THE TAXONOMY OF THE BRITISH SPECIES OF CHLOROPIDAE (DIPTERA)

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ABSTRACT

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The taxonomy of the British Chloropidae is reviewed with special reference to the male postabdomen. A new secondary sexual character, the femoral comb, is found to occur in Oscinellinae. The male genitalia of each species are described and illustrated and the limits and division of genera into species groups are considered. Material collected during this study is considered together with existing material in museum and private collections and in order to stabilize the nomenclature available type specimens have been examined and interpreted. The known distribution and phenology of British species are recorded.

The relationships of British Chloropidae are discussed at the interspecific and intergeneric level with reference to the world fauna. Several species are apparently undescribed and a number of species have not been recorded from Britain. The male genitalia are discussed in relation to existing generic concepts, and certain anomalies in the British genera are pointed out. The data in this thesis is related to the subfamily classification of Chloropidae, the systematic position of Chloropidae in the Diptera Cyclorrhapha and the theories of systematics in general.

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CHAPTER 1. INTRODUCTION

The family Chloropidae is a medium-sized family of Schizophorous Diptera containing over 1000 species from all zoogeographical regions of the world. The following definition separates Chloropidae from other Diptera:

Acalypterate Diptera which show reduction of the wing venation and chaetotaxy. Head variable in shape, with convergent postvertical setae, frontal setae absent except in Siphonellopsinae (non-British). Maxillary laciniae reduced. Frontal triangle well defined, often delimited from frons by colour or dusting. Thorax with sharp lateral margin to propleuron. Sternopleural setae absent, rarely with pleural setae. Legs without preapical setae on tibiae. Wing with costa extending to vein r_{4+5} or m_{1+2}. Subcostal vein absent or only distinguishable at base and costal break well separated from vein r_1. Anal vein absent or greatly reduced; anal cell absent. Crossvein between 2nd basal cell and discal cell absent.

Male abdomen lacking terga 6 and 7. Aedeagus usually small in size and membranous apically; rarely pubescent. Hypandrium with aedeagal base connected to hypandrium wall by gonites. Female abdomen with tergite 7 divided longitudinally. Two rudimentary spermathecae, not sclerotised. Male and female genitalia symmetrical except male Siphonellopsinae (non-British).

The early descriptions of Chloropidae were by Linnaeus (1758, 1761) and Bjerkander (1778) in the genus Musca. Meigen (1803) erected the first chloropid genus, Chlorops. Fallén (1820) described further species and Meigen (1830, 1838) described numerous species and several genera. Haliday (1833) described species from British material. Fallén's work on Scandinavian Chloropidae was continued by Zetterstedt (1838-60), while Macquart (1835) described new species and genera. Lioy (1864) and Loew (1866, 1873) erected further genera while Loew also described many species. The first comprehensive monograph of palaearctic Chloropidae was by Becker (1910), while Duda's (1932-3) volume in Die Fliegen der Palaearktischen Region is still the standard work. Collin (1932, 1939, 1946, 1966) worked mainly on British Chloropidae but never revised the Chloropinae. Smith (1965) revised the British Gaurax. In eastern Europe Nartshuk (1950-) has produced many major revisions of palaearctic Chloropidae, many of which cover British species. Fedoseeva (1960 -) has revised the large and difficult genus Meromyza in the eastern palaearctic region. Andersson (1963, 1966) has revised Fallén's and Zetterstedt's species and (1977) revised the Old World genera. The most comprehensive works on the early stages of Chloropidae are by Balachowsky and Mesnil (1935), Nye (1958) and Nartshuk (1972).

Although the economically important species of Chloropidae have been studied extensively, the family as a whole has been neglected by British authors. Collin (1946) revised the British Oscinellinae and Duda (1932-3) the palaearctic Chloropidae. These papers are now out of date and are difficult to use, so that British Chloropidae are often misidentified. Moreover, a considerable number of new species have been described recently by Russian and eastern European workers: the British total of Chloropidae is therefore larger than existing works would indicate. Kloet and Hincks (1945) recorded 90 species of Chloropidae, but Collin (1946) recorded 90 species of Oscinellinae. The latest edition of Kloet and Hincks (1977) includes 153 species of Chloropidae, but over 170 British species are recorded in this study, and there are almost certainly further species to be added to the list.

