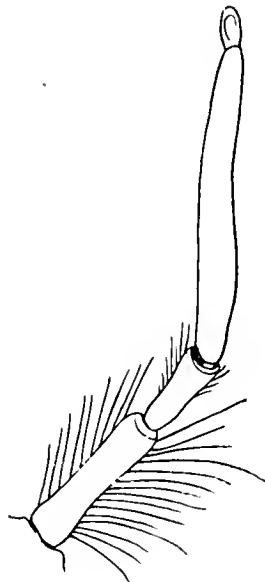


FIG. 387.—*Hystrichopogon hirticeps* ♂.
(After Hermann.)

- 45 (42) Face without a distinct knob (unless in some species of *Scylaticus*).

- 46 (49) Face-beard bristly against the mouthmargin but fine-haired above.

Bristles on the thorax (including two or three pairs of præscutellar) numerous and strong; humeral bristles (2-4) small but distinct; ocellar bristles (usually six) unusually strong; pleuræ without any tuft of pubescence on the small præalar callus* (v. fig. 399) at the top of the mesopleural suture and lying immediately behind the top hind corner of the mesopleuræ. Antennæ with the two basal joints almost equal in length. Alulæ well developed. Fair-sized flies.

- 47 (48) Thorax strongly humped anteriorly so that it is far above the level of the head. Antennæ with a long strong forwards-pointed bristle beneath the second joint (fig. 388); style unusually long and pointed, with a short basal joint but with the second joint about (or more than) half as long as the third antennal joint.
HETEROPOGON.

- 48 (47) Thorax moderately humped anteriorly so that it is not much above the level of the head. Antennæ with only normal bristly hairs on the second joint (fig. 389); style much shorter than the third antennal joint.

Face, thorax, and abdomen narrower than in *Heteropogon*.

ANISOPOGON.

* Tegula of Berlese.

- 49 (46) Face-beard of equal texture and without bristles, limited to about the lower half of the face.

Humeral and ocellar bristles weak and inconspicuous. Style very short and blunt, or absent. Pleuræ usually with a conspicuous tuft of

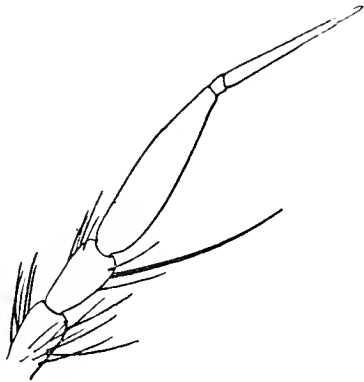


FIG. 388.—*Heteropogon scoparius* ♀.
× 14.

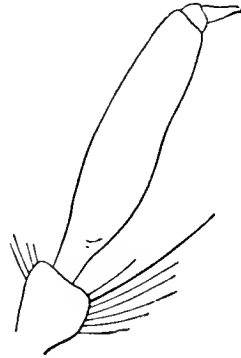


FIG. 389.—*Antisopogon glabellus*.
(After Hermann.)

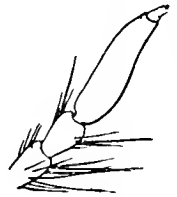


FIG. 390.—*Habropogon exquisitus* ♂. × 22.

pubescence on the small præalar callus (fig. 391), but sometimes with only slight pubescence or even none. Figure cylindrical.

- 50 (53) Proboscis quite straight, sloping forwards. Antennæ with the second joint about as long as the basal one (fig. 390).

Bristles numerous but not very strong.

- 51 (52) Basal joint of the anterior tarsi hardly (if at all) longer than the second joint.

Tuft of pubescence on the small præalar callus (fig. 391) long and conspicuous. Palpi long and long-haired. Prothoracic collar conspicuous. Legs hardly bristly. Flies bearing a considerable amount of pubescence.

HABROPOGON.

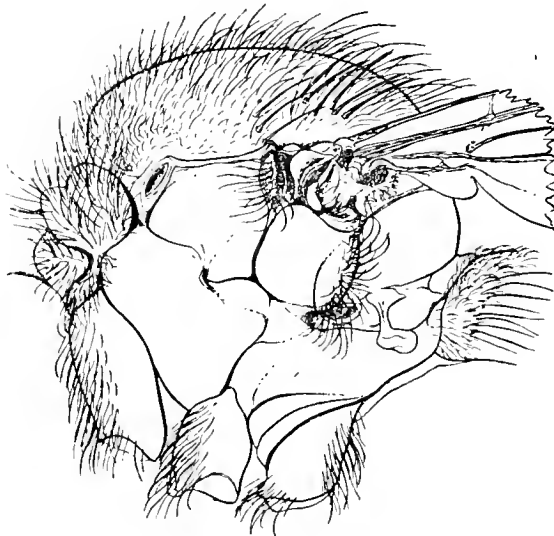


FIG. 391.—*Habropogon exquisitus* ♂. × 13.

- 52 (51) Basal joint of the anterior tarsi quite twice as long as the second joint.

Pubescence on the small præalar callus (*v.* fig. 399) slight or absent. Fourth posterior cell contracted or even just closed. Flies bearing very little pubescence.

SCYLATICUS.

53 (50) Proboscis incurved (fig. 392).

Pubescence and bristles moderate; pubescence on the small præalar callus (*v.* fig. 391) long, dense, and conspicuous. Prothorax very much developed, forming a dorsal collar in front of the thorax. Antennæ with the second joint much shorter than the basal one, and

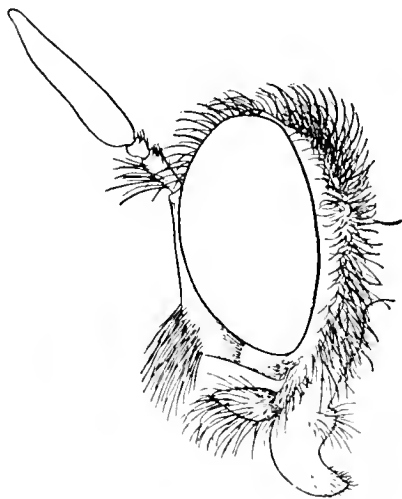


FIG. 392.—*Ancyloirrhynchus glaucius* ♂. × 14.

the third joint long and strap-shaped with scarcely any style. Legs moderately thin and with only inconspicuous bristles as in *Dioctria*. Fourth posterior cell contracted towards the wingmargin.

N.B.—The peculiar proboscis is eminently characteristic.

ANCYLORRHYNCHUS.

54 (39) Alulæ obsolete (fig. 393) (*conf.* *Eriopogon*).

55 (58) Face with a distinct knob.

Flies rather bare of pubescence, but with numerous bristles (including the dorso-central rows). Palpi small, hardly hairy. Antennal style jointed.

56 (57) Face-knob not extending up to the antennæ, and consequently the upper part of the face bare.

Antennal style short, about one-third the length of the third joint. Metapleuræ with a row of bristly hairs (almost bristles).

12. LASIOPOGON.

57 (56) Face-knob and face-beard extending up to the antennæ.

Antennal style long and thin, quite two-thirds the length of the third joint. Metapleuræ bearing a tuft of long silky hairs. EUPALAMUS.

58 (55) Face without any distinct knob, but evenly arched for its whole length.

59 (60) Small cross-vein absent (fig. 393).

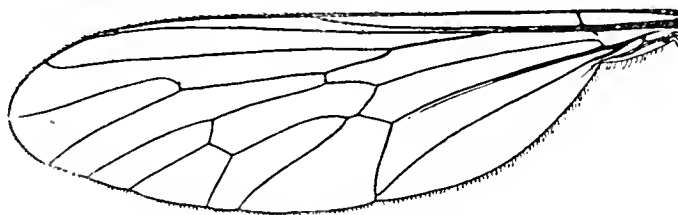


FIG. 393.—*Stichopogon albofasciatus*. × 13.

Face-beard limited to the upper mouthmargin. Frons triangular. Style thin and pointed, indistinctly jointed. Bristles few but strong,

one præsutural, few supra-alar and postalar (often only one), ocellar and postvertical distinct; small subalar callus bare; metapleural fan distinct. Scutellum without any marginal bristles.

STICHOPOGON.

- 60 (59) Small cross-vein present (fig. 394).

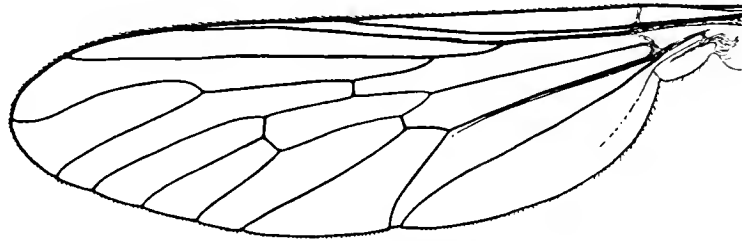


FIG. 394.—*Dioctria Baumhaueri*. × 10.

- 61 (66) Style thick and blunt, usually distinctly jointed.

Thorax only moderately humped anteriorly. Small præalar callus bare.

- 62 (63) Second joint of the style much longer than the first.

Ocellar bristles obvious. Face with only a long bristly mouth-beard. Antennæ with the small cylindrical basal joint longer than the second; third joint also long and cylindrical. Pleuræ dusted all over.

CERATURGUS.

- 63 (62) Second joint of the style not longer than the first, or the style not truly jointed (fig. 395).

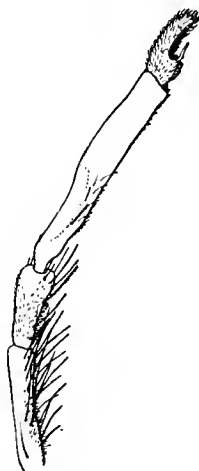


FIG. 395.—*Dioctria Reinhardi* ♂.
× 22.

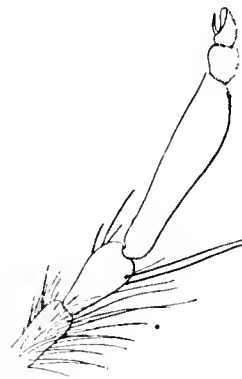


FIG. 396.—*Pseudoholopogon chalcogaster* ♂.
× 33.

Ocellar bristles indistinct. Postalar calli (usually) and the scutellum without distinct bristles.

- 64 (65) Terminal portion of the style without a dorsal spine.

Antennæ with the cylindrical basal joint distinctly longer than the second. Face-beard limited to the upper mouthmargin. Bristles on the thorax limited to one or two præsutural and about two supra-alar, though three rows of tiny dorsal bristles are traceable; metapleural fan distinct. Alar squamæ with short fringes. Hind femora and tibiæ with some furry pubescence.

13. DIOCTRIA.

- 65 (64) Second joint of the style with a dorsal spine (fig. 396).

Antennæ with the two basal joints almost equal in length. Face bearing long bristly hairs all over, and the frons bearing long softer hairs. Hind tibiæ very clavate.

PSEUDOHOLOPOGON.

- 66 (61) Style thin and pointed, indistinctly jointed.
 Thorax strongly humped anteriorly. Small flies.
- 67 (68) Flies clothed with long dense silky or woolly pubescence on the face, frons, pleuræ, legs, etc., but without any bristles.
 Hind tibiæ hardly clavate. Metapleural tuft large and dense, and the mesopleural pubescence extending over the small præalar callus. Alulæ not quite absent.

ERIOPOGON.

- 68 (67) Flies without long or dense pubescence, but with some bristles.
 Hind tibiæ conspicuously stout and clavate. Metapleural fan composed of long bristly hairs, and the small præalar callus bare. Alulæ absent.

- 69 (70) Face-beard not dense but extending up to the antennæ, very soft-haired.

HOLOPOGON.

- 70 (69) Face-beard barely extending up to the middle of the face.
 A pair of ocellar bristles conspicuous.

OLIGOPOGON.

THE BRITISH GENERA OF *Dasypogoninae*

are only three in number, and may be easily distinguished as follows:—

- 1 (2) Front tibiæ with a peculiar curved claw at the tip (*v. fig. 370*).
 Thorax and scutellum without bristles.

11 *Isopogon*.

- 2 (1) Front tibiæ without any peculiar claw at the tip.
 3 (4) Thorax and scutellum with numerous bristles and hairs.

12 *Lasiopogon*.

- 4 (3) Thorax with only one (rarely 2-3) præsutural and 2-4 supra-alar bristles; scutellum without any bristles.

13 *Dioctria*.

Dioctria is composed of a number (6) of almost bare species, which have the face-beard restricted to the slightly produced neighborhood of the mouth, the frons and ocellar prominence almost bare, the antennæ placed on a prominence and with the basal joint long and cylindrical, the thorax with one (rarely two or three) præsutural and (usually) about four supra-alar bristles but with no bristles on the postalar calli or scutellum, the abdomen almost bare except for a short row of long bristly hindmarginal hairs towards the sides of the basal segment, the hind femora and tibiæ with a peculiar furry or felt-like pubescence, and the wings with the anal cell open.

Isopogon has only one British species which is easily known in the male sex by the remarkably long thin basal joint of the hind tarsi, and both sexes have the face-beard occupying almost all the arched face, the frons and the ocellar prominence conspicuously hairy, the antennæ on no prominence and with the two basal joints equally short and cup-shaped, the

thorax and scutellum with abundant pubescence but with no bristles, the abdomen with no bristles or even bristly hairs, the hind femora and tibiæ without any furry pubescence, and the wings with the anal cell closed.

Lasiopogon has also only one British species, which has the face-beard long strong and almost radiating on a large facial knob which occupies quite the lower two-thirds of the face, the frons widening towards the vertex and bearing numerous thin bristly hairs, the antennæ almost as in *Isopogon*, the thorax and scutellum bristly rather than hairy, the abdomen pubescent but without bristles, the genitalia resembling those of the *Asilinae*, the hind femora and tibiæ without any furry pubescence, and the wings with the anal cell closed at the wingmargin.

11. ISOPOGON.

Isopogon Loew, Linn. Ent., ii., 492 (1847).

Medium-sized hairy but bristle-less species of fairly stout build, which have the thorax very much arched.

Head very broad and short and by no means high, appearing depressed because of the highly arched hump-backed thorax; face wide, almost equal in width, and so inconsiderably produced that it has no distinct facial knob; face-beard covering nearly all the face, and its hairs almost equally long and strong though less dense on the upper part; frons shorter than broad, scarcely widened though much sunk on the upper part, without any antennal prominence but with the ocellar knob strongly elevated, and bearing long dense bristly hairs on the orbits and on the ocellar knob. Proboscis sloping forwards; palpi short. Antennæ approximated at the base; the two basal joints equally short, cup-shaped, and bearing long bristly pubescence; third joint elongate, narrow but slightly conical, with a long two-jointed apical style which bears a minute bristle at its tip; basal joint of the style short but distinct, and the style altogether quite half as long as the third joint.

Thorax short and very highly arched, hump-backed, densely hairy on all the disc (*I. brevirostris*), or appearing almost bare anteriorly because of the shortness of the pubescence (*I. vitripennis*), but with no trace of bristles; pleuræ almost bare except for tomentum, but with a rather long soft silky pubescence on the upper part of the mesopleuræ and a tuft of long silky hairs on the metapleuræ. Scutellum appearing depressed because of the hump-backed thorax, bearing slight but not at all bristly submarginal pubescence.

Abdomen cylindrical, in the female pointed at the tip and with the segments after the fifth forming a projecting flat ovipositor; pubescence short and adpressed, almost scabrous. Genitalia of the male small.

Legs rather long though strong; femora fairly thick, especially the hind pair; front tibiæ with a small curved apical claw occurring on the underside but twisted a little posteriorly; hind tarsi normal, or (*I. brevirostris*) remarkably elongate and compressed to a knife-like edge in the male. Pulvilli and claws normal.

Wings small at the base, almost wedge-shaped in outline; first posterior cell not contracted towards the wingmargin, fourth widely open, and the third more open than the second or fourth; fork of the cubital vein hardly bell-mouthed, longer than its stem (measuring from the discal cross-vein); discal cross-vein after the middle of the discal cell; anal cell closed. Alar squamæ narrow; thoracal pair practically absent.

This genus appears to prefer hilly or mountain districts or at any rate dry localities. It is allied to *Lasiopogon* in shape and venation but is very easily distinguished by the presence of the hook at the tip of the front tibiæ, by the absence of any bristles on the thorax or scutellum, and by the genitalia. The metamorphoses are unknown.

Isopogon is a small genus of probably only two Palæaretic species as *I. syriacus* Schin. is described as having bristles on the thorax; one of these is common over most of Europe, while the other is rare or but little known.

Synonymy.—The first name applied to this genus was that of *Leptarthrus* by Stephens in his Catalogue of British Insects (1829), but that was emphatically a mere catalogue name, no distinctive characters whatever having been given except the one conveyed in the word itself. Loew in 1847 declined to admit Stephens' name on the ground that it was founded on a sexual character which applied to one species only and substituted for it the name of *Isopogon*; I cannot trace that even this single sexual character was ever described by Stephens, or else I would use his name because I consider Loew's action to have been very arbitrary; Stephens in his Illustrations (Vol. VII. Suppl., Pl. xlv., 1846), when figuring *Dasyopogon diadema*, gave an adjoining figure which represents the hind tarsus of the male of his *Leptarthrus*, but I cannot trace that he ever gave the slightest indication of what that figure was supposed to represent, so that no additional authority is given there for the name. Loew in his turn committed a grave error in failing to notice the curved thorn at the tip of the front tibiæ, but his genus is otherwise well defined; the result of this error was the formation of the genera *Aphamartania* Schin. (1866), and *Pygostolus* Lw. (1866), which latter name being preoccupied was renamed *Nicoles* by Jaenicke in 1867; it is possible that those genera may not be absolute synonyms (*Nicoles* has a clubbed abdomen and an open anal cell, while *Aphamartania* has bristles round the scutellum and a contracted first posterior cell), but they were founded under the impression that *Isopogon* had no hook at the end of the front tibiæ. It is very remarkable that Schiner and others accepted and described the genus without detecting this error, but Brauer first called attention to it in 1883 and then considered that *Isopogon* Lw. must sink under *Aphamartania* Schin. because Loew had been in error in one character (!), and that both names were superseded by the catalogue name of *Leptarthrus* Steph., while Bezzi in Kertész's Katalog. der Palæarctischen Dipteren, II., 113 (1903) followed Brauer.

1. *I. brevirostris* Meigen. Hind tarsi of the male with the basal joint very long and thin. Thorax with fairly long pubescence even to the front part.

The only British species of the *Dasyopogoninæ* which is entirely without bristles on any part of the thorax.

♂. Black; face moderately produced and arched, dusted grey except on a shining middle space just below the antennæ; face-beard black with the tips of the hairs often bleached, hairs rather dense, equally long, drooping on the lower part, and extending all over the face except quite close to (and on the sides near) the antennæ; chin- and jowl-beards silky white and merging into similar pubescence on the lower part of the back of the head, and the whole of the rest of the back of the head away from the eyes with similar but longer pubescence; postocular margin broadly but rather indefinitely greyish white, with sometimes some short black hairs close to the eyes on the lower part; frons shorter than broad, deeply sunk between the eyes, shining black and very little dusted, bearing long conspicuous black hairs on the orbits and still longer black hairs on the ocellar prominence; the sunk vertical space extends quite bare down the middle of the back of the head; collar small, black but rendered dull by dust, and bearing greyish white silky pubescence. Proboscis black, rather shining, sloping forwards, and bearing short slight pubescence about the tip but longer more abundant greyish white hairs beneath the basal half; palpi short, greyish black, and bearing long greyish white hairs. Antennæ black; two basal joints short cup-shaped and about equal in length, both bearing black bristly hairs but those on the underside of the basal joint long and occasionally to a large extent silky white; third joint long and narrow, quite bare, very slightly tapering and nearly twice as long as the two

basal joints together; style long and two-jointed, bent at an angle to the third joint, basal joint very short but the second joint brown, minutely downy, narrow and quite half as long as the third antennal joint, and with a very short apical arista.

Thorax so highly arched that both the head and scutellum are much below it in profile, shining black on all the upper side, distinctly punctate but with most of the humeral knobs and a pair of approximated narrow stripes (just outside the middle stripe) on the anterior two-thirds of the disc impunctate and consequently more shining, while a small patch of grey tomentum occurs just above each wing-base; pubescence on the disc long and dense, rather sloping and usually black on the front two-thirds (where it is strong but not bristly), and longer still, more sloping, more silky, and whitish on the hind third, but the colour varies a little as some silky white pubescence sometimes occurs on the humeri and along the sides of the front part while stray whitish hairs may occur among the dense black pubescence, or on the other hand the whitish (or yellowish) pubescence may be reduced to less than the hind third and may have stray black hairs intermixed; pleuræ mainly covered with pale grey tomentum, but the lower front part of the mesopleuræ rather bare and shining and the upper part bearing a patch of silky whitish pubescence, and the metapleuræ with a rather large tuft of long crinkled silky white or greyish white hairs which hardly form a fan. Scutellum overhung by the hindmargin of the thorax, shining black and almost bare on the disc but with long upturned silky whitish submarginal pubescence. There is no trace of any præsutural or supra-alar bristles, nor in fact anything which can be called a bristle, on any part of the thorax or scutellum.

Abdomen longitudinally arched, cylindrical (the sidemargins being curved over towards the belly), rather pointed and shining black though obviously punctate; basal segment very short and almost concealed; second segment with its front corners sharply angled and with a girdle at its hindmargins; eighth segment short but distinct, nearly half the length of the seventh.



FIG. 397.—*Isopogon brevitrostris* ♂. × 10.
(Left hind leg.)

Pubescence rendered conspicuous by the shimmer of the rather short closely adpressed whitish hairs which appear to be brushed inwards from the sides and downwards down the middle, but the pubescence is longer and more erect about the sides of the second and part of the third segments and is short erect and rigidly outstanding along the sides of the fifth, sixth, and seventh segments, but hindmarginal bristles or even strong hairs are entirely absent. Genitalia with a pair of small side lamellæ which arch over and conceal the end, while the lower lamellæ are shining black, short, and rounded at the end, and the last ventral segment bears a remarkable tuft of erect black bristles.

Legs black, but the front femora reddish at the underside of the tip, the front tibiæ often obscurely reddish at the base, the middle tibiæ dull orange or reddish on the basal half and the hind tibiæ on nearly the basal two-thirds, and the hind tarsi dull dirty yellow in immature specimens but blackish in mature specimens, while a silvery sheen occurs on the apical half of the hind tibiæ and on the basal joint of the hind tarsi; femora strong, the hind pair strongest; anterior tibiæ and tarsi normal; hind tibiæ very much dilated soon after the base and continuing so to the tip though most dilated about the middle; hind tarsi with the basal joint remarkably long and thin being compressed after a rather cylindrical base to a knife-like upper

edge and about three times as long as the other four joints together (fig. 397), while a silvery sheen caused by minute depressed white pubescence occurs on the posterior apical half of the hind tibiæ and on the anterior side of the basal joint of the hind tarsi. Coxæ grey-dusted and bearing long silky whitish pubescence, and on the anterior pairs a few curved black bristly hairs about the tip; femora with dense dorsal and anterior black bristly hairs, but beneath and behind with longer conspicuous thin silky whitish hairs, of which the longest occur on the basal half

of the underside of the posterior femora; hind femora with numerous comparatively short black bristly hairs beneath about the tip even on the apical half; front tibiae with about ten short black dorsal bristles, six or eight conspicuous strong black postero-ventral bristles on the apical half, and some long hairs on the underside, besides a short curved apical thorn almost on the underside but twisted back; middle tibiae with about eight black dorsal bristles, three long black antero-dorsal bristly hairs, three or four long thin black hairs beneath, several long white antero- and postero-ventral hairs and some short white postero-dorsal and posterior bristly hairs, and several black apical bristles of which some short ones on the underside are rather crowded; hind tibiae with about eight black (sometimes yellow) postero-dorsal bristles on the whole length, three or four antero-dorsal of which the lowest one (or sometimes all) may be white, and a rather dense rigid black pubescence beneath the dilating part which is followed by a shorter dense equal whitish elevation all down to the tip; the usual tiny bristles on the basal half of the hind tibiae are rather sparse and black, but those on the apical half are depressed whitish and more numerous so that they cause posteriorly and beneath a silvery sheen; anterior tarsi with the usual circles of black bristles, but the usual strong posterior bristle near the base is replaced by several less conspicuous bristles and two anterior bristles after the middle of the basal joint; middle tarsi with two anterior bristles on the basal joint not close to the base and no posterior bristle instead of the usual single anterior and posterior bristle*; hind tarsi with only very minute black bristles at the tips of the last four joints, the basal joint having abundant minute shimmering white pubescence and about six small black plantar bristles on the cylindrical base; the second, third, and fourth joints of the hind tarsi about equally short (being as short as broad), and the fifth joint slightly dilated and rather long ovate, while the second and third joints bear a slight dorsal continuance of the shimmering white pubescence. Pulvilli brownish orange; claws black.

Wings faintly brownish and with the wing-tip sometimes conspicuously brownish in mature specimens, or quite hyaline in juvenile specimens. Alar squamæ very narrow, brownish with a broad pale yellow or whitish margin and a fairly abundant whitish fringe. Halteres large, orange or yellow with the stem brown.

The following description of the female is made from a specimen taken at Loch Maree on June 7, 1884, because it agrees well with continental types and descriptions, but the more common British form is mentioned later on.

♀. Not much like the male, as it is a broader insect with stouter legs, simple hind tarsi, and usually less hyaline wings. Head with the pale pubescence less pure white and with no black hairs near the hindmargin of the eyes; frons considerably dusted about the sides. Palpi with long thin pale greyish hairs; Antennæ with the third joint apparently a little longer.

Thorax with considerable greyish yellow pubescence anteriorly and laterally but with that on the disc mainly black.

Abdomen with the adherent pale pubescence slightly longer, less whitish, and brushed more towards the tip; the longer pubescence about the sides near the base less whitish; hind corners of the third, fourth, and fifth segments with rather distinct patches of light grey dust, of which traces exist on the second segment. Belly with no trace of any black bristles on the last segment. Ovipositor shining black and compressed, with a pair of ovate terminal lamellæ which are orange on the underside and which bear rather long outstanding pale pubescence.

Legs black, with the front tibiae distinctly reddish at the base, and the middle tibiae for more than the basal half, and the hind tibiae for more than

* Almost all the *Asilidæ* have one strong posterior bristle near the base of the front tarsi, one anterior and one posterior near the base of the middle tarsi, and one anterior near the base of the hind tarsi; these bristles being probably used by all six legs in grasping prey, but the remarkable development of the basal joint of the hind tarsi in the male of this species has apparently caused additional and different bristles to be used on the anterior tarsi.

the basal two-thirds; front tibiæ with short furry reddish orange pubescence in front on the apical half; anterior femora with a few thin pale hairs intermixed dorsally near the base; hind femora with almost all the bristles and hairs pale even about or under the tip; hind tibiæ almost normal in shape, being only very slightly twisted and moderately dilated, and with mostly pale bristles and hairs except the strong black bristles on the apical third; hind tarsi almost normal in shape, the basal joint being shining black, not compressed, hardly dilated, and not quite so long as the other four joints together, while the bristles and hairs on the basal joint are all black except the minute pubescence and about two anterior bristles near the middle, though a few minute dorsal bristles on the second joint are yellow. All the soft pubescence of the legs has a yellowish tinge.

Wings more brownish than in the male, and the wing-tip not at all darkened.

The more common British form differs as follows:—

Head with *all* its pubescence (face-beard, frons, ocellar prominence, and basal joints of antennæ) light greyish yellow, or the middle hairs of the face-beard rich orange at the base, or the face-beard entirely reddish orange. Thorax with *all* its pubescence light brownish or greyish yellow, or sometimes with the base of the hairs on the back part orange. Legs with the front tibiæ sometimes hardly reddish at the base, and with all the bristles and hairs yellow or orange except the spurs on the anterior tibiæ and most of the hairs and bristles on the anterior tarsi. Wings more strongly tinged with brown from the base to the discal cross-vein but not on the costal and subcostal cells.

Length about 9 mm.

This species has no close ally in Europe as the only other one in the genus is *I. vitripennis* Meig., which has the hind tarsi of the male simple, the face-beard much weaker, and the pubescence on the anterior half of the thorax very short. *Aphamartania syriaca* Schin. must belong to some other genus as it has strong thoracic bristles.

I. brevisrostris cannot be considered a common British species, though I have records from Devonshire (Ivybridge and Holne), Sussex (near Lewes), Kent (Darenth and Dover), Cambridgeshire (near Newmarket), Bucks (Wormsley), Gloucestershire (Selsley and Painswick), Herefordshire (*t.* Dr J. H. Wood), Westmoreland (Rydal Water), Merioneth (Dolgelly and Barmouth), and various Scotch localities (Arran, Aberfoyle, Rannoch, Loch Maree, etc.), from May 26 to July 15. These localities seem to confirm Schiner's statement that it is fairly common in mountain districts but rare in the lowlands. Curtis recorded it "in plenty on Newmarket Heath, in a place commonly called the Devil's Dyke, and the middle of August I found several pair settling upon the plants that grow in profusion in the North-Foreland meadow, Dover." A female in the Hope Museum at Oxford is labelled "Devils Ditch 2/7/33 very sluggish in a dull afternoon. Males very scarce in comparison to females and found in the grass;" this is probably one of Curtis's original specimens. It is recorded from North and Middle Europe.

Synonymy.—The generic synonymy is dealt with under the genus, and the only point worth mentioning here is that the female appears to have been an unsurmountable stumbling block to Bigot, inasmuch as he described two females of the pale haired race as *Dasypogon caudatus* (1881) and four others as *Cyrtopogon? rufitibiale!* while he had another as his sole exponent of the female of *Lasiopogon Macquarti*, and still another under his *Dioctria atricapilla*. It is very probable that the record of *I. hottentottus* as British (Pascoe, Proc. Ent. Soc. Lond., 1880, iii.) was made in mistake for the pale haired form of this species.

12. LASIOPOGON.

Lasiopogon Loew, Linn. Ent., ii., 508 (1847).

Middle-sized moderately elongate rather bristly flies of blackish grey or dark yellowish grey colour with greyish white hindmargins to the abdominal segments.

Head not wider than the thorax and not very short; face narrowest near the antennæ but distinctly widening downwards; face-knob large, occupying fully the lower two-thirds of the face and clothed all over with a long strong-haired outstanding or rather drooping face-beard which leaves only the upper part of the face and just the sides bare; a brilliantly shining bare black space separates the side-cheeks from the jowls; lower part of the back of the head wide even if not truly inflated and bearing abundant long silky pubescence, but the upper part shallower and bearing a rather abundant postocular festoon of long black bristles which extend well round the upper eye-angles and are sharply bent over forwards soon after their base; when seen from above the upper part of the back of the head behind the festoon bears a few rather long thin suberect hairs; frons broad, narrowest near the antennæ but widening upwards (because of the widening orbits and the rounded-off upper eye-angles) until it is twice as wide at the vertex, and it is impressed with three rather deep parallel longitudinal furrows, of which the outer ones extend from the occiput to the antennæ and the middle one begins just in front of the lowest ocellus; the orbits and the spaces between the furrows bear numerous thin black bristles, but the upper middle part of the frons and the middle furrow are bare; ocellar knob not much elevated but bearing some long bristly hairs; collar only slightly prominent, pubescent but without bristles. Proboscis prominent and sloping downwards, without much pubescence about the tip but with long pubescence beneath near the base; palpi short and narrow, apparently one-jointed and bare or with only very slight porrected bristly hairs. Eyes very much flattened on the front part, and the facets there considerably enlarged. Antennæ approximated at the base; the two basal joints short and bearing rather long thin bristles; second joint stouter and a little shorter than the basal one; third joint strap-shaped, of medium length, longer than the basal two together, and with a fairly long style (quite a third the length of the third joint) which has a minute pointed bristle at its end; one or two rather depressed but not very minute bristles occur on the dorsum of the third antennal joint between the middle and the tip in all the species I have seen.

Thorax very flatly arched, moderately bristly. Bristles consisting of about three (2-4 or even 5) præsutural, about three (3-6) supra-alar, and one or two postalar, while the dorso-central rows are evidenced by about five rather well defined post-sutural and about five less well defined præsutural bristles, but these latter ones die out on the front quarter of the disc; in addition to these bristles short bristly hairs occur almost all over the disc, though rather sparsely on the back part. Pleuræ with a slight row of bristles near the hindmargin of the mesopleuræ, and with a long row (hardly a fan) of about ten (7-10) long strong bristly hairs near the hindmargin of the metapleuræ, while the upper part of the sternopleuræ bears a little thin pubescence; hypopleuræ quite bare of pubescence or bristles. Scutellum flat and almost bare on the disc, but with about ten long thin upturned marginal bristles and several shorter thin hairs.

Abdomen flatly cylindrical, moderately hairy but without bristles, black with conspicuous pale grey bands across the hindmargins of the segments; segments gradually decreasing in length after the second one. Genitalia shining, in the male rather large and with the eighth abdominal segment forming the dorsal base as it is considerably produced on each side into a somewhat triangular lobe; claspers large, resembling those of the *Asilinae*, and bearing bristly hairs; in the female the genitalia after or under the flattened eighth segment are small and concealed but show an obvious incomplete terminal circlet of about sixteen stout short bristles.

Legs rather long, with the hind femora rather the longest; basal joint of the anterior tarsi only a little longer than the next, and of the hind tarsi not twice as

long; coxæ dull anteriorly and outside but brilliantly shining and bare beneath; femora usually (but not always) only pubescent except for some antero-dorsal bristles on the hind pair, but the tibiæ and tarsi with bristles and pubescence. Front coxæ with moderately long soft thin pubescence anteriorly; posterior coxæ with similar but less pubescence on the outer part and with some longer thin bristly hairs in front about the tip; trochanters shining and bearing only slight pubescence; front femora with abundant long pubescence all over the hind part even to almost the upper and under sides, but antero-dorsally and anteriorly with short dense inconspicuous depressed pubescence; middle femora with similar clothing but with the long pubescence more restricted towards the underside; hind femora with a row of about seven anterior or antero-dorsal bristles and some smaller subapical ones; front tibiæ bristly and pubescent, with the usual long postero-ventral bristly hairs and the usual few extra long thin hairs beneath, and with a terminal circlet of about eight bristles; middle tibiæ with three rows of (2-4) long bristles besides long pubescence, and with a terminal circlet; hind tibiæ with a few dorsal, antero-dorsal, and antero-ventral bristles, but otherwise with only the terminal circlet and a ciliation of pubescence on the basal half posteriorly; all tarsi with a circlet of four long strong bristles at the tip of each of the four basal joints and without any conspicuous anterior or posterior bristle near the base of any basal joint, but the last joint with a pair of long thin divergent bristles as long as the joint which extend across the claws and with a single long thin bristle above the bristle-like empodium besides other weaker lateral bristly hairs. All these bristles and pubescence are in addition to the dense short depressed bristly clothing which occurs all over the legs, and many of the generic characters now given may be of only specific value. Pulvilli long and narrow; empodium only a rather long thin bristle; claws long, not much curved until near the tip.

Wings shorter than the abdomen; cubital fork distinctly bell-mouthed; posterior cells all widely open, and the first one not at all contracted towards the wingmargin; third posterior cell more widely open than the second or fourth because the third veinlet from the discal cell slopes downwards; discal cross-vein before the middle of the discal cell; anal cell closed close to the wingmargin; wing-membrane minutely pubescent, uneven but not ribbed or wrinkled. Alar squamæ small and narrow with a rather thick margin and a rather short fairly equal fringe; thoracal squamæ absent.

This genus is easily distinguished from the other British genera of *Dasyopogoninae* by the general bristliness of its thorax and scutellum (as compared with pubescence only in *Isopogon* and very sparse bristles in *Dioctria*); furthermore it is distinguished from *Isopogon* by the absence of any curved terminal thorn on the front tibiæ and by the less humped thorax. From the other European genera it may be distinguished by the obvious facial knob with its large projecting beard, the much widened frons on the upper part, and the peculiar genitalia of the male which resemble those of the *Asilinae*; many minor characters are of value, such as the higher head, the less bulging eyes, the rather cylindrical abdomen with its conspicuous light grey bands, and the closed anal cell. The only allied European genus with a prominent facial knob is *Cyrtopogon*.

Lasiopogon is composed of only a few very closely allied species which occur all over Europe and in North America. The metamorphoses are unknown, but the perfect insects sit on stones, dry paths, tree trunks, or similar substances, and although attempts have been made to distinguish mountain species from those of the plains I have received our British *L. cinctus* from most varied localities.

Synonymy.—Loew in 1874 proposed the name *Daulopogon* for this genus on the ground that *Lasiopogon* had been preoccupied, but that generic name had not been used in Zoology.

1. **L. cinctus** Fabricius. Abdomen blackish, with light grey bands;

genital claspers of the male long, with a blunt end which is rounded at its lower angle.

A rather small dark-colored Asilid with greyish white bands on the hindmargins of the abdominal segments, and with the thoracic bristles more abundant than in any other British species of the *Dasypogoninae*.

- ♂. Face and frons dusted brownish; face with a yellowish brown shimmer; facial knob large and wide, with the face-beard extending all over it so that only just the upper part and the sides of the face are left bare; face-beard black with occasionally a few rusty or greyish yellow hairs intermixed on the lower part, and the hairs nearly all equal in length and density and standing out so stiffly that they only slightly droop; chin- and jowl-beards dense, long, and silky whitish, while similar pubescence extends up the lower half of the back of the head; this lower half of the back of the head is greyish white and is rather wide because the eyes are somewhat narrowed thereabouts, but the upper half is more light brownish grey and bears an abundant irregular (three or four bristles wide) festoon of black bristles, which at their tips are strongly curved forwards over the eyes and which extend round the upper eye-angles on to the broad upper part of the orbits until level with the upper ocelli; frons widening rapidly upwards from the antennæ (because of the widening of the orbits) until it becomes about twice as wide at the vertex as at the antennæ, and the orbits bearing numerous moderately long black hairs (sloping forwards), while the two raised parts between the three channels bear numerous similar hairs (but bent rather backwards), and the moderately elevated ocellar knob bears about ten rather longer outstanding black hairs; the middle postvertical channel down the back of the head is bare, but a few black bristly hairs occur on the upper part of the actual back of the head; collar pale greyish brown, bearing short but not sparse pubescence on the upper part and longer thin pale pubescence on the sides and lower part. Proboscis shining black, sloping, with the usual very slight pubescence about the tip and long pale pubescence beneath on the basal half; palpi thin, rigid, short (being hardly one-third the length of the proboscis), black, and almost bare except for two or three comparatively long porrect pale hairs near (but not at) the tip. Antennæ entirely greyish black; two basal joints short, but the second joint shorter and stouter than the basal one, while both joints bear porrected black bristles (rather more obvious on the underside); third joint strap-shaped, slightly longer than the two basal joints together; style bare, rather thick, about one-third the length of the third joint, and bearing a tiny apical bristle.

Thorax ranging in colour from yellowish brown to dark grey, not at all shining, and with the raised extreme back point of the humeri chestnut; sometimes with a rather narrow blackish middle line and two blackish side stripes (not nearly reaching to the front but bending outwards at their front ends towards the humeri); the side stripes may or may not be interrupted at the suture, and extend to the hindmargin, while the middle line may only reach to the suture, and there are indications of dark stripes still more towards the sides just before and just after the suture; or the thorax may have two closely approximated dark brown stripes which do not extend to the hindmargin and a pair of fainter side stripes which become broader on their front part (which is not near the front of the disc) and curve towards the humeri; or the thorax may appear to be blackish brown with two pale greyish brown stripes which are rather wide apart but converge after the suture so that they form one broad grey middle stripe, and then (taking the dark colour as the ground colour) the other side stripes can be traced. Pubescence (as distinct from long bristles) composed of numerous small black bristles on most parts (including the humeral knobs) but not on the front part of the stripes on each side of the middle line nor on the broad dark outer side stripes except on their front part and near the humeri. Bristles consisting of usually two

(2-4 or even 5) præsutural, about three (3-6, but only 3 strong) supra-alar, one strong (1-2 or rarely 3) postalar, and the dorso-central rows which include about five fairly strong but yet rather hair-like postsutural bristles (of which the præscutellar pair are not stronger than the others), and about five less strong præsutural which die out anteriorly long before the front part of the disc. Pleuræ covered all over with pale greyish brown dust; mesopleuræ with about five black bristly hairs in a row on the upper part of the hindmargin and some minute pale grey or blackish bristly pubescence on the upper part; prothorax with some soft pale pubescence; sternopleuræ with some soft pale pubescence on the upper part; metapleuræ with a fan of about six (6-9) long strong though thin conspicuous black bristles of which the bottom one may be yellowish; hypopleuræ quite bare. Scutellum yellowish grey, flattened or almost depressed and practically bare on the disc, but with about ten long upturned black marginal bristly hairs and some shorter thin hairs; metanotum dark ashy grey, quite bare even on the lateral humps.

Abdomen shining deep black or brownish black, slightly obscured by the pale brownish yellow pubescence, and with each bare narrow hindmarginal hem greyish white, but these greyish white bands are widened on to the disc (especially when seen sideways) by whitish grey dust, and this colour extends forward about the sides and covers the hinder corners of the segments and extends more or less on the sidemargins up to the foremargins of the segments, so that when seen sideways the entire sidemargins may be ashy grey, though in some specimens the grey colour does not extend much on the sides but leaves most of each segment shining brownish black. Pubescence mainly or entirely greyish yellow or greyish white, rather long on the sides of the three basal segments, and distinctly long about the hind corners of the basal segment where a few of the hairs on the hindmargin are almost strong and stout enough to be called bristles; the pubescence on the sides of the remaining segments is shorter and not always all greyish yellow, as some hairs may be black at the sides and usually a good deal of the short depressed pubescence on the disc is black on especially the sixth and seventh segments or even on the fifth or fourth segments, though usually the pale pubescence forms a slight fringe at the hindmargins and occasionally occurs all over the abdomen from the base to the genitalia. Belly blackish brown to yellowish grey (according to the light) with obvious pale hindmargins to the segments, and bearing sparse rather thin pendent brownish yellow pubescence. Genitalia shining black; the eighth abdominal segment forms a dorsal base and is produced on each side into a broad rounded triangle which leaves the small intermediate part with a slightly arched or slightly undulating hindmargin, and these triangles bear numerous black bristly hairs and also bear on their inner sides a rather long fringe of dull black or rusty black stiff hairs which point towards the tip; claspers large and long, being about twice as long as broad, arched but equal in width, and bluntly rounded on the lower angle at the end but almost rectangular at their upper angle where they meet for most of their width; these claspers bear obvious suberect black bristly pubescence, but at the tip where they meet the pubescence is often rusty; seen from beneath the claspers enclose an ovate (hardly longer than broad) space of which the sides slope down inwards, and after this ovate space a long slight shallow emargination can be traced rather before their tips, and the pubescence at their tips is sometimes rather more reddish brown.