This thesis examines the species occurring in Britain and their interrelationships, in the context of current generic concepts and of the higher classification of Chloropidae. I have not examined species unrecorded from the palaearctic region since this would have entailed considerable extra research; but the discussion of British species is relevant to the higher classification of Chloropidae in that the homogeneity of taxa is tested.

The work is not intended to be a world revision of genera, but in certain cases in the past species appear to have been misplaced. I have used the existing genera and pointed out the anomalies in the discussion. In some genera an attempt has been made to group the species into 'species groups', a taxonomic unit which I interpret as being below the level of genus. The interrelationships of these genera may be clearer if the species groups are considered separately since some genera may not be monophyletic. New species have been included, but no manuscript names are given, and full taxonomic descriptions will be published elsewhere.

In the classification of insects the first problem is the initial separation of the species. Previous authors have used colouration, but I have found this to be extremely variable and wherever possible I have used morphological characters. The male genitalia have been examined to help determine the limits of the species and uncover any sibling species. I have examined available type specimens and compared them with British material with the object of stabilising the nomenclature.

The terminology in this thesis is illustrated in figs. 1 - 8. In many respects Chloropidae show reductions in character states compared to the ground-plan condition for Diptera Cyclorrhapha (Griffiths, 1972). Andersson (1977) has discussed the morphology of Chloropidae and my terminology is similar.

The cuticle of Chloropidae may have several forms of surface. It is probable (Andersson, 1977) that the ground-plan condition is a smooth, dusted cuticle. In some species (e.g. Tricimba lineela) the cuticle may be ridged or folded, but this is uncommon in Chloropidae. The dusting may be rubbed off to expose the shining surface beneath. McAlpine (1969) has shown that two distinct cuticular processes occur in Platystomatidae and other Diptera. The first of these are called microtrichia, and consist of hairs without a basal socket. Fine microsetae cause the dusting seen in Chloropidae, but the individual microsetae are too small to be seen with a binocular microscope. When a partially dusted sclerite is cleared and examined under a monocular microscope, the pattern of microsetae corresponds to the pattern of dusting. Longer microsetae can be seen under the binocular microscope, and the structure is then termed pubescent. The second kind of cuticular processes are the

Fig. 1, Head, thorax and hind leg of <u>Meromyza</u>, lateral view.

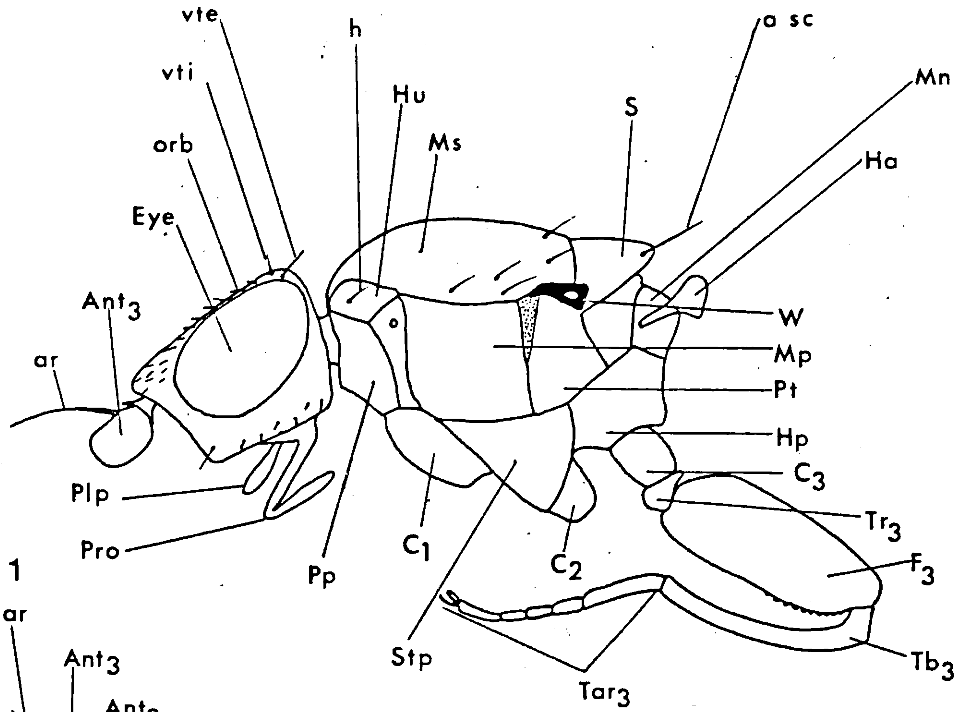
2, head of chloropid, dorsal view.