Legs rather deep black, though in immature specimens the anterior tibiæ and tarsi may be obscurely reddish black, and greyish dust may obscure the ground colour; coxæ on the underside bare and brilliantly shining. Pubescence (as distinguished from bristles) on the front femora rather abundant and rather long except anteriorly, greyish white or sometimes yellowish or even orange but black towards the tip, and even some of the short adpressed pubescence is pale posteriorly but black elsewhere; the front tibiæ bear a fair amount of black pubescence on the underside, but their other clothing is described under the bristles; middle femora with similar pubescence to that on the front pair but more restricted to the underside, and the middle tibiæ also with similar black pubescence to that on the front pair; hind femora also with greyish white pubescence beneath or rather postero-ventrally, and the hind tibiæ with only a slight but fairly long ciliation

on the basal half; the front tibiae have a brownish furry covering on the anterior (inner) two-thirds, while the hind tibiae bear on that part a clothing of very dense very short black bristles. Bristles all black, practically absent on the front femora though a few postero-dorsal hairs after the middle are strong; front tibiae with about eight inconspicuous dorsal bristles extending over nearly all the length, about four well separated long posterior bristles on the middle half, and about three long postero-ventral bristly hairs, besides the apical circlet of bristles; front tarsi with each of the four basal joints bearing an apical circlet of four long bristles but no others except the short plantar ones, while the last joint has a thin bristle above each claw as long as the joint itself in addition to other weaker and shorter lateral bristly hairs; middle femora sometimes (but not always) with two erect short antero-dorsal bristles soon after the middle; middle tibiae with about three strong antero-dorsal, three weak postero-dorsal or almost dorsal after the middle, and three long postero-ventral at and after the middle, in addition to the apical circlet, but the distinction between bristles and long hairs is very slight; middle tarsi with bristles similar to those on the front pair; hind femora with about six (5-10) widely separated anterior bristles of which the end ones become antero-dorsal, and with some small subapical (including two antero-dorsal); hind tibiae with three strong antero-dorsal bristles, about four weaker postero-dorsal (almost dorsal), and three antero-ventral on the apical half, in addition to the apical circlet; hind tarsi with bristles similar to those on the other pairs. Pulvilli yellowish white; claws black, but dull dark reddish on the basal half.

Wings with an equal though slight blackish grey tinge, and with the veins strongly blackish or very dark brown even to the base, but with no trace of clouding on the cross-veins. Squamæ (alar) dull yellow with thick paler dull yellow margins on which is a slight pale yellow fringe. Halteres pale or dull orange, with the knob sometimes blackened at the tip.

♀. Very much like the male. Abdomen with the grey hindmargins less defined anteriorly and the basal segment nearly all grey; eighth segment shining black and flattened but with a fringe of pale pubescence across its hind part; pubescence erect, black, and rigid all about the sides and sidemargins of the fifth, sixth, and seventh segments, but not on the eighth. Ovipositor with two curved rows (hardly forming a circlet) of about seven stout blunt bristles in each row.

Length about 9 mm.

This species has no ally in Britain, but two or three very closely allied species occur on the continent and I believe the distinctions which have been given at present to be very unsatisfactory; I cannot place any value upon characters founded on the colour and markings on the thorax, or the colour of the pubescence on the abdomen and femora, or even on the face-beard, as British specimens of *L. cinctus* seem to me to include sufficient variations for all of the described species. I possess a specimen from Kowarz (labelled "Saualp") under the name of *L. Macquarti* (which I presume represents the *L. montanus* of Schiner) and six specimens (which I believe to belong to one species) from Bigot under the name of *L. Bellardii* in which the claspers are almost hatchet-shaped (the base forming the short side) with the upper side extending up to a point which is the only place at which they ordinarily meet, while the lower side ends in a bluntly rounded angle, and the distance from the sharp angle to the rounded angle is more than that from the latter to the base, so that the clasper is hardly longer than deep; the pubescence on the femora and tibiae is longer and denser than in *L. cinctus*, but the hind femora bear less obvious bristles and especially conspicuous pale pubescence; the front femora may be slightly stouter; the abdomen has rather long pale

pubescence at the sides to the end of the seventh segment, and has nearly all the short pubescence on the disc pale; the cross-veins are rather clouded, and Bigot's specimens vary very much in size. A species taken by Colonel Yerbury at Cintra on February 16 and March 1, and at Collares on February 6, 1896, has the claspers brownish orange or shining dark chestnut and shaped almost as in *L. Bellardii* but bearing much shorter bristly pubescence and with the lower angle sharper, the abdomen with pale pubescence even to the underside of the claspers, and with the grey bands broad, the metapleural fan nearly all pale, the front femora with obvious postero-dorsal bristles, and all the tibiæ with more numerous bristles which are not at all concealed (as in *L. Bellardii*) by any long pubescence. It is possible that this latter species is the true *L. Macquarti* of Perris, but that species should have a parti-colored face-beard and is so little known that it may possibly even belong to some other genus. Even the characters derived from the genitalia must be accepted with caution, as I possess one male of *L. cinctus* (out of several from Mr Nicholas Cooke) in which the claspers seem to be shorter and consequently broader in proportion, and in that specimen a few pale brown hairs occur in the face-beard; I believe also that the claspers in all the species of *Lasiopogon* are sometimes more or less reddish, possibly through immaturity. I note that Loew (Berl. ent. Zeitschr., xviii., 369) referred to *L. Bellardii* as a valid species, but I do not think that he ever mentioned *L. montanus* or *L. Macquarti*, and I also note that a form without clouded cross-veins was referred by Schiner to *L. cinctus* but by Strobl to *L. montanus* var. *immaculatus*.

L. cinctus sometimes occurs in considerable numbers in the spring in the New Forest; Colonel Yerbury has taken it at Oxshott in Surrey and at Porthcawl in Glamorgan, while in 1870 the late Mr Nicholas Cooke sent me a number from Southport in Lancashire and the Cheshire coast. It has occurred from May 11 to June 13. Colonel Yerbury noticed that a number of specimens at Oxshott on May 20, 1900, were feeding on small *Tipulidæ*, while some at Porthcawl preyed on *Pachyrrhina histrio*.

Synonymy.—This species stood in old British Collections under its synonym of *L. cinctellus* Meig.

13. DIOCTRIA.

Dioctria Meigen, Illig. Mag., ii., 270 (1803).

Slender almost bare (never at all woolly haired) flies of medium or rather large size and usually of blackish brown or shining black colour; easily known by the narrow cylindrical abdomen and the long broad wings.

Head short and rather broad, standing well away from the thorax because of the produced large prothorax and elongated collar and neck. Face and frons nearly parallel-sided, the face being slightly narrowest about its middle, and the frons slightly wider than the face and sometimes gradually widening upwards or sometimes slightly narrowing almost up to the ocelli and then arching out to the occiput; face without a knob unless the varying amount of production of the lower part can be considered one, bare above the rather thin but long face- or

mouth-beard which droops over the mouth; sides of the mouth bare; jowls very small and bare; frons deeply sunk between the eyes, usually shining black and bare, but in some species bristly on the orbits down to or almost beyond the antennæ; ocellar knob strongly elevated and bearing short fine pubescence; back of the head nearly flat and bearing numerous long hairs which are rather thin and almost shaggy or at any rate less bristly on the lower part, but which usually become strong and bristly as they ascend the head and sometimes even form a festoon of bristles against the upper part of the eyes, with the points of the hairs or bristles bent forwards; collar sometimes bearing some bristly hairs which are however sometimes slight and restricted to the front or side parts. Proboscis produced horizontally and bearing beneath its base a few long thin hairs; palpi more or less elongate and thin, and (when long) bearing long projecting bristles. Antennæ longer than the head, placed on a more or less raised antennal prominence; basal joint elongate cylindrical; second joint shorter and more cup-shaped; the two basal joints bearing bristly pubescence; third joint longest, and often with a few small bristles on its upper margin just before the middle; style obvious, rather long, stout, and blunt (fig. 398).

Thorax oval, usually bearing dense tomentum in stripes or patches on which there is a slight pubescence but sometimes entirely shining, sometimes clothed all

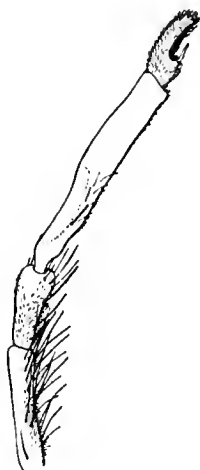


FIG. 398.—*Dioctria Reinhardi* ♂. × 22.



FIG. 399.—*Dioctria rufipes* ♂. × 12.

over with short dense bristly pubescence and occasionally with a few longer bristly hairs, and with a few lateral bristles which are sometimes very indistinct (especially when the pubescence is more abundant than usual); the dorso-central bristles are absent but there are three rows of tiny bristles on the disc and some tiny bristles on the front part which spread outwards towards the humeri, while others may occur on the sides above the dorso-pleural suture; the bristles consist of one (or rarely two) præsutural and a row of about four (2-4) supra-alar; about three small bristles may occur on the front margin of the postalar calli but are often so small as to be easily overlooked; pleuræ usually (not in *D. Reinhardi*) with peculiar slanting shimmering stripes of pale (silvery or golden) tomentum, of which the most conspicuous one runs down the front margin of the mesopleuræ and sternopleuræ, while another one runs down the hindmargin of the mesopleuræ on to the space under the pteropleuræ, and the upper and hind margins of the mesopleuræ (and sometimes the front margin broadly of the sternopleuræ) bear fine pubescence, but otherwise the pleuræ are mainly without distinct pubescence or bristles except for the metapleural fan of long bristles or bristly hairs and other pubescence on the metapleuræ; prothorax bristly or pubescent. Scutellum flattened on the disc, and bearing tomentum and pubescence similar to but less than that on the disc of the thorax, and sometimes with a slight marginal fringe but with no marginal bristles.

Abdomen elongated, narrowly cylindrical, almost without pubescence and without any bristles except for the long bristly ciliation on the hindmargin of the basal segment at especially its hind corners. Genitalia small, rather curved back in the male under a termino-dorsal plate, but in the female almost concealed under the truncate end segment.

Legs usually slender (not in *D. atricapilla*) and with few conspicuous bristles and only slight pubescence, though some bristles may be long and thin; femora usually rather thickened; basal joint of the hind tarsi always rather stout and sometimes conspicuously dilated. Pubescence on the anterior coxæ rather long, pale, and somewhat silky, but without any bristles; anterior femora with a very few long hairs beneath but hardly with bristles except some small subapical ones; front tibiæ with about two (2-4) thin bristles beneath near the middle (but these bristles varying in length and often very thin and inconspicuous), and about four (3-6) postero-ventral bristles extending over nearly the whole length, and a few (3-4) very small inconspicuous dorsal or slightly postero-dorsal ones; middle femora sometimes with a few anterior longer hairs or small bristles near the base, but more commonly with only sparse soft pubescence; middle tibiæ with two or more long antero-dorsal bristles and four or five postero-dorsal, and about four (2-4) ventral; hind femora with only a few antero-dorsal and postero-dorsal bristles near the base; hind tibiæ with a few (2-6) dorsal bristles (very minute in *D. atricapilla*, etc.), and usually a few (0-3) anterior, and sometimes some thin postero-ventral hairs which may easily be overlooked; all the femora have some short subapical bristles, and the hind femora and tibiæ bear on their postero-ventral surface an exceedingly fine brush-like or furry pubescence which is rather conspicuous, and which in this felt-like form is almost peculiar to *Dioctria* among the British *Dasypogoninae*, and this furry pubescence extends beneath the basal joint of the hind tarsi; all the tibiæ have a terminal circlet of spines, and each of the four basal joints of the tarsi has a similar circlet of six strong bristles, but the front tibiæ have no terminal claw as in *Isopogon*. Pulvilli large, extending almost to the end of the long claws.

Wings (fig. 400) proportionately long and broad; small cross-vein present and placed rather near the base of the discal cell; all five posterior cells open, the

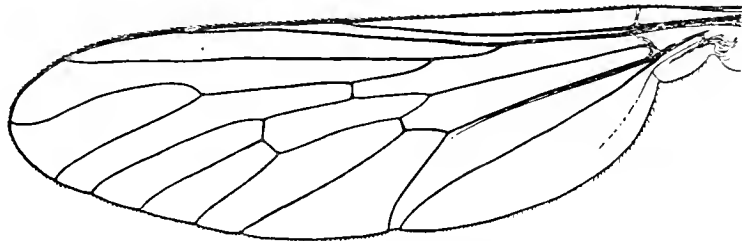


FIG. 400.—*Dioctria Baumhaueri*. $\times 10$.

first, second, and sometimes fourth being almost equally so, but the fourth sometimes a little contracted; anal cell not closed, but steadily narrowing until it is nearly closed at the wingmargin; wing-membrane wrinkled. Squamæ (alar) small, with a thick margin on which there is a fringe; thoracal pair bare, hardly more than the frenum. Halteres with rather large knobs.

This genus is distinguished by the absence of a front tibial claw, the practical absence of any face-knob and the limitation of the face-beard to the upper mouthmargin, the distinct stout antennal style, and the limited chætotaxy and absence of villosity. The best specific characters lie in the shape of the antennal prominence, the length of the antennæ, the constitution of the face-beard, the stripes of tomentum on the pleuræ, the presence and distribution or entire absence of tomentum on the disc of the thorax, and the form of the hind legs, but little value can be attached to the colour of the face and legs and not much to the colour of the wings and humeri.

Dioctria is a rather large Palearctic genus, nearly forty species being known from that region, while seven (which I doubt being congeneric) are recorded from North America, three from South America (including perhaps our *D. ælandica*), one (doubtful) from New Guinea, one from Guadaloupe, and two or three from the Cape of Good Hope. *D. lugubris* of Jaënnicke from Cuba has bristles on the hindmargin of the thorax,

while *D. tasmaniae* of Walker is only *Brachyrrhopala maculineuris* of Macquart. The Palæartic species belong mainly to Middle Europe, but nearly twenty extend to the Mediterranean, of which only two or three occur in North Africa, though two endemic species also occur there. The British species are rather sluggish, and usually occur in long grass or on low shrubs; I have records of only two of our six species north of the Midlands (*D. Reinhardi* and *D. rufipes*), though *D. Reinhardi* seems to be commoner in the North of Scotland than in England. The metamorphoses are but little known, but the larvæ of two or three species have been found in moist earth connected with vegetable matter. The perfect insects prey upon *Ichneumonidæ*, but have been noticed to capture other *Hymenoptera* and also *Diptera* or even *Lepidoptera*.

Synonymy.—I doubt whether the North American species referred to this genus strictly belong to it, as two or three in Bigot's collection (including *D. nitida* Willist.) have the basal joint of the antennæ scarcely (if at all) longer than the second, the style less elongate, the frons more shallow and less shining black and with long hairs all along the orbits, and as a strong chætotactic distinction the thorax bears no distinct bristles but has a longer more ubiquitous pubescence, while indications of a serration beneath the femora somewhat justified Bigot in having placed them under *Echthodopa* in his collection. The European species were very much mixed up in Bigot's collection, and his (probable) type of *D. Bigoti* A. Costa from Sardinia may be only *D. bicincta* with the abdominal bands rather unusually wide and distinct.

Table of Species.

- 1 (2) Femora entirely black (conf. *D. Baumhaueri*). Wings blackish in the male, brownish in the female. Face-beard black and thoracic pubescence blackish in the male. Stoutly built species.
1 *atricapilla*.
- 2 (1) Femora (at least anterior) wholly or partly conspicuously yellow. Face-beard yellowish in both sexes.
- 3 (4) Wings much darkened. Legs nearly all orange. Thoracic pubescence black in both sexes. Large species.
2 *celandica*.
- 4 (3) Wings not obviously darkened.
- 5 (6) Front pleural "shimmer stripe" absent. Legs broadly orange at the base (♂) or all orange (♀). Face-beard pale and abundant (about 50 hairs). Thoracic pubescence black in the male. Rather large species.
3 *Reinhardi*.
- 6 (5) Front pleural "shimmer stripe" complete and conspicuous. Thoracic pubescence pale in both sexes.
- 7 (10) Coxæ and tarsi mainly black.
- 8 (9) Anterior femora with no blackish markings. Thorax hardly striped.
4 *rufipes*.
- 9 (8) Anterior femora with at least a blackish dorsal streak. Thorax inconspicuously striped. Slender species.
5 *Baumhaueri*.
- 10 (7) Coxæ and anterior tarsi almost wholly yellow. Thorax clothed with yellow tomentum, but with conspicuous brilliantly shining black stripes. Very slender species.
6 *linearis*.

D. atricapilla ought not to be mistaken for *D. Baumhaueri*, as it is a stout strongly built species with conspicuously dark wings while *D. Baumhaueri* is a slightly built species with almost hyaline wings. *D. Reinhardi* is easily recognised in the male by its peculiarly colored femora, while the conspicuous absence of the shimmering pale stripe down the front of the pleuræ and the abundant face-beard distinguish it from all other species. *D. rufipes* has the front femora without any black dorsal marking and has the frontal prominence larger than in any other species, while *D. Baumhaueri* has the front femora with at least a blackish dorsal streak.

1. *D. atricapilla* Meigen. Legs black except on the reddish knees. Wings indeterminately blackish on the basal half in the male, but brownish in the female.

The most stoutly built species in the genus.

♂. Moderately shining black. Face shimmering dull brown, but shining black immediately under the antennæ, very slightly produced at the upper mouth-edge, and bearing there the face-beard which is in almost a single row of about ten long black bristly hairs with sometimes a few additional small hairs; sides of the mouth shining black and bare; chin- and jowl-beards rusty black; back of the head almost flat and with a narrow bare greyish brown postocular rim (shimmering white in some lights on the lower half) which is flush with the eyes except slightly on the wider lower part; behind this rim are abundant long black bristly hairs, which are rather thin and crowded on the lower part but gradually become stouter and scarcer (though still numerous) as they ascend towards the top of the head, where they stand further back from the eyes; some tiny black hairs occur close to the top corners of the eyes; frons shining black, deeply sunk between the eyes, and with a few inconspicuous short black hairs on the orbits; ocellar knob very much elevated and bearing a few minute black bristles on the upper and hind part; antennal prominence neither large nor prominent though wide and fairly high, shining black, and bearing numerous black bristly hairs on the sides; collar shining black, and bearing inconspicuous black hairs. Proboscis long and shining black, with the dorsal tuft near the end composed of unusually long brown hairs and numerous tiny ones, while the long hairs beneath near the base are also dark; palpi shining black, not half so long as the proboscis, and bearing about the tip long projecting black bristly hairs, but with shorter thin brownish hairs about the base. Antennæ shining black on the two basal joints; basal joint more than one and a half times as long as the second, and bearing more numerous and longer black bristly hairs; third joint dull black, as long as the basal two together, and bearing at its tip a stout minutely pubescent style which is nearly half as long as the third joint.

Thorax black, with only the points of the humeri just above the prothoracic stigmata orange, densely punctate and consequently rather dull, but the slightly raised middle stripe bears two less punctate (though finely transversely striate) lines and the large humeral spaces are shining and almost impunctate. Pubescence all over the disc (except on the polished parts) composed of very short rusty black hairs. Bristles limited to the usual præ-sutural one and several supra-alar, the postalar calli being without distinct bristles. Pleuræ polished shining black, with the usual "shimmer stripes" of tomentum complete and usually brownish orange but the hypopleural stripe rather vague and undefined; mesopleuræ with black (or partly brownish yellow) pubescence about the front corner and down the stripe on its back part, and the sternopleuræ with similar pubescence on the front point; metapleuræ with rather numerous thin black hairs, but with the usual fan rather weak as it may range from only two long bristly hairs up to about

six weaker hairs. Scutellum rough but almost bare; metanotum considerably dusted with brownish orange at the sides.

Abdomen almost unicolorous black, but the intersegmental membranes show up rather obviously yellow and in connection with them the sides of the hindmargins are often somewhat indistinctly orange; the abdomen bears minute black bristly pubescence all over, but the basal segment bears in addition several short black bristles on the sides and a row of about six rather strong long black bristles along the hindmargin near each side. Belly with the brownish orange incisures shining through rather widely, while when seen from below the actual sidemargins appear rather brownish orange. Genitalia ordinarily with a shining black broad upper plate which is produced at each end corner into a broad subtriangular process, while beneath this plate are several bright orange-red parts; lateral lamellæ shorter than the dorsal plate.

Legs stout and strong, moderately short, shining black with the knees narrowly reddish orange; coxæ at the tip and the trochanters wholly chestnut; hind tibiæ gradually dilated to the tip; basal joint of the hind tarsi not conspicuously dilated. Pubescence on the anterior coxæ dense, rusty black, and not short, while the anterior basal part of the middle pair is brilliantly black and quite bare; hind coxæ with shorter inconspicuous pubescence; anterior femora with a few long hairs beneath close to the base; the furry pubescence beneath the hind femora is very dense and extensive, conspicuously yellowish white, and with a few long thin whitish hairs intermixed near the base, while that beneath the hind tibiæ is also dense and extensive but is darker than that on the femora. Bristles rather few in number; femora with only inconspicuous præapical ones; front tibiæ with one small dorsal bristle near the base, one or more (1-3) inconspicuous slightly anterodorsal, one or two very tiny anterior after the middle, four strong posterior, about two (2-4) very thin rather long postero-ventral hairs, and the usual apical cirlet; front tarsi with the usual circlets of bristles and with the tiny dorsal bristles rusty black; middle tibiæ with two antero-dorsal bristles (one at and one after the middle), two antero-ventral (one at a third and one at three-quarters), four posterior, and three rather long equidistant postero-ventral, besides the apical cirlet; hind tibiæ with about two small anterior bristles (one, sometimes accompanied by a still smaller one, just before the middle, and the other (a stronger one) at about three-quarters), and four small dorsal, besides the apical cirlet; posterior tarsi with the usual bristles. Pulvilli and empodium orange; claws conspicuously orange on the basal half.

Wings proportionately short, being distinctly shorter than the abdomen, all tinged with blackish though with the basal half much blacker than the rest, but the boundary between the blackish base and the rather washed out outer and hind margins not well defined; third posterior cell wider at the wing-margin than the second or fourth, as the fourth (though varying much) is usually a little narrowed; stem of the cubital vein shorter (though varying much in amount) than the fork; anal cell also varying from well open to (in one female) practically closed. Alar squamæ blackish or dirty orange or yellow, with a thick yellow margin on which is a long dense brown or yellow fringe which is however less dense near the alulæ; thoracal pair only indicated by a brownish orange line. Halteres yellow to brownish yellow.

♀. Similar to the male, but the face shimmering brightly with beautiful golden or pale yellow dust and the shining black portion just under the antennæ small; face-beard of the same colour as the face; chin- and jowl-beards pale greyish; bristles and hairs on the back of the head with an orange hue. Palpi with brownish orange hairs.

Thorax with the dense short depressed pubescence so brownish yellow that it somewhat conceals the black ground colour and gives the whole dorsum a rather greyish brown appearance, but with three brownish ashy grey stripes down the middle, of which the two outer ones are the broadest but have their outer margins not well defined and the two intermediate shining black ones are bare and impunctate; the usual shining black side spaces less distinct; postalar calli often rather chestnut; præsutural and supra-alar bristles brownish orange; pleuræ with the shimmering stripes

paler and sometimes almost white so that they become even more conspicuous than in the male, and the pubescence on the stripes yellow or pale yellow; metapleural fan yellow.

Abdomen with the intersegmental membranes usually more distinct than in the male, but the orange on the actual hindmargins very slight and limited to near the sides; abdomen slightly widening after the third segment, but curving back to the eighth segment which is narrower than the third; the very short pubescence black, but brownish yellow and depressed on the ovipositor, while the bristles on the sides of the hindmargin of the basal segment are brownish yellow.

Legs with the pubescence on the coxæ pale or brownish yellow, but all bristles dark orange; furry pubescence beneath the hind femora and tibiæ pale yellow; tiny bristles on the tarsi more brownish orange.

Wings much lighter colored than in the male, though occasionally the contrast between the basal half and the rest is almost as obvious.

Length about 10.5 mm.

This species varies in British specimens only as mentioned above, but Loew recorded a variety of the female with remarkably pale legs, and I found a similar specimen in Bigot's collection which (amongst many other distinctions) has the anterior legs orange or brownish red, and I think that such a variety has not been recorded since Loew's description in 1847. It has no very close European ally.

D. atricapilla is not recorded from many districts, but is common in a few localities in the southern half of England, such as the New Forest and other parts of Hampshire; I have other records from Kent (Colonel Yerbury says it is common at Gravesend), Suffolk (Mr C. Morley records it from Tostock and Wortham), Gloucester (Painswick, and Mr C. J. Wainwright says it is common in a very local area at Selsley), and Worcestershire (Worcester, Wyre Forest, and Malvern). It is recorded from all Europe. Loew stated that the male appears considerably earlier than the female, but my records only give a very immature male on May 29 with both sexes fully mature from June 11 to July 15.

Synonymy.—Loew's synonymy of 1847 appears to be accepted, except that *D. fuscipes* has since been recognised as a distinct species which is common in Sicily. Bigot's collection contained a number of correctly determined specimens with which one female *Isopogon brevirostris* was associated, and in addition ten specimens (of which six purported to be males and four females) stood under the name of *D. nigripes* Meig. all of which were females of *D. atricapilla*, while there was one old specimen labelled *D. Falleni*.

2. *D. celandica* Linné. Wings very much darkened in both sexes. Legs orange, but the tarsi and the tip of the tibiæ black.

A large handsome fly with long legs and wings.

- ♂. Shining black. Face hardly widening from the antennæ to the mouth, shining black across just beneath the antennæ and down the middle, but with the sides and lower part covered with shimmering pale yellow tomentum; face rather produced on the lower third and bearing there the long drooping face-beard, which is composed of nearly twenty yellow hairs and usually some encircling shorter inconspicuous black ones; jowls bare and shining black; back of the head shining black and bearing long coarse black pubescence which develops after the middle into strong bristles which are conspicuous and of which many have the tips bent forward, but these bristles die out on the upper part; frons wider than the face and hardly widening upwards, considerably sunk between the eyes, shining black and almost

bare, ocellar knob considerably elevated and bearing only very short black bristles, antennal prominence rather large and bearing stiff black pubescence; collar shining black and bearing only inconspicuous black bristly pubescence, but with some conspicuous longer stiff black hairs on the side projections. Proboscis horizontally porrect, long, black, and bearing the usual tuft of short pale pubescence above near the tip and some thin straggly pale hairs beneath near the base; palpi black, nearly half the length of the proboscis, and bearing long porrect black bristles, but the basal joint with a few long black pendent hairs. Antennæ upraised, about as long as the height of the head; basal joint elongate cylindrical, about twice as long as the second, and bearing numerous black bristly hairs; second joint with fewer and shorter bristles; third joint slightly shorter than the two basal joints together and diverging widely from them, dull brownish black, and bearing some short inconspicuous (or one or two moderately long) black dorsal bristles just before the middle; style about a third or a quarter the length of the third joint and almost as stout.

Thorax shining black with (in very good specimens) traces of two widely separated greyish brown dusted stripes; pubescence very short, black and inconspicuous on the disc, but rather longer and more obvious about the sides; bristles consisting of one strong (usually) blackish orange præsutural and several (2-6) strong (though not all equally strong) supra-alar, but no noticeable postalar. Pleuræ with the shimmering stripes distinct and usually light grey but sometimes almost golden; mesopleuræ with some longish hairs on the grey stripe down the back part, and slightly pubescent on the upper part; pteropleuræ slightly pubescent on the back part; metapleuræ with longer rather sparse but obvious pubescence and with a fan of about six (4-8) long yellowish bristly hairs. Scutellum with a slight black marginal fringe.

Abdomen unicolorous shining black, but with the tip of the genitalia brownish red; seventh segment hardly widened, and the eighth about half the length of the seventh. Pubescence minute but rather dense, black with some short rusty hairs about the basal corners and with a ciliation of about six longer yellowish bristly hairs along the sides of the hindmargin of the basal segment. Genitalia with a shining black bent down dorsal plate which bears moderately long yellowish pubescence and has each end corner produced into a short prong, while between these prongs are a pair of short blunt lamellæ; lower lamellæ elongate, brownish orange at the end, and bearing rather long yellowish pubescence; inner lamellæ orange.

Legs orange; coxæ usually blackish, but the anterior pairs obscured by dense grey dust and long pale yellowish pubescence; hind trochanters blackish; tibiæ blackened (or in immature specimens browned) for about the apical sixth of the front pair, fifth of the middle pair, and two-fifths of the hind pair; tarsi black, with the base of each joint very narrowly reddish orange; hind tibiæ slightly dilated at the tip; basal joint of the hind tarsi hardly dilated; all the femora with sparse long pale hairs beneath near the base. Bristles all orange, even those at the tips of the tarsal joints; femora with inconspicuous subapical bristles, of which two or three of the hindmost on the anterior legs curve forwards at their tips; middle femora with several inconspicuous though stout anterior bristles on the basal three-quarters, and two or three short posterior ones after the middle; hind femora with four or five similar anterior bristles on the basal third; front tibiæ with indications of a dorsal row of about five bristles (basal one fairly conspicuous), four or five postero-dorsal, and two strong postero-ventral near the middle with another rather before the tip; middle tibiæ with two to four inconspicuous dorsal bristles, two to five anterior (of which two are conspicuous), two antero-ventral, four to six posterior, and two postero-ventral near the middle; hind tibiæ with about five antero-dorsal bristles, about six small dorsal, and some exceedingly thin longish postero-ventral hairs intermixed in the furry pubescence. Pulvilli and empodium orange; claws conspicuously orange on the basal half.

Wings blackened and in certain lights with a violet purplish lustre, rather washed out towards the hindmargin and darkest about the foremargin, but not uncommonly the blackening is most developed about the veins so that the cells have light kernels and the wings a somewhat reticulated appearance;

stem of the cubital vein about as long as the fork ; third posterior cell more widely open than the second or fourth, though the fourth is not appreciably narrowed ; wing-membrane rumpled. Alar squamæ pale brownish, with a thick blackish brown margin on which is a very short pale fringe. Halteres orange or brownish orange with the base of the stem blackish.

♀. Very similar to the male. Face-beard composed of fewer hairs and without any encircling short black hairs.

Thorax with the grey stripes slightly more obvious.

Abdomen usually more flattened and slightly widened after the third segment but narrowed on the eighth segment and ovipositor, and the eighth segment has rather long ciliation on its hindmargin and tawny pubescence beneath ; occasionally moderately large but a inconspicuous lurid red spot occurs on each side on the hinder half of the fourth segment.

Wings more frequently with the reticulated appearance caused by the cells having less darkened kernels, but with the foremarginal parts blackish.

Length about 14 mm.

This species is readily known by its comparatively large size, its long violet-blackened wings, and its orange legs. The only closely allied European species is the very rare *D. Meyeri* from Podolia (of which only two females are known) but that has the middle of the abdomen bright red, the hind legs mainly black, and the face-beard black. *D. alandica* varies only in the intensity of the coloring of the wings and in the darkening of the tibiæ, as stated in the description above, but this amount of variation caused two specimens with very light colored wings to be labelled *D. umbellatarum* in Bigot's collection.

D. alandica can hardly be considered a common insect, though it occurs in numerous localities in the southern half of England. It is certainly not at all uncommon in the New Forest, and I have records from Devonshire, Hampshire, Kent, Herts, Suffolk, Hereford, Leicester, Notts, Worcestershire, Shropshire, Merioneth, and Glamorgan, upon dates ranging from May 23 to July 8. Some specimens taken by Colonel Yerbury at Porthcawl had the wings very darkly colored. It is recorded from all Europe except the South-west, and it is possible that it occurs in Guadeloupe and Brazil (*D. vicina* Macq.).

Synonymy.—*Sylvicola lugubris* of Moses Harris in his *Expos. Brit. Ins.*, T. xlviii., f. i. (1782) is almost certainly a synonym.

3. **D. Reinhardi** Meigen. Mesopleuræ without an anterior shimmering pale stripe. Legs of the female yellow, but those of the male with the femora black except at the base.

A rather fine species, remarkable for the very different coloring of the femora in the sexes.

♂. Shining black. Face shining black on nearly the upper half, but with the lower part (in good specimens) covered with greyish or yellowish white tomentum, slightly produced near the top of the mouth and bearing there the dense yellow or whitish yellow face-beard which is composed of abundant (50-60) coarse hairs but which nevertheless does not extend to the sides ; mouth-margin laterally and the small jowls shining black ; the small chin-tuft varying from all black to mixed black and yellow hairs ; back of the head almost flat or even slightly excavated, shining black but with a bare greyish eyemargin on the lower part, and bearing numerous moderately long black bristly hairs on the lower part and a few stout black bristles just before the

middle which have their tips curving over forwards, while still higher up other black bristles occur which extend to the upper corners of the eyes; frons deeply sunk between the eyes, shining black and practically bare; ocellar knob considerably elevated; antennal prominence small in area but sharply defined and with two or three tiny bristles on the points which bear the antennæ, but otherwise bare and shining black; collar shining black, bare above but with a few black bristly hairs at the sides and beneath. Proboscis shining black with a dark orange projected pointed tip, before which is a fringe of dark orange pubescence, and with a few longer pale yellow hairs beneath near the base; palpi black, half as long as the proboscis, and bearing numerous brownish orange bristly hairs. Antennæ shining black but slightly dusted on the two basal joints; basal joint hardly one and a half times as long as the second, and the third joint about as long as the two basal ones together; the two basal joints bearing short sparse black bristles; style thick, minutely pubescent.

Thorax shining black, with two dark grey dusted lines which run down just outside the brightly polished impunctate middle stripe and sometimes with a third line down the middle of that stripe, but these lines do not reach to the hind part; the middle stripe is bare and impunctate except on the punctate bristly middle line and the broad humeral spaces are also brightly polished and impunctate, but most of the rest of the disc bears minute black bristles or hairs. Bristles fairly distinct and dark lurid orange; præsutural sometimes two, supra-alar four or five, but any on the postalar calli very short. Pleuræ polished and bare except on a dusted band of greyish white tomentum which runs across the top part of the mesopleuræ and curves slightly downwards at each end but not at all across the front part of the sternopleuræ, while another brownish grey dust stripe extends down the back part of the hypopleuræ; the mesopleural band bears slight pubescence which is most obvious on the back part, the prothorax bears slight short inconspicuous dark orange pubescence, and the metapleuræ bear short fine pale pubescence and the usual fan of about six long outstanding yellow bristly hairs. Scutellum curiously roughened.

Abdomen unicolorous black (unless the intersegmental membranes show up narrowly yellowish), usually contracting slightly from each end to about the third and fourth segments; pubescence very minute and black, but a few yellow hairs occur towards the sides of the hindmargins of the basal segment. Genitalia inconspicuous, but with a bare polished black dorsal plate which bears rusty pubescence on its sidemargins, and with more noticeable pubescence beneath.

Legs stout and strong with the posterior femora distinctly clavate, black, but pale yellow at the tip of the coxæ, on the trochanters, and on the base of the femora to about a quarter of the front pair, a third of the middle pair, and nearly half of the hind pair, while the extreme tip of the femora is brownish orange and the basal quarter (or more posteriorly) of the tibiæ is orange; hind tibiæ rather dilated at the tip; basal joint of the hind tarsi obviously though inconspicuously dilated. Pubescence and bristles normal; front coxæ with dense drooping orange pubescence, and the middle coxæ with a little on the lower part; front femora with one posterior bristle just before the middle, two or three inconspicuous anterior ones near the base and one postero-ventral after the middle; front tibiæ with four or five inconspicuous dorsal bristles, three or four posterior, and a minute furry golden or blackish pubescence on the apical half of the inside and on the soles of the tarsi; middle femora with only inconspicuous bristles (one postero-ventral just after the middle being noticeable), and with one or two long thin pale hairs beneath near the base; middle tibiæ with the usual bristles, two posterior being long; hind femora with long pale sparse pubescence about the base and the usual bristles which consist of an anterior row of about eight and a few postero-dorsal on the basal half; hind tibiæ with two or three inconspicuous antero-ventral bristles, three or four dorsal (two near the base), and three small and one long (at three-quarters the length) anterior; hind femora and tibiæ with the usual furry pubescence brownish and not very conspicuous; all the tibiæ and the joints of the tarsi with the usual apical circlets of bristles; all bristles on the legs even to the

apical circlets on the joints of the tarsi dull orange, but some of those on the femora and tibiæ so dark as to appear almost black. Pulvilli broad and pale yellow; empodium orange; claws bright orange on the basal half.

Wings of a greyish brown tinge, but brownish yellow on the base and foremargin and about the postical vein; third posterior cell narrower at the wingmargin than the second or fourth; anal cell well open. Alar squamæ dirty orange, with a thick yellow or orange margin on which is a moderately long pale yellow fringe except near the alulæ; thoracal squamæ represented by a pale yellow line. Halteres canary yellow.

- ♀. Very distinct looking from the male, because of the much paler legs and more distinctly striped thorax. Face nearly all pale greyish yellow or (in some lights) shimmering silvery except just under the antennæ; face-beard smaller (about 30 hairs); chin-beard orange or yellow; bristles on the back of the head orange.

Thorax with three distinct approximated greyish yellow lines (middle one narrowest), and with obvious minute depressed yellow pubescence except in front and on the two polished black impunctate intermediate lines; all the bristles obviously orange; points of the humeri and postalar calli rather shining dark chestnut. Pleuræ with the band of pale tomentum along the top of the mesopleuræ sometimes more extended downwards at each end (and in some very large specimens from Kingussie a resumption of the front line appears on the front part of the produced point of the sternopleuræ). Scutellum almost as in the male.

Abdomen broader, especially after the third segment, and bearing rather sparse minute light grey pubescence which is visible because of its colour.

Legs orange, with the base of the femora paler yellow, but black or brownish black on the tarsi and on rather more or less than the apical half of the tibiæ. Pubescence on the blackish parts minute but obvious because all yellow; long hairs on the femora almost absent.

Wings paler, and the veins about the base and front part yellowish. Squamæ yellower, with bright orange or yellow margins and long pale yellow fringes. Halteres whitish yellow or orange.

Length about 11 mm. to 14 mm.

This species may be distinguished from all our British ones by the absence (or at least wide interruption) of the pale shimmering stripe across the front of the pleuræ and by the abundant face-beard, while the size and the peculiar coloring of the femora of the male at once distinguish that sex; the female may also be distinguished from *D. ælandica* by its much lighter colored wings and its less elongate abdomen, and from *D. Baumhaueri* and *D. linearis* by its much larger size and its stronger stouter build. It varies considerably in size though always a large species, and (in addition to variations already mentioned) two females taken by Colonel Yerbury at Kingussie on July 26, 1898, are worthy of special note; they are very large and have the front pleural shimmering stripe continued (after a long gap) on the lower front part of the sternopleuræ, the femora are dark orange red with the apical half of the posterior pairs inclined to be blackish and with a deeper black stripe above on the apical half, the squamæ and halteres brownish orange, while one of the specimens has three præsutural bristles; I am quite satisfied however that they are only very large forms of *D. Reinhardi*.

D. Reinhardi is not common in England, though apparently common in North Scotland; in England I have records from only the neighborhood of Bristol (according to Shuckard when describing his *D. Meigenii*), the New Forest, Frant in Sussex or Kent, Colchester in Essex, and Herefordshire, and I do not think it is at all abundant in any of these localities, but Colonel Yerbury found it common in cornfields

at Nethy Bridge in Inverness-shire, and also took it at Kingussie, Inverness, Forres, Elgin, and the Culbin Sandhills. Dr J. H. Wood on one occasion observed a male following another male step for step but a few inches behind it, just as if it were on a love chase. It is recorded from all Central and Northern Europe.

Synonymy.—Meigen first described this publicly as *D. Reinhardi* Wied. in 1820, but Wiedemann had in 1818 referred to a "*D. Reinhardi* mihi," which he said Meigen had described long before as a new species under that name, though probably only in correspondence. Meigen described the male only under this name, but three pages previous described the female as *D. cothurnata* and *D. umbellatarum*; it is possible that strong priority-mongers might claim the name of *D. cothurnata* as that appears on p. 244 before *D. umbellatarum*, but I prefer to accept Wiedemann's name. It is strange that even in 1847 Loew thought he possessed or had seen both sexes of both *D. Reinhardi* and *D. cothurnata*, and Walker in 1851 fell into the error of keeping them distinct, while Zetterstedt also thought that he possessed both sexes of both species. Shuckard in 1841 described the female very badly as a new species, *D. Meigenii*, but Walker pointed out the synonymy. One female was in Bigot's collection as *D. umbellatarum* Meig. but his two supposed males under that name were both pale winged females of *D. aelandica*.

4. *D. rufipes* DeGeer. Anterior legs mainly orange, but hind legs black except at the knees.

Distinguished by the large pubescent antennal prominence.

♂. Black, moderately shining. Face pale golden or dull pale yellow or almost silvery, but shining black under the antennæ, though the golden dust extends sparingly outside this shining black part up to the base of the antennæ; face-beard concentrated on the middle part of the slightly produced lower third of the face, and composed of about twenty long pale hairs which extend equally upwards and outwards so that they are not ranged in a single line along the upper mouth-edge and so that they leave wide spaces between them and the eyes; sides of the mouth shining black; chin-beard whitish yellow and composed of soft thin hairs similar to those on the lower part of the back of the head; back of the head shining black with a bare shimmering whitish eye-collar which does not extend above the lower two-thirds, while behind this bare collar on the lower part of the head are rather thin though abundant long pale hairs which diminish in number as they ascend and form behind the upper half of the head a postocular row of about a dozen blackish orange bristles which are curved forwards at their tips, but on the top of the head the bristles and hairs retreat considerably back from the eyes; still more out towards the back of the head are some thin straight orange hairs; close against the upper eye-angle are some tiny yellow hairs which are difficult to see; frons rather deeply sunk, shining black, and bearing on the orbits some minute dark orange hairs which are also difficult to see; antennal prominence broad and unusually high, shining black, and with abundant rather long black pubescence on its sides; ocellar knob sharply raised but with only exceedingly minute pubescence; collar shining black with a few yellowish hairs and bristly hairs. Proboscis shining black, with the usual hairs near the tip on the upper side rather long and pale, but those beneath near the base long and whitish; palpi shining black, about one-third the length of the proboscis, and with long projecting yellow bristles on the end part but with the usual thin whitish hairs beneath near the base. Antennæ shining black on the two basal joints; basal joint nearly twice as long as the second and bearing abundant black bristly hairs which on the underside are rather long; second joint also with short black bristly hairs; third joint dull brownish black, hardly as long as the basal two together, and bearing several small dorsal bristles near its base; style hardly a quarter the length of the third joint.

Thorax shining black, but rather obscured by the orange pubescence which

is longer than usual and not much depressed ; this pubescence is scattered all over the disc except on the lines and spaces mentioned later on, but is most conspicuous on the two distinct stripes of greyish orange dust (which spread out rather V-like above the suture) and on the trace of a narrow middle line, but is almost absent on the two intermediate shining black stripes and also to a certain extent on the usual spaces in front near the humeri and on a roundish space about where an intra-alar bristle would occur. Bristles conspicuous and orange ; one præsutural, three strong and about three small supra-alar, but none worth noting on the postalar calli. Pleuræ (fig. 399) shining black, with the "shimmer stripes" entire and sharply defined and covered with rather coarse pale yellow tomentum ; the front stripe is broad but the stripe on the back part of the mesopleuræ is narrow, and the back part of the hypopleuræ bears similar but less dense and less conspicuous tomentum ; pubescence moderately long and whitish yellow on the front part of the sternopleuræ, less long and yellower on the stripe along the top of the mesopleuræ, but again moderately long on the narrower stripe down its back part ; metapleuræ with very fine pale pubescence and with only a moderately strong fan, which is composed of about five long thin bristles ; hypopleuræ with no distinct pubescence ; all the parts of the pleuræ below the prothorax and in front of the front "shimmer stripe" bear long straggling pale hairs. Scutellum roughened, and bearing sparse orange pubescence similar to that on the thorax but without any noteworthy marginal fringe ; metanotum with a little greyish yellow dust at the sides.

Abdomen apparently unicolorous shining black, but the intersegmental membranes usually pale and the hindmargins sometimes inclined to be narrowly reddish orange, especially at the sides of the fourth segment, while sometimes the hind corner of the third segment and the front corner of the fourth segment are decidedly reddish orange, and the hindmargin of the seventh segment may be orange. Pubescence on most parts extremely short and pale yellow, but not very short at the sides of the basal segment and towards the hind corners of the next two segments, while about nine long yellow bristly hairs occur on each side along the hindmargin of the basal segment. Genitalia with the shining black dorsal plate not very large but with its end corners produced to moderately long points, while between these points two broadly ovate blackish lamellæ exist which extend out about as far as the points, and two ventral plates arise from the sides of the base and extend out below the dorsal plate and bear at their ends a pair of long dentate claspers ; beneath are some long narrow brownish orange lamellæ and a considerable amount of long dull orange pubescence.

Legs, except the hind pair, mainly orange ; anterior pairs occasionally almost brownish red with the knees paler, and in dark colored specimens sometimes with blackish reflections about the tip of the femora, and the underside of the middle femora may have a broad blackish streak on the apical half ; tibiæ dark brown at just the tip, and the tarsi dark brown except on the base of the first joint and on the connecting necks between the other joints ; hind legs shining black or brownish black, with the extreme base and tip of the femora and the base of the tibiæ narrowly orange ; tip of the hind tibiæ only moderately dilated ; basal joint of the hind tarsi moderately dilated. Anterior coxæ densely covered with greyish white dust except on the shining black basal front part, and bearing on all the grey part rather long hardly depressed greyish white pubescence ; the small hind coxæ bear little dust and little pubescence ; all the femora with a few long thin pale hairs beneath about the base ; front tibiæ with one dorsal bristle near the base, two or three thin postero-ventral, and three to five posterior ; middle tibiæ with the usual bristles, of which two anterior and two postero-ventral are rather long ; hind femora with the usual bristles obvious about the basal half, but with the greyish white furry pubescence beneath and behind not so dense as usual and hardly so long or so dense as that on the tibiæ ; hind tibiæ (besides the furry pubescence) with one rather strong antero-dorsal bristle at two-thirds of the length and a smaller one at about one-third, and with four or five small dorsal bristles of which however the one close to the base is rather strong ; all the bristles on the legs are orange.

Pulvilli orange; claws orange at the base but gradually becoming black towards the tip.

Wings with a slight brownish grey tinge, but more brownish yellow about the base and foremargin; third posterior cell wider open than the second or fourth, and the fourth usually rather narrowed. Squamæ (alar) dirty yellow with a thick yellow margin, but with the pale yellow marginal fringe very thin on the alar end. Halteres clear yellow to brownish orange.

♀. Very much like the male. Face a little broader.

Thorax more shining, because the short pale yellow pubescence is still shorter and therefore conceals the ground colour less, but the grey stripes are narrower and more sharply defined and consequently the oblique divergence of their anterior part (when seen from in front) is more marked; humeri and postalar calli rather brownish.

Abdomen after the third segment a little wider, and the pale incisures a little more pronounced, while inconspicuous lurid reddish markings may occur about the sides of the second, third, and fourth segments.

Legs with very few long thin hairs about the base of the femora.

Length about 11.5 mm.

This species varies but little, except that the anterior legs may be sometimes darker reddish than usual and then blackish reflections or even stripes may occur on the femora. The prominence upon which the antennæ are placed is larger and more pubescent than in any species known to me, while the orange anterior and black hind legs distinguish it very easily from all other British species. I think it should not be confounded with any European species except *D. liturata* Loew and *D. meridionalis* Bezzi (of which the latter is possibly only a southern race of *D. rufipes*), but both of these have the anterior femora with some blackish markings.

D. rufipes is the commonest British species in the genus and I have records from Devonshire to Inverness. It has occurred occasionally in my garden here and also in the garden at Denmark Hill, London, when I lived there. My dates range from May 16 to July 21. It is recorded from nearly all Europe.

Synonymy.—*Sylvicola cursor* of Moses Harris in his *Expos. Brit. Ins.*, T. xlviii., f. 2 (1782) is almost certainly a synonym of *D. rufipes*. DeGeer's name dates from 1782 (or possibly 1776), but there was an *Asilus rufipes* of Fabricius described in 1775 from America which is now known as *Promachus rufipes*; I leave both names because there can be no possible confusion between the European *Dioctria rufipes* DeG. and the North American *Promachus rufipes* Fabr.

5. **D. Baumhaueri** Meigen. Thorax with indistinctly shining lines. Anterior femora black on the upper side, and hind legs mainly black.

A small dark legged species.

♂. Black, moderately shining. Face covered with greyish white or pale golden or even pale orange dust which leaves only a small middle space beneath the antennæ shining black; the face is only very slightly produced at just the upper mouth-edge, where a single row of about ten long whitish bristly hairs curving downwards forms the face-beard, but this face-beard does not nearly extend outwards to the eyes; sides of the mouth shining black; chin-beard whitish, rather long, and extending on to the shimmering whitish lower part of the back of the head, but soon after the middle of the back of the head this shimmering part dies out and the pubescence grows sparser, while about eight stronger brownish yellow hairs (hardly curved forwards at their tips) form a postocular row, the absolute back of the head is shining black and the whitish pubescence extends a little on the lower part,

but on the upper part between the neck and the vertex are numerous long stronger brownish yellow hairs ; frons shining black, wider than the face but hardly widening on its upper part, deeply sunk and apparently bare ; ocellar space very much elevated and bearing some very minute brownish yellow bristles behind and above ; antennal prominence broad but rather slight, and bearing some short blackish bristly hairs on its sides ; collar shining black and bearing an inconspicuous circlet of about eight longer thin pale yellow hairs on the upper part, while behind these are some sparse shorter yellow hairs, and much more numerous hairs on the sides, in addition to some whitish longer hairs below on the prothorax. Proboscis shining black, with the bush of hairs above near the tip long, rather dense, and obscurely whitish, while those beneath near the base are few in number ; palpi shining black, hardly half as long as the proboscis, and bearing on the end part numerous long porrected brownish white bristly hairs. Antennæ (fig 398) black, moderately dulled on the two basal joints by brownish orange dust ; basal joint barely one and a half times as long as the second joint, and bearing some short depressed black bristles on its upper part and a few longer more erect ones beneath ; second joint more cup-shaped and with the bristles beneath shorter ; third joint barely as long as the two basal joints together, and with only indications of tiny dorsal bristles before the middle ; style almost as thick as the third joint and more than a quarter its length.

Thorax mainly covered with brownish yellow tomentum and pubescence, but with two rather narrow moderately shining black stripes down the disc, which are separated by more than their own width, and which die out considerably before the hindmargin, while broader blackish side lines begin considerably before the suture and extend almost to the hindmargin, but these side lines are less defined and bear a few short yellow hairs like those on the dusted part of the disc ; the dorsopleural suture and the greater part of the humeral plates are shining black (leaving the upper part rather dusted), but the raised point at the back part of the humeri is shining chestnut. Bristles ; one præsutural and three supra-alar, strong, distinct, and brownish orange. Pleuræ shining black, but the "shimmer stripes" and the coarse tomentum cover the greater part of them ; the front shimmer stripe is glistening pale yellow all along the top margin of the mesopleuræ and broadly down the front of that and of the sternopleuræ, and apparently continues all across the front coxæ (where it bears rather abundant rather long whitish pubescence) ; the stripe on the back part of the mesopleuræ is narrow and less conspicuous but becomes more conspicuous on the small patch just after the lower hind corner of the mesopleuræ and down the back part of the sternopleuræ ; metapleuræ all dulled by brownish yellow dust, bearing on their back part thin pale yellow pubescence and a fan of about four long thin whitish bristly hairs ; hypopleuræ all dulled by brownish yellow tomentum ; the tomentum on most of the pleuræ is very coarse (especially on the front part) but scarcely amounts to pubescence (unless on the hind and upper margins of the mesopleuræ). Scutellum with but little dust though with rather sparse short yellow hairs and consequently more shining black, and with no distinct marginal fringe ; metanotum dulled by not dense brownish orange dust.

Abdomen practically unicolorous black and shining though not brilliant, but sometimes the extreme hind corners of the third and fourth segments are indistinctly orange ; a very short sparse adherent yellow pubescence is scattered all over except on a ring at the base of each of the second to fifth segments, and the hindmargin of the basal segment bears at each side a row of about five long whitish bristly hairs. Genitalia with the shining black dorsal plate bearing sparse short yellow pubescence and with each lower end corner produced into an almost pointed short projection, so that the pair of rather thick ovate shining black lamellæ between these projections extend out a little farther and bear very short white hairs ; side ventral plates long and triangular, ending in a pair of shining brownish orange processes, while beneath are some more long brownish orange lamellæ and some long not at all dense dull orange hairs.

Legs orange and black ; upper part of the anterior femora broadly black ; apical third of the anterior tibiæ indeterminately blackish and this colour

extending vaguely upwards on the inner (=front) side almost to the base; anterior tarsi black or dark brown with the necks of the joints orange and with rather conspicuous orange bristles and pubescence; hind legs black, but orange on the trochanters, the base of the femora (more or less distinctly), the apical third (or less) of the femora except on the upper side, and the extreme base of the tibiae; hind tarsi with the basal joint, and the hind tibiae at just the tip, considerably dilated. Anterior coxae densely covered with pale greyish yellow tomentum and anteriorly with long drooping whitish yellow pubescence; hind coxae with less dust, and with only slight short pale pubescence about the tip; anterior femora with a few long thin pale hairs beneath near the base; front tibiae with about three widely separated very thin long pale postero-ventral hairs, and with three stronger also widely separated orange posterior bristles (and a small one near the base), but with the usual dorsal bristles very small and inconspicuous; middle tibiae with the usual bristles, but the two postero-ventral (one at and one after the middle) long, and the two antero-dorsal (one at one-third from the base and the other at two-thirds) also long; hind femora with one strong though rather short orange anterior bristle not far from the base which usually stands out rather distinct from the others, and with a few long pale hairs among the furry pubescence beneath; the furry pubescence whitish and so long that it is hardly of a furry nature, while that on the tibiae is more brownish yellow; hind tibiae with one orange antero-dorsal bristle at one-third of its length and one at two-thirds, and about five dorsal bristles almost equally separated (the last one being apical); the close short bristly pubescence on the hind tibiae and above the hind tarsi is black, but all the longer bristles on the legs are orange. Pulvilli dark orange; claws dark orange at the base.

Wings (fig. 400) slightly greyish, with usually the base and the costal and upper basal cells tinged with brown which may also enclose the stem of the postical vein; fourth posterior cell slightly narrowed at the tip. Alar squamæ dirty brownish yellow with a yellow margin, on the lower portion of which is a very short whitish yellow fringe. Halteres varying from pale yellow to canary yellow, or even to a brownish orange stem and a brown knob.

- ♀. Very similar to the male. Face-beard not quite so much in a single row; the shimmering white postocular portion of the back of the head extending further up but less defined.

Abdomen usually more distinctly reddish orange at the hind corners of the third to sixth segments and narrowly along the hindmargins for a short distance, though the two last segments usually have the hindmargins narrowly orange all across, of which the preceding segments have traces.

Legs inclined to be paler, the black streak on the upper side of the anterior femora being usually rather narrower and the under portion more clearly orange; middle tibiae sometimes hardly blackened anteriorly; hind femora rather more orange, a broad black ring occupying rather more than their middle third and extending dorsally almost to the tip, while the basal third is yellow rather than orange; hind tibiae with nearly the basal third indeterminate reddish orange; minute pubescence on the hind tarsi pale. Hind femora with two or three anterior bristles on the basal half.

Wings perhaps a shade more hyaline. Squamæ clearer yellow.

Length (♂) about 9 mm., or (♀) about 9 mm. to 11 mm.

This species varies considerably in the amount and intensity of the blackish coloring of the legs, which is however never reduced to such a small amount (even in immature specimens) as to render its distinction from *D. hyalipennis** at all difficult; the palest forms have the upper side of the anterior femora streaked with black, and the hind femora broadly black about the middle and on the upper side almost to the tip, while the basal joint of the front tarsi has scarcely more than its narrow neck

* Lundbeck (Dipt. Danica, Part II., 25) has proved that Meigen's *D. flavipes* is a synonym of *A. hyalipennis* of Fabricius, as had been pointed out by Loew sixty years previously.

orange; on the other hand very dark legged forms occur, a male taken by Colonel Yerbury at Torcross in Devonshire on August 9, 1903, being rather large and long with the legs mainly black, only the trochanters and just the base of the femora being orange, the apical sixth of the underside of the anterior femora and the actual knee joints and the extreme base of the tibiæ dark reddish orange, the hind knees only narrowly and obscurely reddish orange beneath, the hind trochanters with only the joints reddish orange, and the extreme base of the hind femora obscurely yellowish, while the wings in this specimen are more strongly tinged with brown, the halteres are canary yellow, and the third posterior cell of the wings is the widest open. The true *D. hyalipennis* (of which *D. Baumhaueri* may be a western race) has the anterior femora entirely pale orange (or with only a small dorsal streak near the tip) and the basal half of the basal joint of the front tarsi orange, but has no known structural distinction. Our *D. linearis* is easily distinguished by the brightly shining black lines on the thorax, the yellower legs (especially on the tarsi), and the tendency to orange markings on the abdomen.

D. Baumhaueri is fairly common in the southern half of England, as I have numerous records from Cornwall (Penzance) to Suffolk (Newmarket and Orford), Norfolk (West Runton), Wiltshire (Savernake), Warwickshire (Sutton Coldfield), probably Notts (Sherwood Forest), probably Worcestershire (Wyre Forest), and Cheshire (*t. B. Cooke*). The specimens taken in the south-west of England appear to have the blackest legs, and I have already specially mentioned a male from Torcross in the extreme south of Devonshire, while I had noticed this peculiarity in specimens from Penzance, and Colonel Yerbury had done the same in some taken at Christchurch; some specimens however from Orford in Suffolk are small and have the legs remarkably blackish. It is not very uncommon in my garden at Newmarket and has even occurred on my study window. My records extend from June 5 to August 9. Mr G. C. Bignell once caught it preying upon the Ichneumon *Phygadeuon galactinus*. Out of England it is known to occur in Western Germany, France, and Belgium, its place being taken over the rest of Europe from middle-Scandinavia to Dalmatia and Hungary by *D. hyalipennis*; other more eastern records for *D. Baumhaueri* I somewhat distrust as I doubt their correct identification; Lundbeck however has found *D. hyalipennis* only in Denmark, while van der Wulp recorded both species as common in Holland.

Synonymy.—We are no nearer deciding upon the specific distinctness of *D. Baumhaueri* from *D. hyalipennis* than we were when Loew wrote in 1847; he then admitted that he could find no structural difference between the two, but that the colour characters would always distinguish them, and as far as he could trace the two forms never occurred together; he stated that Zeller had taken 68 specimens of *D. flavipes* (= *hyalipennis*) and not one *D. Baumhaueri*, while he himself took over 100 specimens near Posen and in Silesia amongst which there was not one *D. Baumhaueri*; on the other hand he received *D. Baumhaueri* commonly from Western Germany without any *D. flavipes* (= *hyalipennis*), and a long series from Winnertz in Crefield (Prussia) were all *D. Baumhaueri*. Zetterstedt also recorded having examined over a hundred Scandinavian specimens of *D. flavipes* (= *hyalipennis*) which were constant in the colour of the legs, and he apparently never saw *D. Baumhaueri*, and it is in accordance with this distribution that all our specimens in England are *D. Baumhaueri*. As the two species or forms are common and well known I have retained the name *D. Baumhaueri* for the British one,

though any union of the two would necessitate the use of the older name *D. hyalipennis*. A specimen from the Westwood collection which is now included in the Hope Museum at Oxford is labelled "*lateralis*." *Sylvicola informis* of Moses Harris in Expos. Brit. Ins., T. xlviii., f. 3 (1782) is probably this species but the figure and description make any identification far from certain.

6. *D. linearis* Meigen. Thorax black with brilliantly shining stripes. Legs including coxæ and tarsi mainly yellow.

The smallest and slenderest British species, easily known by the diagnostic characters. (Fig. 369.)

♂. Black, mainly brilliantly shining. Face all covered with dense silvery white tomentum which may bear a trace of yellow on at least the upper part, but with a shining black small middle patch (scarcely one-third the width of the face) just under the antennæ, though the tomentum when seen from below is velvety brown; face scarcely produced even at the upper mouth-edge but with a gently rounded prominence on which is placed the face-beard, which forms a clump of about twenty long rather drooping white bristly hairs; sides of the mouth shining black; chin-beard whitish, rather slight but extending more conspicuously on to the lower part of the back of the head; back of the head almost flat but the lower half slightly puffed out in profile and with a rather broad and conspicuous glistening white postocular space which extends to rather above the middle and then ceases without narrowing to a point, and bearing on the upper half eight to ten pale yellow postocular hairs which are neither strong nor bristly; the back of the head is shining black behind and above the shimmering white margin and bears numerous fairly long brownish yellow hairs amongst which a pair of post-vertical hairs (hardly bristles) may be detected; frons brilliantly shining black, quite bare, deeply sunk as usual, and with the ocellar space highly elevated and bearing minute pale pubescence behind and above; antennal prominence narrow but fairly high and sharply defined and with very slight pubescence on its sides; collar brilliantly shining black with sparse erect pale hairs on its sides. Proboscis shining black, with the usual dorsal pubescence near the tip brownish yellow but that beneath near the base very slight and greyish white; palpi black, very short, being only about a quarter the length of the proboscis, and bearing towards the tip porrect greyish white bristly hairs. Antennæ rather long; the two basal joints black but appearing dull and brownish from minute brown tomentum, and bearing very slight brownish yellow or almost black bristly pubescence which is rather longer and more obvious on the underside; basal joint long and thin, about twice as long as the second joint; second joint but little cup-shaped; third joint hardly so long as the two basal ones together, dull brownish black, and bearing a few small dorsal bristles before the middle; style thick but comparatively short, about a quarter the length of the third joint.

Thorax brilliantly shining black and impunctate except where densely covered with brownish yellow tomentum and pubescence; the middle stripe brilliantly shining but divided by a narrow line of tomentum and dying out at about two-thirds down the disc; side stripes broad but less regular, beginning broad in front close to the middle stripe but quickly diverging and extending almost to the hindmargin though interrupted by a cross-band of tomentum at about half-way between their front and the suture, becoming rather contracted after the suture, and then bending outwards a little over the dark chestnut postalar calli; the brownish yellow tomentum is conspicuous on all the rest of the disc, and wherever that is present there is a rather sparse short similarly colored pubescence. Bristles; one presutural distinct; one distinct supra-alar followed by two or three weaker ones, and the pubescence from them to the postalar calli rather strong. Pleuræ brilliantly shining black and impunctate except on the "shimmer stripes"; front stripe beginning rather narrow at the hind upper corner of the mesopleuræ but soon widening and extending down the front margin and becoming wide and

conspicuous all down the front margin of the sternopleuræ, being rather yellowish on its upper part but silvery white (in most lights) on its lower part and especially on the sternopleuræ; the stripe down the hindmargin of the mesopleuræ is sharply defined though rather narrow, but widens out on the space below; back part of the hypopleuræ covered with dense pale grey tomentum; metapleuræ with rather dense but less conspicuous brownish yellow tomentum and with some slight brownish yellow pubescence and an indistinct fan of about four long pale yellow hairs; pleuræ without any pubescence except that mentioned above, and a few slight hairs on the stripe down the hindmargin of the mesopleuræ; prothoracic stigma brown but with a bright chestnut raised point above its hind end. Scutellum dusted on the disc but shining black about the margin, and with scarcely any definite pale marginal pubescence; metanotum dulled by yellowish grey tomentum.

Abdomen brightly shining black with reddish orange bands or side spots about the ends of the third, fourth, and fifth segments; the first marking is mainly on each basal corner of the fourth segment but includes just the hind corners of the third, and may extend as a band across the basal third of the fourth segment and narrowly on the hindmargin of the third; then the hindmargin of the fourth segment may be rather broadly reddish orange and the base of the fifth quite as broadly or even more so at the sides, while the hindmargin of the fifth segment may be as broadly reddish, and the last three hindmargins may be rather narrowly and inconspicuously orange, and the genitalia have reddish orange markings and underside; sometimes even the basal corners of the second and third segments are obscurely reddish, while sometimes the reddish orange markings may be reduced to orange spots at the front corners of the fourth (and end of third) segment and not extended dorsally, and less so at the next incisure but vaguely more on the hindmargin. Pubescence sparse and inconspicuous, but about five long pale bristly hairs occur along each side of the hindmargin of the basal segment, and a few thin pale hairs on the sides of the basal segment, and some sparse pubescence down the sides which is longest on the hind halves of the second and third segments, while the fifth to seventh segments bear some depressed dorsal pubescence. Belly with the reddish orange bands and side spots large and conspicuous. Genitalia with a brightly shining black dorsal plate which bears some reddish markings (which may form a pair of rounded spots) and has the extreme hindmargin reddish and also has its end corners produced into dark reddish points, which are longer than the intermediate pair of rounded pubescent brown lamellæ; each lateral plate has a sub-quadrate shining black polished basal portion which extends onwards as a large blunt triangular reddish orange clasper, and these claspers meet below; other lamellæ are bright reddish orange, and the pubescence all about the claspers is long and yellow.

Legs yellow; posterior knees narrowly black; anterior tarsi with the tip of each joint usually brownish, and the last joint blackish except at its base, and the soles of the darkened parts more obviously darkened; hind femora usually with a broad blackish band (or upper streak, the underside being scarcely darkened) on more than the middle third, and even this leaving sometimes an indefinite dorsal orange line, or in pale specimens the hind femora may be only faintly brownish about the middle; hind tibiæ usually only rather vaguely orange at the base and soon growing blackish until more than the apical half is quite black, but sometimes in pale specimens the tip only remains brownish; hind tarsi usually blackish dorsally with the base of each joint reddish orange, and with all the underside of the basal joint orange and of the other joints only light brown; just the tip of the hind tibiæ distinctly dilated, and the basal joint of the hind tarsi stout but not conspicuously dilated; anterior coxæ glossed with silvery sheen (when seen from in front), and the front pair bearing rather long drooping white pubescence, of which there is a smaller amount on the middle coxæ; hind coxæ practically bare; middle coxæ blackened at the extreme base. Bristles on the legs slight, being hardly more than strong hairs; front tibiæ with four or five small inconspicuous dorsal hairs, three long thin postero-ventral hairs, and three long bristly posterior hairs; middle tibiæ with two long bristly hairs in front, four behind, and three postero-ventral; hind tibiæ with

five rather small dorsal bristly hairs and two anterior (one at a third from the base small, and the other at two-thirds much longer); hind femora with one or two anterior bristles before the middle which are short but rather strong; several long thin hairs occur beneath the basal half of the middle femora, and a few beneath the other femora; the furry pubescence on the hind femora and tibiæ pale yellow. Pulvilli orange; claws orange with just the tip black.

Wings very slightly greyish or rarely brownish, but yellowish at the base and on the subcostal vein. Alar squamæ pale yellow with a slight pale yellow marginal fringe. Halteres yellow.

♀. Very much like the male. Head with the postocular silvery band extending a little more upwards.

Thorax with the middle line of tomentum rather broader.

Abdomen varying in the amount of the orange markings, which are frequently limited to triangular lateral spots, though sometimes the terminal segments have broader orange hindmargins. Genitalia orange and orange haired beneath.

Legs inclined to be less darkened, so that the hind femora and tibiæ may have only indistinct brownish markings and the tarsi be hardly darkened dorsally, though sometimes the legs are as dark as in the male.

Wings sometimes a little brownish.

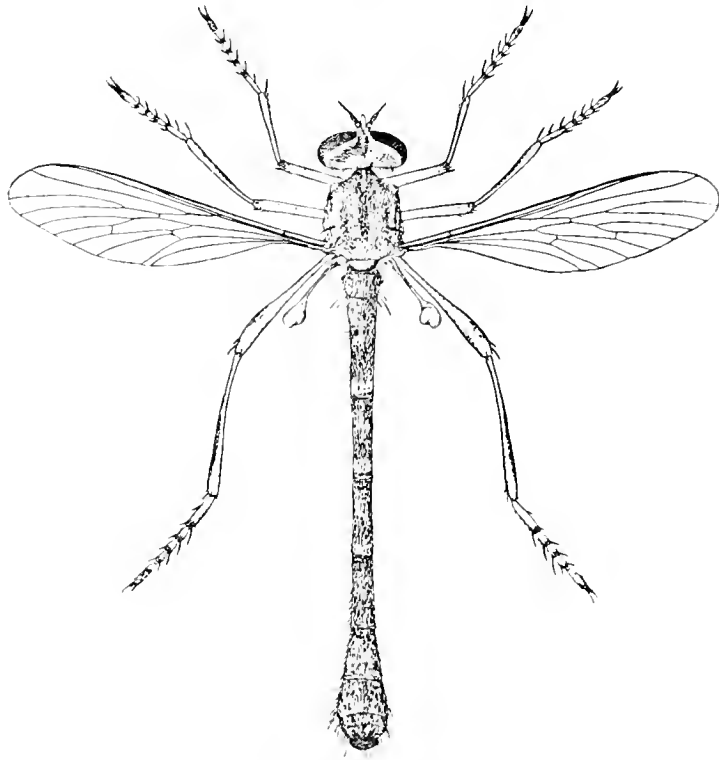
Length about 9.5 mm.

This species is not really closely allied to any other and can be readily recognised if care be taken to observe the brilliantly shining thoracic stripes and markings, and the yellow coxæ and yellowish anterior tarsi. It varies considerably in the amount of reddish orange markings on the abdomen and slightly in the darkening of the hind legs and all the tarsi.

D. linearis is not at all uncommon in the New Forest, but otherwise I have only seen it from several localities in Sussex and Kent, though I have records from Somerset, Leicestershire (Market Bosworth), Herefordshire, and Notts, and Mr C. Morley says it is not uncommon locally in Suffolk, at Assington Thicks. My captures have all been made between June 11 and July 11, though I believe I have seen specimens which were taken in August. It is recorded from South Sweden through all Central to South Europe.

Synonymy.—All the English references to *D. flavipes* may without doubt be referred to *D. linearis*, as it is almost certain that the true *D. hyalipennis* (= *flavipes*) does not occur so far west except in its (possible) form *D. Baumhaueri*. Walker's description of his *D. flavipes* also obviously applies only to *D. linearis*. A few specimens of *D. linearis* occurred in Bigot's collection mixed up with *D. flavipes*, but other specimens under the name of *D. linearis* were correctly identified.

LEPTOGASTRINÆ.

FIG. 401.—*Leptogaster guttiventris* ♂. × 5½.

Marginal cell open. Claws remarkably elongate, but the pulvilli absent. Alula and hind-angle of the wing absent.

Very elongate slender flies, which have the hind legs especially long and the hind femora and tibiæ more or less clavate. Pubescence and bristles almost absent, there being only one præsutural and one* supra-alar bristle on the thorax.

The character of the open marginal cell distinguishes this subfamily from all the other *Asilidæ* except the *Dasyopogoninæ*, but from them it has not yet been sharply differentiated. No doubts can arise about our British species, and I have dealt at some length with the distinctive characters of the *Leptogastrinæ* in my remarks upon the characters of the *Dasyopogoninæ* on p. 705. The almost total absence of pubescence and the extreme degradation of the alula and hind-angle of the wing seem to point the way from the *Asilidæ* to the *Empidæ*.

Face narrow near the antennæ but widening downwards, bare except for a mouth-beard composed of a few bristly hairs which overhang the mouth; frons narrow near the antennæ but widening upwards. Palpi one-jointed. *Antennæ* (fig. 402) with the third joint narrowly elongate oval and *with a long* rather thick terminal *style*, which is not so long as the third antennal joint.

Thorax almost bare of bristles except for one strong præsutural bristle and one strong bristle which I believe represents the last of the supra-alar bristles,* though

* In a female *L. guttiventris* taken at Orford in Suffolk on July 10, 1908, two supra-alar bristles placed close together occur on one side only.

from its position Osten Sacken called it an intra-alar bristle; faint traces exist of dorso-central bristles and of the metapleural fan.

Abdomen very elongate and very slender, almost without pubescence or bristles except as usual along the sides of the hindmargin of the basal segment. Genitalia of the male rather well developed; ovipositor ending bluntly.

Legs long and rather thin, the hind pair longest, and the hind femora and tibiae more or less clavate. Pubescence absent, and any bristles very inconspicuous; there are however a few subapical bristles on the posterior femora and the usual postero-ventral bristly hairs on the anterior tibiae, besides the usual terminal tibial spurs and the usual circling at the tip of each tarsal joint except the last. Claws remarkably long (fig. 404) and not much curved; pulvilli absent or minute, but the empodium developed like a strong but shorter middle claw.

Wings with a venation distinguished by the long and narrow cubital fork-cell and posterior cells, and by the almost parallel-sided open anal cell; the shape of the discal cell is also peculiar because the upper veinlet is emitted long before the end of the cell, and consequently the *second posterior cell* is unusually long and *pointed at its base*; small cross-vein absent or present, even in different individuals of the same species. Squamæ small and bare.

The *Leptogastrinae* as now restricted bear a similar relationship to the rest of the *Asilidae* as the *Systropinae* do to the *Bombyliidae*, but with more numerous connecting forms. The two last characters given in the diagnosis must be taken together in order to separate the subfamily from the rest of the *Dasypogoninae*, many of the latter having very elongate claws and abortive pulvilli but at the same time the alula well (or fairly well) developed, while others have the alula and hind-angle obsolete but the claws and pulvilli normal. In cases of doubt the *Leptogastrinae* can be further distinguished by the rather long antennal style, the limited chaetotaxy (almost but not quite paralleled in *Stenobasis*, etc.), and the peculiarly pointed base of the long narrow second posterior cell.

Leptogaster is the only Palearctic genus of this subfamily.

14. LEPTOGASTER.

Leptogaster Meigen, Illig. Mag., ii., 269 (1803).

Exceedingly lanky almost bare flies of moderate size and of greyish yellow or blackish grey colour, with short wings and very much elongated hind legs.

Head widely transverse, wider than the thorax; face and frons narrow near the antennae but the face considerably widening downwards and the frons upwards; no facial knob, but the front mouth-edge slightly produced and bearing a thin mouth-beard; chin and jowls almost bare; lower part of the back of the head with a thin postocular ciliation, but the upper part with a row of strong postocular bristles (=the festoon); frons triangular, sunk between the eyes and practically bare, but with faint traces of bristles on the orbits; ocelli on a bare elevated knob; collar short and bare. Proboscis fairly long, extending out horizontally; palpi short and thin, one-jointed. Eyes curved on the inner margin so that they become rather approximate near the antennae. Antennae (fig. 402) closely approximate at the base, not so long (without the style) as the head; two basal joints almost equally short, and bearing minute bristles; third joint elongate, long-oval but tapering almost to a point, twice as long as the two basal joints together, compressed laterally, and bearing a moderately thick (*i.e.*, too thick to be aristiform)

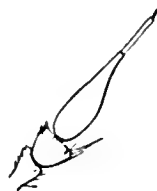


FIG. 402.—*Leptogaster cylindrica* ♂. × 32.

terminal style which is half as long as the third antennal joint and may bear a minute hair-like terminal bristle.

Thorax (fig. 403) somewhat globular and almost bare, there being only two strong



FIG. 403.—*Leptogaster cylindrica* ♂. × 14.

bristles present of which one is præsutural and the other supra-alar though the latter one is placed so far out on the disc as to appear to be intra-alar; some minute easily overlooked bristles however occur which indicate other Asilid bristles, as sometimes a thin one exists on the postalar calli and two rows of very minute dorso-central bristles can be traced after the suture, while some minute pale hairs occur near the præsutural bristle; pleuræ covered with dense tomentum which develops into fine short pubescence on the front part of the mesopleuræ and on the upper front corner of the sternopleuræ; metapleuræ with very faint minute hairs which indicate the usual tuft or fan. Scutellum small, bearing minute marginal

pubescence; metanotum small, concealed beneath the scutellum.

Abdomen very long and thin, rather dangling downwards, slightly widened at the end in the male, bearing very minute pubescence but with a ciliation (almost bristly) along the sides of the hindmargin of the basal segment; basal segment short, second very long and with the spiracular dots far from the base (about one-third down the segment), next five segments long, but the eighth segment very short. Genitalia of the male rather knobbed and complex, those of the female truncate or at any rate short.

Legs long and thin (especially the hind pair), the hind femora distinctly, and the hind tibiæ somewhat, clavate; the legs are almost unarmed, but the femora have some subapical bristles, the anterior tibiæ have about four postero-ventral inconspicuous bristly hairs, the hind tibiæ have three or four irregular inconspicuous bristles about the middle, and all the tibiæ have long thin spurs; tarsi with strong bristles about the tip of each of the four basal joints and with numerous plantar bristles. Pulvilli absent, but the claws remarkably long and gently curved, with the empodium showing between them as a strong sharp bristle (fig. 404).



FIG. 404.—*Leptogaster cylindrica* ♂. (Right front tarsus.) × 45.

Wings small, much shorter than the abdomen; marginal cell wide open; cubital fork long and rather narrow; second posterior cell unusually long as it commences in a point considerably before the end of the discal cell, and in consequence the upper margin of the discal cell is divided into three (often nearly equal) spaces; all five posterior cells widely open; anal cell long and rather narrow, almost parallel-sided but slightly narrowest soon after the postical fork so that it ends rather widely open; discal cell emitting the usual three simple veinlets (fig. 406), or apparently four (fig. 405) when the small cross-vein is absent; hind angle of the wing completely sloped away, and the alulæ practically absent, though the wings have a long fringe where the latter should be; wing-membrane slightly rippled all over. Alar squamæ small and without fringes; thoracal pair practically absent. Halteres with an unusually long stem.

This genus is easily distinguished from any other Palearctic one by the elongate slender form combined with the remarkably long claws and abortive pulvilli.

Leptogaster is a genus of about seventy species from all parts of the world except perhaps New Zealand, and of these about sixteen occur in Europe; the distinctive characters of some of the species are not well defined. According to specimens in Bigot's collection *L. fuscipennis* Gay from Chili has nothing to do with the genus, as they have the pulvilli

fully developed and the fourth posterior and anal cells closed. The metamorphoses are only imperfectly known, but the larva of *L. cylindrica* has been found in field earth.

The flies usually occur in dry meadows, where they rest on grass stems. They are slow and laborious flyers.

Synonymy.—*Leptogaster* was established by Meigen in 1803 upon quite adequate characters; *Gonypes* of Latreille appeared a year later in *Nouv. Dict. d'Hist. Nat.*, xxiv., 191.

Table of Species.

1 (2) Hind femora with longitudinal dark stripes. Abdomen with an entire dark dorsal stripe. Small cross-vein absent.

1 *cylindrica*.

2 (1) Hind femora with a subapical dark band. Abdomen with inconspicuous pale bands. Small cross-vein almost always present.

2 *guttiventris*.

1. ***L. cylindrica*** DeGeer. Abdomen with an entire dark dorsal stripe and with no bands paler than the ground colour. Hind femora with dark stripes; hind tibiae with the apical third black. Upper branch of the fork of the postical vein forming a part of the lower margin of the discal cell, and consequently no small cross-vein present. (Fig. 405.)

A remarkably slender fly, which is very distinct from all other British species except the next one.

♂. Face (including the sides of the mouth) densely covered with yellow or pale yellow tomentum; face-beard yellowish white, small but not so small as in *L. guttiventris*, composed of about thirty hairs; frons yellowish grey; back of the head (especially towards the sides and below) ashy greyish yellow, and bearing a little yellowish pubescence on the lower third, while higher up a postocular row of stout brownish yellow bristles (= the festoon) extends on to the interocular depression and almost meets the row on the opposite side, and some shorter thin pale hairs occur between and in front of these bristles on the upper quarter of the eyes. Proboscis shining black; palpi obvious, black, and bearing four or five tiny whitish bristles. Eyes with the front facets enlarged and green in life, but the small hind and lower facets more bronzy green. Antennae brownish black; second joint orange or ferruginous, and both the basal joints bearing bristles; third joint long and narrowly oval with a fairly long point; style thick but not pubescent, not quite so long as the third joint.

Thorax brownish ashy grey, though when viewed from behind the back part and the scutellum are lighter ashy grey; the usual three stripes are darker brown, and the middle one is sometimes split by a paler line; the side stripes are shortened anteriorly, and all three stripes are pointed posteriorly and end well before the hindmargin; praesutural bristle sometimes black and sometimes yellowish.

Abdomen lanky (but not so much as in *L. guttiventris*), ashy grey with (when seen from above) a narrow clear darker brown uninterrupted dorsal stripe, or (when seen from behind) with a broader less regular and less defined dorsal stripe; pubescence inconspicuous, short greyish white, most distinct about the sides and especially (being longer) beneath the eighth and the neighboring part of the seventh segments. Belly unicolorous yellowish ashy grey, with a very short soft pale pubescence. Genitalia forming a moderate knob; lateral lamellae shining black, long, and bearing obvious pale yellow pubescence, each with an indistinct short basal segment and produced

at its end into a long prong which curves round and finally ends in a strong overlapping rather upturned hook; the inner margin of this incurved part is fringed with long pale yellow hairs; beneath are two shorter but broad basal plates, between which is a broad shining dark chestnut rounded middle piece which curves up between the lateral lamellæ and bears slight pale pubescence; above at the base is a polished black bare basal plate immediately after the eighth abdominal segment followed by two contiguous erect oblong smaller lamellæ which are chestnut behind but darker in front and which bear fairly dense whitish or brownish yellow pubescence; penis reddish brown.

Legs dirty brownish yellow; coxæ grey, front pair bearing a few thin pale hairs at the tip in front; hind femora with a more or less distinct longitudinal darkened streak on the apical half, both in front and behind while a similar but lighter brown antero-dorsal streak usually occurs on the middle femora, and sometimes a still less distinct streak on the front femora; anterior femora with a black spot in front at the extreme tip, and the hind femora with a similar spot in front and behind; anterior tibiæ black at the tip, and the middle tibiæ usually blackish all down the underside, while the hind tibiæ have two blackish streaks which run together and make the apical third all black; tarsi usually all black after the tip of the basal joint, but in pale specimens the base of the second or even third joint is yellowish; anterior tibiæ with two or three slight postero-ventral bristles; hind tibiæ with two slight pale antero-ventral bristles, and one small anterior and one small dorsal one just below the middle; apical circlets of all tibiæ mainly consisting of a few rather long pale bristles on the underside; posterior femora with some inconspicuous yellow subapical bristles.

Wings (fig. 405) proportionately short (sometimes very short), hyaline or with a slight greyish tinge but ochreous about the extreme base; cubital fork of moderate length but varying slightly, rather more than half the length of the first submarginal cell, and with its stem usually less than half the length of the fork and usually considerably longer than the stem of the second posterior cell though not always so especially in small specimens; fourth posterior cell

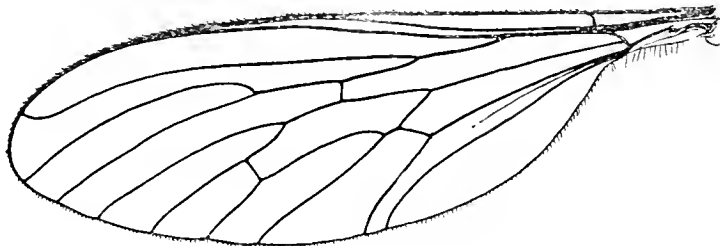


FIG. 405.—*Leptogaster cylindrica* ♂. × 13.

very little widened to the wingmargin; discal cross-vein placed a little beyond the basal third of the discal cell; small cross-vein absent, and consequently the upper branch of the postical fork forming part of the lower margin of the discal cell for a short distance; anal cell well open and in fact narrowest at about half-way between the base of the postical fork and the wingmargin. Squamæ (alar) small, and without any fringes; thoracal pair little more than a pale yellow stripe. Halteres with very long brownish yellow stalks and a rather darker knob.

- ♀. Extremely like the male. Ovipositor (when viewed laterally) appearing to form a blunt and short truncate last abdominal segment, about half the length of the previous segment; abdomen not at all knobbed at the end but slightly compressed so that a dorsal ridge is visible.

Length 9 mm. to 13 mm.

This species varies in the length of the wings, and in the extent and intensity of the dark markings on the legs, but may usually be distinguished from *L. guttiventris* by the absence of the small cross-vein, by the

stripe-like dark markings on the hind femora, by the black tips to all and especially the hind tibiae, and by the entire dark dorsal stripe on the abdomen being uninterrupted by paler bands. A rather small male (Wicken, June 21, 1906) has the face gilded or rather dark orange but greyish silvery white below the face-beard; face-beard composed of about twenty white hairs; frons brown; postocular bristles yellowish to their very tips, very obvious and long though rather wide apart, and the bristles lower down the back of the head about as long but thinner and whiter.

L. cylindrica is not uncommon in Britain, but owing to its being usually confounded with *L. guttiventris* the only records I can give with certainty are from Devon, Somerset, Dorset, and thence to Kent, and up to Cambridgeshire (Wicken), Norfolk, Bucks (Stokenchurch), and Notts (South Leverton), but it occurs in numerous localities over all that area, while I have also seen it from Glamorgan (Porthcawl); I have notes of its occurrence in Worcestershire (Wyre Forest), Leicestershire (Blaby), Herefordshire (West Hide), and Cheshire (Delamere Forest), but I cannot be certain whether those specimens belong to this or the next species. I am also in doubt as to its period of occurrence, but can speak of it with certainty from June 5 to August 10, while I have a doubtful record of August 24. It may often be found on long grass near woods. It is recorded from Western and Northern Europe and extends to Eastern Siberia.

2. **L. guttiventris** Zetterstedt. Abdomen with inconspicuous pale bands. Hind femora with an incomplete dark subapical band; hind tibiae with a vague dark ring before the tip. Upper branch of the fork of the postical vein almost always connected with the discal cell by the small cross-vein. (Fig. 401.)

Very closely resembling the previous species but even more lanky.

♂. Very much like *L. cylindrica*. Face narrower and whiter, and the sides of the mouth whiter; face-beard very small, composed of about eight white hairs; frons darker ashy grey, hardly orange; postocular bristles less evident and more hair-like, but the two or three top ones rather stout and inclined to be black. Antennæ with the style microscopically pubescent.

Thorax of a more brownish yellow tint, with the dark stripes more distinct and the middle one more obviously split on the front part; humeri and postalar calli rather ferruginous; hind part of the disc bearing minute dark bristles which are by no means confined to the dorso-central rows.