3, head of chloropid, ventral view.

4, thorax of <u>Chlorops</u>, dorsal view.

5, wing of <u>Meromyza</u>.

a n, anterior notopleural setae. Ant_2, second antennal segment. Ant_3, third antennal segment. a pa, anterior postalar setae. ar, arista. a sc, apical scutellar setae. C, costa. C_{1-3}, first to third coxae. Cell 1, first basal cell. Cell 2, second basal and discal cell. Eye, compound eye. F, frons. F_3, femur of third leg. Fr tri, frontal triangle. h, humeral setae. Ha, haltere. H cv, humeral cross-vein. Hp, hypopleuron. Hu, humerus. Mn, metanotum. Mp, mesopleuron. Ms, mesonotum. Ms b, mesonotal bands. N, notopleuron. N S, notopleural suture. Oc, ocellus. oc, ocellar setae. orb, orbital setae. p dc, prescutellar dorsocentral setae. Pg, postgena. Plp, labial palp. p n, posterior notopleural setae. Pp, propleuron. p pa, posterior postalar setae. Pro, proboscis. Pt, pteropleuron. pvt, postvertical setae. S, scutellum. Sc, subcosta. Stp, sternopleuron. ta, anterior cross-vein. Tar_3, tarsus of third leg. Tb_3, tibia of third leg. tp, posterior cross-vein. Tr_3, trochanter of third leg. vib, vibrissal setae. vte, outer vertical setae. vti, inner vertical setae. W, wing base.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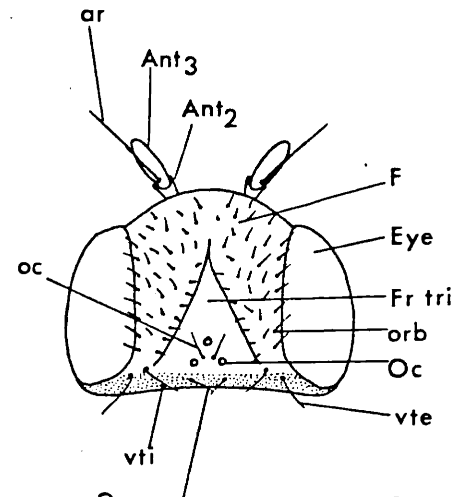
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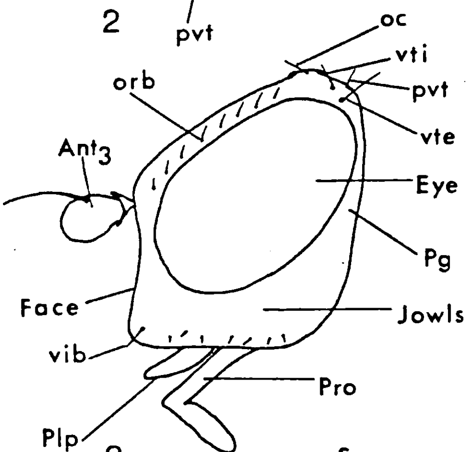
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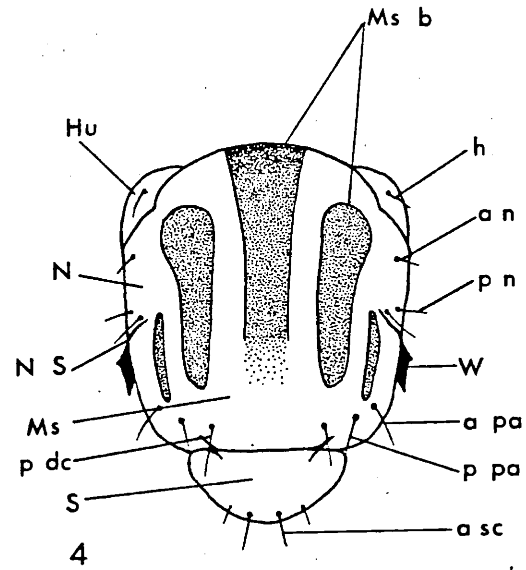
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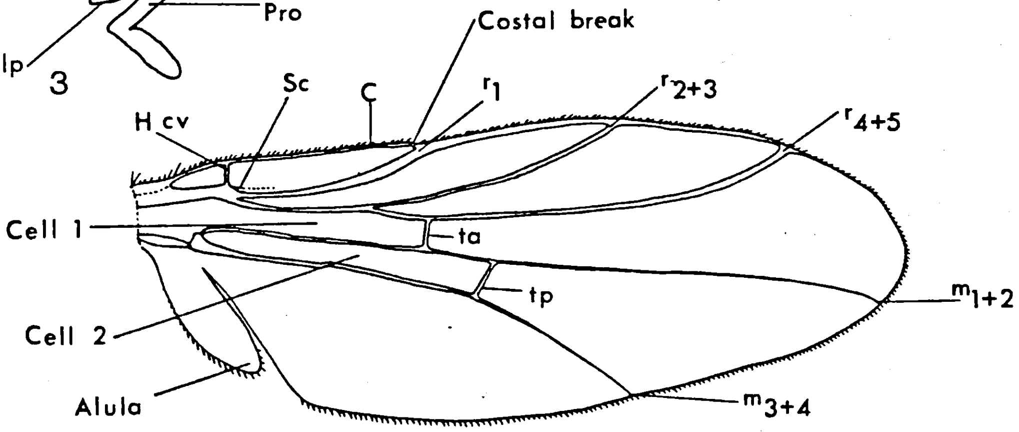
Costal break
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r4+5
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Cell 1
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Cell 2
tp
m1+2
Alula
m3+4