Abdomen longer and thinner, with an obscure pale band before the hind-margin of each segment, and these bands becoming rather ferruginous on the second, third, and fourth segments; the actual sidemargins rather ferruginous near the hind corners of the segments, though more noticeably so on the basal segments than on the others; the darkened dorsal stripe indistinct and interrupted by the paler bands, and becoming vague and widened out just before each band. Genitalia smaller, the lateral lamellæ having a small almost quadrate shining orange basal segment, followed by a longer simple falcate second segment which is dark orange at its base but soon becomes black and bears under its basal half a long pale fringe; hooks intercrossing; beneath are two lateral basal subquadrate shining pale chestnut lamellæ and a triangular intermediate one; the upright small lamellæ near the base on the upper side are oblong, shining brown, and bear pale pubescence.

Legs with an obscure dark band before the tip of the hind femora (in contrast with the darkened streak of *L. cylindrica*); anterior tibiæ hardly darkened at the tip (*vide* var. of female), and hind tibiæ with a broad vague dark ring (especially on the underside) after the middle which leaves the tip not much darkened; tarsi more distinctly pale on the base of the second, third, and fourth joints.

Wings (fig. 406) with the small cross-vein present in all the British

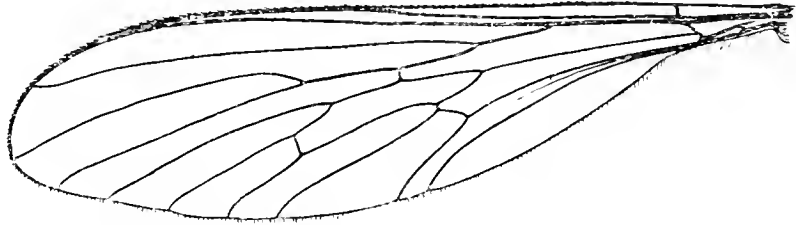


FIG. 406.—*Leptogaster guttiventris* ♂. × 10.

specimens I have seen, though it is sometimes absent in continental specimens; cubital fork usually rather longer than in *L. cylindrica*.

♀. Abdomen with the pale bands less obvious than in the male and not at all ferruginous, so that there appears to be simply a rather dark band across each segment just after its middle; abdomen not at all compressed about the tip and the last segment not truncate.

Legs with the tarsi having little more than the tips of the four basal joints and the whole of the last joint dark. A female taken at Nethy Bridge on June 24, 1905, has the anterior femora rather darkened anteriorly and about the tip, the hind femora almost blackish anteriorly and with an unusually deep black ring a little before the tip and with the extreme tip black, the anterior tibiæ with a dark stripe anteriorly down the whole length, the hind tibiæ black with the base yellowish white and the tip brownish yellow, the tarsi with only the basal joint except its tip whitish yellow and just the base of the second joint orange.

Length 9 mm. to 13 mm.

This species has been contrasted with its close ally, *L. cylindrica*, but there are other allied species in South and Central Europe. A female taken at Orford on July 10, 1908, has two supra-alar bristles on one side of the thorax placed so close together that they are obviously abnormal.

L. guttiventris has been overlooked as a British species, because of its great similarity to *L. cylindrica*, but may be not uncommon. I caught a female at St Mary Cray in Kent as long ago as June 19, 1869, and have since met with it at Barton Mills and near Orford in Suffolk, while Colonel Yerbury has taken it in the New Forest (Ringwood, Brockenhurst, and Lyndhurst) and in Scotland at Golspie and Nethy Bridge; Mr C. J. Wainwright has taken it at Selsley in Gloucestershire, and Dr J. H. Wood at The Dowards in Herefordshire, but in all these cases it was not distinguished from *L. cylindrica* at the time of capture. My records extend from June 6 to August 14 or even a little later. It is recorded from North and Central Europe.

SPECIES IN HORTO MEO.

My garden has been considerably enlarged since the publication of the volume on British *Syrphidæ* and now includes about five acres of garden and meadow and also a small artificial pond, while "the banks" have been mainly removed. The species marked * have occurred on my study window.

- 1 **Sargus cuprarius.** Not uncommon on shrubs.
- 2 **S. nubeculosus.** Of occasional occurrence.
- 3 **Chloromyia formosa.** Not uncommon.
- *4 **Microchrysa polita.** Common.
- 5 **M. flavicornis.** At one time common in a very limited area.
- 6 **Beris chalybeata.** Very uncommon, but I have a record of a male on June 3, 1895.
- 7 **Chrysops relictæ.** A female was caught on July 9, 1904, on a leaf of a bulrush (*Typha*) in the pond. Fortunately *Tabanidæ* do not seem to like the close neighborhood of towns.
- 8 **Bombylius discolor.** Some years ago this was not uncommon in the early spring, but I have not seen one for many years.
- 9 **B. major.** Less common than it used to be, but still almost certain to occur on a suitable spring day.
- *10 **Thereva nobilitata.** Occasionally occurring on leaves in bright sunshine.
- 11 **T. plebeia.** Also occasionally occurring, and apparently not uncommon in Cambridgeshire.
- *12 **Scenopinus fenestralis.** Occasionally occurring on windows, and on one occasion on *Asparagus*.
- 13 **Dioctria rufipes.** Not uncommon on leaves, ready to pounce on any victim.
- *14 **D. Baumhaueri.** Stray specimens occur in most summers, and a specimen was taken on my study window as long ago as July 20, 1885.
- 15 **Asilus crabroniformis.** I can hardly claim this fine species as a true inhabitant of my *garden*, though it was not uncommon about 1880 within thirty yards of my house on what soon became part of my lawn but was then a cow-pastured paddock. I had not seen it for at least twenty-five years, but this year (1908) a specimen was again seen after a strong gale.

I can therefore claim only about ten per cent. of the British species included in this volume, or if the garden-loving *Sarginae* be omitted only about seven per cent.

REPUTED BRITISH SPECIES.

STRATIOMYIDÆ.

- 1 *Nemotelus brevis* Meig. All British writers since the days of Stephens have included this species as British, but without any attempt to test its identification. All the specimens I have seen so named belong to *N. notatus* Zett., which is a fairly common British species.
- 2 *Oxycera leonina* Panz. Curtis in 1833 (Brit. Ent., 441) gave the following record: "A female taken at Pinny by Mr Morris," and J. C. Dale in 1842 (Ann. Mag. Nat. Hist., viii., 432) wrote "I have a pair, both from Charmouth; the ♂ I took." There is however no specimen in the collection bequeathed to the Oxford Museum by C. W. Dale, and it is impossible to know now what species Curtis and Dale had before them. *O. leonina* may well occur in England as it is not uncommon in the Netherlands; it is rather near *O. terminata* but has some yellow markings about the sides of the thorax and at the base of the abdomen, and has the femora mainly black.
- 3 *O. muscaria* Fabr. Meigen unfortunately stated that his *O. pygmæa* was a synonym of *O. muscaria*, and consequently our British authors like many others recorded *O. muscaria* when they meant to record *O. pygmæa*. The true *O. muscaria* Fabr. was described from Italy and is probably the same as *O. flavipes* Loew, which is known from Dalmatia and Italy. Duncan's *O. muscaria* must have been *O. formosa*, as was also probably Walker's in his List Dipt. Brit. Mus., i., 527 (but not in his Ins. Brit. Dipt., i., 22), and these errors were also caused by Meigen's incorrect synonymy. The true *O. muscaria* Fabr. is unlikely to occur in Britain.
- 4 *O. Falleni* Stæg. Recorded by Walker in 1851 (Ins. Brit. Dipt., i., 21) as "Rare. In Mr Haliday's collection. (I.)" Through the kindness of Mr G. H. Carpenter I have seen this specimen, and it is a true *O. Falleni*, but from its general appearance and its pin I am strongly of opinion that it was a continental specimen sent to Haliday by Loew, especially as the latter was at that time writing about this and the allied species. It is also improbable that Haliday would have left such a specimen without any record of locality and date. *O. Falleni* is a possible British species, but is more likely to occur in the Scotch Highlands than in Ireland.
- 5 *Odontomyia microleon* L. Walker in 1851 (Ins. Brit. Dipt., i., 17) said "Rare. In Mr E. Brown's collection. (E.)" The collection of Edwin Brown (whom I remember meeting at an Entomological Club meeting in London) was acquired by Dr P. B. Mason, and consequently the specimen mentioned by Brunetti was undoubtedly the same. *O. microleon* probably occurs in Britain, but I do not consider its claims strong enough to include it at present.
- 6 *O. hydrodromia* Meig. Walker in 1851 (Ins. Brit. Dipt., i., 18) said "Rare. In Mr Stephens' collection. (E.)" I have seen the (probably) original specimen referred to by Walker, and consider it to be only *O. viridula*, var. *subvittata*. The true *O. hydrodromia* of Meigen has never been recorded since its description, and its habitat is unknown, but it is a perfectly distinct species which may not even be European.

- 7 *O. felina* Panz. Included by Stephens in his Catalogue in 1829, as having been taken to his knowledge within twenty-five miles of St Paul's. Duncan in 1837 (Mag. Zool. Bot., i., 153) described it and said "Has been found in several parts of the country, but appears to be uncommon. 'Cardew Mire,' T. C. Heysham, Esq.;" his description might well apply to the true *O. felina*, and I have seen a female of true *O. felina* from the Dublin Museum which is reputed to be British and was part of Haliday's collection and so labelled by him, but it is on a foreign pin and probably came from Loew at the same time as *Oxycera Fallenii*. It is not at all improbable that the true *O. felina* may be found in Britain, and possibly even be not uncommon. Some specimens named *O. felina* in the old collection of the British Museum are only *O. viridula* but include one *O. angulata*.
- 8 *O. hydroleon* L. Stephens included this species in his Catalogue (1829) because the older British entomologists had recorded it, and he marked it as having occurred to his knowledge within twenty-five miles of St Paul's, but in his synonymy he identified the female as *Str. angulata* Panz. and the male as *Str. hydroleon* Panz. Duncan in 1837 (Mag. Zool. Bot., i., 153) said "Not so plentiful as the following (*O. viridula*), but occurring now and then on banks and in meadows. 'Cardew Mire,' C. T. Heysham, Esq." "In ponds, 'Holywood': Killarney, etc. 'A. H. Haliday, Esq.;" Duncan's species was probably neither *O. angulata* nor *O. felina* and certainly not a variety of *O. viridula*, and therefore may have been the true *O. hydroleon*. Walker in 1851 (Ins. Brit. Dipt., i., 19) said "Very rare. In the British Museum. (E.);" A female in the British Museum labelled "Berkshire, J. C. Dale" may belong to this species, but has the basal abdominal spots small and the band-like black markings on the second and third segments caused by triangular side-spots which slope back almost to the sides and has smaller spots on the fourth segment which have the inner points cut off; in other words the black base of the third and fourth segment widens out though not quite to the sides and is not much band-like.
- 9 *O. hydropota* Meig. This species was recorded by Stephens in 1829 (Syst. Cat. Brit. Ins., ii., 277) as having been taken to his knowledge within twenty-five miles of St Paul's; Duncan also included it in 1837, but his description almost certainly refers to *O. angulata*. Walker in 1851 (Ins. Brit. Dipt., i., 18) said "Rare. In the British Museum. (E.);" but his description might apply to *O. felina*. Brunetti in 1889 (Entom., xxii., 131) said "among some specimens from his collection kindly lent me by Mr C. Dale for examination, I found a specimen undoubtedly of this species. I have it from France and Bohemia, it being rather common on the Continent." I have included these last words in my quotation because they make me doubtful as to what species Brunetti had before him, *O. hydropota* being very little known on the Continent, and I could not recognise any such specimen in the Dale collection at Oxford. The British Museum specimens under the labels of *O. hydropota* and *O. felina* are *O. angulata*.
- 10 *O. connexa* Walk. Walker in Ins. Brit. Dipt., vol. i., 17 (1851) said "Very rare, in Mr Stephens' collection. (E.);" but in vol. iii., xi., he added "probably not European." I have seen the specimen and made the following notes upon it: *O. connexa* ♀. Basal joint of the antennæ three times as long as the second, obscurely reddish; third joint not twice as long as the basal one; head yellow including a broad collar, frons with a large black ocellar spot which is diamond shaped but has the points rounded, and with a pair of conspicuous sloping black spots near the middle which just reach the eyes;

face under the antennæ black almost to the sides and the black colour slightly projecting down towards the mouth at the middle, and each side of the mouth with a tiny black spot; thorax with the sides broadly yellow all round, including the postalar calli and the broad margin of the scutellum; abdominal side-spots small but connected triangles, and the tip with a narrow pale equal cross-band; legs black, but yellow on the tip of the femora, on the basal half of the anterior tibiæ and basal third of the hind tibiæ, and on the basal joint of all the tarsi except its tip; cubital vein not forked, and the anterior veins dark brown. It is probably a North American species, which seems to be closely allied to *O. occipitalis* Johnson from Pennsylvania and Virginia.

- 11 *Stratiomys riparia* Meig. Duncan (1837) said "Once taken near Duddingston; likewise found in the vicinity of London, and in other parts of England." Walker (1851) said "Rare. In Mr Saunders's collection. (E.)" I believe that both Duncan and Walker referred to specimens which belong to a common variety of *S. furcata*, and moreover I am of opinion that Meigen's species is only the same, as nobody in recent times seems to have clearly distinguished it.
- 12 *Actina nitens* Latr. Walker in his List Dipt. Brit. Mus., i., 126 (1848) recorded this species from England, giving *Stratiomys similis* Forst. as a synonym, but in the same List, v., 14 (1854) he gave *Actina similis* Forster as a good species (possibly intended to include *A. nitens*, as he omitted that species altogether) and added "It is mentioned as British erroneously in the first 'Catalogue of 'Diptera';" this is absurd because Forster's *S. similis* was described from a British specimen, but it has not been clearly made out what species Forster intended, and the absence of *A. nitens* from Britain makes it almost certain that Forster had some other species before him (possibly *B. geniculata*).

LEPTIDÆ.

- 13 *Leptis inutilis* Walk. Originally described by Walker in his List Dipt. Brit. Mus., i., 213 (1848) as *Rhagio inutilis* "England. From Mr Walker's collection." Both sexes were described, but it has remained unrecognisable ever since. Walker again described it in rather different words in his Ins. Brit. Dipt., i., 67 (1851) as "Rare. In the British Museum," but close search has been unsuccessfully made for the specimens. I am unable to give any suggestion about it as its small size seems to prevent its being a very pale variety of *L. tringaria*.
- 14 *L. strigosa* Meig. If this be a good species it is distinguished from *L. scolopacea* by being very much paler, but most of the British specimens which I have seen under this name were only small dark specimens of *L. scolopacea* similar to those I have noticed in my description; a specimen in the old collection of the British Museum is however only *L. tringaria*. Walker's description (Ins. Brit. Dipt., i., 66) probably referred to small dark specimens of *L. scolopacea*, but in List Dipt. Brit. Mus., i., 210 he gave *Sylvicola derelictus* Harris as a synonym probably because Stephens had done so in 1829; *S. derelictus* Harris must however be a synonym of *L. tringaria*. Vice recorded *L. strigosa* (Scottish Naturalist, vii., 11) in 1883 as having occurred at Strathnaver in Sutherland.
- 15 *L. vitripennis* Meig. Walker in his List Dipt. Brit. Mus., i., 211 (1848) gave "England" as a locality for this species, but I have never seen a British

specimen. I have a note that this was supposed to be the *Leptis gracilis* of Curtis' Guide, Ed. ii., 243, but Curtis himself stated that his *Leptis gracilis* was the same as *Leptis diadema* (= *Chrysopilus aureus*).

- 16 *L. conspicua* Meig. I included this species in my List of British Diptera (1888) upon a wrongly identified specimen of *L. tringaria*, and the Rev. W. J. Wingate recorded it as common at Hesleden in Durham, but his specimens were *L. nigriventris* Lw. It was reputed as long ago as Curtis' Guide (Ed. ii.), 243 (1837), but the true *L. conspicua* is very distinct from anything that I have seen in British collections. A specimen labelled *conspicua* in the old collection at the British Museum is *L. tringaria* var. *vanellus*.
- 17 *L. immaculata* Meig. Stephens recorded this in 1829 (Syst. Cat., ii., 270) as having occurred near London, and gave *reconditus* Harris (Expos. Brit. Ins., 101, t. 31, f. 3) as a synonym, but I consider *S. reconditus* Harris to represent the var. *vanellus* of *L. tringaria*, and Curtis in Brit. Ent., 705 (1838) had already come to that conclusion. A specimen labelled *immaculata* in the old collection in the British Museum is only *L. tringaria* with yellow stripes on the thorax. There may have been some confusion among the older authors between this species and *Symphoromyia immaculata* Meig.
- 18 *Chrysopilus helvolus* Meig. Stephens in Syst. Cat., ii., 269 (1829) gave *Leptis helveola* as having occurred near London. Curtis in Brit. Ent., 713 (1838) said "June, Hampstead Heath: males beginning of August, ditches, "Sandwich," but I think he quoted from Donovan. All the British specimens that I have seen under this name are only *C. cristatus* Fabr.
- 19 *C. flaveolus* Meig. was recorded as British by Stephens and Curtis at the same time as the preceding species, and Curtis said "End of May, Nettle Abbey; "end of June in woods, Dorset; and the females in marshes at Horning," but I think he again quoted from Donovan. Specimens so labelled in the old collection of the British Museum are all *C. cristatus* Fabr.
- 20 *C. auratus* Fabr. The common British species has always up to the present time been believed to be true *C. auratus*, but is in my opinion a distinct species which I have described as *C. cristatus* Fabr. It is not at all unlikely that the true *C. auratus* may also occur in Britain but I have never seen any satisfactory British specimens.
- 21 *C. atratus* Fabr. Until recent times this species has also been considered to be only a synonym of *C. auratus*, and as such has been recorded in our British Lists. The true *C. atratus* Fabr. is now believed to be an allied but distinct South European species, which is probably the same as *C. siculus* Lw.
- 22 *Symphoromyia melæna* Meig. was included in Stephens' Catalogue (p. 270, 1829) as having occurred near London, and Walker in 1836 (Entom. Mag., iii., 180) said "May, in woods near London. The male probably belongs to the genus "*Spania*, Meigen. The disposition of the nervures of the wings varies very "much." In 1851 Walker (Ins. Brit. Dipt., i., 71) said "Rare (E.S.)." I think it probable that Walker's record in 1836 referred to *Ptiolina obscura*, but his record of 1851 to *Symphoromyia immaculata*. I have never seen an undoubted British specimen, but there was a record in The Naturalist of April 1880 by Benjamin Cooke of a specimen taken at Whaley Bridge in Cheshire, which however I have but little doubt referred to *Ptiolina obscura*. The *Pt. melæna* of the Entomological Club was represented by *Ptiolina obscura*. Nevertheless I think *S. melæna* is likely to occur in Britain.

TABANIDÆ.

- 23 *Theriopectes tarandinus* L. Included in Stephens' Catalogue and Curtis' Guide, but Duncan in Mag. Zool. Bot., i., p. 365 (1837) said "It has been long included in our British Catalogues, but we have never seen any particular locality cited for it. It is most likely to occur in the North of Scotland." Seventy years have elapsed and there has not been the slightest confirmation of its occurrence in Britain.
- 24 *T. aterrimus* Meig. Probably only recorded under its synonym of *T. signatus* Meig., and then through a mistaken idea that *T. signatus* was a synonym of *T. micans* Meig. Walker's *T. signatus* Wdm. (Ins. Brit. Dipt., i., 39) probably referred to *T. tropicus* L. var *bisignatus* Jaenn.
- 25 *T. borealis* Meig. I have dealt with this at some length under *T. montanus* Meig. (p. 366).
- 26 *Atylotus anthracinus* Meig. is a species limited to South Europe and North Africa, and consequently Walker's *T. anthracinus* (Ins. Brit. Dipt., i., 37) must refer to some other species; he said "Rare. In the collection of the "Entomological Club (E.)," but I have been unable to trace any such specimen; I cannot distinguish Walker's description from specimens of *T. autumnalis*.
- 27 *A. gigas* Herbst. The synonym, *T. albipes* Fabr., was included in Curtis' Guide, Ed. ii., 243.
- 28 *A. nemoralis* Meig. is a South European and North African species, which was included in Curtis' Guide, Ed. ii., 243.
- 29 *A. vittatus* Fabr. is also confined to the same district as the preceding species, but Duncan in Mag. Zool. Bot., i., 364 (1837) said that Mr Babington stated that he had found a specimen in Monkswood, Hunts, on June 17, 1828. Duncan's description (as I believe was often the case) appears to be a hashed up translation of Meigen's. It was also included by Captain Blomer in a list of insects captured at Bridgend, Glamorganshire, in 1832 (Ent. Mag., i., 317).
- 30 *Tabanus græcus* Fabr. This species was included in Curtis' Guide, Ed. ii., 243, but subsequently omitted as British until I reintroduced it on insufficient grounds in 1886 (Entom. Mon. Mag., xxii., 200).

BOMBYLIDÆ.

- 31 *Phthiria fulva* Latr. was recorded as British by Westwood in his Introduction to the Modern Classification of Insects in a foot-note on p. 131 of his Generic Synopsis. I know nothing about it. Walker tried to recognise Olivier's *M. gibbosa* under our *P. pulicaria*, but subsequent writers have failed unless Meigen revived Olivier's name for *Geron gibbosus*, which may account for his suppressing his own older name of *hybridus*.
- 32 *Systæchus ctenopterus* Mikan. This species was included in Stephens' Catalogue (1829), and Curtis in British Entomology, 613 (1836) said "July Dover, Devon Mr J. Cocks, and near Perth"; as however he quoted his description from Meigen in inverted commas it may be presumed that he did not personally know the species; his first locality is elaborated elsewhere into "Dover, July 1826 Mr Ingpen." Walker's *B. ctenopterus* (Ins. Brit. Dipt., i.,

82) is almost certainly *B. canescens*, as he omitted that comparatively common British species, and said "black hairs . . . on each side of the epistoma." The other records probably also refer to *B. canescens* or possibly to *B. minor*, as I have noted in the synonymical note on p. 505.

- 33 *S. sulphureus* Mikan has only got into the British list through Loew's (Neue Beitrage, ii., 37) mistake in believing that Walker's *B. ctenopterus* was a true *Systœchus*, and instead of being *S. ctenopterus* was the allied species *S. sulphureus*.
- 34 *Anastœchus nitidulus* Fabr. was included in Curtis' Guide (Ed. ii.), 244, but as he himself admitted (Brit. Ent., 613) under a mistake.
- 35 *Bombylius pictus* Panz. Recorded by Stephens and Curtis, and repeated by Duncan (Mag. Zool. Bot., ii. 208) in 1838 on the authority of Stephens.
- 36 *B. medius* L. Naturally recorded by all old authors in mistake for *B. discolor*. It differs from *B. discolor* in having no black pubescence about the end of the abdomen, and is a possible British species.
- 37 *B. venosus* Mikan. Walker in his List of Diptera, i., 284 (1849) included this as a synonym of *B. minor*; it is however much more closely allied to *B. canescens* and (as it is common in Germany) may occur in Britain. Stephens recorded it doubtfully in his Catalogue (1829).
- 38 *B. cruciatus* Fabr. Stephens and Curtis included as British *B. posticus* Fabr. which is a synonym of *B. cruciatus* Fabr., in mistake probably for *B. posticus* Meig. which is a synonym of *B. fugax* Wied. *B. cruciatus* is a very distinct South European species.
- 39 *B. fugax* Wied. Stephens and Curtis included *B. posticus* Fabr. as British as mentioned under the previous species, but undoubtedly in mistake for *B. posticus* Meig. which is a synonym of *B. fugax* Wied. I myself reintroduced it as British from a specimen in the late Dr P. B. Mason's collection, but I am now inclined to believe that that specimen was only a very large *B. canescens*, as at that time I had no knowledge to what size *B. canescens* could extend. The specimen was acquired by Dr Mason from Mr Benjamin Cooke, and was probably taken by him in Lancashire. *B. fugax* is not an unlikely species to occur in Britain.
- 40 *B. cinerascens* Mikan. Stephens, Curtis, and Duncan all gave this species as British, but probably in mistake for *B. canescens*. I have however called attention to a possible British specimen in my synonymical note under *B. minor* (p. 505).
- 41 *Ploas virescens* Fabr. Included by Stephens, and Duncan said (Mag. Zool. Bot., ii., 212, 1838) "Specimens in the British Museum are said to have occurred in "this country."
- 42 *Lomatia Belzebul* Fabr. Included by Stephens and Curtis; Walker (Ins. Brit. Dipt., i., 79) said "Very rare; has been found near Bristol? (E.)."
- 43 *L. lateralis* Meig. Also included by Stephens and Curtis; Walker (l.c.) said "Very rare in Britain; has been found near Bristol? In the British "Museum," and a specimen exists in the British Museum which bears a label "Swansea" (t. Colonel Yerbury). A specimen exists in C. W. Dale's collection at Oxford which is noted "Millard, Bristol," and in Dale's note-book is added "Devon? Dr "Leach? in Brit. Mus." These persistent references are

- interesting because the sand-hills on the Welsh or Somerset coasts (where *Pamponerus germanicus* still survives) are possible localities for a *Lomatia*. I have noted under *Anthrax circumdatus* that a specimen of that species stood in the Hope Museum at Oxford under the label of *Anthrax Belzebug*.
- 44 *Exoprosopa Jacchus* Fabr. Walker said (Ins. Brit. Dipt., i., 78), "Very rare. In "the British Museum (E.)," and included *Pandora* Fb., *Megara* Hms., *italica* Rsi., and *picta* Wdm. as synonyms, but *E. italica* Meig. is a distinct species and has a variety *Megara* Meig.
- 45 *E. Pandora* Fabr. Stephens and Curtis included this species in their Catalogues, and Stephens subsequently figured it (Illustrations of British Entomology, Suppl. 27, T. xlvi., fig. 4, 1846) and said "Taken near Dover, in July." Walker included it in Ins. Brit. Dipt., i., 77 (1851) as a synonym of *E. Jacchus*. In 1869 (Entomologist, iv., 215) Newman again introduced "*Anthrax Pandora*, a "new British Dipteron of the Family *Anthracidae*," and stated that the Entomological Club cabinet contained some specimens from the south-west of England which had been standing under the name of *Anthrax fenestratus*. In Dale's note-book (now in the Hope Museum at Oxford) a reference is given to "Dr Cocks, Devon."
- 46 *Argyramœba anthrax* Schrank. Some of the very ancient British authors such as Stewart and Turton recorded *Anthrax morio* Fabr. as British, Fabricius' species being a synonym of *A. anthrax* Schrank.
- 47 *A. binotata* Meig. I include this species because I possess a specimen from the late W. W. Saunders' collection, which was said to have been captured at Barmouth, but I conclude that a similar mistake has occurred about this specimen as with *Saropogon jugulum* Lw. (No. 76).
- 48 *Anthrax morio* L. *Anthrax semiatra* Meig. which is a synonym of *A. morio* L. was recorded by the very ancient British authors, and Newman re-introduced it in 1869 (Entom., iv., 215) as new to Britain on the strength of a pair "pierced with English pins" which had been presented to the Entomological Club collection. Newman added that full descriptions would appear in the "Year-Book," but I have not collated that work.
- 49 *A. maurus* L. It is probable that Linné's description of this species included *A. fenestratus*, and Haliday (Stett. ent. Zeit., xii., 138) recorded that the specimen in Linné's collection belonged to that species. It is therefore only natural that some of the old English writers should have recorded *A. maurus* as British. Newman however in 1869 (Entom., iv., 215) deliberately introduced *A. bifasciata* Meig. (which is a synonym of the true *A. maurus*) upon the strength of a specimen (apparently without history) in the Entomological Club collection.
- 50 *A. hottentottus* L. Walker (Ins. Brit. Dipt., i., 78) recorded this species as "Rare. (E.I.);" there is however no doubt that his species was the comparatively common *A. Paniscus* (even though he gave *A. circumdata* as a synonym). Several earlier English authors recorded *A. hottentotta* as British, but probably always in mistake for *A. Paniscus*, though I still think that a large clear-winged *Anthrax* occurs in Britain.
- 51 *A. flavus* Meig. Bezzi has sunk this as a synonym of *A. hottentottus* L., but until definite descriptions have been given of the species belonging to this group it may be well to keep records separate. *A. flava* was recorded by Stephens in his Catalogue, and Curtis in 1824 (Brit. Ent., 9) described it as British, but almost certainly in mistake for *A. circumdatus* as at any rate Curtis's species had a banded abdomen.

- 52 *A. venustus* Meig. is a distinct species from South-west Europe, which Walker gave as a synonym of *A. hottentotta* (List Dipt. Brit. Mus., i., 260).
- 53 *A. fasciatus* Meig. is a little known South European species which was also included under the synonyms of the supposed British *A. hottentotta* by Walker (List Dipt. Brit. Mus., 260). It was also included by Stephens amongst his synonyms of *A. circumdata*.
- 54 *A. Abbadon* Fabr. Samouelle (I., 3, 1833, according to Stephens) included this species as British under the name of *A. Abaddon*, and Walker included its synonym, *A. concinna* Meig., under his synonyms of the supposed British *A. hottentotta* (List Dipt. Brit. Mus., 260).
- 55 *A. leucostoma* Meig. This is also a South European species which was included by Walker (List. Dipt. Brit. Mus., 260) under his synonyms of *A. hottentotta*.

THEREVIDÆ.

- 56 *Thereva flavilabris* Meig. This species, which has not been clearly recognised since its description, was recorded as British in Stephens' Catalogue. Seven specimens under this name in the old collection of the British Museum are females of *T. nobilitata*, and along with them is one female of *T. plebeia*.
- 57 *T. taeniata* Meig. This is now considered to be a variety of *T. arcuata* Lw., but was recorded in Stephens' Catalogue and was represented in his collection in the British Museum by females of *T. plebeia* L. Walker also recorded it as British (List Dipt. Brit. Mus., p. 221).
- 58 *T. funebris* Meig. is another unrecognised species which from its name might be *T. ursina* Wahlb. (*T. circumscripta* Lw.); Walker (Ins. Brit. Dipt., i., 75) recorded it as "Rare. In Mr Stephens's collection," and his description except for "brown femora" might apply to almost any species of *Thereva* in which the male has yellowish pubescence.
- 59 *T. albipennis* Meig. is another unrecognised species which was included in Stephens' Catalogue. Meigen's species may be the same as *T. didyma* Lw., but Zetterstedt's *T. albipennis* is more likely to be a synonym of *T. marginula* Meig., a not improbable British species.
- 60 *T. cincta* Meig. This is now believed to be a synonym of *T. nobilitata* Fabr., and Walker's description (Ins. Brit. Dipt., i., 75, T. ii., fig. 11) probably applies to that species. In the old collection at the British Museum *T. cincta* is represented by a number of males of *T. nobilitata* intermixed with some specimens of *T. plebeia*. In the Entomological Club collection the specimens under *T. cincta* are all *T. plebeia*, but the *T. plebeia* of that collection is mainly represented by males of *T. nobilitata* with I believe one or two males of *T. circumscripta* intermixed. In Dale's collection I think the specimens under *T. cincta* are four females of *T. nobilitata* and two of *T. plebeia*.
- 61 *T. fuscipennis* Meig. This species was recorded by Benjamin Cooke in 1878 (Entom. Mo. Mag., xv., 19) in mistake for *Psilocephala ardea* Fabr. If my knowledge of *T. fuscipennis* be correct, it is a *Psilocephala* in which the female is very much like *P. ardea* but with the veins on the base and fore part of the wing conspicuously blacker, and of which the male is quite distinct.

SCENOPINIDÆ.

- 62 *Scenopinus glabrifrons* Meig. This species was erroneously introduced by me, as explained on page 600.

ASILIDÆ.

- 63 *Antipalus varipes* Meig. This species was included by Stephens in his Catalogue as having been taken by himself within twenty-five miles of London, but he was in doubt whether he had correctly identified it; he also gave as a synonym *As. maculosus* Harr. Ex. 64, pl. xvii., F. 6, but my interpretation of Harris' species is that it is almost certainly *Epitriptus cingulatus*; on the other hand the specimens under the name of *A. varipes* in Stephens' collection in the British Museum are two immature *Machimus atricapillus*. In the Entomological Club collection *A. varipes* is represented by *Neoitamus cyanurus*. Walker (Ins. Brit. Dipt., i., 56) described *A. varipes* and said "Not rare (E.)." In C. W. Dale's collection *A. varipes* was represented by three normal specimens of *Dysmachus trigonus*, one very immature specimen, and one *Epitriptus cingulatus*.
- 64 *Dysmachus cristatus* Meig. Stephens doubtfully included this species as having occurred near London, and from that time onwards it has been considered to be British; Walker (Ins. Brit. Dipt., i., 50) said "Not rare (E.)." There is not the slightest doubt that all British records refer to the common *Dysmachus trigonus* Meig. The true *D. cristatus* is at present only known from Spain.
- 65 *D. forcipatus* L. The old British authors all included this as British, and I have endeavoured to find out what species was intended by Stephens and Walker. Stephens gave it as one of the species occurring within twenty-five miles of St Paul's and as having been taken by himself, but the specimens in his collection appear to have been *Eutolmus rufibarbis*; he also included as a synonym "*As. tipuloides* Harr.," but Harris' species must be quite distinct because of the colour of the legs and was very probably *Neoitamus cyanurus*. It is not improbable that the form of *Asilus forcipatus* mentioned by Linné in Syst. Nat., Ed. x., p. 606, when he said "*Varietas major Tibiis ferrugineis*" may be *N. cyanurus*. Linné's *A. forcipatus* itself was described as having "Pedes nigri," and is now commonly believed to be *Dysmachus picipes* Meig., which is a probable though at present unidentified British species. Walker in saying (Ins. Brit. Dipt., i., 52) "Generally distributed. (E.I.);" probably also referred to *E. rufibarbis*, which seems to have been a commoner insect in Britain in Stephens' time. I cannot help believing that the *A. forcipatus* recorded by B. Cooke (Naturalist, v., 134) as "common on the Cheshire coast" must refer to *P. albiceps*.
- 66 *D. forcipula* Zell. Walker doubtfully included this in his synonyms of the supposed British *D. forcipatus* L. (Ins. Brit. Dipt., i., 52). The name is now sunk as a synonym of *D. picipes* Meig.
- 67 *D. bifurcus* Loew. Walker in 1849 (List Dipt. Brit. Mus., 468) recorded this as British, but made no reference to it in 1851. He gave as doubtful synonyms *A. picipes* Meig. and *A. varius* Gurtl.
- 68 *Machimus annulipes* Brullé. Under the name of *A. basalis* Lw. (a synonym of *M. annulipes*) Walker (Ins. Brit. Dipt., i., 51) described a species concerning which he said "Very rare. In Mr Stephens' collection." I have some note which associates this species of Walker's with *Eutolmus sinuatus* Lw.; and another note referring to Stephens' specimen in the British Museum which intimates that it was a very small female of *Machimus rusticus*, but some details taken do not agree with that species. These details are:
Face-beard not crowded, black above and orange below; face whitish yellow, hardly wider at the mouth than at the antennæ; festoon apparently

all yellow. Thoracic stripes blackish brown and all rather coalescing; all the short pubescence very short, but the bristles long and very distinct; four very distinct black dorso-central bristles after the suture, but all the others very distinctly yellow except two strong black præsutural; scutellum with two not stout long obscure yellow bristles. Abdominal incisures almost as in *P. albiceps*; ovipositor very much compressed. Basal half of the tibiæ or all the anterior tibiæ obscurely reddish; basal joint of the front tarsi almost brown; front femora with no pubescence, but with about four rather small yellow spines beneath on the basal half; all tibial and tarsal bristles whitish, except one long anterior and one long posterior on the hind tarsal joints, and also the bristles towards the upper side on the front tarsi, and two antero-ventral spurs on the front tibiæ.

- 69 *M. colubrinus* Meig. *A. fimbriatus* Meig. is now somewhat doubtfully considered to be a synonym of this, but some species has been recorded as British under that name. Walker (Ins. Brit. Dipt., i., 52) described it and said "Rare. In "the collection of the Entomological Club. (E.)" I am informed that this specimen cannot now be found, but the exponents in the British Museum collection are a male and a female of *E. rufibarbis* and two females of *P. albiceps*. Vice in 1883 (Scottish Naturalist, vii., 11) recorded *A. fimbriatus* as occurring near Montrose. *M. colubrinus* is a South European species.
- 70 *Paritamus geniculatus* Meig. Walker (List Dipt. Brit. Mus., i., 468, 1849) recorded this species from England, but two years later made no reference to it in his Ins. Brit. Dipt. It is a very probable British species.
- 71 *Andrenosoma atrum* L. The old English authors, Stewart and Turton, seem to have considered this species to have been British.
- 72 *Laphria gibbosa* L. Same as the previous species.
- 73 *L. gilva* L. Same as the previous species.
- 74 *Isopogon hottentottus* Fabr. Pascoe in the Proceedings of the Entomological Society of London, 1880, iii., recorded this as British, but I can only suppose that he possessed a specimen of the pale-haired form of *I. brevirostris*.
- 75 *Selidopogon diadema* Fabr. This fine species has often been recorded as British, and with such circumstantial details as to make it probable that it has occurred on our western coasts, but I have never seen an undoubted British specimen. Mr R. C. Bradley told me that he once saw but failed to catch a large blackish Asilid at Barmouth. I believe it was first recorded by Samouelle under the synonym of *D. punctatus* Fabr.; then Curtis (Brit. Ent., 153, 1827) recorded it and said "Specimens of this fine insect have been "taken I believe near Bristol, in sandy situations in June and July, and are "in the cabinets of the British Museum and Mr Stephens." Two years later Stephens included it in his Catalogue as having merely been seen by him and in 1846 (Illustr. Brit. Entom. Suppl., 25) he figured and described it, and said "Found, but very rarely, in June, near Swansea, in Glamorganshire." Walker in 1849 (List Dipt. Brit. Mus., 302) noted an English specimen as being in the British Museum, and in 1851 (Ins. Brit. Dipt., i., 57) said "Very "rare; has been found near Bristol. In the British Museum. (E.)"
- 76 *Saropogon jugulum* Lw. I possess a pair of this species from the late W. W. Saunders' collection, which were said to have been caught at Barmouth. I have however but little doubt that they came from Greece, as the species is only known to occur there and in Asia Minor and North Africa.

- 77 *Dioctria fuscipes* Macq. Walker (misled by Loew) included this as a synonym of *D. fuscipennis* Fall., which is a synonym of *D. atricapilla* Meig., but it is now known to be a distinct common Sicilian species.
- 78 *D. gagates* Meig. Walker (List Dipt. Brit. Mus., 300) recorded an English specimen of this species as being in the British Museum, while *D. semihyalina* Meig., which is a synonym, was recorded by Stephens (Syst. Cat. Brit. Ins., ii., 259) as having been taken by himself within twenty-five miles of London, but from his associating it with only *D. atricapilla* in a proposed new generic division it is almost certain that he had only the female of that species. *D. gagates* is an exclusively Portuguese species.
- 79 *D. flavipes* Meig. All British authors have included this as a somewhat common British species, but always in mistake for *D. linearis* Fabr. The true *D. flavipes* Meig. (= *hyalipennis* Fabr.) may be only a form of *D. Baumhaueri* Meig. as has been noted under that species, but does not seem to extend so far west as England.
- 80 *D. bicincta* Meig. is a Central and South European species of which *D. annulata* Meig. is a synonym. Stephens (Syst. Cat. Brit. Ins., ii., 259) recorded *D. annulata?* as having been taken by himself within twenty-five miles of London, but his species was probably *D. linearis* Fabr.
- 81 *D. lateralis* Meig. Stephens included this species in his Catalogue as having been taken by himself within twenty-five miles of London, and gave *Sy. informis* Harr., Ex. 159, pl. xlvi., F. 3, as a synonym. I have very little doubt but that Harris' and Stephens' species was *D. Baumhaueri*. Walker in 1854 (List. Dipt. Brit. Mus., v., 385) noted two specimens in the British Museum from Stephens' collection. A specimen of *D. Baumhaueri* in the Hope Museum at Oxford which came from Westwood's collection bears a label "*lateralis*."
- 82 *Leptogaster fusca* Meig. Stephens included this species in his Catalogue as having been seen by him. I think it is very possible that *L. fusca* Meig. may be distinct from *L. cylindrica* DeG., but Stephens was probably in error in identifying it as British.
- 83 *L. pumila* Macq. This is a possible synonym of the previous species, but was recorded by Stephens (Entomologist, i., 201) as having been taken by him at Harrietsham in Kent in 1840.

EUROPEAN AND NORTH AMERICAN SPECIES INCLUDED IN THIS VOLUME.

Not many species have been positively identified as common to the two continents, but several are so closely allied that subsequent examination of good series of specimens may prove some of them to be synonyms.

- 1 **Pachygaster orbitalis** Wahlbg. From Aldrich's remarks (Cat. N.-Amer. Dipt., 192) it seems extremely probable that Loew had this species before him when describing the female of his *P. pulcher* from Columbia.
- 2 **Nemotelus nigrinus** Fall. Van der Wulp stated (Tijdschr. Ent., x., 127) that he had seen this species from Wisconsin, but Melander considered that he had mistaken *N. unicolor* Loew for it. It is however most probable that *N. unicolor* and even *N. niger* Bigot from Chili are synonyms of one very widely spread species.
- 3 **Sargus cuprarius** L. This species is recorded as not rare in Canada and the United States. It is a very possible colonist from Europe.
- 4 **S. nubeculosus** Zett. The record (Johnson, Ent. News, vii., 94) of this species from New Jersey must be doubtful until the specific distinctness of Zetterstedt's species is assured. Melander (Canad. Ent., xxxvi., 19) has stated that all North American specimens under this name are only *S. cuprarius*.
- 5 **S. viridis** Say. This species is common in North America, and is possibly the same as a single male which was stated to have been taken at Cassel, and which was described by Loew in 1855 under the name of *S. frontalis*; some mistake may have occurred as Loew's species has not been again recorded from Europe. *Myiochrysa coerulea* Bigot is a synonym of *S. viridis*.
- 6 **Microchrysa polita** L. Apparently common at Quebec and Montreal. In all probability another colonist from Europe.
- 7 **Beris Morrisii** Dale. Recorded by van der Wulp (Tijdschr. Ent., xxiv., 153) as having occurred at Quebec.
- 8 **Xylomyia varia** Meig. is very closely allied to *X. pallipes* Loew.
- 9 **Xylophagus ater** Fabr. According to a female in Bigot's collection (labelled "Washington") *X. reflectens* Walk. is very closely allied though not quite conspecific, and a supposed male of the same species is still more distinct through the frons being more grey on even the front part and the wings very much more clouded.
- 10 **X. cinctus** DeG. A female in Bigot's collection under the name of *X. abdominalis* Loew appears to be this species.
- 11 **Cœnomyia ferruginea** Latr. Say's *C. pallida* from the Atlantic States, and *Sicus crucis* Fabr. from the West Indies, are now accepted as synonyms of the European species.
- 12 **Atherix Ibis** Fabr. According to Walker the American *A. variegata* is very closely allied.
- 13 **Hæmatopota crassicornis** Wahlbg. The very characters used by Osten Sacken to distinguish his *H. americana* from *H. pluvialis* tend to prove that the American species must be almost or quite identical with *H. crassicornis*.
- 14 **Tabanus distinguendus** Verr. More study is still required to differentiate this from *T. affinis* Kirby, which occurs from Canada northwards.

- 15 **T. bromius** L. Van der Wulp recorded this species from North America, but Osten Sacken did not notice it and Aldrich has not included it in his Catalogue.
- 16 **T. flavipes** Wied. is an Arctic species occurring in Eastern Siberia and North America.
- 17 **Chrysops nigripes** Zett. is another Arctic species recorded from North Europe and from Sitka or Alaska.
- 18 **C. sepulcralis** Fabr. Kirby doubtfully recorded this species as North American in Faun. Bor. Amer. Ins., 314, but Osten Sacken considered the identification very uncertain.
- 19 **Anastoechus nitidulus** Fabr. has a very wide range through South Europe, Siberia, and Japan, and is believed to be the same as *A. barbatus* O. Sack. which occurs widely in the United States.
- 20 **Bombylius major** L. This species certainly occurs in California and Japan, and is now considered indistinguishable from *B. fratellus* Wied. which occurs generally over the United States.
- 21 **Ploas macroglossa** Duf. A number of specimens in Bigot's collection under this name may include more than one species, but I am unable to distinguish them from the single type specimen of *P. mauritanica* Bigot, or from the single specimen which I believe to be the original type of *P. pictipennis* Macq. from Carolina.
- 22 **Exoprosopa capucina** Fabr. This common European species is now believed to be identical with *E. doreadion* O. Sack. from the Western States, and possibly with *E. californiae* Walk. It was at one time suspected of being the same as *E. sima* O. Sack. from Nevada, but Aldrich in his Catalogue (1905) has retained that as a distinct species.
- 23 **Argyramœba varia** Fabr. Coquillett has recorded this species from California.
- 24 **Anthrax morio** L. This well known European species is now considered the same as *A. morioides* Say and probably the same as *Hemipenthes seminigra* Lw.
- 25 **A. Paniscus** Rossi and **A. hottentottus** L. belong to a group of very closely allied species, and some of the American forms seem to be indistinguishable from some European forms, at any rate from existing descriptions. *A. molitor* Loew is said to differ from *A. flavus* only in having yellow hairs round the margin of the scutellum, but unfortunately *A. flavus* Meig. still remains insufficiently described.
- 26 **Scenopinus fenestralis** L. This species is apparently common in North America, and was described by Say under the name of *S. pallipes*.
- 27 **S. glabrifrons** Meig. Loew in Sillim. Journ. N. Ser., xxxvii., identified this species from South-west Europe and from North America.
- 28 **Pamponerus germanicus** L. This species has not been recorded from North America, but there were several specimens (3 ♂ 3 ♀) in Bigot's collection to which a label of "Am. boreal." was attached.
- 29 **Laphria gilva** L. This well known European species has been recorded from Canada and Colorado.
- 30 **L. flavescens** Macq. is an unrecognised species allied to *L. flava* of which Macquart professed to recognise two male specimens, one from Carolina and the other from the Pyrenees. The types are probably in the Paris Museum and the species must remain undetermined until they are examined.

ADDENDA ET CORRIGENDA

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|------|---------|--|
| 12. | 36. | The discal cross-vein is placed near the middle of the discal cell in <i>Spania</i> (fig. 208). |
| 37. | | Fig. 64 for "Nielson" read "Nielsen." |
| 70. | Last. | <i>Pachygaster atra</i> occurred at Bridgend in Glamorgan on August 6, 1908. |
| 79. | | <i>P. Leachii</i> was not uncommon near Orford in Suffolk about July 11, 1908. |
| 82. | 2. | An examination of Meigen's original genus <i>Clitellaria</i> proves it to have been an absolute synonym of <i>Ephippium</i> , and consequently the name <i>Adoxomyia</i> should be adopted for the genus indicated here. |
| 101. | | <i>Oxycera tenuicornis</i> synonymy. Villeneuve has just (December 1908) imagined that he had found a new genus and species, <i>Vanoyia scutellata</i> , in this fairly well-known fly, which was described from France by his own compatriot (Maequart) more than seventy years ago. |
| 107. | | <i>Oxycera pulchella</i> . A male which was taken by Colonel Yerbury at Bridgend in Glamorgan on August 8, 1908, had the eyes in life dark blue-green on the upper two-thirds but bronze-green on the lower third, with a dark purple intermediate band. |
| 111. | | <i>O. trilineata</i> . A male which was taken by Colonel Yerbury at Dartford in Kent had the eyes in life bright blue-green on the upper facets but yellowish green on the lower facets, with an orange intermediate band. |
| 118. | | <i>Nemotelus pantherinus</i> . I have a record from Tarrington as early as May 13. |
| 119. | 34. | The words "large white spot" scarcely apply to the female. |
| 135. | | <i>Odontomyia tigrina</i> . The eyes of the male range from this description to reddish coppery with an indigo-blue band which is margined with yellowish green. |
| 163. | Last 2. | It is possible that the larvæ of <i>Sargus</i> are carnivorous and feed on the larvæ of other insects which occur in any rotting matter. |
| 166. | | An examination of a large number of specimens of the " <i>Sargus flavipes</i> " group which were taken by Colonel Yerbury in Glamorgan about the end of August, 1908, has not tended to clear up the species; some of the large males answer to my idea of <i>S. rufipes</i> , but all the large females show at least a tendency towards a dark splash on the front femora, while the small males (and perhaps one female) come under my <i>S. nitidus</i> , the medium sized specimens being true <i>S. flavipes</i> ; the natural conclusion is that <i>S. rufipes</i> and <i>S. nitidus</i> (mihi) are only forms of the widely spread and |

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variable species, *S. flavipes*, and it is very probable that this is the true solution of the difficulty. *S. nitidus* of Meigen is (according to the supposed type at Paris) only a small specimen of *S. iridatus*. In August, 1908, I closely studied the Scandinavian type collections and saw *S. nigripes* and *S. minimus* of Zetterstedt, and found that I had misinterpreted those species, *S. nigripes* being a member of the *S. flavipes* group and in my opinion identical with my *S. nitidus* (nec Meigen), while *S. minimus* may represent a composite species of which the Smöl female and the Wadstena male may be immature specimens of *S. nubeculosus* while the Wadstena female may belong to another species, none of the specimens appearing to be identical with my *S. minimus*. The Scandinavian representatives of *S. rufipes* mainly agreed exactly with the females as understood by me and I still think that Wahlberg did not know the male of his species; other female specimens of *S. rufipes* occurred under labels of *S. flavipes*, or at least under "vars" of that species. *S. nitidus* Zett. belonged to a form near my interpretation, but is nearer the male of *S. flavipes* than that of *S. nigripes*. Fallén recognised the true male of *S. flavipes* but probably mixed up *S. rufipes* with it. My *S. minimus* (nec Zett.) still remains an unsatisfactory species.

192. *Microchrysa polita* was taken by Colonel Yerbury at Margam in Glamorgan on August 24, 1908.
202. *Beris vallata* occurred at Ringwood as early as May 28.
247. 25. Omit the first "was."
258. 48. The fourth figure should be 8.
266. *Leptis scolopacea*. Colonel Yerbury caught this species at Port Talbot in Glamorgan on August 4, 1908.
286. Fig. 189 should have been a reproduction of fig. 171 on page 242.
316. *Ptiolina atra*. Mr James J. F. X. King has informed me that he and Mr Malloch took several specimens of this species on May 30, 1908, at Bonhill.
331. } *Hæmatopota crassicornis* occurs on the East coast, a female having been
340. } taken near Butley in Suffolk on June 28, 1908, at which time *H. italica*
could not be found.
347. *H. Bigoti*. Two females were caught by Mr J. E. Collin amongst reeds in

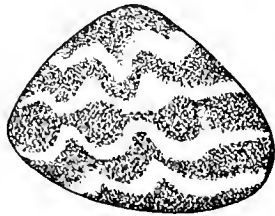


FIG. 407.

the Butley River near Chillesford Decoy in Suffolk on July 12, 1908, at a time when *H. pluvialis* was not uncommon, while I believe a female taken by Colonel Yerbury at Walton-on-Naze on June 11, 1908, and a female at Dartford in Kent on July 19, 1908, belong to this species. The eyes appear to have the bands different from the other species; I give a figure (fig. 407) from one of the females taken on July 12, 1908, and the following description has been drawn up from the other female taken on that day:

Eyes with any pubescence hardly visible; in life with four narrow yellowish green bands (the uppermost one greenest, while the others are nearly yellow) and five blackish purple bands which are broader than the yellowish green bands; the middle band broad and continuous though narrowed to a rather narrow neck at the middle, but ending very broad against both front and hind margins of the eye. All the bands (both light and dark) run out entire to the hindmargin (but the upper and lower green ones barely so), but the second and fourth dark bands widen

- there a little while the third slightly contracts but so that it extends broadly from the hindmargin to the middle of the eyes before the contracted neck, though the middle of this space may have a faint reddish dot (at the place where the band is almost interrupted in fig. 407); the two middle pale bands are very narrow (and even the other two rather narrow) at their front ends; the apical dark space is rather tridentate on its lower margin. Specimens of *H. pluriatis* taken in a wood or on fairly dry ground close by on the same day all had the middle band well interrupted as in fig. 223, and had the pale bands wider than the dark bands. One of these specimens of *H. Bigoti* has the basal antennal joint dull reddish. The whitish spot on the thorax immediately after the suture is more conspicuous in *H. Bigoti* than in the other species.
360. *Theriopectes tropicus*. A large number (38) of female specimens of a *Theriopectes* which were taken by Colonel Yerbury at Crymlyn Bog in Glamorgan on July 24, 1908, do not agree at all well with the specimens I have described, but are I believe more truly representative of the species as known on the continent. They are smaller and less squarely built than my original specimens; all have a tuft of long black hairs at the back of the vertex (whereby they are undoubtedly distinct from *T. montanus*), and have the frons with rather long black hairs as in *T. tropicus*, with the exception of one specimen which has shorter and more numerous yellow hairs (? black hairs abraded); the palpi have a dirty yellow ground colour as in *T. tropicus*; they are nearly allied to the species I have described as *T. solstitialis* but are less red-orange. If these specimens are true *T. tropicus* it seems impossible that *T. bisignatus* can be a variety, but the absence of undoubted males renders it very difficult to limit the species. When these specimens occurred in abundance one specimen of *T. distinguendus* also occurred but was easily distinguished.
366. *T. montanus*. Amidst the swarms of biting flies observed by Colonel Yerbury at Crymlyn Bog on July 24, 1908, were three females of this species, and a note was made that the eyes were "blue-green with three dark orange bands, middle one at lower level of lower callus, upper at lower level of upper callus, and third band just above antennæ."
384. *Atylotus fulvus*. One female (with another one seen) occurred at Crymlyn Bog on July 24, 1908.
403. *Tabanus autumnalis* occurred at Walton on Naze as early as June 6, 1908.
431. *Chrysops quadrata* was common at Crymlyn Bog on July 24, 1908, in company with *C. cæcutiens* and many other *Tabanidæ*.
436. 8. *C. melanopleura* Wahlb. is in my opinion a good species. I have examined Wahlberg's original specimens.
453. Fig. C. read *Pterodontia*. The "Fig." seven lines from the bottom is 260.
460. *Acrocera globulus*. Colonel Yerbury caught a female at Dartford in Kent on July 5, 1908, and Mr Donisthorpe took it in Sherwood Forest.
536. { 3 from } *L. Belzebul* instead of *L. Belzebub*.
 { bottom. }
539. 6. The reference "Vet. Acad. Handl." is incorrect, and I cannot trace the correct reference.
595. {
 596. { A reconsideration of the venation of *Scenopinidæ* has brought me to the
 597. { conclusion that the discal cell is wholly formed by the discal vein, and
 that consequently the discal vein has its normal two branches, while the
 postical vein is reduced to its lower branch and a stump of its upper
 branch (as in many *Cystidæ*).

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636. { 8 from } *P. dorsiger* Wied. and *P. scaurus* Walk. are according to Colonel Yerbury
 { bottom. } probably synonyms and belong to the genus *Eutolmus*.
658. 10. For *D. spinifer* read *D. spiniger* Zell., which is a synonym of *D. fuscipennis* Meig.
678. 11. *M. atricapillus*. Some males taken by Colonel Yerbury at the The Mumbles in Glamorgan, on September 1-6, 1908, have hardly any horns to the ventral process.
695. 36. *hæmorrhœa* for *hæmorrhœa*.
711. { 8 from } ACNEPHALUM should in my opinion be emended to ACNEPHALLUM.
 { bottom. }

NOTE.—The contention that Meigen's genera of 1800 should be revived and claim priority is on a par with the discovery of certain Chicagoan historians that the annulment of one of the marriages of King Henry VIII. was invalid, and that consequently King Edward VII. is not the King of England. Meigen himself and his contemporaries (including Latreille, who often referred to the work) did not accept the genera as legally established. If any attempt be made now to substitute *Hermione* for *Oxycera*, *Erinna* for *Xylophagus*, *Chrysozona* for *Hæmatopota*, etc., an absolutely flawless case must be made out, and these cases are full of flaws. Irrespective of the refusal of the supposed author's refusal to recognise the work, there remains the fact that none of the genera were founded in accordance with binomial law; a claim is now made that they can be identified through Meigen's paper of 1803, but I have on pages 247 and 285 thrown considerable doubt upon the priority value of that paper. Coquillett's paper in *The Canadian Entomologist* of December 1908 is "special pleading" of an aggravated form.

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<i>globulus</i> <i>Panz.</i>	458

References to other existing Genera and Species are given in ordinary type but with the page in italics such as:—

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Synonyms are given in italics such as:—

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SYSTEMATIC LIST
OF THE
PALÆARCTIC
DIPTERA BRACHYCERA

STRATIOMYIDÆ
LEPTIDÆ
TABANIDÆ
NEMESTRINIDÆ
CYRTIDÆ

BOMBYLIDÆ
THEREVIDÆ
SCENOPINIDÆ
MYDAIDÆ
ASILIDÆ

BY

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P R E F A C E

The publication of Kertész's "Katalog der Paläarktischen Dipteren," Band II. 1903, has rendered it unnecessary to give detailed bibliographical references to the species included in this List.

An endeavour has however been made to arrange the species in systematic order, and although this is probably far from being accurate yet it may draw the attention of students to allied species and thereby facilitate nomenclature. An attempt has sometimes been made to indicate groups of species by means of dotted lines, and the number of dots roughly indicates the distinctness of the groups.

Many changes in synonymy have been introduced, but in no case without good reason.

DIPTERA ORTHORRHAPHA.

BRACHYCERA.

EREMOCHÆTA.

STRATIOMYIDÆ

PACHYGASTRINÆ.

- PACHYGASTER** *Meig.*
VAPPO *Latr.*
NEOPACHYGASTER *Aust.*
minutissima *Zett.* . . . Eur. centr. et sept.
tenella *Jaenn.*
pini *Perris*
 var. *unicolor* *Jaenn.*

atra *Panz.* Eur.
pachygaster *Fall.*
tarsalis *Zett.* Eur. centr. et sept.
meromelas *Duf. pt.*
robusta *Jaenn.*
argentifer *Jaenn. ♂.*
orbitalis *Wahlb.* Eur. centr. et sept.
meromelas *Duf. pt.*
argentifer *Jaenn. ♀.*
Leachii *Curt.* Eur.
pallipennis *Macq.*
flavipes *O.G. Costa*
ALLIOPHLEPS *Beck.*
elliptica *Beck.* I. Canariæ.

CLITELLARINÆ.

- PYCNOMALLA** *Gerst.*
splendens *Fabr.* Eur. mer., Afr. sept.
flavipes *Macq. (nec Fabr.)*
rufitarsis *Macq.*
annulata *Macq.*
**auriflua* *Erichs.* Africa sept.
EPHIPPIUM *Latr.*
CLITELLARIA *Meig. (1803)*
EPHIPPIOMYIA *Bezzi*
POTAMIDA *Kert.*
thoracicum *Latr.* Eur. centr. et mer.
ephippium *Fabr.*
inda *Schrank*

- bilineatum* *Fabr.* Japonia, Asia mer.
bivittatum *Wied.* Arch. Indicus.
angustum *Macq.*
spinithorax *Macq.*
tenebricum *Walk.*
spinigerum *Dolesch.*

ADOXOMYIA

- Kert.*
CLITELLARIA *Meig. (1830)*
Dahlii *Meig.* Eur. mer.
Sarudnyi *Pleske* Persia
obscuripennis *Lw.* Turkestan
ruficornis *Lw.* Turkestan, Persia
cinerascens *Lw.* Ross. asiat., Persia
**flavipes* *Fabr.* Africa sept.
**Portschinskii* *Pleske* Transeaucasia
**Kabylina* *Bigot* Africa sept.

NEMOTELUS

- Geoffr.*
proboscideus *Lw.* Eur. mer., Afr. sept.
longirostris *Wied.* Africa sept.
? algericus *Jaenn.*
gadensis *Schin.* Hispania
pilosus *Lw.* Yunquera
fuscinervis *Lw.* Eur. mer.
? punctatus *Meig. (nec Fabr.)*
punctatus *Fabr.* Africa sept.

lasiops *Lw.* Sicilia, Afr. sept.
anchora *Lw.* Eur. mer.
siculus *Jaenn.*
pulcher *Lw.* Hispania
æmulus *Lw.* Hispania
modestus *Lw.* I. Naxos.
cingulatus *Duf.* Hispania
angulatus *Duf.*
annulatus *Lw.*
obseuripes *Lw.* Corfu
serbieus *Strobl* Serbia
lateralis *Duf.* Hispan., Afr. sept.

* The species marked with an asterisk are insufficiently described, or are doubtfully distinct, or are placed in doubtful systematic order.

- latusculus* *Lw.* . . . Hispan., Afr. sept.
cothurnatus *Bigot*
Cardinalii *Bezzi* . . . Italia
limbatus *Egg.* . . . Eur. mer.
Carthaginis *Beck.* . . . Algeria
.
argentifer *Lw.* . . . Græcia, Asia min.
Lomnickii *Mik* . . . Eur. centr. et or.
? ærosus *Gimm.*
.
**maculiventris* *Bigot* . . . Sicilia
brevirostris *Meig.* . . . Eur. centr. et mer.
globuliceps *Lw.* . . . Eur. centr. et mer.
uliginosus *Lw.* (1840)
brachystomus *Lw.* . . . Eur. mer., As. min.
punctiventris *Beck.* . . . Ægyptus
notatus *Zett.* . . . Eur.
brevirostris *Walk.*
var. *ventralis* *Zett.* (nec *Meig.*)
atriceps *Lw.* . . . Hispan., Gall. mer.
fraternus *Lw.* . . . Eur. centr.
dentatus *Beck.* . . . Africa sept.
gracilis *Lw.* . . . Asia min. Creta
rufiventris, *Portsch.* . . . Armenia
albifacies *Beck.* . . . Ægyptus
nigrifrons *Lw.* . . . Sicilia
insularis *Beck.* . . . I. Canariæ
tomentosus *Beck.* . . . Algeria
signatus *Friv.* . . . Eur. centr. et mer.
Zichyi *Kert.* . . . Sibiria
varius *Lw.* . . . Corfu
uliginosus *L.* . . . Eur., Africa sept.
muticus *Fabr.*
var. *bifasciatus* *Meig.*
var. *pica* *Lw.*
pantherinus *L.* . . . Eur., Africa sept.
marginatus *Fabr.*
marginellus *Gmel.*
uliginosus *Panz.*
muticus *Schrank.*
? nigritus *Meig.*
bipunctatus *Lw.* . . . Asia min.
nigroæneus *Verh.* . . . I. Norderney
crenatus *Egg.* . . . Eur. mer.
luteicornis *Egg.* . . . Eur. centr. et mer.
candidus *Beck.* . . . Algeria
plagiatus *Schin.* . . . Eur. centr. et mer.,
Af. sept.
pullus *Lw.* . . . Hispania
.
ventralis *Meig.* . . . Africa sept.
**marinus* *Beck.* . . . Ægyptus
niloticus *Oliv.* . . . Ægyptus
fasciatus *Oliv.*
leucorrhynchus *Costa* . . . Sardinia
leucocephalus *Beck.*
oasis *Beck.* . . . Algeria
.
nigrinus *Fall.* . . . Eur., Amer. sept.
nigritus *Panz.*
? frontalis *Oliv.*
? unicolor *Lw.*
? niger *Bigot*
LASIOPA *Brullé.*
CLITELLARIA *Meig.* pt. (1822)
CYCLOGASTER *Macq.*
INERMIA *Bigot*
- Peleteria* *Brullé* . . . Græcia
villosa *Fabr.* . . . Eur. centr. et mer.
Balius *Walk.*
caucasica *Pleske* . . . Caucasus
Koenigi *Lichtw.*
tenuirostris *Lw.* . . . Eur. mer.
Mannii *Mik* . . . Eur. mer., As. min.,
Africa sept.
rufitarsis *Strobl.* . . . Hispania.
calva *Meig.* . . . Eur. centr. et mer.,
Africa sept.
PERITTA *Beck.*
melichlora *Beck.* . . . Algeria
OXYCERA *Meig.*
HERMIONE *Kert.*
VANOYIA *Villen.*
tricolor *Lw.* . . . Turkestan
atra *Lw.* . . . Turkestan
rufifrons *Lw.* . . . Turkestan
melanodactyla *Lw.* . . . Turkestan
pygmæa *Meig.* . . . Eur., Asia min.
muscaria *Wlk.*
nigripes *Verr.* . . . Scotia
? affinis *Dale*
nana *Lw.* . . . Turkestan
formosa *Meig.* . . . Eur.
? nigricornis *Oliv.*
muscaria *Panz.* (nec *Fabr.*)
æmula *Lw.* . . . Turkestan
analisis *Meig.* . . . Eur.
marginata *Lw.* . . . Italia
**nigra* *Macq.* . . . Gallia
amœna *Lw.* . . . Eur. centr. et sept.
? formosa var. *Macq.*
pardalina *Schin* (1855) (nec *Meig.*)
**engadinica* *Juenn.* . . . Alpes
.
trilineata *L.* . . . Eur.
pantherina *L.* pt.
græca *Pontop.*
var. *hypoleon* *L.*
var. *proxima* *Lw.*
var. *collaris* *Brun.*
fasciventris *Lw.* . . . Turkestan
bipunctata *Lw.* . . . Turkestan
hybrida *Lw.* . . . Turcomania
nigriventris *Lw.* . . . Turkestan
notata *Lw.* . . . Turkestan
.
Meigenii *Stæg.* . . . Eur. (nec Anglia)
hypoleon *Fabr.*
fraterna *Lw.* . . . Turkestan
Fallenii *Stæg.* . . . Eur. centr. et sept.
hypoleon *Fall.*
hirticeps *Lw.* . . . Turkestan
**octomaculata* *Jarosch.* . . . Rossia
locuples *Lw.* . . . Alpes
dives *Lw.* . . . Eur. centr.
? hypoleon *Schrank*
varipes *Lw.* . . . Lusitania
var. *? Bolivari* *Strobl*
pulchella *Meig.* . . . Eur.
? rara *Scop.*
? tardigrada *Harris*
maculata *Meig.*
hypoleon *Meig.* (1804)
muscaria *Fabr.* . . . Eur. centr. et mer.
flavipes *Lw.*

Ranzonii Schin. . . . Eur. mer.
 calceata Lw. . . . Austria
 pardalina Meig. . . . Eur. centr. et occ.
 formosa Macq.
 maculata Zett. (nec Oliv. nec Meig.)
 grata Lw. . . . Græcia
 Morrisii Curt. . . . Anglia
 limbata Lw. . . . Eur. centr. et mer.
 tenuicornis Macq. . . . Eur. occ., I.
 longicornis Dale Canar.
 terminata Walk. pt. (nec Meig.)
 scutellata Villen.
 annulata Beck. . . . Tunisia
 leonina Panz. . . . Eur. (nec Anglia)
 terminata Meig. . . . Eur. centr.

STRATIOMYINÆ.

STRATIOMYS Geoffr.

HOPLOMYIA Zell.

THYREODONTA Rond.

ALLIOCERA Saun .

græca, Saund. . . . Eur. mer.
 clavicornis Egg.

HIRTEA Scop.

longicornis Scop. . . . Eur., Asia min.,
 Transcaucasia
 strigata Fabr. . . .
 tenebricus Harris
 villosa Meig.
 nubeculosa Meig.
 thoracica Fabr.
 var. pallida Lw.
 Pleskei Wagn. . . . Turkestan
 Anubis Wied. . . . Rossia or et mer.,
 ? flavifrons Macq. . . . Af. sept., Persia
 apicalis Walk. . . . China sept.
 *japonica r. d. Wulp . . . Japonia

STRATIOMYS Geoffr.

pyrrhocera Lw. . . . Asia min., Persia.

erythroceræ Pleske pt. (1899)

Herzi Pleske Transcaucasia

Portschinskii Pleske Transcaucasia

pyrrhocera Pleske pt. (1899)

erythroceræ Egg. . . . Eur. mer., As. min.

sublunata Lw. . . . Eur. centr. et mer.

concinna Meig. . . . Eur. centr. et mer.

Beckeri Pleske

armeniaca Bigot Caucas., Transca.

rubricornis Bezzi Italia

furcata Fabr. . . . Eur., Africa sept.,
 Siberia

? singularis Harris

strigata Meig. (1804)

panthaleon Fall.

var. riparia Meig.

equestris ♂ Pleske (1901)

brevicornis Portsch. . . . Asia centr.

Roborowskii Pleske China sept.

Sarudnyi Pleske Persia

Zarudnyi Pleske

lambessiana Bigot Algeria

*flavolimbata A. Costa Africa sept.

serica Pleske China sept.

ventralis Lw. . . . Siberia

Koslowi Pleske China centr.

Sintenisi Pleske Rossia sept.

sinensis Pleske China sept.

equestris Meig. . . . * Eur. centr. et mer.,
 Transbaikal

tomentosa Schrank

hirtuosa Meig.

cypria Pleske Cyprus

Ahngeri Pleske Transcaspia

nobilis Lw. . . . Turkestan

lugubris Lw. . . . Siberia

Beresowskii Pleske China sept.

*segnis Beck. . . . Tunisia

potamida Meig. . . . Eur. centr. et sept.

chamæleon Meig. (1804)

cenisia Meig. . . . Eur. centr. et mer.,

Afric. sept., Asia

min. et centr.

Potanini Pleske China sept.

Kosnakowi Pleske Mt. Altai

hispanica Pleske Hispania

chamæleon L. . . . Eur. Siberia,

? spatula Scop. . . . Transcaspia.

sellata Sulz.

nigrodentata Meig.

var. rhatia Jaenn.

var. caucasica Pleske

monst. unguicornis Beck.

flaviventri- Lw. . . . Eur. mer., Af. sept.

validicornis Lw. . . . Eur. sept., Siberia,

paludosa Siebke Mt. Altai

lævifrons Lw. . . . Siberia

bochariensis Pleske Asia centr.

Przewalskii Pleske Asia centr.

Wagneri Pleske Mt. Altai

rossica Gimm. . . . Rossia, Caucas.

Barca Walk China sept., Jap.

ODONTOMYIA Meig.

EXOCHOSTOMA Macq.

OPSEOGYMNUS O. Costa

PSELLIDOTUS Rond.

EULALIA Kert.

ODONTOMYIA.

tigrina Fabr. . . . Eur.

nigrita Fall.

var. signata Jaenn.

flavissima Rossi Eur. mer., As. min.

decora Meig.

semiriolacea Brullé

var. infuscata Meig.

periscelis Lw. . . . Eur. centr.

annulata Meig. . . . Eur. centr. et mer.,

septemguttata Meig. . . . Africa sept.

discolor Lw. . . . As. min., Hispania

pictifrons Lw. . . . Siberia

ornata Meig. . . . Eur.

furcata Meig. (1804)

signaticornis Lw. . . . Asia min.

*megacephala Oliv. . . . Ægyptus

limbata Meig. . . . Eur. mer., Af. sept.

pacificæ Meig.

flavesignata A. Costa

var. cephalonica Strobl

hydroleon L. . . . Eur. (nec Anglia?)

rulpina Panz.

angulata Meig. (1804)

var. alpina Jaenn.

- angulata* Panz. . . Eur.
mycroleon Harris
hydropota Macq. (nec Meig.)
brevicornis Lw.
ruficornis Zett.
hydroleon Walk.
hydropota Meig. . . Eur. centr.
latifasciata Macq.
hydropophila Lw. . . Eur. mer., As. min.
felina Panz. . . Eur. centr.
marginata Fabr.
hydropota Walk. (nec Meig.)
personata Lw. . . Eur. mer.
**staurophora* Schin. . . China, Japonia
**byzantina* Strobl . . . Eur. mer.
.
argentata Fabr. Eur., Sibiria
? *anilis* Schrank
paludosa Schumm.
? *nitida* Macq.
argentula Gimm.
microleon L. Eur. centr. et sept.
nigriceps Bigot
**nigripes* Macq. Syria

HOPLODONTA Rond.
viridula Fabr. Eur., Asia min.,
canina Panz. Africa sept.
dentata Meig.
? *holosericea* Oliv.
? *lunata* Oliv.
? *lunulata* Macq.
var. *jejuna* Schrank
var. *subvittata* Meig.
var. *bimaculata* Meig.
var. *interrupta* Lw. (nec Oliv.)
var. *Heydenii* Jaenn.

SARGINÆ.

PTECTICUS Lw.

- MACROSARGUS* Bigot
PEDICELLA Bigot
aurifer Walk. China, Borneo
luridus Walk.
insignis Macq.
tenebrifer Walk. China, Japon.
illucens Schin.

SARGUS Fabr.

- CHRYSONOTUS* Lw.
CHRYSOCHROMA Willist.
CHRYSONOTOMYIA Hunter
GEOSARGUS Bezzi
niphonensis Bigot . . . Japonia
.
bipunctatus Scop. Eur. centr. et mer.
Reaumuri Meig.
viridiceps Macq. China sept.
rufipes Wahlb. Eur. sept.
flavipes var β Zett.
flavipes Meig. Eur. centr. et sept.
nitidus Zett.
pallipes Lw. (laps.)
albibarbus Lw. Eur. centr. et mer.
? *angustifrons* Lw.
? *ceriferus* Jaenn.
flavipes Beck. (1897)

- *tuberculatus* Lw. Nubia
chrysis Lw. Nubia
**nigripes* Zett. Eur. sept.
nitidus Verr. (nec Meig.)
**minimus* Verr. (nec Zett.) Anglia
.
**minimus* Zett. Eur. sept.
nitidus Zett. (1842)
cuprarius L. Eur., Amer. sept.
violaceus Scop.
politus Schrank
cæruleicollis Meig.
nubeculosus Zett. Eur.
iridatus Scop. Eur.
indicus Harris
cærulescens Vill.
auratus Meig. (1804)
cuprarius Fall. pt.
infuscatus Meig.
nitidus Meig.
robustus Lw.
gracilis Lw.
viridis Say Eur. cen., Am. sept.
? *frontalis* Lw.
nigribarbis Bigot
cærulea Bigot

CHLOROMYIA Duncan

- CHRYSONYIA* Macq.
MYIOCHRYSA Rond.
formosa Scop. Eur., Africa sept.
cupraria Scop.
flavogeniculata DeG.
cicur Harris
aurata Fabr.
xanthoptera Meig.
azurea Lw.
speciosa Macq. Eur. centr., et mer.
melampogon Zell.

MICROCHRYSA Lw.

- CLORISOMA* Rond.
CHLOROSIA Rond.
polita L. Eur., Amer. sept.
aurata DeG.
vitrea Harr.
splendens Meig.
cyanea Fabr.
flavicornis Meig. Eur. centr. et sept.
? *parvula* Harris
pallipes Meig.
cyaneiventris Zett. Eur. sept.

BERINÆ.

ALLOGNOSTA O. Sack.

- METOPONIA* Lw. (nec Macq.)
vagans Lw. Eur. centr. et sept.

BERIS Latr.

- OPLACANTHA* Rond.
HEXACANTHA Lioy.
OCTACANTHA Lioy.
vallata Forst. Eur.
? *rex* Poda
claripes Meig. (1804)
nigritarsis Latr.

- clavipes* L. Eur.
nigra Geoffr.
nigroptera Fourcr.
chalybeata Forst. Eur. centr. et sept.
sexdentata Fabr.
atra Meig. (1804)
obscura Meig.
nigra Meig.
flavipes Macq.
Morrisii Dale Eur., Amer. sept.
pallipes Lw.
fuscipes Meig. Eur. centr. et sept.
geniculata Curt. Eur. centr. et sept.
fuscipes Beck.
? similis Forst.
ACTINA Meig.
nitens Latr. Eur. (nec Anglia)
chalybea Meig. (1804)
scutellata Meig.
femoralis Meig.
nigripes Meig.
flavofemorata Meig.
hirsuta Macq.
CHORISOPS Rond.
EXAIRETA Schin.
NEOEXAIRETA O. Sack.

- tibialis* Meig. Eur. centr. occid.
hyaliniventris A. Costa et mer.
ACANTHOMYIA Schin.
HEXODONTA Rond.
dubia Zett. Eur. (nec Anglia)

XYLOMYINÆ.

- XYLOMYIA** Rond.
SUBULA Meig.
? SOLVA Walk.
? MACROCEROMYS Bigot
SUBULOMYIA Willist.
marginata Meig. Eur. centr. et occid.
varia Macq.
nigritibialis Macq. I. Canariæ
varicolor Bigot
 var. *? caffra* Bigot
cabreræ Beck. I. Canariæ
varia Meig. Eur. centr. et mer.
atra Latr.
maculata Latr.
citripes Duf.

trinotata Bigot Caucasus
maculata Meig. Eur. centr. et sept.

LEPTIDÆ.**XYLOPHAGINÆ.**

- XYLOPHAGUS** Meig.
PACHYSTOMUS Latr.
ERINNA Kert.
ater Meig. Eur.
compeditus Meig.
cinctus DeG. Eur.
subulatus Panz.
syrphoides Panz.
ater var. β Fall.
RHACHICERUS Walk.
ANTIDOXION Voll.
tristis Lw. Hispania

CÆNOMYINÆ.

- ARTHROPEAS** Lw.
sibirica Lw. Sibiria.
tessella Motsch.
ANACANTHASPIS v. Röd.
bifasciata v. Röd. Sibiria
CÆNOMYIA Latr.
SICUS Fabr.
ferruginea Scop. Eur. (nec Anglia).
crucis Fabr. Amer. sept.
? testacea Fabr.
olens Herbst.
? australis Gmel.
errans Fabr.
bidentata Fabr.
bispinosa Fabr.
macroleon Panz.
unguiculata Panz.
bicolor Fabr.

- grandis* Schrank
major Schrank
palatina Schrank
unicolor Meig.
aurea Meig.
pallida Say
cinereibarbis Bigot

VERMILEONINÆ.

- VERMILEO** Macq.
PSAMMORYCTER Blanch.
APOGON Duf. (nec Lacord.)
DeGeerii Macq.
vermileo L. Eur. mer., I. Canar.
cylindraceus O.G. Costa
Dufourii Perr.
 var. *nigriventris* Strobl.
LAMPROMYIA Macq.
LEPTYNOMA Westw.
cylindrica Fabr. Hispan., Afr. sept.
funebri Duf.
canariensis Macq. I. Canariæ
pallida Macq. Africa sept.
Mikii March.

LEPTINÆ.

- ATHERIX** Meig.
IBISIA Rond.
PELECHOIDOCERA Bigot
Ibis Fabr. Eur., Sibir., Japon.
melancholia Harris
Titanus Fabr.
maculata Meig.
? trifasciata v. Ros.
 var. *femoralis* Lw.

picta Lw. Ross.sept.,Sibiria
marginata Fabr. Eur.
Apfelbecki Strobl Bosnia
 **flavipes* Fabr. Eur. centr.
chrysopus Gmel.

ATRICHOPS Verr.

crassipes Meig. Eur. centr. occid.
 ? *cælebs* Harris et mer.
nebulosa Meq. (nec F.)

LEPTIS Fabr.

RHAGIO Fabr.
SYLVICOLA Harris
scolopacea L. Eur.
 ? *maculata* Scop.
 ? *inquinata* Scop.
solitaria Harris
 ? *guttata* Olin.
 ? *bifasciata* v. Ros.
 **strigosa* Meig. Eur.
maculipennis Lw. Ross.mer.,As.min.
latipennis Lw. Eur. centr.
Cavannæ Bezzi Italia

.....
maculata DeG. Eur. (nec Anglia)
annulata Meig. (1804)
nigrofasciata Meig.
distigma Meig.
bimaculata Gob.
 var. *obscura* Strobl
immaculata Meig. Eur. centr. et sept.
stigmatica Zett.
chrysostigma Lw. Eur. mer.

.....
annulata DeG. Eur. centr. et sept.

conjungens Ruthe
tringaria L. Eur.
scolopacea var. DeG.
vermileo Schrank
solivaga Harris
derelecta Harris
monotropus Harris
 var. *vanellus* Fabr.
 ? *rufa* Scop.
reconditus Harris
simplex Meig.
ephippium Zett.
striola Meig.
 var. *punctata* Lw.
Gæbelii Strobl
pilosa (laps. cal.)
 Strobl
Pandellei Gob.
Perezii Gob.
Perrisii Gob.
Cartereani Gob.
 var. *nigriventris* Lw.
conspicua Wingate
tonsa Lw. Hispania
græcula Lw. Eur. mer.
florentina Lw. Eur. mer.
conspicua Schin. (pt.)
conspicua Meig. Eur. centr. et mer.
 var. *alpina* Lw.
Janota Now.
Marchalii Pierre

**sordidipennis* Villen. Gallia mer.
 **balcanica* Strobl Bosnia
cingulata Lw. Alpes
 **scapulifera* Bigot Japonia
fuscipennis Meig. Eur. centr.

.....
 **flavimcdia* Coquill. Japonia
vitripennis Meig. Eur. centr. et mer.
tringaria Panz.
stigma Schumm.

**annulata* Bigot (nec DeG.) Japonia
 **flavicornis* Macq. Gallia
notata Meig. Eur.
Heyskami Curt.
sordida Lw. Eur. mer. et or.,
 var. *pilosa* Lw. Asia min.
subpilosa Beck. Alpes

.....
nigra Meig. Eur. mer.
fuscipes (*Chrysopila*) Bigot
lineola Fabr. Eur.

monachus Harris
albifrons Meig.
 var. *monticola* Egg.
cinerascens v. Röd. Sardinia
funebri Meig. Eur. mer.
 **algerica* Beck. Algeria
chrysopiliformis Bezzi Italia

CHRYSOPILINÆ.

OMPHALOPHORA Beck.

oculata Beck. Sibiria

CHRYSOPILUS Macq.

HELIOMYIA Dolesch.
 ? *STYREX* Scop.
nubecula Fall. Eur. (nec Anglia)
 ? *sylvestris* O.F. Mull.
 ? *bicolor* Fabr.
 ? *oculatus* Fabr.
auricollis Meig.
binotatus Lw. Græcia
alpicola Pok. Alpes
luteolus Fall. Eur. (nec Anglia)
pullus Lw. Eur. centr. et mer.
 ? *bicolor* Meig.
lætus Zett. Eur. (nec Anglia)
 var. ? *nigricauda* Beling
 **pullatus* Coquill. Japonia

.....
aureus Meig. Eur.
diadema Fabr. (nec L.)
cinereus Zett.
piceus Walk.
 var. *meridionalis* Bezzi
pallipes Lw. Asia min.
obscuripennis Lw. Transcaspia
pretiosus Lw. Naxos
dives Lw. Sibiria, Japonia
intermedius Bezzi Italia
splendidus Meig. Eur. centr. et mer.
 ? *nigritus* Fabr.
chlorophthalmus Lw.
obscuribarbus Lw. Rhodus, Asia min.

<i>auratus</i> Fabr.	. . .	Eur.
? <i>holosericeus</i> Scop.		
<i>atratus</i> (Fabr.?) Meig.		
<i>tomentosus</i> Fabr.		
<i>cristatus</i> Fabr.	. . .	Eur. occident.
? <i>secretus</i> Harris		
<i>solitaneus</i> Harris		
? <i>cingulatus</i> Donov.		
<i>auratus</i> Walk.		
<i>mærens</i> Lw.	. . .	Eur. centr.
<i>erythrophthalmus</i> Lw.	. . .	Eur. centr. et mer.
? <i>hyalipennis</i> v. Ros.		
<i>siculus</i> Lw.	. . .	Italia
? <i>atratus</i> Fabr.		
<i>palparis</i> Lw.	. . .	Corfu
<i>latifrons</i> Bezzi	. . .	Italia
.		
<i>helvolus</i> Meig.	. . .	Eur. centr. et mer.
<i>flaveolus</i> Meig.	. . .	Eur. centr. et mer.
? <i>Genius</i> Panz.		

SYMPHOROMYIA Frauenf.

<i>crassicornis</i> Panz.	. . .	Eur.
? <i>griseola</i> Fall.		
<i>melæna</i> Meig.	. . .	Eur. centr.
? <i>pilosa</i> Meig.		
<i>grisea</i> Meig.	. . .	Eur. centr. et mer.
<i>immaculata</i> Meig.	. . .	Eur. centr. et oec.
? <i>unicolor</i> Curt.		

PTIOLINA Zett.		
EURYTION Jaenn.		
<i>paradoxa</i> Jaenn.	. . .	Eur. centr. et occid.
? <i>lapidaria</i> Now.		
? <i>grisea</i> Strobl (nec Meig.)		
<i>nitida</i> Wahlbg.	. . .	Eur. sept.
* <i>nigripes</i> Zett.	. . .	Eur. centr. et sept.
<i>obscura</i> Fall.	. . .	Eur. centr. et sept.
? <i>tristis</i> Walk.		
? <i>Wodzickii</i> Frauenf.		
? <i>Wodzickii</i> Schin.		
.		
<i>atra</i> (Stæg.) Zett.	. . .	Eur. centr. et sept., Sibiria
? <i>nigra</i> Zett.		
<i>nigrina</i> Wahlbg.	. . .	Eur. sept.
? <i>nigra</i> Zett. pt.		
.		
* <i>calamodytes</i> Schin.	. . .	Eur. centr.
* <i>phragmitophila</i> Schin.	. . .	Eur. centr.
.		
<i>fulva</i> Beck.	. . .	Sibiria
.		
<i>pelliticornis</i> Beck.	. . .	Italia
SPANIA Meig.		
<i>nigra</i> Meig.	. . .	Eur. centr. et sept.
? <i>Fallenii</i> Hal.		
HILARIMORPHA Schin.		
<i>singularis</i> Egg.	. . .	Eur. centr.
<i>tristis</i> Egg.	. . .	Eur. centr.

TABANIDÆ.

TABANINÆ.

HEXATOMA Meig. (nec Latr.)		
HEPTATOMA Meig. (1803)		
<i>pellucens</i> Fabr.	. . .	Eur. centr. et sept.
? <i>albipes</i> Schrank		
? <i>bimaculata</i> Meig.		
HÆMATOPOTA Meig.		
CHRYSOZONA Kert.		
<i>pluvialis</i> L.	. . .	Eur., Africa sept., Japonia
? <i>equorum</i> Fabr.		
? <i>hyetomantis</i> Schrank		
? <i>subcylindrica</i> Pand.		
* <i>lusitanica</i> Guér.	. . .	Lusitania
<i>tristis</i> Bigot	. . .	Japonia
* <i>pallens</i> Lw.	. . .	Turkestan
<i>Bigoti</i> Gobert	. . .	Gallia, Anglia, Servia
<i>italica</i> Meig.	. . .	Eur.
? <i>elongata</i> Oliv.		
? <i>gymnonota</i> Brullé		
? <i>tenuicornis</i> Macq.		
? <i>longicornis</i> Macq.		
? <i>grandis</i> Macq.		
? <i>nigricornis</i> Gobert		
* <i>variegata</i> Fabr.	. . .	Eur. mer., Af. sept.
<i>crassicornis</i> Wahlbg.	. . .	Eur. centr. et sept.
? <i>americana</i> O. Sack.		Amer. sept.
* <i>globulifera</i> Schumm.	. . .	Eur. centr.
* <i>obscurata</i> Bigot		
? <i>obscura</i> Bigot (nec Lw.)		
* <i>rufipennis</i> Bigot	. . .	Japonia

TABANUS L.