5

macrosetae, which arise from a distinct socket. The smaller macrosetae are the hairs which often clothe the sclerites of Chloropidae; these are arranged in rows or at random. The larger macrosetae or setae proper have a more restricted distribution and have been given names (figs. 1 - 4).

The geographical area covered by this thesis is Great Britain excluding the Channel Islands, whose fauna is more related to mainland France than to Great Britain. Ireland is considered as part of the British Isles. Older British records have been regarded with caution because of the difficulty of naming specimens in the past, and unless there is a statement to the contrary all records in this work have been checked personally.

Methods.

The specimens examined during this study are from a variety of sources. The British Museum (National History) houses the National collection. The Hope Dept., University of Oxford, has important collections including that of J. E. Collin. Many smaller museums and private collectors have allowed me to examine their material; a list is included in the acknowledgements. Finally, I have collected extensively during this study.

Specimens were examined dry using a binocular microscope and a high intensity light source. It was found that spirit material was not suitable for determination because the dusting is difficult to see. It was necessary to prepare mounts of the male postabdomen to study the male genitalia, using a monocular microscope. The whole abdomen was removed by means of fine forceps and placed in a small tube of 10% KOH in water. After 12 hours at room temperature the specimen was washed in 70%, 90%, 95% and absolute industrial alcohol (several changes) and then cleared in clove oil. In most cases the male genitalia were dissected out using fine stainless steel pins mounted in match-sticks, and the IX tergite and hypandrium teased apart. In the Oscinellinae one edita was removed and mounted on its side. The dissected genitalia were mounted in Canada Balsam (thick) on a plastic slip. The IX tergite and hypandrium were usually mounted flat. In some cases the IX tergite was mounted so that it could be viewed laterally, and in Meromyza the aedeagus was removed. The plastic slip was placed on the same pin as the insect.

All the drawings were prepared using a camera lucida and a monocular microscope. They were drawn to the same dimensions by the use of a Grant projector, which enlarged the original drawings. The drawings were then folded in half and, on the reverse, an average of the two halves was drawn. These drawings were taken from single specimens, but they are not simple outlines; some account has been taken of other specimens. Lastly, the drawings were reduced to their final size. The scale line on each drawing or plate is 0.1 mm.

CHAPTER 2.