THIERIOPECTES Zell.		
AGELANIUS Rond.		
<i>micans</i> Meig.	. . .	Eur. centr. et mer.
? <i>austriacus</i> Fabr. (nec Wied.)		
? <i>niger</i> Donov.		
? <i>signatus</i> Panz.		
<i>aterrimus</i> Meig.	. . .	Eur. (nec Angl a)
? <i>signatus</i> Meig.		
? <i>austriacus</i> Meig. pt.		
? var. <i>auripilus</i> Meig.		
? <i>æthiops</i> Ljungh		
? var. <i>lugubris</i> Zett.		
? <i>nigerimus</i> Zett.		
? <i>Heydenianus</i> Jaenn.		
<i>lapponicus</i> Wahlbg.	. . .	Eur. mer. et centr., Sibiria
? <i>fuscintus</i> DeG.		
? <i>borealis</i> Fabr.		
? <i>albomaculatus</i> Zett.		
<i>tarandinus</i> L.	. . .	Eur. bor., Sibiria
* <i>æquitinctus</i> Beck.	. . .	Sibiria
<i>Astur</i> Erichs.	. . .	Sibiria
? <i>spilopterus</i> Lw.		
<i>tataricus</i> Portsck.	. . .	Asia centr., Mt. Altai
<i>flavipes</i> Wied.	. . .	Sibir., Amer. sept.
<i>borealis</i> Meig. pt. Lw.	. . .	Eur. centr. et sept., Sibiria
<i>montanus</i> Meig.	. . .	Eur. centr. et sept.
? <i>flaviceps</i> Zett.		Sibiria
? <i>tropicus</i> Lw.		
<i>brevis</i> Lw.	. . .	Sibiria

- tropicus *L. pt. Panz.* . Eur. centr. et sept.,
paganus Fabr. . Sibiria
 ? *bimaculatus Mac*
luridus Lw. pt.
signatus Schin. pt.
 var ? *bisignatus Jaenn.*
borealis Jaenn.
 * *pulchri ventris Portsch.* Mongolia
luridus Fall. . Eur. centr. et sept.
borealis var. a et e Zett.
depressus Walk.
Muhlfeldi Brau. . Asia min., Sibiria
græcus Macq. pt. (nec Fabr.)
distinguendus Verr. . Eur. Amer. sept. ?
tropicus Harris
 ? *affinis Kirby*
solstitialis Pand.
Muhlfeldi Lundb.
solstitialis Meig. . Eur.
sanguisorba Harris
tropicus Lw. pt.
Erberi Brau. . Eur. mer.
decorus Lw. . Syria, Creta
cyanops Brau. . Syria
 * *trichocerus Bigot* . Marocco
lateralis Meig. . Eur. centr. et mer.
pilosus Lw.
nigricornis Zett. . Eur. centr. et sept.
alpinus Zett.
luridus Schin. pt.
engadinensis Jaenn.
punctifrons Wahlbg. . Eur. sept., Sibiria
confinis Zett. . Eur. sept., Sibiria
pusillus Egg. (nec Macq.) Eur. centr. et mer.
acuminatus Lw. . Eur. mer. et or., Sib.
macularis Fabr. . Africa sept.
 * *fulvicornis Meig.* . Italia
 * *batnensis Bigot* . Algeria
- ATYLOTUS *O. Sack.*
 BRACHYTOMUS *A. Costa*
ater Rossi . Eur. centr. et mer.,
morio Fabr. . Africa sept.
nigrita Meig. 1804 (nec Fabr.)
fuscatus Macq.
algerus Macq.
 ? *transiens Walk.*
anthracinus Meig. . Eur. mer., Af. sept.
obscurus Lw.
atropos Jaenn.
corsicanus Pand.
alexandrinus Wied. . Eur. mer., Af. sept.,
 Syria
carbonatus Macq.
umbrinus Meig. . Eur. mer., Af. sept.,
 Asia min.
istriensis Meig.
maculipennis Brullé
Swiridowi Portsch. . Caucasus

Eatoni Ric. . Algeria
hirticeps Lw. . Japonia
 * *calopsis Bigot* . Algeria
tomentosus Macq. . Eur. mer., Algeria
apiarius Jaenn.
 * *expollicatus Pand.* . Gallia
villosus Macq. . Algeria
 * *fezianus Bigot* . Africa sept.
rupium Brau. . Eur. centr.
 * *Letourneuxi Bigot* . Algeria
- gigas Herbst.* . Eur. centr. et mer.,
albipes Fabr. . Asia min.
ignotus Rossi
grossus Thunb.
ursus A. Costa
tricolor Zell. . Eur. mer., As. min.
carabaghensis Portsch. . Rossia
barbarus Coqueb. . Eur. mer., Af. sept.
taurinus Meig.
maroccanus Fabr.
auricinctus Macq.
auripunctatus Macq. . Algeria
 ? *tibialis Macq.*
angusticornis Lw. . Japonia
plebejus Fall. . Eur. centr. et sept.
sublunaticornis Zett.
 ? *cetherens Bigot*
agricola Wied. . Afric. sept., China
 * *mitidgensis Macq.* . Algeria
rusticus L. . Eur. centr. et mer.,
 Africa sept.
 ? *Roussellii Macq.*
fulvus Meig. . Eur. Africa sept.
 ? *ferus Scop.*
alpinus Schrank? Walk.
 var. *rufipes Meig.*
ruralis Zett.
 ? *siccus Walk.*
 * *aurotestaceus Walk.* . China sept.
 * *chinensis Thunb.* . China, Cap. B. S.
latistriatus Brau. . Eur.
nigrifacies Gobert
lunatus Fabr. . Eur. mer., Af. sept.,
 Asia min.
lunulatus Meig. pt.
anthophilus Lw.
Wideri Jaenn.
 * *alazinus Bigot* . Caucasus
bifarius Lw. . Eur. centr. et mer.,
 Af. sept., As. min.
quadrifarius Lw. . Turkestan
quatuornotatus Meig. . Eur. centr. et mer.
quadrinotatus Gobert
nemorialis Meig. . Eur. mer., Algeria
glaucopis Meig. pt.
atricornis Meig. pt.
vittatus Fabr. . Eur. mer., Af. sept.
sabuletorum Lw. . Turkestan
 * *Abazus Bigot* . Persia ? Caucasus?
 * *cameronensis Bigot* . I. Madeira
 * *canipalpis Bigot* . Persia
- TABANUS *L. (sens. O. Sack.)*
apricus Meig. . Eur. centr. et mer.
tropicus Meig. pt.
 ? *infuscatus Lw.*
Confucius Macq. . China sept.
 ? *Hoang Macq.*
 * *arabicus Macq.* . Arabia
græcus Fabr. . Eur. centr. et mer.,
 Asia min.
ferrugineus Meig.
segmentarius Brullé
infusus Walk.
 ? *propinquus Palm*
 * *polyzonatus Bigot* . Persia
paradoxus Jaenn. . Eur. centr. et mer.,
 Caucasus.
spodopterus Meig. . Eur. centr. et mer.
Éggeri Schin . Eur. mer., Ægyptus,
 Asia min.
intermedius Egger

Yao Macq. China sept.,
 ? *trigonus* Coquill. Japonia
sudeticus Zell. Eur.
 var. ? *perplexus* Verr.
bovinus L. Eur., Caffraria
trigeminus Coquill. Japonia
tenebrosus Coquill. (nec
Walk). Japonia
humilis Coquill. Japonia
bromius L. Eur.
maculatus DeG.
nemorialis Meig. pt.
scalaris Meig.
atricornis Meig. pt.
bronicus Gimm.
connexus Walk.
connexans Ric.
glaucus Meig. Eur. centr., Anglia
glaucescens Schin.
clausicella Macq. China sept.
tergestinus Egger Eur. centr. et mer.
glaucus Meig. pt.
Mikii Brau. Eur. centr., Dania
græcus Meig. pt.
maculicornis Zett. Eur. centr. et sept.
borealis pt. Meig.
nemorialis Meig. pt.
glaucus Walk.
nigricans Egger
glaucescens ♀ Schin.
unicinctus Lw. Ægyptus
**obsolescens* Pand. Græcia
spectabilis Lw. Eur. centr. et mer.,
lateralis Brullé (nec Asia min.
Meig.)
 ? *albivittatus* Macq.
rectus Lw. Eur. mer.
ornatus Jaenn.
**yokoamensis* Bigot Japonia
polygonus Walk. Bagdad
autumnalis L. Eur. mer. or. et occ.
bovinus Harris Af. sept., Syria
barbarus Thunb. (nec Coqueb.)
algericus Thunb.
**signatipennis* Ports. Mongolia
regularis Jaenn. Eur. centr.
biguttatus Wied. Arabia, Africa or.
cilipes Macq. et Cap. B.S.
cerberus Walk.
noctis Walk.
tripunctifer Walk.
nigrita Fabr. Eur. mer., Af.
carbonarius Meig. sept., Asia min.
gagates Lw.
glaucopis Meig. Eur.
ferrugineus Meig. (1804)
lunulatus Meig.
chlorophthalmus Meig.
flavicans Zell.
 var. *cognatus* Lw.
 var. *castellanus* Strobl
cordiger Meig. Eur. centr. et mer.,
atricornis Meig. Af. sept., As. min.
latifrons Zett.
vicinus Egger (nec Macq.)
megacephalus Jaenn.
Braueri Jaenn.
albifacies Lw. Ægyptus

pulverifer Walk. Mesopotamia
unifasciatus Lw. Eur. centr. et mer.,
 Af. sept., As. min.
**exclusus* Pand. Gallia
hæmatopotoides Jaenn. Eur. centr.
Gerkei Brau. Ross. mer., Caucas.
lama Ports. Mongolia
Sufis Jaenn. Africa sept. et or.
alboveitralis Newst.
**albicans* Macq. Arabia, Senegal
pulchellus Lw. Af. sept., As. min.
Pyrrhus Walk. Japonia, Ind. or.
**niveipalpis* Bigot Pers. sept., Caucas.
chrysurus Lw. Japonia
Buddha Ports. Mongolia
taeniola Pal-Beauv. Africa
 ? *sagittarius* Macq.
 ? *macrops* Walk.
 ? *rubicundus* Walk (nec Macq.)
 ? *socius* Walk.
 ? *tibialis* Walk.
 ? *variatus* Walk.
 ? *longitudinalis* Lw.
 ? *dorsivitta* Walk.
 ? *secedens* Walk.
 ? *serratus* Lw.
 ? *virgatus* Aust.
 ? ? ?
**agrestis* Wied. Ægyptus
**dorsomaculatus* Macq. Algeria
**infestans* Macq. Algeria
**japonicus* Bigot Japonia
**pyrrhoceras* Bigot Japonia
**rufidens* Bigot Japonia
**ispahanicus* Kert.
aspahanicus Rond. Persia sept.

PANGONINÆ.

SILVIUS Meig.

algerus Meig. Eur. mer., Algeria
 ? *italicus* Fabr.
appendiculatus Macq.
**bicolor* Bigot Africa sept.
 ? *algerus* Meig. ♀
vituli Fabr. Eur. centr. et mer.
 ? *alpinus* Scop.
decisus Walk.
alpinus Drap. Eur. centr.
hirtus Lw.
dorsalis Coquill. Japonia
ochraceus Lw. Asia min.
irritans Ric. Afghanistan
**maroccanus* Bigot Marocco
**barbatus* Bigot Pedemont

CHRYSOPS Meig.

hamata Lw. Asia min.

dissecta Lw. Sibiria
valida Lw. Sibiria

suavis Lw. Sibiria, Japonia
japonica Wied. Japonia, Amur
aterrima Kirby
parallelogramma Zell. Eur. centr. et sept.,
bipunctata Motsch. Sibiria

- concaua* *Luc.* Russia
sepalicrallis *Fabr.* Eur. centr. et sept.
maura *Sjöstr.* Eur. sept.
nigrripes *Zett.* Eur. sept., Am.
nigrripes *Luc.* (ps) sept. Alaska
lapponica *Luc.* Lapponia
divaricata *Luc.* Sibiria
.
rufipes *Meig.* Eur. (nec Anglia)
sepalicrallis (pt.) *Meig.*
**Melichartii* *Mit.* Illyria
quadrata *Meig.* Eur.
picta *Meig.*
ribinata var. *Meig.* (1864)
sepalicrallis *Zett.* ? (1855)
**nova* *Schm.* Hispania
relicta *Meig.* Eur.
orientalis *Pana.* (nec *L.*)
ribinata *Meig.* (1864)
melanopleura *Waldsp.* Eur. sept.
morio *Zett.*
caucasiensis *L.* Eur., Sibiria
lapponia *L.*
maritima *Steg.*
nubilans *Harris*
obovata *Fabr.*
var. *mediterranea* *Ströbl*
**indeus* *Luc.* Asia min.
.
ovumexa *Luc.* Gallia
italica *Meig.* Eur. mer.
? *pallida* *Macq.*
mauritanica *A. Dougl.* Africa sept.
marmorata *Rossi* Eur. centr. et
? *admiranda* *Steg.* mer., Asia min.
femestrata *Fabr.*
nigriventris *Luc.*
isidica *Luc.*
**laurentica* *Jassem.* Hispania ?
navipes *Meig.* Eur. centr. et mer.,
peripicillaria *Luc.* Algeria, Syria
quadrata *Luc.*
punctifera *Luc.* Syria, Gallia ?
**Minkosiewiczii* *Bigot* Caucas.
transiens *Bigot*
NEMORIUS *Rond.*
HEMIPILLA *Kriechb.*
singularis *Meig.* Eur. mer.
- vitripennis* *Meig.* Eur. centr. et mer.
Ranconii *Schin.*
Fallotii *Kriechb.*
PANGONIA *Lair.*
TANTALISSA *Meig.*
PHILODORCHE *Wied.*
FIDENA *Walk.*
TALINA *Walk.*
DIATOMINUREA *Rond.*
ORBIZONETRA *Rond.*
maculata *F.* (nec *Rossi*?) Eur. mer., Af. sept.
proscoridea *Fabr.*
tabaniformis (*D&G*?) *Lair.*
varipennis *Lair.*
granatensis *Ströbl.* Hispania
escaleræ *Ströbl.* Hispania
**basalis* *Macq.* Algeria
variegata *Fabr.* Eur. mer.
? *maculata* *Rossi*
fulvipes *Luc.* Asia min.
pyritosa *Luc.* Eur. centr. et mer.,
Asia min.
obscurata *Luc.* Rhodus, Asia min.
.
fumida *Luc.* Hispania
dimidiata *Luc.* Hispania
ferruginea *Meig.* Hispania
**Rüppellii* *Jassem.* Nubia
affinis *Luc.* Hispania
flava *Macq.* Gallia
.
marginata *Fabr.* Eur. mer., Af. sept.,
Asia min.
? *mauritanica* *L.*
haustellata *Fabr.*
mauritanica *Meig.*
cellulosa *Brullé*
junctaria *Macq.*
aterrima *Duf.*
micans *Meig.* Eur. mer.
haustellata *Oliv.* (nec *Fabr.*)
ornata *Meig.*
griseipennis *Luc.* Hispania
**orientalis* *Bigot* Caucasus
aperia *Luc.* Lusitania
**tigris* *Bigot* Persia et Caucas.
?
**fasciata* *Lair.* Scio, Egyptus

NEMESTRINIDÆ.

NEMESTRININÆ.

- NEMESTRINA** *Lair.*
ANDREMYMA *Rond.*
nivea *Lichtw.* Transcaspia
abdominalis *Oliv.* Egyptus, Tripolis
Olivæ *Wied.*
taschiroensis *Bigot* Tunisia
Perezii *Luc.* Hispania
rufipes *Oliv.* Egyptus, Syria
lateralis *Wied.*
nitida *Lichtw.* Turkestan
ruficornis *Macq.* Africa sept.
exaltata *Lichtw.* Syria
fraudatrix *Luc.* Turkestan
innocata *Luc.* ?
rufotestacea *Lichtw.* Turkestan
rubriventris *Luc.* Transcaspia
læta *Luc.* Transcaspia
obscuripennis *Portsch.* Armenia
cincta *Macq.* Arabia
atra *Oliv.* Egyptus
nigra *Wied.*
egyptiaca *Wied.* Eur. mer., Af. sept.
striata *Lichtw.* Tripolis
tripolitana *Lichtw.* Tripolis
capito *Luc.* Transcaspia
marginata *Luc.* Transcaspia

<i>dedecor</i> <i>Lr.</i>	Turcomania
<i>cinerea</i> <i>Lichtn.</i> (nec <i>Oliv.</i>)	Thibet
<i>cristalis</i> <i>Lr.</i>	Turcomania
<i>innotata</i> <i>Lr.</i>	Turkestan
<i>reticulata</i> <i>Latr.</i>	Eur. mer., Africa
<i>Latreillii</i> <i>Fisch.</i>	sept., Syria
<i>signata</i> <i>Lichtn.</i>	Syria
<i>canaanitica</i> <i>Lichtn.</i>	Syria
<i>bombiformis</i> <i>Portsch.</i>	Caucasus
<i>ruficaudis</i> <i>Lichtn.</i>	Mesopotamia
<i>amoena</i> <i>Lichtn.</i>	Turkestan
<i>melaleuca</i> <i>Lr.</i>	Transcaspia
<i>naso</i> <i>Lr.</i>	Turcomania
<i>nigrifemorata</i> <i>Lichtn.</i>	Transcaspia
<i>flavipes</i> <i>Lichtn.</i>	Turcomania
<i>fasciata</i> <i>Macq.</i> (<i>Oliv.</i> ?)	Africa sept.
<i>græca</i> <i>Lichtn.</i>	Græcia
<i>caucasica</i> <i>Fisch.</i>	Eur. mer., Africa
<i>Adamsi</i> <i>Fisch.</i>	sept., Syria
<i>analis</i> <i>Oliv.</i>	
<i>albofasciata</i> <i>Wied.</i>	
<i>anthophorina</i> <i>Portsch.</i>	Caucasus
<i>simplex</i> <i>Lr.</i>	Transcaspia
<i>mollis</i> <i>Lr.</i>	Turkestan
.....	

<i>Bolivari</i> <i>Strobl</i>	Hispania, Græcia
* <i>cinerea</i> <i>Oliv.</i>	Arabia
:	
<i>Hermanni</i> <i>Lichtn.</i>	Algeria
<i>hirta</i> <i>Lichtn.</i>	Turkestan
<i>nigrovillosa</i> <i>Lichtn.</i>	Hispania
<i>persica</i> <i>Lichtn.</i>	Persia

RHYNCHOCEPHALUS *Fisch.*

<i>Tauscheri</i> <i>Fisch.</i>	Rossia mer.
<i>tauricus</i> <i>Wied.</i>	
<i>lativentris</i> <i>Portsch.</i>	Persia

FALLENIA *Meig.*

<i>fasciata</i> <i>Fabr.</i>	Eur. mer., Af. sept.
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HERMONEURINÆ.

SYMMICTUS *Lr.*

<i>DOROTINEANA</i> <i>Bigot</i>	
<i>costatus</i> <i>Lr.</i>	Hispania, Africa
? <i>faropikusus</i> <i>Bigot</i>	sept., Caffraria

HERMONEURA *Meig.*

<i>PARASYMMICTUS</i> <i>Bigot</i>	
<i>obscura</i> <i>Meig.</i>	Eur. centr.
<i>villosula</i> <i>Lr.</i>	Transcaspia

CYRTIDÆ.

PHILOPOTINÆ.

PHILOPOTA *Wied.*

<i>OLIGONEURA</i> <i>Bigot</i>	
<i>murina</i> <i>Lr.</i>	Græcia, Asia min.

PANOPINÆ.

ASTOMELLA *Duf.*

<i>PHYSEGASTER</i> <i>Macq.</i>	
<i>curviventris</i> <i>Duf.</i>	Eur. mer.
<i>clavicornis</i> <i>Latr.</i>	
<i>marginata</i> <i>Latr.</i>	
<i>aurea</i> <i>Erichs.</i>	
<i>Lindenii</i> <i>Erichs.</i>	Eur. mer., Syria ?
<i>Vaxelii</i> <i>v. d. Lind.</i> (nec	Algeria
<i>Waxelii</i> <i>Klug</i>)	
<i>Macquarti</i> <i>A. Costa</i>	
<i>grandipennis</i> <i>A. Costa</i>	
? <i>gravis</i> <i>Erichs.</i>	
<i>apiformis</i> <i>Westw.</i>	
<i>bombiformis</i> <i>Westw.</i>	
<i>maculata</i> <i>Macq.</i>	

CYRTINÆ.

PTERODONTIA *G. B. Gray*

<i>Waxelii</i> <i>Klug.</i>	Rossia mer.
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CYRTUS *Latr.*

<i>gibbus</i> <i>Fabr.</i>	Eur. mer., Af. sept
? <i>acephalus</i> <i>Vill.</i>	
<i>dentatus</i> <i>Macq.</i>	Algeria
<i>pusillus</i> <i>Macq.</i>	Gallia

OPSEBIUS *A. Costa*

<i>PITHOGASTER</i> <i>Lr.</i>	
<i>inflatus</i> <i>Lr.</i>	Hispania
<i>formosus</i> <i>Lr.</i>	Gallia mer.
* <i>perspicillatus</i> <i>A. Costa</i>	Italia
<i>pepo</i> <i>Lr.</i>	Hispania

ACROCERA *Meig.*PARACROCERA *Mik*

<i>globulus</i> <i>Panz.</i>	Eur.
<i>albipes</i> <i>Meig.</i>	
? <i>orbiculus</i> <i>Fabr.</i>	
? <i>pubescens</i> <i>Latr.</i>	
<i>tumida</i> <i>Erichs.</i>	
<i>borealis</i> <i>Zett.</i>	
* <i>læta</i> <i>Gerst.</i>	Sardinia
* <i>nigrifemorata</i> <i>Meig.</i>	Eur. mer.
= <i>sanguinea</i> <i>Meig.</i> (<i>t. Griff.</i>)	
.....	
<i>sanguinea</i> <i>Meig.</i>	Eur. centr. et mer.
? <i>globulus</i> <i>var. Fall.</i>	
<i>trigrauma</i> <i>Lr.</i>	Eur. centr. et mer.
<i>trigrammoides</i> <i>Pok.</i>	Eur. centr.
<i>stelviana</i> <i>Pok.</i>	Alpes
? <i>Braueri</i> <i>Pok.</i>	
<i>var. punctata</i> <i>Pok.</i>	
ONCODES <i>Latr.</i>	
<i>HENOPS</i> <i>Meig.</i>	
<i>varius</i> <i>Latr.</i>	Eur. (nec Anglia)
<i>fuliginosus</i> <i>Erichs.</i>	
* <i>guttatus</i> <i>A. Costa.</i>	Italia
? <i>benacensis</i> <i>Pok.</i>	
* <i>fumatus</i> <i>Erichs.</i>	Bavaria
* <i>apicalis</i> <i>Meig.</i>	Eur. centr.
<i>gibbosus</i> <i>L.</i>	Eur. centr. et sept.
<i>leucomelas</i> <i>Meig.</i>	
<i>marginatus</i> <i>Curt.</i>	
<i>cingulatus</i> <i>Erichs.</i>	
<i>nigripes</i> <i>Zett.</i>	Eur. sept.
* <i>etruscus</i> <i>Griff.</i>	
<i>marginatus</i> <i>var. ? Griff.</i>	
<i>zonatus</i> <i>Erichs.</i>	Eur. (nec Anglia)
<i>gibbosus</i> <i>Panz.</i>	
<i>pallipes</i> <i>Macq.</i>	
<i>pallipes</i> <i>Latr.</i>	Eur. centr. et occ.
<i>gibbosus</i> <i>Meig.</i> (1804)	
<i>marginatus</i> <i>Meig.</i>	
<i>limbatus</i> <i>Meig.</i>	
<i>formosus</i> <i>Lr.</i>	Transcaspia

TROMOPTERA.

BOMBYLIDÆ.

BOMBYLINÆ.

GLABELLULA *Bezzi**PLATYGASTER* *Zett.* (nec *Latr.*)*SPHEROGASTER* *Zett.* (nec *Dej.*)*GLABELLA* *Lw.* (nec *Swains.*)*arctica* *Zett.* . . . Eur. sept., Sibiria**femorata* *Lw.* . . . Rossia asiat.EMPIDIDEICUS *Beck.**carthaginiensis* *Beck.* . AlgeriaCYRTOSIA *Perris**opaca* *Lw.* . . . Sicilia*nitens* *Lw.* . . . Sicilia, I. Canariæ,
Africa sept.**pallipes* *A. Costa* . . Sardinia**meridionalis* *Rond.* . I. Melita*pusilla* *Lw.* . . . Transcaspia*cinerascens* *Lw.* . . . Rossia asiat.*marginata* *Perris* . . Gallia mer., I.
Canariæ**occidentalis* *Rond.* . Italia sept.*obscuripes* *Lw.* . . GræciaPLATYPYGUS *Lw.**POPSIA* *A. Costa**chrysanthemii* *Lw.* . . Græcia, Rhodus*lativentris* *Lw.* . . Transcaspia*melinoproctus* *Lw.* . . Transcaspia*bellus* *Lw.* . . . Rossia mer.*pumilio* *Lw.* . . . Transcaspia**ridibundus* *A. Costa* . Italia mer.*melleus* *Lw.* . . . Eur. mer., Ægypt.*maculiventris* *Lw.* . . Persia sept.APOLYSIS *Lw.**eremophila* *Lw.* . . Eur. or., Ross. asiat.**andalusiaca* . . . Hispania*Cyrtosia* *Strobl*OLIGODRANES *Lw.**fumipennis* *Lw.* . . Græcia, Asia min.*obscuripennis* *Lw.* . . Græcia, Asia min.*modestus* *Lw.* . . . TranscaspiaGERON *Meig.**gibbosus* (*Oliv. ?*) *Meig.* . Eur. mer., Africa,*hybridus* *Meig.* . . . Syria*Olivierii* *Macq.**?capensis* *Walk.*var. *halteralis* *Meig.*USIA *Latr.**VOLUCELLA* *Fabr.* (nec *Geoffr.*)*florca* *Fabr.* . . . Eur. mer., Af. sept.*cuprea* *Macq.**gagathea* *Bigot**atrata* *Fabr.* . . . Eur. mer., Af. sept.*vicina* *Macq.**?floreana* *Schin.* (nec *Fabr.*)*vestita* *Macq.* . . . Algeria*claripennis* *Macq.* . . . Algeria*anus* *Beck.* . . . Algeria*unicolor* *Lw.* . . . Transcaspia*crinipes* *Beck.* . . . Armenia*manca* *Lw.* . . . Sicilia*sicula* *Egger* . . . Eur. mer., As. min.*floreana* *Lw.* (nec *Fabr.*)*lata* *Lw.* . . . Rhodus, Asia min.*notata* *Lw.* . . . Transcaspia*calva* *Lw.* . . . Asia min.*bicolor* *Macq.* . . . Ægyptus, As. min.,
Syria*angustifrons* *Beck.* . . Tunisia, Sibiria*ænea* *Rossi* . . . Eur. mer., As. min.,*floreana* *Mg.* (1804) (nec *F.*) . Africa sept.*accola* *Beck.* . . . Tunisia*putilla* *Beck.* . . . Gallia, Austria*incisa* *Wied.* . . . Hispania, Af. sept.*major* *Macq.**aurata* *Fabr.* . . . Eur. mer., Af. sept.*taniolata* *A. Costa**Loewi* *Beck.* . . . Hispania*?grata* *Lw.**punctipennis* *Lw.* . . Græcia, Asia min.*vagans* *Beck.* . . . Tunisia*versicolor* *Fabr.* . . . Eur. mer., Af. sept.*hyalipennis* *Macq.**pusilla* *Meig.* . . . Eur. mer.*Novakii* *Strobl* . . . Dalmatia, Corfu*pusilla* *Macq.* (nec *Meig.*)*forcipata* *Brullé* . . . Græcia*ignorata* *Beck.* . . . Syria, Africa sept.*carmelitensis* *Beck.* . . Syria*pallescens* *Beck.* . . Hispania, TunisiaTRIPLASIUS *Lw.**bivittatus* *Lw.* . . . Tunisia, Cap. B.S.PLOAS *Latr.**CONOPHORUS* *Meig.**valida* *Lw.* . . . Græcia*alpicola* *Villen.* . . . Alpes*virescens* *Fabr.* . . . Eur. centr. et mer.*maura* *Mikan**hirticornis* *Latr.**lurida* *Meig.**lata* *Duf.**fuliginosa* *Meig.* . . . Hispania, Af. sept.*grisea* *Fabr.* . . . Eur. mer.*atrata* *Latr.**decipiens* *Lw.* . . . Transcaspia*fuscipennis* *Macq.* . . . Eur. mer., Af. sept.*fuminervis* *Duf.* . . . Hispania*glaucescens* *Lw.* . . . Eur. mer. et or.*flavescens* *Meig.* . . . Eur. mer.*luctuosa* *Lw.* . . . Turkestan

.

pictipennis *Macq.* . . . Eur. mer., Algeria,*macroglossa* *Duf.* . . . Amer. sept.*mauritanica* *Bigot**bivittata* *Lw.* . . . Græcia, Asia min.*bella* *Beck.* . . . Tunisia

.

<i>bombylifformis</i> <i>Lw.</i>	. Turkestan
<i>adunca</i> ♀ <i>Lw.</i> (1871)	
<i>adunca</i> <i>Lw.</i>	. Turkestan
<i>simplex</i> <i>Lw.</i>	. Asia min.
<i>pusilla</i> <i>Lw.</i>	. Dalmatia
<i>nobilis</i> <i>Lw.</i>	. Caucasus

LEGNOTOMYIA *Bezzi*

<i>LEGNOTUS</i> <i>Lw.</i> (nec <i>Schiodte</i>)	
<i>trichorrhœa</i> <i>Lw.</i>	. Syria

PSIATHOLASIUS *Beck.*

<i>bombylifformis</i> <i>Beck.</i>	. Tunisia
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PHTHIRIA *Meig.*

<i>pulicaria</i> <i>Mikan</i>	. Eur., Tunisia
<i>nigra</i> <i>Meig.</i>	
<i>pygmæa</i> <i>Fabr.</i>	
<i>campestris</i> <i>Fall.</i>	
<i>gibbosa</i> <i>Walk.</i>	
* <i>fulva</i> <i>Meig.</i>	. Eur. centr.
<i>convergens</i> <i>Lw.</i>	. Eur. centr. et mer.
<i>Zimmermanni</i> ♀ <i>Now.</i>	
<i>minuta</i> <i>Fabr.</i>	. Eur. centr. et mer.
<i>Zimmermanni</i> ♂ <i>Now.</i>	
<i>atriceps</i> <i>Lw.</i>	. Rossia mer.
<i>canescens</i> <i>Lw.</i>	. Eur. centr. et sept.
<i>pulicaria</i> (pt.) <i>Zett.</i>	
<i>vagans</i> <i>Lw.</i>	. Ross.mer., As.min.
<i>quadrinotata</i> <i>Lw.</i>	. Transcaspia
<i>umbripennis</i> <i>Lw.</i>	. Eur. mer.
* <i>notata</i> <i>Bigot</i>	. Corsica
<i>conspicua</i> <i>Lw.</i>	. Asia min.
<i>scutellaris</i> <i>Meig.</i>	. Hispania
<i>Gædii</i> <i>Meig.</i>	. Eur. centr. et mer., Tunisia
<i>maculata</i> <i>Meig.</i>	
<i>punctata</i> <i>Meig.</i>	
<i>subnitens</i> <i>Lw.</i>	. Asia min.
<i>rustica</i> <i>Lw.</i>	. Asia min.
<i>Simonyi</i> <i>Beck.</i>	. I. Canariæ

HETEROTROPUS *Lw.*

<i>albidipennis</i> <i>Lw.</i>	. Transcaspia
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SYSTÆCHUS *Lw.*

<i>setosus</i> <i>Lw.</i>	. Rossia
<i>ctenopterus</i> <i>Mikan</i>	. Eur. centr. et mer.
<i>minor</i> <i>Meig.</i>	
var. <i>aurulentus</i> <i>Meig.</i>	
var. <i>convergens</i> <i>Lw.</i>	
* <i>sulphureus</i> <i>Mikan</i>	. Eur. (nec Anglia), Tunisia
<i>fulvus</i> <i>Meig.</i>	
<i>minimus</i> <i>F.</i> (nec <i>Schrank</i>)	
var. <i>dalmatinus</i> <i>Lw.</i>	
<i>ctenopterus</i> var? <i>Strobl</i>	
.....	
<i>leucophæus</i> <i>Meig.</i>	. Eur. centr. et mer.
var. <i>lucidus</i> <i>Lw.</i>	
var. <i>gallicus</i> <i>Villen.</i>	
<i>gradatus</i> <i>Meig.</i>	. Hispania
<i>quadratus</i> <i>Lw.</i> (l.c.)	
<i>autumnalis</i> <i>Wied.</i>	. Ross.mer., Algeria
<i>microcephalus</i> <i>Lw.</i>	. Sicilia
<i>lævifrons</i> <i>Lw.</i>	. Sibiria
<i>acuticornis</i> <i>Macq.</i>	. Ægyptus
* <i>sericeus</i> <i>Meig.</i>	. Eur. centr. et mer.
<i>nubilus</i> <i>Meig.</i> (1804)	

<i>retrogradus</i> <i>Beck.</i>	. Ægyptus
<i>tresignatus</i> <i>Portsch.</i>	. Caucasus
* <i>albicans</i> <i>Macq.</i>	. Algeria
.....	
<i>exalbidus</i> <i>Meig.</i>	. Hispania, Tunisia
<i>latifrons</i> <i>Macq.</i>	. I. Canariæ

ANASTÆCHUS *O. Sack.*

<i>nitidulus</i> <i>Fabr.</i>	. Eur. centr. et mer., Japonia, Sibiria, Amer. sept.
<i>diadema</i> <i>Meig.</i>	
<i>caudatus</i> <i>Meig.</i>	
<i>barbatus</i> <i>O. Sack.</i>	
<i>hircanus</i> <i>Wied.</i>	. Eur. centr. mer. et or., Asia occ.
<i>stramineus</i> <i>Meig.</i>	. Eur. mer., Afr. sept.

BOMBYLIUS *L.*

"1 ^{te} Gruppe" <i>Lw.</i>	
<i>lugubris</i> <i>Lw.</i>	. Eur. mer., Syria
<i>ater</i> <i>Scop.</i>	. Eur. centr. et mer., Asia sept. et centr., Afr. sept.
* <i>barbula</i> <i>Wied.</i>	. Rossia mer.
<i>floccosus</i> <i>Lw.</i>	. Syria
<i>ambustus</i> <i>Wied.</i>	. Eur. or. centr. et mer., Ross. asiat.
<i>dispar</i> <i>Meig.</i>	
<i>fuscus</i> <i>Fabr.</i>	. Eur. mer., Afr. sept.
<i>boghariensis</i> <i>Lucas</i>	. Algeria
<i>alveolus</i> <i>Beck.</i>	
<i>maculipennis</i> <i>Macq.</i>	. Africa sept.
* <i>nigropenicillatus</i> <i>Bigot</i>	. Asia min.
.....	
<i>analis</i> <i>Fabr.</i>	. Eur. mer., Afr., Syria
? <i>nigrita</i> <i>Cyrillo</i>	
<i>discoideus</i> <i>Fabr.</i>	
<i>thoracicus</i> <i>Fabr.</i>	
<i>suffusus</i> <i>Walk.</i>	
<i>dorsalis</i> <i>Lw.</i> (nec <i>Oliv.</i>)	. Transcaspia
<i>pericaustus</i> <i>Lw.</i>	. Turkestan
<i>punctatus</i> <i>Fabr.</i> (nec <i>DeG.</i>)	. Eur. mer., Africa
<i>subluna</i> <i>Walk.</i>	
.....	
"2 ^{te} Gruppe" <i>Lw.</i>	
<i>pictus</i> <i>Panz.</i>	. Eur. centr. et mer., Asia min.
<i>planicornis</i> <i>Fabr.</i>	
<i>callipterus</i> <i>Lw.</i>	. Sibiria
<i>mobilis</i> <i>Lw.</i>	. Transcaspia
.....	
<i>discolor</i> <i>Mikan</i>	. Eur. centr. et mer., As. min., Afr. sept.
<i>medius</i> <i>Scop.</i> (nec <i>L.</i>)	
<i>concolor</i> <i>Zell.</i> (nec <i>Mikan</i>)	
<i>medius</i> <i>L.</i>	. Eur. (nec Anglia), Africa sept.
<i>punctatus</i> <i>DeG.</i>	
<i>concolor</i> <i>Mikan</i>	
<i>major</i> <i>Samou.</i>	
<i>discolor</i> <i>Macq.</i>	
var. <i>dalmatinus</i> <i>Strobl.</i>	
<i>pictipennis</i> <i>Lw.</i>	. Eur. mer., Afr. sept.
<i>medius</i> var. <i>Strobl</i>	
<i>seminiger</i> <i>Beck.</i>	. Tunisia
<i>punctipennis</i> <i>Lw.</i>	. Græcia, Asia
<i>albomicans</i> <i>Lw.</i>	. Asia min.
<i>pallipes</i> <i>Lw.</i>	. Eur. mer., Afr. sept.
? <i>intermedius</i> <i>Walk.</i>	
<i>confrater</i> <i>Lw.</i>	
.....	

“3 ^{te} Gruppe” <i>Lw.</i>		<i>fugax Wied.</i>	Eur. centr. et mer.
<i>major L.</i>	Eur., Africa sept.,	<i>micans Meig.</i> (nec	Algeria
<i>variegatus DeG.</i>	Japonia, Amer.	<i>Fabr.)</i>	
<i>sinuatus Mikan</i>	sept.	<i>posticus Meig.</i> (nec <i>Fabr.</i>)	
<i>fratellus Wied.</i>		<i>vulpinus Meig.</i>	
<i>vicinus Macq.</i>		* <i>trichurus Wied.</i>	Rossia mer.
<i>var. consanguineus Macq.</i>		* <i>numida Macq.</i>	Africa sept.
<i>var. australis Lw.</i>		<i>cinerascens Mikan.</i>	Eur. centr.
<i>basilinea Lw.</i>	Sicilia, Tunisia	<i>favillaceus Meig.</i>	
<i>collaris Beck.</i>	Tunisia	<i>argentifrons Lw.</i>	Hispania
.....		<i>similis Lw.</i>	Transcaspia
<i>fimbriatus Meig.</i>	Eur. centr. et mer.,	<i>oceanus Beck.</i>	I. Canariæ
<i>dimidiatus Meig.</i>	Asia min.	<i>gracilipes Beck.</i>	Algeria
<i>var. expletus Lw.</i>		<i>tephroleucus Lw.</i>	Persia
<i>ventralis Lw.</i>	Corsica	* <i>fumosus Duf.</i>	Hispania
<i>debilis Lw.</i>	Syria	* <i>lusitanicus Meig.</i>	Lusitania
.....		
<i>torquatus Lw.</i>	Eur. mer.	<i>fulvescens Meig.</i>	Eur. centr. et mer.,
<i>undatus Meig.</i> (nec <i>Mikan</i>)		<i>longirostris Meig.</i>	Africa sept.
<i>undatus Mikan</i>	Eur. centr. et mer.	<i>pumilus Meig.</i>	Eur. mer., As. min.,
<i>var. diagonalis Meig.</i>			Af. sept.
* <i>mus Bigot</i>	Corsica	<i>versicolor Fabr.</i>	Marocco
? <i>Biroi Beck.</i>		* <i>Olivierii Macq.</i>	Bagdad
.....		<i>citrinus Lw.</i>	Gallia mer.
“4 ^{te} Gruppe” <i>Lw.</i>		* <i>flavipes Wied.</i>	Ægyptus
<i>venosus Mikan</i>	Eur. centr. et mer.	<i>minor L.</i>	Eur.
<i>holosericeus Meig.</i>		<i>venosus Meig.</i> (nec <i>Mikan</i>)	
<i>minor Zell.</i> (nec <i>L.</i>)		<i>dilutus Meig.</i>	
* <i>axillaris Macq.</i>	Eur. centr.	<i>subcinctus Meig.</i>	
<i>rhodius Lw.</i>	Rhodus	<i>albibarbis Zett.</i>	
<i>canescens Mikan</i>	Eur. centr. et occ.	<i>pumilus Zett.</i>	
<i>minor Curt.</i>		* <i>cinerarius Wied.</i>	Rossia mer.
<i>ctenopterus Walk.</i>		<i>androgynus Lw.</i>	Syria ?
<i>variabilis Lw.</i>	Eur. centr. et mer.	<i>flavescens Palm</i>	Dalmatia
.....		<i>striatifrons Beck.</i>	Africa sept.
“5 ^{te} Gruppe” <i>Lw.</i>		<i>modestus Lw.</i>	Eur. mer. et or.
* <i>pallens Meig.</i>	Hispania	* <i>apicalis Meig.</i>	Eur. mer.
* <i>fuliginosus Wied.</i>	Eur. mer.	* <i>niveus Meig.</i>	Eur. mer.
<i>polypogon Lw.</i>	Syria	<i>candidus Lw.</i>	Persia
.....		<i>hololeucus Lw.</i>	Transcaspia
“6 ^{te} Gruppe” <i>Lw.</i>		?	
<i>nubilus Mikan</i>	Eur. centr. et mer.	* <i>obliquus Brullé</i>	Græcia
<i>pilirostris Lw.</i>	Sardinia	* <i>pallierus Brullé</i>	Græcia
<i>semifuscus Meig.</i>	Eur. centr.	* <i>vertebralis Duf.</i>	Hispania
<i>senilis Jaem.</i>		* <i>vagans Meig.</i>	Africa sept.
<i>cincinnatius Beck.</i>		* <i>agilis Oliv.</i>	Gallia
<i>nigripes Strobl</i> (nec <i>Macq.</i>)		* <i>brevirostris Oliv.</i>	Gallia
.....		* <i>cinereus Oliv.</i>	Gallia
“8 ^{te} Gruppe” <i>Lw.</i>		* <i>dorsalis Oliv.</i>	Gallia
<i>senex Meig.</i>	Hispan., Lusitania	* <i>gibbosus Oliv.</i>	Gallia
<i>deses Meig.</i>		* <i>mauritanus Oliv.</i>	Africa sept.
<i>separatus Beck.</i>	Africa sept.	* <i>maurus Oliv.</i>	Gallia
<i>Biroi Beck.</i>	Tunisia	* <i>morio Oliv.</i>	Gallia
? = <i>mus Bigot</i>		* <i>capillatus Palm</i>	Dalmatia
.....		* <i>megacephalus Ports.</i>	Persia
“9 ^{te} Gruppe” <i>Lw.</i>		* <i>senex Rond.</i> (nec <i>Meig.</i>)	Caucasus
<i>atriceps Lw.</i>	Japonia, Am. sept.	* <i>pallidulus Walk.</i>	Ægyptus
.....			
“10 ^{te} Gruppe” <i>Lw.</i>		DISCHISTUS <i>Lw.</i>	
<i>cruciatus Fabr.</i>	Eur. mer., Tunisia	<i>BOMBYLISOMA Rond.</i>	
<i>leucopogon Meig.</i>		<i>minimus Schrank</i>	Eur. centr.
<i>posticus Fabr.</i>		<i>flavus Meig.</i>	
<i>leucopygus Macq.</i>	Africa sept.	<i>sulphureus Fabr.</i> (nec <i>Mikan</i>)	
<i>quadrifarius Lw.</i>	Rossia mer.	<i>imitator Lw.</i>	Asia min.
		<i>simulator Lw.</i>	Syria
		<i>nigriceps Lw.</i>	Eur. mer. et or.
		<i>multisetosus Lw.</i>	Hispania

<i>flavibarbus</i> <i>Lw.</i>	. . .	Rhodus, Tunisia
<i>croaticus</i> <i>Kert.</i>	. . .	Croatia
<i>unicolor</i> <i>Lw.</i>	. . .	Sicilia, Algeria
<i>eximius</i> <i>Beck.</i>	. . .	Tunisia
<i>barbula</i> <i>Lw.</i>	. . .	Gallia mer.
<i>breviusculus</i> <i>Lw.</i>	. . .	Eur. mer., As. min.
<i>melanocephalus</i> <i>Fabr.</i>	. . .	Eur. mer., Syria,
<i>argyropygus</i> <i>Macq.</i>	. . .	Africa sept.
<i>lutescens</i> <i>Lw.</i>	. . .	Syria

?