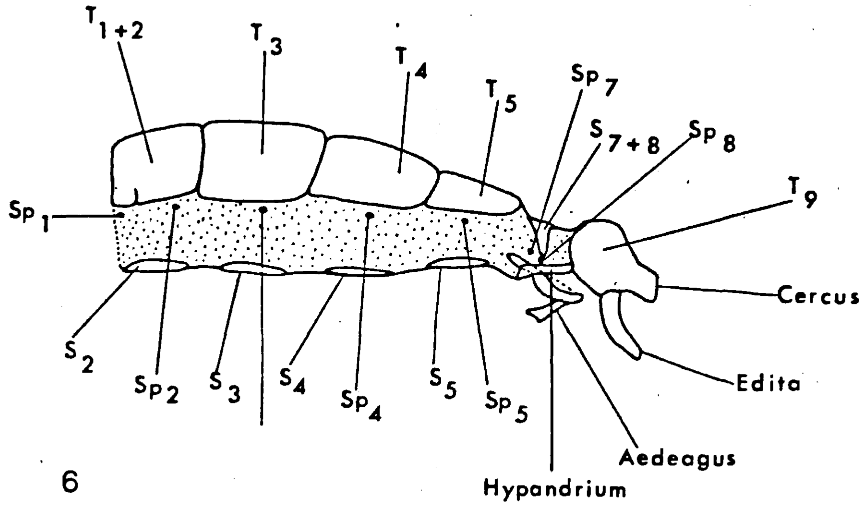
THE MALE POSTABDOMEN OF CHLOROPIDAE

Griffiths (1972) reviewed the male postabdomen of Diptera Cyclorrhapha, and discussed Chloropidae. The homology of certain parts of the postabdomen is disputed (Andersson, 1977) and therefore in this thesis I have used existing terminology when discussing the postabdomen. The following account applies particularly to the British fauna.

The male abdomen of Chloropidae consists of 5 pregènital segments, a narrow dorsal sclerite above spiracles 6 and 7, a bowl-shaped structure with two or more pairs of appendages, here termed the 1X tergite, and the inner copulatory apparatus, the hypandrium with the aedeagal complex attached (fig. 6)

Griffiths (1972) considered the narrow dorsal sclerite, here called the pregenital sclerite, to represent sternite 8 and possibly 7. He considered the 1X tergite to be derived from the fusion of the bases of the parameres. This latter theory has been disputed (Andersson, 1977) and as I do not consider it to be proven, I have continued to use the terms 1X tergite and edita. The cerci are fused or separate paired structures ventral to the anus and between the editae.

The hypandrium or inner copulatory apparatus is usually considered to be derived from sternite 9. The structures here termed gonites are difficult to homologise; Griffiths (1972) referred to them as 'X'. Such gonites are also found in the Milichiidae and related families, but are absent in many families of Diptera Cyclorrhapha. Since the homology is not proven I have continued to use the term gonite. In Chloropidae the aedeagus is rarely large or heavily sclerotised,



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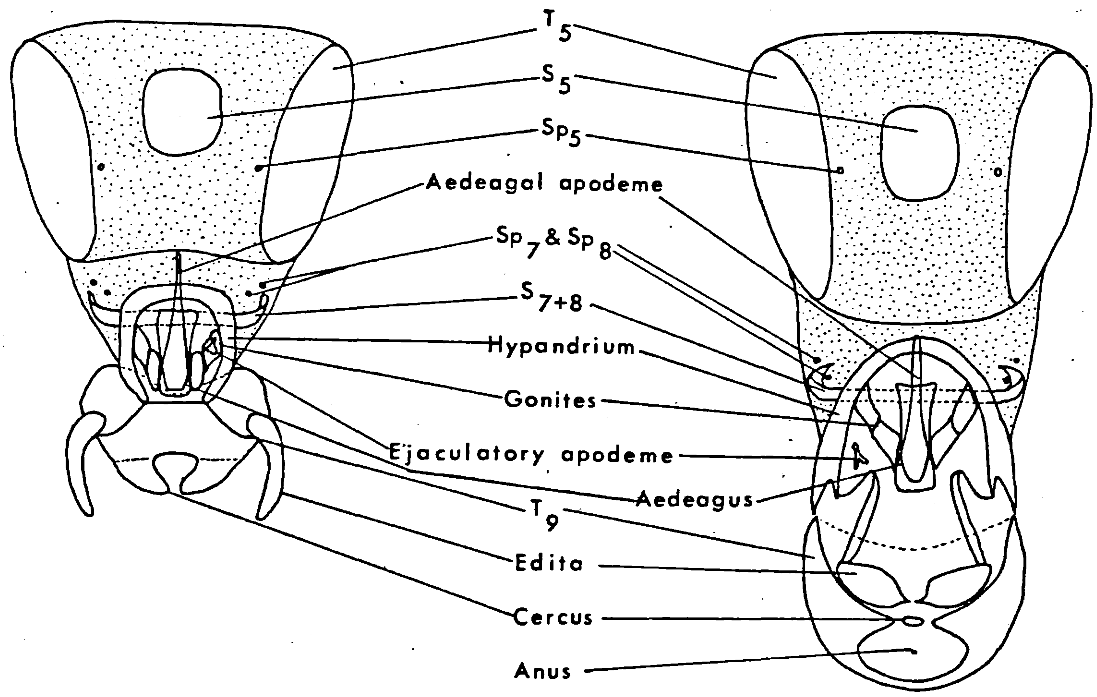