* <i>algirus</i> <i>Macq.</i>	. . .	Algeria
* <i>singularis</i> <i>Macq.</i>	. . .	Algeria

LOMATINÆ.

PRORACHTHES *Lw.*

<i>Ledereri</i> <i>Lw.</i>	. . .	Asia min.
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CONONEDYS *Herm.*

<i>stenura</i> <i>Lw.</i>	. . .	Turkestan
<i>erythraspis</i> <i>Herm.</i>	. . .	Græcia

APHCÆBANTUS *Lw.*

<i>Escheri</i> <i>Bezzi</i>	. . .	Algeria
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PLESIOCERA *Macq.*

<i>algira</i> <i>Macq.</i>	. . .	Algeria
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CODIONUS *Rond.*

* <i>chlorizans</i> <i>Rond.</i>	. . .	Persia
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ANISOTAMIA *Macq.*

=? <i>ONCODOCERA</i> <i>Macq.</i>		
<i>ruficornis</i> <i>Macq.</i>	. . .	Ægyptus

LOMATIA *Meig.*

<i>STYGIA</i> <i>Meig.</i>		
<i>superba</i> <i>Lw.</i>	. . .	Asia min.
<i>gratiosa</i> <i>Lw.</i>	. . .	Hispania
<i>fasciculata</i> <i>Lw.</i>	. . .	Asia min.
<i>grajugena</i> <i>Lw.</i>	. . .	Græcia
<i>Erinnys</i> <i>Lw.</i>	. . .	Eur. mer.
<i>Alecto</i> <i>Lw.</i>	. . .	Asia min.
<i>Lachesis</i> <i>Egger</i>	. . .	Eur. centr.
<i>Belzebul</i> <i>Fabr.</i>	. . .	Eur. mer., Af. sept.
<i>lateralis</i> <i>Meig.</i>	. . .	Eur. (nec Anglia?),
<i>Belzebul</i> <i>Pnz.</i> (nec <i>F.</i>)	. . .	Tunisia
<i>Atropos</i> <i>Egger</i>	. . .	Dalmatia
<i>obscuripennis</i> <i>Lw.</i>	. . .	Hispania
<i>Rogenhoferi</i> <i>Now.</i>	. . .	Eur. centr.
<i>sabæa</i> <i>Fabr.</i>	. . .	Eur. mer., Tunisia
<i>infernalis</i> <i>Schin.</i>	. . .	Rossia mer., Syria
<i>Tisiphone</i> <i>Lw.</i>	. . .	Hispania, Tunisia
<i>polyzona</i> <i>Lw.</i>	. . .	Rhodus, Asia
<i>Hecate</i> <i>Lw.</i> (1869) (nec <i>Meig.</i> ?)		
<i>tibialis</i> <i>Lw.</i>	. . .	Transcaspia
<i>bella</i> <i>Lw.</i>	. . .	Transcaspia
<i>inornata</i> <i>Lw.</i>	. . .	Ægyptus
<i>fuscipennis</i> <i>Portsch.</i>	. . .	Sibiria
* <i>Hecate</i> <i>Meig.</i>	. . .	Italia

ANTONIA *Lw.*

<i>DIMORPHOPHORA</i> <i>Walk.</i>		
<i>suavissima</i> <i>Lw.</i>	. . .	Ægyptus
<i>syrphoides</i> <i>Walk.</i>		
<i>Fedtschenkoi</i> <i>Lw.</i>	. . .	Turkestan

TOXOPHORINÆ.

TOXOPHORA *Meig.*

<i>HENICONEURA</i> <i>Macq.</i>		
<i>maculata</i> <i>Rossi</i>	. . .	Eur. mer., Af. sept.
? <i>fasciculata</i> <i>Vill.</i>	. . .	et Cap. B.S.,
		Asia min.
<i>epargyra</i> <i>Herm.</i>	. . .	Asia min.
* <i>fuscipennis</i> <i>Macq.</i>	. . .	Eur. mer., Af. sept.

ECLIMUS *Lw.*

<i>THEVENETIMYIA</i> <i>Bigot</i>		
<i>EPIBATES</i> <i>O. Sack.</i>		
<i>gracilis</i> <i>Lw.</i>	. . .	Asia min.
? <i>venosus</i> <i>Bigot</i>		
<i>hirtus</i> <i>Lw.</i>	. . .	Acarmania
<i>perspicillaris</i> <i>Lw.</i>	. . .	Archipelagus
* <i>Quedenfeldti</i> <i>Engel</i>	. . .	Algeria

AMICTUS *Wied.*

<i>THILIPSOMYZA</i> <i>Wied.</i>		
<i>TRUQUIA</i> <i>Rond.</i>		
<i>THLYPSOGASTER</i> <i>Rond.</i>		
<i>scutellaris</i> <i>Lw.</i>	. . .	Asia min.
<i>insignis</i> <i>Lw.</i>	. . .	Turkestan
<i>nobilis</i> <i>Lw.</i>	. . .	Turkestan
<i>latifrons</i> <i>Lw.</i>	. . .	Transcaspia
<i>variegatus</i> <i>Waltl</i>	. . .	Hispania, Af. sept.
<i>strigilatus</i> <i>Lw.</i>	. . .	Rhodus, Af. sept.,
		Asia min.
<i>pictus</i> <i>Lw.</i>	. . .	Corfu, Africa sept.
<i>setosus</i> <i>Lw.</i>	. . .	Asia min.
<i>zinamominus</i> <i>Beck.</i>	. . .	Algeria
<i>validus</i> <i>Lw.</i>	. . .	Asia min., Cyprus
<i>compressus</i> <i>Wied.</i> (fig. nec descr.)		
* <i>insularis</i> <i>Rond.</i>	. . .	Archipelagus
* <i>compressus</i> <i>Wied.</i> (descr. nec fig.) (? <i>Fabr.</i>)	. . .	Hispania, Algeria
<i>tener</i> <i>Beck.</i>	. . .	Algeria

?

* <i>castaneus</i> <i>Macq.</i>	. . .	Algeria
* <i>heteropterus</i> <i>Macq.</i>	. . .	Algeria
<i>oblongus</i> <i>Fabr.</i>	. . .	Africa sept.
<i>pulchellus</i> <i>Macq.</i>	. . .	Algeria

CYLLENIA *Latr.*

<i>maculata</i> <i>Latr.</i>	. . .	Eur. mer.
? <i>rustica</i> <i>Rossi</i>		
<i>obsoleta</i> <i>Lw.</i>	. . .	Asia min.
<i>marginata</i> <i>Lw.</i>	. . .	Asia min.
<i>globiceps</i> <i>Lw.</i>	. . .	Turkestan
* <i>lævis</i> <i>Bigot</i>	. . .	Tunisia

TOMOMYZA *Wied.*

<i>STOMYLOMYIA</i> <i>Bigot</i>		
<i>europæa</i> <i>Lw.</i>	. . .	Hungaria, Rho-
? <i>leonina</i> <i>Bigot</i>		dus, Asia min.
<i>tenella</i> <i>Lw.</i>	. . .	Hispania
<i>fornicata</i> <i>Lw.</i>	. . .	Syria

SYSTROPINÆ.

SYSTROPUS *Wied.*

<i>CEPHENES</i> <i>Latr.</i>		
<i>Barbiellinii</i> <i>Bezzi</i>	. . .	China
<i>polistoides</i> <i>Westw.</i>	. . .	China
.		
<i>chinensis</i> <i>Bezzi</i>	. . .	China

ANTHRACINÆ.

CALLISTOMA Macq.

- fascipennis Macq. . . Græcia, Creta, As.
min., Af. sept.
soror Lw. Turkestan
desertorum Lw. Turkestan

MULIO Latr.

- CYTHEREA Fabr.
CHALCOCHITON Lw.
GLOSSISTA Rond.
LOGCOCERIUS Rond.
tauricus Beck. Asia min.
obscurus Fabr. Eur. mer., Asia
min., Af. sept.
trifarius Beck. Algeria
infuscatus Meig. Gallia mer.,
Hispania
*cinereus Fabr. Marocco
delicatus Beck. Tunisia
maroccanus Beck. Africa sept.
nucleorum Beck. Syria
argyrocephalus Macq. Africa sept.
farinosus Lw. Transcaspia
dispar Lw. Transcaspia
barbarus. Sack Tunisia
fenestratus Lw. Transcaspia
fenestrulatus Lw. Transcaspia
alexandrinus Beck. Ægyptus
transcaspicus Beck. Transcaspia
carmelitensis Beck. Syria, Asia min.
aureus Fabr. Eur. mer., Asia
min., Af. sept.
? punctipennis Macq.
claripennis Beck. Transcaspia
persicanus Beck. Persia
*brevirostris Oliv. Gallia
albifrons Lw. Transcaspia
fratellus Beck. Transcaspia
argentifrons Macq. Africa sept.
lugubris Lw. Transcaspia
? aberrans (Cyllenia) Walk. (1852)
holosericeus Fabr. Eur. mer., Af. sept.
semiargenteus Macq.
aberrans (Cyllenia) Walk. (1849)
semiargyreus Strobl Hispania
Pallasii Lw. Eur. mer.
holosericeus Wied. (nec Fabr.)
melaleucus Lw. Transcaspia
melanoleucus Beck.
syriacus Lw. Syria
Pallasii Now. (nec Lw.)
speciosus Lw. Asia min.
frontalis Wied. Ægyptus, Turke-
stan, Asia min.

HYPERALONIA Rond.

- VELOCIA Coquill.
ferrea Walk. Eur. centr. et or.,
Rhodus
Tantalus Fabr. Japonia
cæruleipennis Dolesch.
Gebleri Lw. Japonia
Helena Lw. Ægyptus
gloriosa Walk.
*similis Coquill. Japonia

EXOPROSOPA Macq.

- TRINARIA Muls.
ARGYROSPILA Rond.
HETERALONIA Rond.
DEFILIPPIA Lioy
EXOPTATA Coquill.
*anus Wied. Ægyptus
*decrepita Wied. Ægyptus
*vetula Wied. Ægyptus
Minos Meig. Eur. mer., Africa
sept.
Germari Wied.
semialba Wied.
senilis Klug
albiventris Macq.
semiflavida Beck. Tunisia
Minois Lw. Rhodus, Asia
*squamea Muls. Gallia
dedecor Lw. Turkestan
stupida Rossi Eur. centr. et mer.
Rhadamanthus Meig.
chalcoides Wied.
var. Iris Lw. Græcia
*mucorea Klug Syria
*Letho Wied. Ægyptus
*Latona Wied. Ægyptus
rutila Wied. Eur. mer., Sibiria,
Transcaspia
Daubei Guer.
Miegi Duf.
interrupta Muls.
hilaris Erersm.
Tamerlan Portsch. Asia media
*griseipennis Macq. Ægyptus
*antica Walk. Arabia
*volitans Wied. Ægyptus, Græcia
normalis Lw.
algira Fabr. Eur. mer., Africa
sept.
pygmalion Macq. (nec
Fabr.)
sicula Macq.
archimedeia Bigot
singularis Macq. pt.
? var. suavipennis Macq.
fallaciosa Lw. Transcaspia
rivulosa (Klug) Beck. Ægyptus
bagdadensis Macq. Mesopotamia
*tephroleuca Lw. Africa sept.
bagdadensis var. Beck.
singularis Macq. Arabia, Ægyptus
*Olivierii Macq. Arabia
*nigrifera Walk. Ægyptus
nubeculosa Lw. Turkestan
latiuscula Lw. Transcaspia
occlusa Lw. Transcaspia
completa Lw. Transcaspia
melanoptera Wied. Transcaspia
delineata Beck. Tunisia
suffusa Klug Africa sept.
conturbata Lw. Rossia mer.
*disrupta Walk. Arabia
Pygmalion Fabr. Eur. mer., Africa
sept.
varinervis Macq.
rivularis Meig. Eur. mer., Africa
sept.
sabæa Meig. (nec F.)
argyrocephala Macq.
munda Lw. Sicilia
rivularis var. Griff.

<i>dispar</i> <i>Lw.</i>	. Rhodus
<i>rivularis</i> var. <i>Griff.</i>	
* <i>Busiris</i> <i>Jaenn</i>	. Ægyptus
.....	
<i>Æacus</i> <i>Meig.</i>	. Eur. mer., Africa
<i>livida</i> <i>Wied.</i>	sept.
<i>bombyciformis</i> <i>Duf.</i>	
<i>lutea</i> <i>Macq.</i>	
<i>Telamon</i> <i>Lw.</i>	. Archipelagus
.....	
<i>Jacchus</i> <i>Fabr.</i>	. Eur. mer., Africa
<i>italica</i> <i>Rossi</i>	sept.
? <i>Pandora</i> <i>Fabr.</i>	
<i>Jocchus</i> <i>Fabr.</i> (laps. cal.)	
? <i>Megara</i> (<i>Fabr.</i>) <i>Lw.</i> (laps. cal.)	
<i>picta</i> <i>Meig.</i>	
<i>Mænas</i> <i>Lw.</i>	. "Grusien"
<i>italica</i> <i>Meig.</i> (nec <i>Rossi</i>)	Hispania, Bavaria
var. <i>Megara</i> <i>Meig.</i>	(t. typ.)
(nec <i>Fabr.</i>)	
<i>baccha</i> <i>Lw.</i>	. Eur. mer.
<i>Cleomene</i> <i>Egger</i>	. Eur. centr. et sept.,
.....	Africa sept.
.....	
<i>capucina</i> <i>Fabr.</i>	. Eur., Amer. sept.
<i>caloptera</i> <i>Wied.</i>	
<i>Pandora</i> <i>Macq.</i> (nec <i>Fabr.</i>)	
? <i>californiæ</i> <i>Walk.</i>	
<i>dorcadion</i> <i>O. Sack.</i>	
<i>serpentata</i> <i>Lw.</i>	. Ægyptus
.....	
<i>grandis</i> <i>Wied.</i>	. Eur. mer., Asia,
<i>fasciata</i> <i>Duf.</i> (nec <i>Mg.</i>)	Africa sept.
<i>turcomana</i> <i>Portsch.</i>	
<i>Pallasii</i> <i>Wied.</i>	. Eur. mer., Arabia,
<i>rhymnica</i> <i>Eversm.</i>	Transcaspia
<i>Dionysii</i> <i>Bigot</i>	
<i>melæna</i> <i>Lw.</i>	. Persia sept.
<i>arenacea</i> <i>Beck.</i>	. Sahara
<i>adelpha</i> <i>Beck.</i>	. Tunisia
<i>Ægina</i> <i>Wied.</i>	. Ægyptus
<i>Bovei</i> <i>Macq.</i>	
<i>bovis</i> <i>Beck.</i> (laps. cal.)	
* <i>Herzi</i> <i>Portsch.</i>	. Corca
<i>flavofasciata</i> <i>Macq.</i>	. China sept.
* <i>monacha</i> <i>Klug</i>	. Syria
* <i>ferruginea</i> <i>Klug</i>	. Syria
.....	
* <i>Truquii</i> <i>Rond.</i>	. Cyprus
<i>Mayeti</i> <i>Bigot</i>	. Tunisia
* <i>lugubris</i> <i>Macq.</i>	. Arabia
<i>vespertilio</i> <i>Wied.</i>	. Eur. mer.
<i>Megerlei</i> <i>Meig.</i>	
<i>vesperugo</i> <i>A. Costa</i>	. Tunisia
* <i>phæoptera</i> <i>Meig.</i>	. Eur. centr.
* <i>noctilio</i> <i>Klug</i>	. Syria
* <i>consanguinea</i> <i>Macq.</i>	. Ægyptus
<i>pectoralis</i> <i>Lw.</i>	. Græcia, Cyprus
.....	
<i>zona</i> <i>Bigot</i>	. Sicilia
.....	
<i>chalybæa</i> v. <i>Röd.</i>	. Syria
?	
* <i>campicola</i> <i>Eversm.</i>	. Rossia mer.,
	Transcaspia

SPONGOSTYLUM *Macq.*

<i>pallipes</i> <i>Lw.</i>	. Asia min.
<i>flavipes</i> v. <i>Röd.</i>	. Asia min.
<i>Ocyale</i> <i>Wied.</i>	. Ægyptus
?	
* <i>Hippolyta</i> <i>Wied.</i>	. Ægyptus
* <i>irrorella</i> <i>Klug</i>	. Syria, Ægyptus
ARGYRAMCEBA <i>Schin.</i>	
<i>SPOGOSTYLUM</i> <i>Willist.</i>	
<i>COQUILLETIA</i> <i>Willist.</i>	
<i>ANTHRAX</i> (sens. <i>Bezzi</i>)	
<i>etrusca</i> <i>Fabr.</i>	. Eur. mer., Africa
<i>satyrus</i> <i>Rossi</i> (nec <i>F.</i>)	sept., Persia
<i>rubiginipennis</i> <i>Macq.</i> (descr. nec fig.)	
<i>formosa</i> <i>Duf.</i>	
<i>hetrusca</i> <i>Auct.</i>	
<i>nivea</i> <i>Rossi</i>	. Italia
var. <i>Liogi</i> <i>Griff.</i>	
<i>lepida</i> <i>Herm.</i>	. Asia min.
<i>anthracina</i> <i>Beck.</i>	. Ægyptus
<i>dedecor</i> <i>Herm.</i>	. Asia min.
<i>Isis</i> <i>Meig.</i>	. Eur. centr. et mer.,
var. <i>pilosula</i> <i>Strobl.</i>	Ægyptus
<i>niphæa</i> <i>Herm.</i>	. Transcaspia
<i>subnotata</i> <i>Wlk.</i> (nec <i>Mg.</i>)	Ægyptus
<i>bimotata</i> <i>Meig.</i>	. Eur. centr.
<i>subnotata</i> <i>Meig.</i>	
* <i>muscaria</i> <i>Klug</i> (nec <i>W.</i>)	Ægyptus, Syria
<i>trinotata</i> <i>Duf.</i>	. Hispania
<i>tripunctata</i> <i>Wied.</i>	. Eur. mer.
<i>difficilis</i> <i>Meig.</i>	
<i>lucida</i> <i>Beck.</i>	. Ægyptus
* <i>appendiculata</i> <i>Macq.</i>	
(1849).	. Algeria
* <i>appendiculata</i> <i>Macq.</i>	
(1855 nec 1849)	. China sept.
<i>trifasciata</i> <i>Meig.</i>	. Eur. centr. et mer.
<i>capitulata</i> <i>Muls.</i>	
<i>æthiops</i> <i>Laboulb.</i>	
<i>leucogaster</i> <i>Meig.</i>	. Corsica
<i>varia</i> <i>Fabr.</i>	. Eur. (nec Anglia),
	California
<i>trimaculata</i> <i>Beck.</i>	. I. Canariæ
<i>dentata</i> <i>Beck.</i>	. Tunisia
<i>virgo</i> <i>Egger</i>	. Italia, Gallia
var. <i>pedemontana</i> <i>Griff.</i>	
<i>velox</i> <i>Lw.</i>	. Græcia, Italia
<i>æthiops</i> <i>Fabr.</i>	. Eur. (nec Anglia)
<i>punctata</i> <i>Meig.</i>	
* <i>stictica</i> <i>Klug</i>	. Syria
<i>distigma</i> <i>Wied.</i>	. Japonia
<i>argyropyga</i> <i>Dolesch.</i>	
<i>tripunctata</i> v. <i>d. Wulp.</i>	
<i>sabulonis</i> <i>Beck.</i>	. Algeria
<i>inaurata</i> <i>Klug</i>	. Syria
<i>anthrax</i> <i>Schrank</i>	. Eur. (nec Anglia)
<i>morio</i> <i>Scop.</i> (L. pt.)	
<i>sinuata</i> <i>Meig.</i>	
?	
<i>polystigma</i> <i>Sack.</i>	. Povol.
<i>heteropyga</i> <i>Sack.</i>	. Græcia
<i>maculosa</i> <i>Sack.</i>	. Pamir
ANTHRAX <i>Scop.</i>	
TRYRIDANTHRAX <i>O. Sack.</i>	
<i>polyphemus</i> <i>Meig.</i>	. Eur. mer.
* <i>varipennis</i> <i>Macq.</i>	. Algeria

- fenestratus *Fall.* . . . Eur.
nigrita Fabr. pt.
maurus Meig.
variegatus Wied.
ornatus Curt.
- perspicillaris *Lw.* . . . Eur. mer., Tunisia
gallus *Lw.* . . . Gallia mer.,
fenestratus var. *Griff.* Tunisia
- hispanus *Lw.* . . . Hispania, Af. sept.
mutilus *Lw.* . . . Rhodus
indigenus *Beck.* . . . I. Canariæ
*plagiatus *Walk.* . . . Ægyptus
incanus *Klug.* . . . Africa sept.
? *testaceus Macq.*
- obliteratus *Lw.* . . . Græcia
stigmula *Klug.* . . . Syria, Ægyptus
griseolus *Klug.* . . . Syria
elegans *Meig.* . . . Eur. mer., Af. sept.
? *variegatus Jaenn.* (nec *Wied.*)
nebulosus *Duf.* . . . Hispania
occipitalis Lw.
nubilus Lw.
- misellus *Lw.* . . . Græcia, Archi-
pelagus
subarcuatus *Lw.* . . . Turkestan
nitidifasciatus *Portsch.* . . . Asia centr.
- ANTHRAX *Scop.*
HEMIPENTHES *Lw.*
- morio *L. pt.* . . . Eur. (nec Anglia),
semiater Meig. Amcr. sept.
morioles Say
seminiger Lw.
- lotus *Lw.* . . . Rhodus, Asia min.
vagans *Lw.* . . . Eur. mer., As. min.
*punctulatus *Macq.* . . . Gallia
punctatus Macq.
- *marginalis *Meig.* . . . Lusitania
*ægyptius *Macq.* . . . Ægyptus
syphax *Fabr.* . . . Africa sept.
Massinissa *Wied.* . . . Nubia
afer *Fabr.* . . . Eur. (nec Anglia),
Africa sept.
fimbriatus Meig.
abruptus *Lw.* . . . I. Canariæ, Caf-
fraria
- unctus *Lw.* . . . Rhodus, Asia min.
melanchlænus *Lw.* . . . Rhodus, Asia min.
afer var. *Griff.*
- inconspicuus *Lw.* . . . Ægyptus
maurus *L.* . . . Eur. (nec Anglia),
Siberia
denigratus L.
hirsutus Villers
Dæmon Panz.
bifasciatus Meig.
- uncinus *Lw.* . . . Ross. sept., Siberia
hamiferus *Lw.* . . . Siberia
præcisus *Lw.* . . . Siberia
velutinus *Meig.* . . . Eur. centr. et mer.,
Tunisia
? *morio Villers* pt.
? *holosericeus Meig.* (1804)
bicinctus Meig.
nycthemera Meig.
? *maurus Meig.*
- *arabicus *Macq.* . . . Arabia
*muscarius *Wied.* . . . Rossia mer.
? *afer Fabr.*
*minutus *Macq.* . . . Algeria
- occultus *Meig.* . . . Eur. centr. et
mer., Siberia
punctum *Lw.* . . . Italia, Græcia
.
- brunnipennis *Macq.*
(*Beck?*) . . . I. Canariæ
- PETROROSSIA *Bezzi*
- hesperus *Rossi* . . . Eur. mcr., Afr.
albipectus Walk. sept.
longitarsis *Beck.* . . . Africa sept.
angustoculatus *Beck.* . . . Ægyptus
- HYALANTHRAX *O. Sack.*
ASPILOPTERA *Künck.*
VILLA *Lioy*
- hottentottus *L.* . . . Eur. (nec Anglia?)
flaccus Meig.
- Paniscus *Rossi* . . . Eur.
cingulatus Meig. pt.
bimaculatus Macq.
hottentottus Walk.
- *canus *Meig.* . . . Gallia mer.
*bicingulatus *Macq.* . . . Naxos
distinctus *Meig.* . . . Hispania, Gallia
circumdatus *Meig.* . . . Eur.
hottentottus Schell.
? *modestus Meig.*
flavus Curt.
cingulatus Walk.
- *limbatus *Coquill.* . . . Japonia
venustus *Meig.* . . . Hispania, Gallia
dosus Jaenn. mer?
turbidus Lw.
- halteralis *Kow.* . . . Eur. (nec Anglia)
circumdatus Meig. pt.
cingulatus Zett. pt.
- fasciatus *Meig.* . . . Eur. mer.
cingulatus *Meig.* . . . Eur.
claripennis *Kow.* . . . Eur. centr.
*stœchades *Jaenn.* . . . Gallia mer.
*fasciventris *Macq.* . . . Algeria
stenozonus *Lw.* . . . Makri
quinquefasciatus *Meig.* . . . Eur. centr. et mer.
Ixion var. *Griff.*
- blandus *Lw.* . . . Makri, Siberia,
Asia min.
- *perfectus *Beck.* . . . Tunisia
Ixion *Fabr.* . . . Eur. centr. et mer.
Abbadon *Fabr.* . . . Eur. mer.
Abaddon Meig.
concinus Meig.
- leucostoma *Meig.* . . . Eur. mer.
melanurus *Lw.* . . . Hispania mer.
cuzonus *Lw.* . . . Hispania mer.
nizriceps *Macq.* . . . I. Canariæ
*margaritiferus *Duf.* . . . Hispania
*macrops *Portsch.* . . . Armenia
niphobletus *Lw.* . . . Asia min.
cingulum *Meig.* . . . Lusitania
senecio *Lw.* . . . Corfu, Ægyptus
*squamifer *Jaenn.* . . . Hispania, Gallia
pygarga *Lw.* . . . Asia min.
humilis *Ruthé* . . . Eur. centr. et mer.
mucidus Zell.
- albulus *Lw.* . . . Rhodus, Makri
humilis var. *Griff.*
senecio var. *Beck.*

<i>micrargyrus</i> Walk.	. Ægyptus	* <i>rufipes</i> Macq.	. . . Africa
* <i>niloticus</i> Jaenn.	. Abyssinia	<i>albifacies</i> Macq.	
* <i>uningulatus</i> Macq.	. I. Scio	* <i>tangerinus</i> Bigot	. . . Marocco
<i>ventruosus</i> Lw.	. Sicilia	<i>Circe</i> Klug	. . . Syria, Ægyptus
<i>ovatus</i> Lw.	. Rossia asiat.	* <i>erythrostomus</i> Rond.	. . . Persia sept.
<i>brunnescens</i> Lw.	. Syria	. . . . .
.		<i>inæqualis</i> Beck.	. . . Tunisia
<i>clarissimus</i> Lw.	. Cyprus, Syria, As.	* <i>stenogaster</i> A. Costa	. . . Sardinia
<i>cyprignus</i> Rond.	. . . min.	?	
<i>unicolor</i> Beck.	. Ægyptus	* <i>scutellatus</i> Meig.	. . . Bavaria
<i>nigrifrons</i> Macq.	. I. Canariæ	* <i>suffusus</i> Walk. (nec Klug)	. . . Ægyptus
* <i>longipennis</i> Macq.	. Mesopotamia	* <i>nomas</i> Eversm.	. . . Kirghisia
		* <i>persicus</i> Macq.	. . . Persia

THEREVIDÆ.

PHYCUS Walk.

<i>SALENTIA</i> A. Costa	
<i>dispar</i> Meig.	. Eur. mer.
<i>fuscipennis</i> A. Costa	. Eur. mer.
<i>tristis</i> v. Röd.	

XESTOMYZA Wied.

<i>CHIONOPHORA</i> Egger	
<i>chrysanthemii</i> Fabr.	. Hispania, Af. sept.
<i>rhagioniformis</i> Duf.	
<i>heliomthemi</i> Duf. (laps. cal.)	
* <i>Kollari</i> Egger	. Dalmatia
<i>tuberculata</i> Beck.	. Tunisia
<i>costalis</i> Wied.	. Marocco
?	
* <i>culiciformis</i> Duf.	. Hispania
<i>calyciformis</i> Schin.	

BARYPHORA Lw.

? <i>TABUDA</i> Walk.	
? <i>PACHYRRHIZA</i> Phil.	
<i>speciosa</i> Lw.	. Archipelagus

DIALINEURA Rond.

<i>anilis</i> L.	. Eur.
<i>flavipes</i> Fabr.	
<i>sordida</i> Panz.	
? <i>albicans</i> Macq.	
<i>rufipes</i> Macq.	

PSILOCEPHALA Zett.

<i>eximia</i> Meig.	. Eur. (nec Anglia)
<i>laticornis</i> Lw.	. Eur. centr.
<i>quadripunctata</i> Lw.	. Turkestan
<i>melaleuca</i> Lw.	. Eur. centr. et mer.
<i>formosa</i> Lw.	. Turkestan
<i>melanostoma</i> Lw.	. Ægyptus
<i>imberbis</i> Fall.	. Eur. centr. et sept.
<i>mendicula</i> Lw.	. Sibiria
* <i>albata</i> Coquill.	. Japonia
<i>ardea</i> Fabr.	. Eur.
<i>rustica</i> Panz.	
<i>plebeia</i> Schrank	
<i>confinis</i> Fall.	
<i>ruficaudis</i> Meig.	
<i>fuscipennis</i> Cooke	
<i>fuscipennis</i> Meig.	. Eur. centr.
<i>nigrispennis</i> Ruthe	. Eur. centr. et sept.
<i>lapponica</i> Zett.	

<i>nuda</i> Lw.	. . . Ægyptus
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?	
<i>nana</i> Wollast.	. I. Madeira
<i>Frauenfeldi</i> Lw.	. Ægyptus
<i>nigrifrons</i> Beck.	. Ægyptus

THEREVA Latr.

<i>EXAPATA</i> Macq.	
<i>flavescens</i> Lw.	. Asia min.
<i>lutescens</i> Lw.	. Rossia mcr.
<i>subfasciata</i> Schumm.	. Eur. centr.
* <i>flavilabris</i> Meig.	. Eur. centr.
<i>fulva</i> Meig.	. Eur. centr. et mer.
* <i>anthracoides</i> Macq.	. Sicilia
<i>nobilitata</i> Fabr.	. Eur.
<i>hirta</i> DeG.	
<i>nobilis</i> Gmel.	
<i>plebeia</i> Fall.	
? <i>cincta</i> Meig.	
var. <i>oculata</i> Egger	
<i>arcuata</i> Lw.	. Eur.
? <i>taniata</i> Meig.	
* <i>albilabris</i> Meig.	. Eur. centr.
<i>tristis</i> Lw.	. Italia mer.
* <i>subtilis</i> Lw.	. Sicilia
<i>tuberculata</i> Lw.	. Eur. mer.
<i>plebeia</i> L.	. Eur.
<i>monos</i> Harris	
<i>fasciata</i> DeG.	
<i>strigata</i> Fabr.	
<i>lugubris</i> Fabr.	
<i>rustica</i> Fall.	
<i>lugens</i> Lw.	
* <i>funebri</i> Meig.	. Eur. centr.
<i>lugubris</i> Meig. (1804) (nec Fabr.)	
<i>didyma</i> Lw.	. Eur. centr.
? <i>albigennis</i> Meig.	
<i>circumscripta</i> Lw.	. Eur. centr. et sept.
? <i>frontalis</i> Schumm. (nec Wied.)	
<i>ursina</i> Wahlb.	
<i>occulta</i> Beck.	. I. Canariæ
<i>spinulosa</i> Lw.	. Eur. mer.
* <i>claripennis</i> Lw.	. Asia min.
* <i>binotata</i> Lw.	. Sicilia
<i>bipunctata</i> Meig.	. Eur. centr. et sept.,
<i>unicus</i> Harris	. Africa sept.
var. <i>canescens</i> Zett.	
* <i>nervosa</i> Lw.	. Rossia, Sibiria

<i>marginula</i> Meig. . . . .	. Eur. centr. et sept.	<i>præcox</i> Egger . . . . .	. Eur. centr.
? <i>marginata</i> Rossi		. . . . .
<i>albipennis</i> Zett.		<i>lunulata</i> Zett. . . . .	. Eur. sept.
<i>fuscinervis</i> Zett. . . . .	. Eur. sept.	<i>frontata</i> Beck. . . . .	. I. Canariæ
<i>lanata</i> Zett. . . . .	. Eur. sept.	* <i>cæsia</i> Meig. . . . .	. Bavaria
<i>vetula</i> Zett.		* <i>alpina</i> Egger . . . . .	. Eur. centr.
<i>pæcilopectera</i> Lw. . . . .	. Sicilia, Hispania, Tunisia	<i>valida</i> Schin. (nec Lw.)	
* <i>spiloptera</i> Wied. . . . .	. Africa sept.	<i>aurata</i> Lw. . . . .	. Eur. mer., As. min.
* <i>punctipennis</i> Wied.	. Rossia mer.	var. <i>cauricincta</i> Egger	
* <i>pallipes</i> Lw. . . . .	. Rossia mer.	* <i>obtecta</i> Lw. . . . .	. Sicilia
* <i>macularis</i> Wied. . . . .	. Ægyptus	* <i>valida</i> Lw. . . . .	. Eur. centr.
* <i>thoracica</i> Macq. . . . .	. Ægyptus	<i>microcephala</i> Lw. . . . .	. Eur. centr.
<i>apicalis</i> Wied. . . . .	. Eur. centr. et mer.	* <i>brevicornis</i> Lw. . . . .	. Eur. mer.
<i>bivittata</i> Lw.		<i>nigripes</i> Lw. . . . .	. Eur. centr., Sibiria
<i>amœna</i> Kow. . . . .	. Eur. centr.	<i>rustica</i> Lw.	
<i>sybarita</i> Lw. . . . .	. Calabria	<i>superba</i> Egger . . . . .	. Eur. centr.
<i>annulata</i> Fabr. . . . .	. Eur.	<i>atripes</i> Lw. . . . .	. Rossia, Sibiria
<i>anilis</i> Fabr.		* <i>Rondanii</i> Jaenn. . . . .	. Helvetia
<i>pæcilopa</i> Lw. . . . .	. Rossia mer.		
<i>hebes</i> Lw.		CÆNOPHANOMYIA Bezzi	
* <i>citrina</i> Beck. . . . .	. Ægyptus	<i>CÆNOPHANES</i> Lw.	
* <i>bisignata</i> O. G. Costa . . . . .	. Italia mer.	<i>insignis</i> Lw. . . . .	. Cyprus, As. min., <i>appendiculata</i> v. Röd.
* <i>ruficornis</i> Gimm. . . . .	. Rossia		. Persia sept.
* <i>bicinctella</i> A. Costa . . . . .	. Sardinia	RUEPPELLIA Wied.	
* <i>nuba</i> Wied. . . . .	. Ægyptus	* <i>semiflava</i> Wied. . . . .	. Ægyptus

DERMATINA.

SCENOPINIDÆ.

SCENOPINUS Latr.		<i>niger</i> DeG. . . . .	. Eur. centr. et sept.
<i>ATRICHIA</i> Schrank		<i>fenestralis</i> (pt) Fabr.	
<i>CONA</i> Schell.		<i>rugosus</i> Fabr.	
<i>HYPSELURA</i> Meig.		<i>tarsatus</i> Pcz.	
<i>ASTOMA</i> Lioy		<i>ater</i> Fall.	
<i>fenestralis</i> L. . . . .	. Eur., Amer. sept.	<i>nigripes</i> Meig.	
<i>tardus</i> L. (t. Hal.)		<i>fasciatus</i> Walk. (nec Schrank)	
<i>spoliatus</i> Scop.		<i>lesinensis</i> Strobl . . . . .	. Dalmatia
<i>saltitans</i> Scop.		<i>glabrifrons</i> Meig. . . . .	. Eur. mer., Am. sept.
<i>senilis</i> Fabr.		<i>halteratus</i> Meig.	
<i>fasciatus</i> Schrank		<i>orbita</i> Meig.	
<i>pallipes</i> Say		<i>vitripennis</i> Meig.	
<i>sulcicollis</i> Meig.		<i>lævifrons</i> Lw.	
<i>domesticus</i> Meig.		<i>nitidulus</i> Lw. . . . .	. Transcaspia
<i>rufitarsis</i> Meig.		<i>albicinctus</i> Rossi . . . . .	. Eur. mer.
<i>furcinervis</i> Zett.		<i>Zelleri</i> Lw.	
<i>graminicola</i> Zett.		<i>clausus</i> Lw. . . . .	. Transcaspia
<i>opaculus</i> Lw. . . . .	. Rossia mer.	<i>limpidipennis</i> Lw. . . . .	. Persia sept.
<i>brevicornis</i> Lw. . . . .	. Rossia mer.	<i>lucidus</i> Beck. . . . .	. Ægyptus
<i>varipes</i> Lw. . . . .	. Rossia mer.	<i>niveus</i> Beck. . . . .	. Tunisia

MYDAIDÆ.

LEPTOMYDAS Gerst.		<i>algericus</i> Gerst. . . . .	. Africa sept.
<i>lusitanicus</i> Meig. . . . .	. Hispania, Corsica, Af. sept.	<i>vittatus</i> Macq. (nec Wied.)	
<i>fulviventris</i> Duf.		<i>claripennis</i> Beck. . . . .	. Tunisia
* <i>lineatus</i> Oliv. . . . .	. Ægyptus	<i>cinctus</i> Macq. . . . .	. Algeria
* <i>maculatus</i> Walk. . . . .	. Arabia		
* <i>sardous</i> A. Costa . . . . .	. Sardinia	RHOPALIA Macq.	
		<i>Spinolæ</i> Macq. . . . .	. Ægyptus
EREMOMYDAS Semen.		* <i>Olivieri</i> Macq. . . . .	. Ægyptus
* <i>chan</i> Semen. . . . .	. Transcaspia		
* <i>emir</i> Semen. . . . .	. Transcaspia	PERISSOCERUS Gerst.	
SYLLEGOMYDAS Beck.		* <i>cylindricornis</i> Portsch. . . . .	. Transcaspia
* <i>vittatus</i> Wied. . . . .	. Africa sept.	* <i>transcaspicus</i> Portsch. . . . .	. Transcaspia

ENERGOPODA.

ASILIDÆ.

ASILINÆ.

PROMACHUS *Lw.**TRUPANEA Macq.*

canus Wied. Rossia mer.
leoninus Lw. Græcia, Asia min.
leontochlænus Lw. Rossia mer.,
 Transcaspia

viridiventris Macq. China sept.
mustela Lw. Syria
microlabis Lw. Syria
maculatus Fabr. Eur. mer. et or., As.
rectangularis Lw. Ægyptus, Arabia

? *cinctipes Walk.*
Rueppellii Lw. Ægyptus

? *cincticolor Walk.*
 * *anicus Walk.* China sept.,
 Japonia
yesonicus Bigot
ater Coquill.

testaceipes Macq. China sept.
pallipennis Macq. China sept.
pictus Meig. Eur. centr. mer.
 et or.

consanguineus Macq. I. Canariæ
latitarsatus Macq. I. Canariæ
vexator Beck. I. Canariæ

.....
 * *cypricus Rond.* I. Cyprus
lacinosus Beck. Tunisia

?
 * *guineensis Wied.* I. Canariæ

ALCIMUS *Lw.*

* *ludens Wied.* Ægyptus
 * *albopilosus Macq.* China sept.

?
 * *ponticus Bigot* Persia

PHILODICUS *Lw.*

spectabilis Lw. Turkestan

PROCTACANTHUS *Macq.**ACANTHODELPHIA Bigot*

gigas Eversm. Rossia mer.
 * *niveus Macq.* Arabia
 * *minor Portsch.* Asia media
 * *Shah Rond.* Persia sept.

POLYSARCA *Schin.*

ungulata Wied. Rossia mer.
neptis Lw. Transcaspia
 * *violacca Schin.* Rossia

APOCLEA *Macq.*

* *algira Fabr.* Africa sept.
conicera Lw. Ægyptus
 * *illustris Schin.* Ægyptus
femoralis Wied. Ægyptus
micracantha Lw. Ægyptus
helva Wied. Ægyptus
pallida Macq.
fuscana Macq.

trivialis Lw. Transcas., Algeria
approximata Beck. Tunisia
helvipes Lw. Transcas., Algeria
 * *aberrans Schin.* Ægyptus

?
 * *vegeta Wied.* Ægyptus

POLYPHONIUS *Lw.*

lævigatus Lw. Græcia, Corfu,
 Rhodus

PHILONICUS *Lw.*

albiceps Meig. Eur., Sibiria,
 Japonia

? *delector Harris*
caescens Meig.
albibarbus Zell.
nudus Lw.

elutus Lw. Gallia mer., Sicilia
albiceps var. Pand.

ANTIPHRISSON *Lw.*

trifarius Lw. Eur. mer., Asia
 min., Tunisia

adpressus Lw. Asia min.
angustifrons Lw. Asia min.
elachypteryx Lw. Rossia mer.
fuligineus Lw. Rossia mer.
 * *aberrans Schin.* Hispania
 * *sareptanus Lichtw.* Rossia mer.
 * *Thalhammeri Lichtw.* Eur. mer.
 * *testaceicornis Macq.* China sept.
 (*Proctacanthus*)

ASILUS *L.*

barbarus L. Eur. mer., Af. sept.
crabroniformis L. Eur., Africa sept.
algirus Schrank (nec L.)
 * *lucidus Wied.* Caucasus, Persia

ECCOPTOPUS *Lw.*

CÆLOPUS Beck.
longitarsis Macq. Persia
erythrogastrus Lw. Hispania, Tunisia
lucidus Beck.
nitidus Beck. (laps. cal.)

RHADIURGUS *Lw.*

variabilis Zett. Eur. centr. et sept.
 Sibiria

PAMPONERUS *Lw.*

germanicus L. Eur.
niger DeG.
tibialis Fabr.
 var. *helveticus Mik*

GEN. ?

armatipes Macq. China sept.