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8

T = Tergite

S = Sternite

Sp = Spiracle

Fig. 6. Abdomen of male Oscinellinae, lateral view.

7. Abdomen of male Oscinellinae, ventral view.

8. Abdomen of male Chloropinae, ventral view.

but usually a basal and a distal region may be distinguished, the latter being less sclerotised. The terms basiphallus and distiphallus have been used for these two regions of the aedeagus. The basiphallus is connected at its base to the aedeagal apodeme, a rod-like structure which, when muscles act on it, swings the aedeagus through 90^{o} or more. The posterior part of the aedeagal apodeme is expanded as far as the junction with the basiphallus.

The lX tergite and the hypandrium are hinged together; at rest the lX tergite covers the hypandrium. The outer point of the hypandrial arm, usually at the tip, is connected to the lX tergite, normally about half-way along its length. The inner point of the hypandrial arm is more variable in its connection; in Chlorops it connects to the inner part of the editae but in most Oscinellinae it connects to a median plate which is apparently more associated with the cerci. This inner connection is more flexible than the outer connection, and an elongated, often v-shaped, deformable rod connects the points of articulation.

CHAPTER 3. Femoral Combs.

The occurrence of femoral combs in British Chloropidae was described by Ismay (1975) and Andersson (1977) reviewed the femoral combs of some Old World genera of Chloropidae. This chapter describes the types of femoral combs and their occurrence in the genera of British Chloropidae; a more detailed account of the femoral combs of each species is given in the body of the thesis, and the occurrence of femoral combs in the genera of Oscinellinae is discussed in Chapter 16.

Mesnil and Balachowsky (1930) illustrate an area of specialised setae on the upper surface of the middle femur of two species of male Chloropidae, *Elachiptera cornuta* (p. 985) and *Oscinella frit* (p. 994). I have seen few other references (Sabrosky, 1949; Andersson, 1977) to this structure, which is termed the femoral comb in this thesis. The upper surface of the middle femur of male and female Chloropidae was examined to determine the form and occurrence of this structure at generic and species level.

In the genera *Elachiptera* and *Dicraeus* large numbers of specimens were available, and an attempt was made to discover if the variation of numbers of setae followed a statistically normal distribution, and if there was any variation between the left and right sides of the fly.

Morphology

A range of femoral combs is shown on figs. 464 - 473. The major types are described below.

Prominences.

Most of the femoral combs examined are raised a little from the surface of the femur, but in some cases a prominent area is raised, sometimes as high as it is wide. Fig. 470 shows a male femur and fig. 471 a female femur, both in side view, not drawn to scale. Such prominences are found in the genera _Lipara, Calamoncosis_ (fig. 464) and certain species of _Dicraeus_.

Patches.

A useful distinction between types of femoral combs is between species that have the setae arranged in patches and those that have the setae arranged in rows. Setae arranged in patches are commonest in those species with large numbers of femoral setae, but they may occur in species with very few setae, e.g. _Tropidoscinis antennata_ (fig. 473). All the species with prominences have setae in patches, but patches are also found in species without prominences.

Rows.

The majority of species have femoral setae arranged in rows, and the number of rows is usually small and distinct. There can be one, two or three rows of setae, and the differences are usually constant enough to be used in classification at the species and generic level. Where there are two or more rows there are often more setae in one row than in the other, and where there is a large number of setae in more than two rows the orderly arrangement often breaks down and a patch is formed, e.g. _Elachiptera cornuta._

Each femoral seta is similar in structure to a normal leg seta, but the base is much larger than usual and the seta is shorter, e.g. _Oscinella frit_ side view of femur (figs. 466, 472).

The femora of Chloropidae may be shining or dusted due to minute setae, or partly dusted, and the area of the femoral comb may be the same as the rest of the femora or different. It is usually the same, but an associated patch of dusting is sometimes found, as in Elachiptera cornuta (fig. 465). The structure of the femoral comb may be specifically distinct, as in Tropidoscinis antennata (fig. 473) with a patch of few setae, Elachiptera megaspis with a patch of long fine dense setae basal to the femoral comb (fig. 469) and Eribolus nana Zett. with three rows of setae enclosed by a fourth, J-shaped row around them (fig. 468).

The colouration of the femoral comb is the same as that of the rest of the femora in almost every species, but in Lioscinella anthracina and L. atricornis the femur is yellow and the femoral comb is black.

Survey of genera

All of the genera of Chloropinae examined, Camarota, Platycephala, Eurina, Meromyza, Haplegis, Lasiosina, Anthracophaga, Melanum, Diplotoxa, Eutropha, Cetema, Epichlorops, Chlorops, Thaumatomyia, and Chloropisca had no femoral comb. In the Oscinellinae no females had femoral combs, and only some males had femoral combs. Table 1 shows the occurrence and type of femoral combs in male Oscinellinae, the average number of setae, the limits of the number of setae and the sample number of each genus examined.

TABLE 1

Femoral combs in males of Oscinellinae

Genus	Occurrence	Type of * comb	Av. no. of setae	Limits	No. of specimens studied	No. of British species
Lipara	+	PB			6	3
Calamoncosis	+	PB			15	4
Siphonella	-				2	1
Polyodaspis	-				2	2
Fiebrigella	-				2	2
Lasiambia	-				2	2
Siphunculina	-				3	1
Hapleginella	-				2	1
Trachysiphonella	+	P	9.2	7-14	6	4
Oscinimorpha	+	1	5.6	3-7	5	4
Aphanotrigonum	±	2	11.7	8-15	33	7
Tricimba	±	2	12	9-13	10	2
Conioscinella	±	1	4.4	4-5	8	5
Tropidoscinis	+	1,2,P	13.3	3-20	19	6
Dicraeus	±	P	9	4-22	224	9
Mimogaurax	-				1	1
Gaurax	-				5	2
Oscinisoma	+	P	17.5	14-23	10	2
Eribolus	+	2,3+,P	18	8-31	12	4
Oscinella	±	1	6	4-9	54	12
Lioscinella	+	2	15	11-19	18	5
Elachiptera	+	1,2,P	18.5	6-41	152	9
Melanochaeta	+	1	4	4	2	1

* Key to abbreviations: P = setae in patch, B = on prominence,
1 or 2 = number of rows.