ECHTHISTUS *Lw.*

rufinervis Wied. Eur. centr.
 ? *flavescens Macq.*
cognatus Lw. Eur. mer.
rufinervis Meig. pt.

ANTIPALUS *Lw.*

<i>varipes</i> <i>Meig.</i>	. Eur. (nec Anglia)
<i>rufinervis</i> <i>Meig.</i> pt.	
<i>xanthopygus</i> <i>Ruthe</i>	
<i>macrurus</i> <i>Ruthe</i>	
<i>aurifluus</i> <i>Zell.</i>	
<i>tenax</i> <i>Zell.</i>	
<i>flabellifer</i> <i>Pand.</i>	
<i>Krueperi</i> <i>Lw.</i>	. Græcia
<i>truncatus</i> <i>Lw.</i>	. Asia min.

PROTOPHANES *Lw.*

<i>punctipennis</i> <i>Meig.</i>	. Eur. centr. et mer.
? <i>barbatus</i> <i>Scop.</i>	
<i>punctatus</i> <i>Meig</i> (1804) (nec <i>Fabr.</i>)	
<i>atticus</i> <i>Lw.</i>	. Græcia, Rossia mer.
<i>crassicauda</i> <i>Lw.</i>	. Eur. centr. et or.
<i>tenuicornis</i> <i>Lw.</i>	. Archipelagus, Asia min.
<i>nubecula</i> <i>Lw.</i>	. Asia min.
* <i>varians</i> <i>Meig.</i>	. Eur. centr.
<i>varius</i> <i>Lw.</i>	
* <i>fuscidus</i> <i>Wied.</i>	. Rossia mer.

DYSMACHUS *Lw.*

<i>cristatus</i> <i>Meig.</i>	. Hispania, Algeria
* <i>albisetosus</i> <i>Macq.</i>	. Algeria
* <i>albisetula</i> <i>Beck.</i>	. Tunisia
<i>acutus</i> <i>Lw.</i>	. Hispania
* <i>spurius</i> <i>Lw.</i>	. Hispania
<i>cristatus</i> var. <i>Strobl.</i>	
<i>trigonus</i> <i>Meig.</i>	. Eur.
<i>albipilus</i> <i>Meig.</i>	
<i>pullus</i> <i>Meig.</i>	
<i>hispidus</i> <i>Zell.</i>	
<i>dasynotus</i> <i>Lw.</i>	. Hispania
.....	
<i>setiger</i> <i>Lw.</i>	. Asia min.
<i>albiciliatus</i> <i>Lw.</i>	. Ægyptus
<i>fuscipennis</i> <i>Meig.</i>	. Eur. centr. et mer., Asia min.
<i>spiniger</i> <i>Zell.</i>	
* <i>appendiculatus</i> <i>Schin.</i>	. Asia min.
<i>pauper</i> <i>Beck.</i>	. Algeria
.....	
<i>atripes</i> <i>Lw.</i>	. Hispania
<i>picipes</i> <i>Meig.</i>	. Eur. (nec Anglia)
? <i>forcipatus</i> <i>L.</i>	
<i>cinereus</i> <i>DeG.</i> pt.	
<i>forcipula</i> <i>Zell.</i>	
<i>mixtus</i> <i>Lw.</i>	
<i>tricuspis</i> <i>Lw.</i>	. Archipelagus, Asia min.
<i>præmorsus</i> <i>Lw.</i>	. Eur. centr.
<i>tridens</i> <i>Egg.</i>	
<i>harpax</i> <i>Villen.</i>	. Gallia
<i>falcularis</i> <i>Pand.</i>	
? <i>parvulus</i> <i>Meig.</i>	
<i>stylifer</i> <i>Lw.</i>	. Eur. centr.
<i>femoratellus</i> <i>Lw.</i>	. Hispania
<i>cephalenus</i> <i>Lw.</i>	. Corfu
<i>macropterus</i> <i>Lw.</i>	. Ægyptus
<i>bimucronatus</i> <i>Lw.</i>	. Eur. centr.
<i>hamulatus</i> <i>Lw.</i>	. Gallia mer.
<i>rotulans</i> <i>Pand.</i>	
<i>verticillatus</i> <i>Beck.</i>	. Tunisia

<i>bilobus</i> <i>Lw.</i>	. Rossia mer.
<i>stenogastrus</i> <i>Lw.</i>	. Turkestan
<i>bifurcus</i> <i>Lw.</i>	. Eur. centr.
? <i>varius</i> <i>Meig.</i>	
* <i>hiulcus</i> <i>Pand.</i>	. Gallia mer.
<i>cochleatus</i> <i>Lw.</i>	. Eur. mer.
<i>trilobus</i> <i>Strobl.</i>	. Bosnia
<i>dasyproctus</i> <i>Lw.</i>	. Corfu
* <i>fuscocinereus</i> <i>Macq.</i>	. Algeria
<i>basalis</i> <i>Lw.</i>	. Eur. centr.

EUTOLMUS *Lw.*

<i>mollis</i> <i>Lw.</i>	. Creta
<i>corsicus</i> <i>Schin.</i>	. Corsica, Sardinia
<i>vermicularis</i> <i>Pand.</i>	
<i>græcus</i> <i>Lw.</i>	. Græcia
<i>polypogon</i> <i>Lw.</i>	. Asia min.
<i>Sedakoffii</i> <i>Lw.</i>	. Sibiria
<i>pictipes</i> <i>Lw.</i>	. Eur. centr.
<i>calopus</i> <i>Lw.</i>	. Rhodus, Asia min.
<i>immaculatus</i> <i>Lw.</i>	. Turkestan
<i>lusitanicus</i> <i>Lw.</i>	. Lusitania
* <i>tephreus</i> <i>Meig.</i>	. Lusitania
<i>sinuatus</i> <i>Lw.</i>	. Eur. centr.
<i>periscelis</i> <i>Lw.</i>	. Rossia
* <i>flavopilosus</i> <i>Macq.</i>	. Algeria
* <i>hæmatoscelis</i> <i>Gerst.</i>	. Græcia
* <i>stratiotes</i> <i>Gerst.</i>	. Græcia
<i>Kiesenwetteri</i> <i>Lw.</i>	. Gallia mer.
<i>involvilis</i> <i>Pand.</i>	
<i>apiculatus</i> <i>Lw.</i>	. Asia min.
<i>rufibarbis</i> <i>Meig.</i>	. Eur.
<i>forcipatus</i> var. <i>major</i> <i>Fall.</i>	
<i>melampodius</i> <i>Zell.</i>	
<i>glauca</i> <i>Zett.</i>	
* <i>limbipennis</i> <i>Macq.</i>	. China sept.
* <i>Misao</i> <i>Macq.</i>	. China sept.
<i>facialis</i> <i>Lw.</i>	. Asia min.
* <i>scutellaris</i> <i>Coquill.</i>	. Japonia
.....	
<i>excisus</i> <i>Lw.</i>	. Asia min.
<i>decipiens</i> <i>Meig.</i>	. Hispania
<i>variegatus</i> <i>Meig.</i>	
<i>multicolor</i> <i>Schin.</i>	
<i>mordax</i> <i>Lw.</i>	. Rhodus
<i>parricida</i> <i>Lw.</i>	. Asia min.
<i>hyalopterus</i> <i>Lw.</i>	. Hispania
* <i>brevistylus</i> <i>Coquill.</i>	. Japonia
.....	
<i>leucacanthus</i> <i>Lw.</i>	. Hispania
<i>implacidus</i> <i>Lw.</i>	. Turkestan
.....	
<i>dorsiger</i> <i>Wied.</i>	. Africa sept.
? <i>scaurus</i> <i>Walk.</i>	

MACHIMUS *Lw.*

<i>cribratus</i> <i>Lw.</i>	. Sicilia, Tunisia
<i>concinus</i> <i>Lw.</i>	. Hispania, Gallia mer.
<i>dactyliferus</i> <i>Strobl.</i>	. Hispania
.....	
<i>chrysitis</i> <i>Meig.</i>	. Eur. centr. et mer.
<i>femorialis</i> <i>Zell.</i>	
<i>subdulus</i> <i>Lw.</i>	. Hispania
<i>fortis</i> <i>Lw.</i>	. Italia
<i>stenolabes</i> <i>Lw.</i>	. Græcia

- annulipes* *Brullé* . . . Eur. centr. et mer.
basalis *Lw.*

colubrinus *Meig.* . . . Eur. mer.
fimbriatus *Meig.*
 ? *cappuccinus* *A. Costa*
gratiosus *Lw.* . . . Asia min.
gonatistes *Zell.* . . . Eur. centr., Tunisia
rusticus *Meig.* . . . Eur. centr. occ. et
 obscurus *Meig.* . . . mer.
 genualis *Zell.*
 **cerdo* *Gerst.* . . . Græcia
atricapillus *Fall.* . . . Eur.
 opacus *Meig.*
 rufimanns *Meig.*
 plebeius *Meig.*
 subulatus *Lw.*
 bicornis *Zell.*
calceatus *Meig.* . . . Eur. centr.
 atricapillus var.?
madeirensis *Schin.* . . . I. Madeira
pilipes *Meig.* . . . Italia, Hispania,
 hispanus *Lw.* . . . Gallia mer.
 armatus *Jaenu. (nec Macq.)*
lacinulatus *Lw.* . . . Eur. centr.
dactyliferus *Strobl* . . . Hispania
oophorus *Lw.* . . . Hispania

dasypygus *Lw.* . . . Sicilia
 flaviscopula *Pand.*
minusculus *Bezzi* . . . Italia centr.
elegans *Lw.* . . . Asia min.

setibarbus *Lw.* . . . Eur. mer., Rhodus,
 ? *wigripes* *Macq.* . . . As. min., Tunisia
thoracicus *Lw.* . . . Asia min.
lugens *Lw.* . . . Eur. centr.
caliginosus *Meig.* . . . Eur. centr.
 apicatus *Lw.*
intermedius *Zett.* . . . Scandinavia
 ? *domitor* *Meig.*
cyanopus *Lw.* . . . Eur. centr.
modestus *Lw.* . . . Asia min.
 ?
 **ermineus* *Beck.* . . . ?
HELIGMONEURA *Bigot*
 MOCHTHERUS *Lw.*
 NEOMOCHTHERUS *O. Sack.*
illustris *Schin.* . . . Syria
Goliath *Schin.* . . . Syria, Tunisia
brunnipes *Fabr.* . . . Eur. mer., Africa
 castanipes *Meig.* . . . sept.
Goedli *Lw.* . . . Syria
ochriventris *Lw.* . . . Hispania

flavicornis *Ruthe* . . . Eur. centr. et mer.,
 Olivierii *Macq.* . . . Japonia
flavipes *Meig.* . . . Eur. centr. et mer.
 **sicula* *Macq.* . . . Sicilia
 **malacias* *Gerst.* . . . Græcia
munda *Lw.* . . . Archipelagus
 ? *analis* *Macq. (nec Fabr.)*
lepida *Lw.* . . . Hispania
longitudinalis *Lw.* . . . Ægyptus
pallipes *Meig.* . . . Eur. centr.
 fulvipes *Meig.*
 omissa *Meig.*
Schineri *Egg.* . . . Eur. centr.
striatipes *Lw.* . . . Eur. centr. et mer.
eulabes *Lw.* . . . Turkestan
albicans *Lw.* . . . Asia min.
 **arabica* *Macq.* . . . Arabia

farinosa *Lw.* . . . Turkestan
tridentata *Lw.* . . . Turkestan
 ?
 **pallens* *Wied.* . . . Transcaspia
 **fuscifemorata* *Macq.* . . . I. Canariæ
 **ægyptia* *Macq.* . . . Ægyptus
 **bicolor* *Oliv.* . . . Gallia
STILPNOGASTER *Lw.*
æmulus *Meig.* . . . Eur. centr. et sept.
 nigricans *Macq.*
 stabilis *Zell.*
 var. *setiventris* *Zett.*
NEOITAMUS *O. Sack.*
 ITAMUS *Lw.*
cyanurus *Lw.* . . . Eur.
 ? *forcipatus* var. *L.*
 ? *æstivus* *Schrank (nec Scop.)*
 tipuloides *Harris (nec L.)*
 ? *niger* *DeG.*
 tibialis *Fall. (nec Fabr.)*
 ? *tabidus* *Meig.*
 **cyaneocinctus* *Pand.* . . . Eur. mer.
socius *Lw.* . . . Eur. centr. et sept.
 æstivus *Meig. pt.*
cothurnatus *Meig.* . . . Eur. centr. et sept.
 æstivus *Zett. pt.*
flavimystaceus *Macq.* . . . Algeria
angusticornis *Lw.* . . . Japonia
 **virgatipes* *Coquill.* . . . Japonia
 **impudicus* *Gerst.* . . . Græcia
univittatus *Lw.* . . . Sibiria
maculifemora *Macq.* . . . China sept.
 ?
 **dasymallus* *Gerst.* . . . Græcia
EPITRIPTUS *Lw.*
cingulatus *Fabr.* . . . Eur.
 maculosus *Harris*
 annulatus *Macq. (nec Fabr.)*
 striatus *Meig. pt.*
micans *Meig.* . . . Gallia
el kantaræ *Beck.* . . . Tunisia
 **Osiris* *Wied.* . . . Ægyptus
setosulus *Zell.* . . . Eur. centr.
 inconstans *Meig. (t. Paud.)*
 striatus *Macq. (nec Fabr.)*
 namus *Lw.*
dimidiatus *Macq.* . . . I. Canariæ
major *Beck.* . . . Tunisia
 **syriacus* *Schin.* . . . Syria
inconstans *Meig.* . . . Eur. mer., Af. sept.,
 cuticiformis *W. (nec F.)* . . . I. Canar., As. min.
 **biparvitus* *Macq.* . . . Algeria
cervinus *Lw.* . . . Ægyptus
senex *Meig.* . . . Lusitania
arthriticus *Zell.* . . . Eur. centr.

<i>auriflua Gerst.</i>	. Græcia
<i>flava</i> var. <i>Portsch.</i>	
<i>ephippium Fabr.</i>	. Eur. (nec Anglia)
? <i>dorsalis DeG.</i>	
<i>flava</i> var. <i>Portsch.</i>	
<i>gibbosa L.</i>	. Eur. centr. et sept.
<i>bombylius DeG.</i>	
* <i>anthrax Meig.</i>	. Eur. centr.
* <i>bomboides Macq.</i>	. Algeria
<i>empyrea Gerst.</i>	. Græcia
.....	
<i>aurea Fabr.</i>	. Eur. centr. et mer.
<i>lutea Meig.</i>	
<i>dizonias Lw.</i>	. Asia min.
.....	
<i>ignea Meig.</i>	. Eur. centr. et sept.
<i>gilva Meig.</i> 1804 (nec <i>L.</i>)	
<i>gilva L.</i>	. Eur. centr. et sept. Amer., sept.
<i>rufa DeG.</i>	
<i>bilineata Walk.</i>	
<i>abdominalis Walk.</i>	
<i>dimidiata Lw.</i> (nec <i>Macq.</i>)	Asia min.
.....	
<i>fimbriata Meig.</i>	. Eur. centr. et mer.
<i>fulva Meig.</i>	. Eur. centr. et mer.
<i>proboscidea Lw.</i>	
<i>aurifera Schin.</i> (l. c.)	
<i>Galathei A. Costa</i>	. Italia mer.
var. <i>minor A. Costa</i>	
<i>ursula Lw.</i>	. Rossia
* <i>nitidula F.</i>	. Italia
* <i>chrysocephala Meig.</i>	. Alpes occ.
<i>marginata L.</i>	. Eur.
<i>nigra Scop.</i>	
<i>femorata Meig.</i>	
<i>podagrica Meig.</i>	
<i>fulgida Meig.</i>	
<i>dioctriaformis Meig.</i>	
<i>aeneiventris A. Costa</i>	. Italia mer.
<i>fuliginosa Panz.</i>	. Eur. centr. et mer., Asia min.
<i>auribarbis Meig.</i>	
<i>cincta Meig.</i> (nec <i>F.</i>)	
* <i>Rueppellii Wied.</i>	. Ægyptus
.....	
<i>rufipes Fall.</i>	. Eur. centr. et sept.
<i>lapponica Zett.</i>	. Eur. sept. Sibiria
<i>rufipes Zett.</i> pt. (1832)	
* <i>tibialis Meig.</i>	. Eur. centr.
.....	
<i>venatrix Lw.</i>	. Sicilia
? ?	
* <i>dispar Coquill.</i>	. Japonia
* <i>Mitsukurii Coquill.</i>	. Japonia
* <i>meridionalis Muls.</i>	. Corsica
* <i>coarctata Duf.</i>	. Hispania
* <i>scutellata Macq.</i>	. Gallia
<i>limbata Macq.</i>	

DASYPOGONINÆ.

ISOPOGON *Lw.*

<i>LEPTARTHURUS Steph.</i> (nom. cat.)
? <i>APHAMARTANIA Schin.</i>
? <i>PYGOSTOLUS Lw.</i>
? <i>NICOCLES Jaenn.</i>

<i>brevirostris Meig.</i>	. Eur. occ. centr. et mer.
<i>armillatus Fall.</i>	
<i>longitarsis Fall.</i>	
<i>apicalis v. Ros.</i>	
<i>rufitibialis (Cyrtopogon?) Bigot</i>	
<i>caudatus (Dasypogon) Bigot</i>	
<i>vitripennis Meig.</i>	. Eur. (nec Anglia?)
? <i>hottentottus Fabr.</i>	
<i>hyalipennis Meig.</i> (nec <i>Fabr.</i>)	
<i>elatus Meig.</i>	
.....	
<i>syriacus Schin.</i>	. Syria

CENOPOGON *v.d. Wulp*

? <i>LAPARUS Lw.</i>	
<i>volcatus Walk.</i>	. China sept.
<i>hypsaon Walk.</i>	
<i>bifidus v.d. Wulp.</i>	
<i>cerco Walk.</i>	

SAROPOGON *Lw.*

<i>melampyrgus Lw.</i>	. Syria, Arabia
<i>confluens Lw.</i>	. Syria
<i>clausus Beck.</i>	. Algeria
<i>Lamperti Beck.</i>	. Algeria
<i>Vosseleri Beck.</i>	. Algeria
<i>longicornis Macq.</i>	. Ægyptus
.....	
<i>obscuripennis Macq.</i>	. Africa sept.
<i>notatus Lw.</i>	. Græcia
<i>luctuosus Meig.</i>	. Eur. mer.
<i>nigripennis O. G. Costa</i>	
var. <i>ticinensis Bezzi</i>	. Italia
<i>laticinctus Beck.</i>	. Tunisia
<i>pollinosus Lw.</i>	. Asia min., Tunisia
<i>alternatus Lw.</i>	. Transcaspia
<i>axillaris Lw.</i>	. Italia, Sardinia
<i>comosus Lw.</i>	. Corsica
<i>flavicinctus Meig.</i>	. Lusitania, Hispania
* <i>senex Duf.</i>	. Hispania
<i>aberrans Lw.</i>	. Hispania
<i>micropterus Lw.</i>	. Græcia
<i>jugulum Lw.</i>	. Græcia, Af. sept., Asia min.
<i>Ehrenbergii Lw.</i>	. Syria
<i>atricolor Lw.</i>	. Rhodus
<i>pittoproctus Lw.</i>	. Transcaspia
<i>geniculatus Lw.</i>	. Rossia mer.
<i>leucocephalus Meig.</i>	. Gallia mer., Hispania
var. <i>hispanicus Strobl</i>	
<i>frontalis Lw.</i>	. Hispania, Algeria
<i>platynotus Lw.</i>	. Asia min.
<i>sodalis Lw.</i>	. Hispania
var. <i>setulosus Lw.</i>	
<i>scutellaris Meig.</i>	. Hispania
<i>obesulus Lw.</i>	. Hispania
<i>fucatus Lw.</i>	. Hispania
<i>eucerus Lw.</i>	. Asia min.
<i>dasynotus Lw.</i>	. Turkestan
?	
<i>distinctus Beck.</i>	. Algeria
<i>vestitus Wied.</i>	. Ægyptus
<i>ægyptius Macq.</i>	. Ægyptus, Algeria
<i>aurifrons Macq.</i>	. Algeria
<i>Olivieri Macq.</i>	. Ægyptus

- perlatus *A. Costa* . . . Sardinia
 *rufipes *Gimm.* . . . Rossia mer.
 varians *Bigot* . . . Tunisia

SELIDOPOGON *Rond.*CHEILOPOGON *Rond.*

- diadema *Fabr.* . . . Eur. centr. et mer.,
 punctatus Fabr. . . . Asia min.
 bohemicus Preyssl.
 analis Fabr.
 nervosus Meig.
 liburnicus Meig.
 umbrosus Brullé
 sicanus A. Costa
 *melanopterus *Lw.* . . . Hispania
 diadema var. Strobl
 octonotatus *Lw.* . . . Rossia mer.
 *variabilis *Brullé* . . . Eur. mer. et or.
 *cylindricus *Fabr.* . . . Eur. centr. et mer.
 fasciatus Meig.
 punctatus (pt.) Zell.
 diadema var. Strobl
 crassus *Macq.* . . . Africa sept.
 atratus *Fabr.* . . . Africa sept.
 Gougeleti *Bigot* . . . Marocco
 *Olcesci *Bigot* . . . Marocco

DASYPOGON *Meig.*

- teutonus *L.* . . . Eur. centr. et mer.
 tenthredoides Scop.
 egregius *Lw.* . . . Transcaspia
 rubidus *Herm.* . . . "Issyk-Kul"
 japonicus *Bigot* . . . Japonia
 pekinensis *Bigot* . . . China sept.
 subauratus *Walk.* . . . China sept.

MICROSTYLUM *Macq.*MEGAPOLLYON *Walk.*

- dux *Wied.* . . . China sept.
 sinense Macq.
 shalumus Walk.
 spectrum var. Walk.
 *spectrum *Wied.* . . . China sept.
 flaviventre *Macq.* . . . China sept.

STENOPOGON *Lw.*GONIOSCELIS *Schin.*

- coracinus *Lw.* . . . Eur. centr. et mer.
 bicolor *Bigot* . . . Eur. mer.
 milvus *Lw.* . . . Rhodus
 harpax *Lw.* . . . Rossia mer.
 elongatus *Meig.* . . . Eur. centr. et mer.,
 Loewii Schin. . . . Asia min.
 tristis *Meig.* . . . Eur. centr.
 callosus *Wied.* . . . Eur. centr. mer. et
 or.
 macilentus *Lw.* . . . Hungaria
 Roederii *Bezzi* . . . Italia
 sabaudus *Fabr.* . . . Eur. mer.
 occultus *Lw.* . . . Eur. centr.
 xanthotrichus *Brullé*
 græcus Lw.
 pyrrius *Lw.* . . . Turkestan
 xanthomelas *Lw.* . . . Asia min.
 nigriventris *Lw.* . . . Asia min.
 mollis *Lw.* . . . Asia min.
 lævigatus *Lw.* . . . Asia min.
 melanostolus *Lw.* . . . Asia min.

- tanygastrus *Lw.* . . . Hispania
 cervinus *Lw.* . . . Hispania, Af. sept.
 semitestaceus *Lw.* . . . Rossia mer.
 denudalus *Lw.* . . . Hispania
 costatus *Lw.* . . . Hispania, Af. sept.
 var. escorialensis Strobl
 fulvus *Meig.* . . . Hispania
 ochripes *Lw.* . . . Hispania
 var. escalerae Strobl
 brevipennis *Meig.* . . . Lusitania
 junceus *Meig.* . . . Gallia mer., His-
 pania
 ochreatus *Lw.* . . . Græcia, Asia min.
 *antar *Schin.* . . . Asia min.
 *strategus *Gerst.* . . . Græcia
 *Wolfii *Mik* . . . Caucasus
 *schisticolor *Gerst.* . . . Græcia
 *arabicus *Macq.* . . . Arabia
 *Csikii *Strobl.* . . . Sibiria
 *Kolenati *Gimm.* . . . Caucasus
 *pyrrhomus *Wied.* . . . Rossia mer.
 Scheno *Walk.* . . . Tnnisia

SCLEROPOGON *Lw.*

- rufipilus *Lw.* . . . Caucasus
 Sciron *Lw.* . . . Transcaspia
 Theseus *Lw.* . . . Transcaspia
 porcus *Lw.* . . . Turkestan
 avus *Lw.* . . . Persia sept.
 superbus *Portsch.* . . . Persia sept.
 heteroneurus *Macq.* . . . Algeria
 Scheno *Walk.* . . . Tunisia

TRICLIS *Lw.*CORMANSIS *Walk.*GASTRICHELIUS *Rond.*

- hæmorrhoidalis *Fabr.* . . . Eur. mer., Af. sept.
 nubeculipennis A. Costa
 olivaceus *Lw.* . . . Italia
 ornatus *Schin.* . . . Hispania, Af. sept.
 *Pallasii *Wied.* . . . Ross. mer., As. min.
 *octodecimnotatus *A.* . . . Sicilia
 Costa

PERASIS *Herm.*

- sareptana *Herm.* . . . Sarepta
 violacea *Beck.* . . . Algeria
 postica *Beck.* . . . Algeria

STROBILOTHRIX *Beck.*

- albipila *Beck.* . . . Algeria

HOPLISTOMERUS *Macq.*

- auriventris *Lw.* . . . Ægyptus

SISYRNODYTES *Lw.*

- brevis *Macq.* . . . Africa sept.
 floccus Lw.
 contrarius Walk.
 *nilicola *Rond.* . . . Ægyptus

ANAROLIUS *Lw.*

- jubatus *Lw.* . . . Asia min.
 fronto *Lw.* . . . Transcaspia

RHADINUS *Lw.*

- megalonyx *Lw.* . . . Ægyptus
 unguinus *Lw.* . . . Ægyptus

ACNEPHALLUM *Macq.*

Olivierii Macq. . . . Archipelagus,
Rossia mer.

AMPHISBETETUS *Herm.*

favillaceus Lw. . . . Eur. mer., As. min.
affinis Herm. . . . Africa sept.
leucomallus Lw. . . . Turkestan

CROBILOCERUS *Lw.*

megilliformis Lw. . . . Eur. mer., As. min.

PYCNOPOGON *Lw.*

fasciculatus Lw. . . . Eur. mer.
pallidipennis Brullé . . . Græcia, Asia min.
apiformis Lw.
apiformis Macq. . . . Algeria
mixtus Lw. . . . Asia min.
anthophorinus Lw. . . . Asia min.
lanigerus Duf. . . . Hispania
melanostomus Lw. . . . Persia sept.
leucostomus Lichtw. . . . Armenia
cinctus Lichtw. . . . Turkestan

HYSTRICHOPOGON *Herm.*

hirticeps Herm. . . . Asia centr.

CYRTOPOGON *Lw.*

EUARMOSTUS Walk.

ruficornis Fabr. . . . Eur. centr. et mer.
maculipennis Macq. . . . Eur. centr.
flavimanus ♀ *Meig.*
monticola Schumm.
litura Zell.
flavimanus Meig. . . . Eur. centr. et sept.
var. *nigrimanus Jaenn.* Eur. centr.
fulvicornis Macq. . . . Eur. centr. et mer.
interruptus Meig.
? *erythroceros Schumm.*
ochrocerus Duf.
var. *varicornis Bezzi*
luteicornis Zett. . . . Eur. sept.
pulchripes Lw. . . . Sibiria
centralis Lw. . . . Ross. sept., Sibiria
lateralis Fall. . . . Eur. centr. et sept.
fimbriatus Meig.
flicornis Lw. . . . Turkestan
**pictipennis Coquill.* . . . Japonia
lapponicus Zett. . . . Eur. sept.
**culminum Bigot* . . . Alpes
montanus Bigot (nec Lw.)
annulatus Herm. . . . Turkestan
quadripunctatus Herm. Turkestan
.
Meyer-Dürrii Mik . . . Alpes
quadrizonatus Lw.
oculiferus Bigot
.
tenuibarbus Lw. . . . Hispania

EUPALAMUS *Jaenn.*
longibarbus Lw. . . . Alpes
alpestris Jaenn.

LASIOPOGON *Lw.*
DAULOPOGON Lw.
cinctus Fabr. . . . Eur.
hirtellus Fall.
cinctellus Meig.

montanus Schin. . . . Eur. centr.

Macquarti Schin. (nec Perris)

Bellardii Jaenn.

var. *immaculatus Strobl*

**Macquarti Perris.* . . . Gallia mer.

pilosellus Lw. . . . Eur. centr.

? *hirtellus Meig. (nec Fall.)*

tarsalis Lw. . . . Ephesus

STICHOPOGON *Lw.*

PHILAMMOSIUS Rond.

scaliger Lw. . . . Eur. centr. et mer.

congener Lw. . . . Ægyptus

barbistrellus Lw. . . . Eur. centr.

spinimanus Pok. . . . Tirolia

septemcinctus Beck. . . . I. Canariæ

tener Lw. . . . Eur. centr. et mer.,

? *elegantulus* ♂ *Meig.* Ægyptus

Frauenfeldi Egg.

inæqualis Lw. . . . Eur. centr.

? *elegantulus* ♀ *Meig.*

riparius Lw. . . . Hispania

albellus Lw. . . . Ægyptus

albofasciatus Meig. . . . Eur. centr. et mer.

nigrifrons Lw.

Schineri Koch

arenivagus Koch

? *Dziedzickii Schnabl*

?

canariensis Beck. . . . I. Canariæ

candidus Beck. (nec Macq.) Africa sept.

**æquicinctus A. Costa* . . . Sardinia

**ripicola Duf.* . . . Hispania

**pygmæus Macq.* . . . Algeria

inconstans Wied. . . . Ægyptus, Arabia

chrysostoma Schin. . . . Eur. mer., Ægyptus, Asia min.

? *lucidiventris Beck.*

LAPHYSTIA *Lw.*

Erberi Schin. . . . Corfu

hispanica Strobl . . . Hispania

carnea Herm. . . . Asia centr.

.

latiuscula Lw. . . . Turkestan

sabulicola Lw. . . . Eur. centr. et mer.,
Asia min.

metallescens Herm. . . . Asia centr.

**brevipennis Meig.* . . . Hispania

selenis Herm. . . . Gobi

HETEROPOGON *Lw.*

aureus Beck. . . . Tunisia

elegans Beck. . . . Tunisia

pyrinus Herm. . . . "Ascabad"

flavibarbus Beck. . . . Algeria

manicatus Meig. . . . Gallia mer., His-
pania

scoparius Lw. . . . Asia min.

Manni Lw. . . . Asia min.

ornatipes Lw. . . . Eur. mer.

maurus Macq. . . . Algeria

succinctus Lw. . . . Græcia, Asia min.

lugubris Herm. . . . Asia centr.

ANISOPOGON (*Lw.*) *Herm.*

erinaceus Lw. . . . Hispania

Waltlii Meig. . . . Hispania

- rubigipennis* Macq. Algeria
glabellus v. *Röd.* Corfu, Asia min.
**punctiferus* Bigot Mauritania
(Stichopogon)
- ANCYLORRHYNCHUS** Latr.
XIPHOCERA Macq.
ENCHOCERA Blanch.
OPEGIOCERA Rond.
ELASMOCERA Rond.
glaucius Rossi Eur. mer.
pictus Wied.
brussensis Schin. Asia min.
gummigutta Beck. Algeria
variegatus Wied. Sibiria
limbatus Fabr. Hispania, Af. sept.
Laufferi Strobl Hispania
**longicornis* Schin. Sicilia
- SCYLATICUS** Lw.
semizonatus Beck. Sahara
**sp?* Turcia europ.
- HABROPOGON** Lw.
DACTYLISCUS Rond.
exquisitus Meig. Eur. mer., Algeria
appendiculatus Schin. Eur. mer.
latifrons Lw. Turkestan
longiventris Lw. Græcia, Asia min.
rubriventris Macq. Africa sept.
rutilus Meig. Hispania
pertusus Beck. I. Canariæ
Gujoti Herm. Sinai
striatus Fabr. Africa sept.
?
- *albibarbis* Macq. Eur. centr. et or.
**Doriæ* Rond. Persia sept.
- CERATURGUS** Wied.
**nubilus* Meig. Lusitania
dispar Lw. Amur
**brevis* Schin. Hispania
- PSEUDOHOLOPOGON** Strobl
chalcogastrus Duf. Hispania
- DIOCTRIA** Meig.
METHYLLA Hans.
celandica L. Eur. centr. et
lugubris Harris sept., Amer. mer?
var. limbata Lw.
Meyeri Now. Podolia
.
- Reinhardi* Meig. Eur., centr. et
cothurnata Meig. sept., Sibiria
umbellatarum Meig.
Meigenii Shuck.
lugens Lw. Transcaspia
atricapilla Meig. Eur.
nigripes Meig.
fuscipennis Fall.
geniculata Meig.
Falleni Meig.
atrata Meig.
var. rufimana Lw.
fuscipes Gimm. (nec Macq.)
- Kowarzi* Priv. Hungaria
claripennis Villen. Gallia
fuscipes Macq. Italia
melanopa Egger
melanopogon Schin.
œdipus Lw. Archipelagus
Harcyniæ Lw. Eur. centr.
gagates Meig. Lusitania
semihyalina Meig.
speculifrons Meig. Lusitania
var. gagatoides Strobl
.
- pollinosa* Lw. Hispania
rufipes DeG. (nec Fabr.) Eur.
cursor Harris
pratensis Oliv.
frontalis Fabr.
flavipes var. Fall.
meridionalis Bezzi Italia
laturata Lw. Eur. centr.
dispar Lw. Turkestan
aurifrons Meig. Eur. centr.
flavipennis Meig.
**ochrifacies* Beck. Tunisia
Baumhaueri Meig. Eur. centr. et occ.
informis Harris
hyalipennis Fabr. Eur. (nec Anglia),
flavipes Meig. Tunisia
varipes Meig.
frontalis Meig. (nec Fabr.)
anomala Macq.
rufipes Zell. pt.
linearis Fabr. Eur.
cingulata Zett.
flavipes Walk.
læta Lw. Eur. centr. et mer.
humeralis Zell. Eur. centr.
**maculata* Wied. Rossia mer.
calceata Meig. Eur. centr.
var. nigriventris Strobl
rufithorax Lw. Eur. centr.
rufa Strobl Hispania
**concinna* A. Costa Sardinia
**Wiedemanni* Meig. Gallia mer.
.
- gracilis* Meig. Eur. centr. et mer.,
hyalipennis Meig. (1830) Africa sept.
bicincta Meig. Eur. centr. et mer.
annulata Meig.
infuscata Meig.
Bigoti A. Costa
**flavicincta* v. *Röd.* Hispania
lateralis Meig. Eur. centr. et mer.,
hæmorrhoidalis Meig. Africa sept.
(nec Fabr.)
longicornis Meig. Eur. centr.
frontalis Panz. (nec Fabr.)
lateralis (pt.) Meig. (1804)
valida Lw. Syria
.
- lata* Lw. Eur. centr.
.
- arthritica* Lw. Transcaspia
nigribarba Lw. Eur. mer. et or.
?
- *cæsia* Wied. Tauria

ERIOPOGON *Lw.*

- laniger *Meig.* . . . Hispania, Africa
sept.
jubatus *Beck.* . . . Algeria

HOLOPOGON *Lw.*

- CERATURGUS Rond. (nec Wied.)*
dimidiatus *Meig.* . . . Eur. centr.
fuscipennis Meig.
tiuidus *Lw.* . . . Italia
albosetosus *Schin.* . . . Asia min.
*auribarbis *Meig.* . . . Eur. centr.
*brunnipes *Meig.* . . . Eur. centr.
nigripennis *Meig.* . . . Eur. centr.
venustus *Rossi* . . . Eur. centr. et mer.
minutus Fabr.
Iris Meig.
sculus *Macq.* . . . Italia
fumipennis *Meig.* . . . Eur. centr. et mer.
albipilus Meig.
nigrifacies *Bezzi* . . . Italia
fumipennis Bezzi (nec Meig.)
melaleucens *Meig.* . . . Gallia mer.
clavipes *Lw.* . . . Eur. centr.
laniger Zell. (nec Meig.)
claviger Lw. (laps. cal.)
*priscus *Meig.* . . . Eur. centr.
imbecillus *Lw.* . . . Turkestan
?
*flavescens *Jaenn.* . . . Gallia mer.
binotatus *Lw.* . . . Hispania
claripennis *Lw.* . . . Hispania
Heydenii *Lw.* . . . Hispania
var. castellanus Strobl
*melas *Duf.* . . . Hispania
rugiventris *Strobl* . . . Hispania
digrammus *Lw.* . . . Rossia mer.
nobilis *Lw.* . . . Græcia
*nitidus *Macq.* . . . Algeria
*pusillus *Macq.* . . . Algeria
*pusio *Macq.* . . . Algeria

OLIGOPOGON *Lw.*

- hybotinus *Lw.* . . . Rhodus

DASYPOGONINÆ *incertæ sedis*DASYPOGON *Meig.*

- *arenatus *Fabr.* . . . Italia
? *Fabricii Meig.*
*ruficauda *Fabr.* . . . Marocco
*longus *Macq.* . . . Ægyptus
*tenuis *Macq.* . . . Algeria
*nigriventris *Duf.* . . . Hispania

LEPTOGASTRINÆ.

LEPTOGASTER *Meig.**GONYPES Latr.*

- pubiceps *Lw.* . . . Græcia
*Pallasii *Wied.* . . . Rossia mer.
*variegata *Lw.* . . . Gallia
nitida Macq. (nec Wied.)
*basilaris *Coquill.* . . . Japonia
.
.
.
*nitida *Wied.* . . . Ægyptus
.
.
.
palparis *Lw.* . . . Turcia
subtilis *Lw.* . . . Italia
helvola *Lw.* . . . Turkestan
hispanica *Meig.* . . . Eur. centr. et mer.,
Tunisia
nigricornis Lw.
fumipennis *Lw.* . . . Græcia
guttiventris *Zett.* . . . Eur. centr. et sept.
cylindrica Meig. (nec DeG.)
? *pallipes v. Ros.*
gracilis *Lw.* . . . Turcia, Græcia,
Asia min.
linearis *Beck.* . . . Tunisia
pubicornis *Lw.* . . . Hungaria
latistriata *Beck.* . . . Tunisia
cylindrica *DeG.* . . . Eur.
tipuloides Fabr.
livida Geoffr.
*fusca *Meig.* . . . Eur. centr. et mer.?
? *pusilla Jaenn.*
? *pumila Macq.*
*dorsalis *Dahlb.* . . . Eur. sept.
pedunculata *Lw.* . . . Eur. mer.
cylindrica DeG. var. Strobl
straminea *Beck.* . . . Algeria

SPECIES EXPURGATÆ.

Patria incerta, haud palæarctica, aut descriptio turpissima.

STRATIOMYIDÆ.

PACHYGASTER *Meig.*

- alpina *Lioy = Oxycera* sp? Italia

NEMOTELUS *Geoffr.*

- paludosus *Meig.* . . . ?

STRATIOMYS *Geoffr.*

- ruficornis *Macq.* . . . Mesopotamia
rufipennis *Macq.* . . . China sept.

ODONTOMYIA *Meig.*

- confusa *Rossi* . . . Italia
connexa *Walk.* . . . ?
fuscipennis *Macq.* . . . ?

- halterata *Schrank* . . . Austria
hydrodromia *Meig.* . . . ?

SARGUS *Fabr.*

- sulphureus *Meig.* . . . ?

LEPTIDÆ.

LEPTIS *Fabr.*

- inutilis *Walk.* . . . Anglia
cinereofasciata *Schumm.* Eur. centr.
tristis *Schumm.* . . . Eur. centr.
tenella *Motsch.* . . . Gallia

? SYMPHOROMYIA *Frfld.*

- nebulosa *Fabr.* . . . Eur. centr.

TABANIDÆ.

HÆMATOPOTA Meig.

arctica O. F. Müll . . Eur. sept.

TABANUS L.

TABANUS

testaceus Forsk. . . Arabia.
 bifasciatus Fourcr. . . Eur.
 intersectus Fourcr. . . Eur.
 rufus Scop. . . Eur. centr.
 hirsutus Vill. . . Eur.
 nigriker Walk. . . Arabia
 pallescens Walk. . . Arabia
 politus Walk. . . Arabia
 terminalis Walk. . . Arabia

CHRYSOPS Meig.

cæculus O. F. Müll . . Eur. sept.

PANGONIA Latr.

annulata Bigot . . Eur. mer.?
 variegata Macq. (nec Fabr.) Eur. mer.?
 picta Macq. . . Eur. mer.?
 semiviridis Ric. . . ?
 subfasciata Walk. . . Somali
 zonata Walk. . . Somali

CYRTIDÆ.

ONCODES Latr.

limbatus Bigot (nec Meig.) Tunisia

BOMBYLIDÆ.

BOMBYLIUS L.

melanopygus Bigot . . Sicilia
 apulus Cyrillo . . Italia mer.
 marginatus Cyrillo . . Italia mer.
 angulatus Macq. . . Gallia
 minimus Macq. (nec Fabr.) Eur.
 nigripes Macq. . . Sicilia
 pumilus Macq. (nec Meig.) Eur. mer.
 cinereus Meig. (nec Oliv.) Eur. centr.
 floralis Meig. . . Eur. mer.?
 nanus Meig.
 pygmæus Macq. . . Gallia mer.
 pusillus Meig. . . Eur. mer.?
 minimus Meig. (nec Fabr.)
 pusio Meig. . . ?
 vagabundus Meig. . . ?
 elongatus Rossi . . Italia centr.
 exiguus Walk. . . Arabia
 miscens Walk. . . Arabia?
 nivifrons Walk. . . Asia min.

SYSTÆCHUS Lw.

canus Macq. . . ?
 fasciculatus Macq. . . Africa sept.?

DISCHISTUS Lw.

heterocerus Macq. . . Africa sept.?

? ECLIMUS Lw.

venosus Bigot . . Eur. mer.?

MULIO Latr.

leucoproctus Wied. . . Africa sept.?

EXOPROSOPA Macq.

paupera Walk. . . Somali

ANTHRAX Scop.

affinis Eversm. . . Rossia
 obscurus Weber . . Helvetia
 scrutatus Meig. . . Eur. centr.

THEREVIDÆ.

THEREVA Latr.

cinifera Meig. . . ?
 Olivierii Macq. . . Mesopotamia
 nitida Macq. . . Gallia

SCENOPINIDÆ.

SCENOPINUS Latr.

scutellatus Macq. . . Africa

MYDAIDÆ.

? LEPTOMYDAS Gerst.

rufipes Westw. . . Sicilia?

ASILIDÆ.

ASILUS L.

deformis Walk. . . Somali
 tibialis Wied. (nec Fabr.,
 nec Fall.) . . Rossia
 tibialis Gimm (nec Fabr.) Rossia mer.

EUTOLMUS Lw.

mivatus Walk. . . Somali

HELIGMONEURA Bigot

mellea Macq. . . Eur.?

DASYTHRIX Lw.

heteroneura Macq. . . Arabia? Brazilia?

LAPHRIA Meig.

flavescens Macq. . . M. Pyrenæi?
 Carolina
 varipes Bigot . . Eur. mer.?

SAROPOGON Lw.

castaneicornis Macq. . . Eur. mer.?

DAMALIS Fabr.

cinctipes Walk. . . Arabia

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