Fig. 464. Femoral comb of _Calamoncosis glyceriae_

465. " " " _Elachiptera cornuta_

466. " " " _Oscinella frit_

467. " " " _Lioscinella femoralis_

468. " " " _Eribolus nanus_

469. " " " _Elachiptera megaspis_

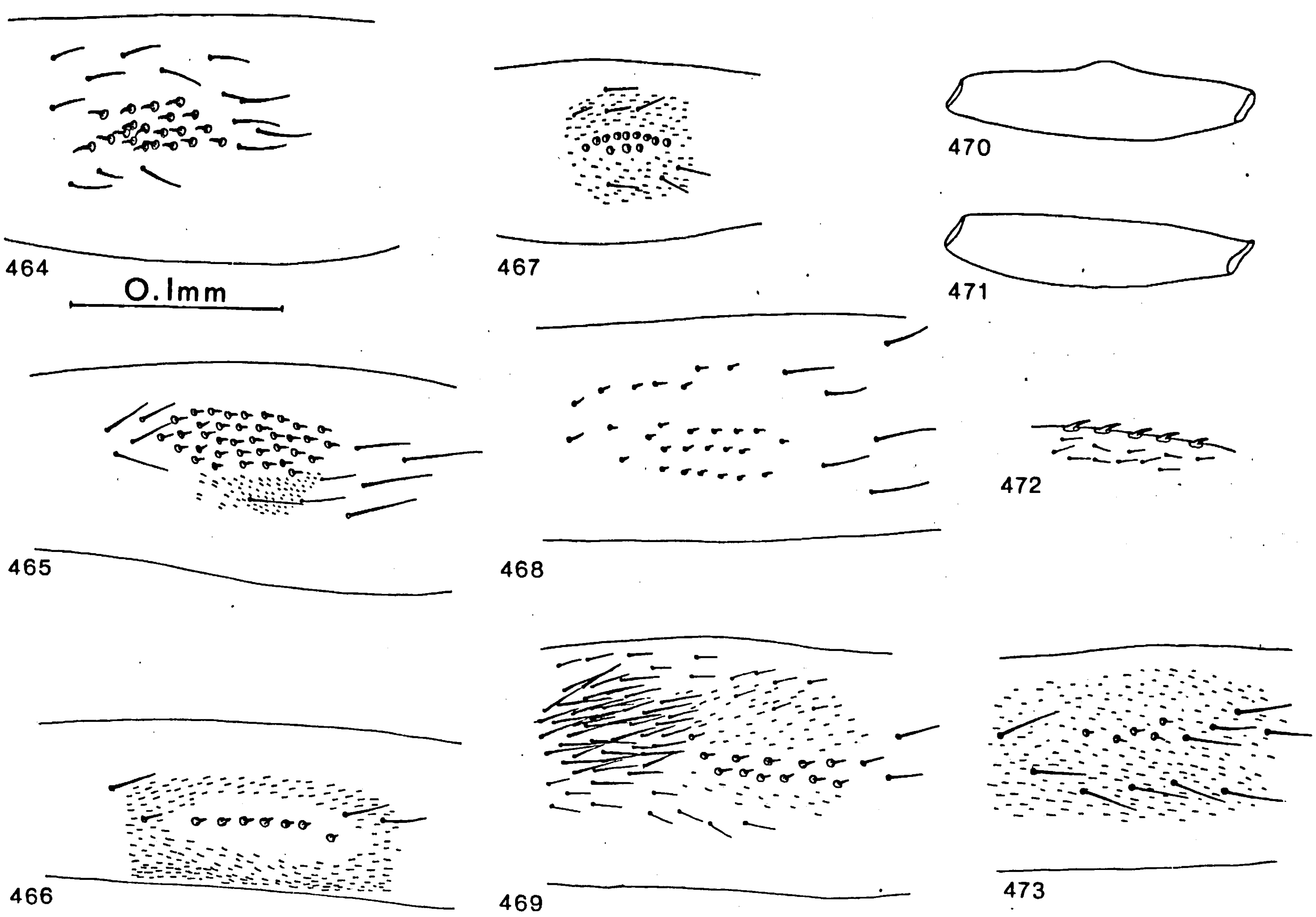
470. Male Oscinellinae left femur, anterior view

471. Female Oscinellinae left femur, anterior view

472. Upper margin of femur of _Oscinella frit_, anterior view

473. Femoral comb of _Tropidoscinis antennata_

Oscinelline femoral setae combs



Statistical survey of femoral combs

Many insects have asymmetrical male genitalia. In Diptera Cyclorrhapha the male genitalia undergo torsion during development (Griffiths, 1972) and evidence of this torsion may persist in the adult. None of the British Chloropidae I have examined had asymmetrical genitalia, but *Lasiopleura* (Chloropidae) had asymmetrical genitalia. If the male genitalia are asymmetrical and the femoral comb has a sexual function, then the latter may also be asymmetrical, and counts of setae numbers would have to include both sides.

92 specimens of male *Dicraeus vagans* were soaked in KOH and cleared. The femora and editae were dissected off and the numbers of setae on each counted for each side.

Results

Table 2 shows the distribution of the numbers of femoral setae and editae setae. The body of the table is the number of specimens with each number of setae.

Discussion

The average number of setae for the editae of the left side is 7.27, and the corresponding figure for the right side is 7.5. The difference of 0.23 between these figures is small compared with the standard error of 0.8, and therefore there is no significant differences between the two sides of the fly. The same comparison applies to the femora, but here the differences are even smaller. A study of the correlation of the numbers of setae on the left and right sides of the fly gave indecisive results, and so it seems safe to use random femora to count the number of setae in the femoral comb.

TABLE 2.

The distribution of editae and femoral comb setae in *Dicraeus vagans*.

Number of setae:	4	5	6	7	8	9	10	11	12	13
Editae, left side	-	4	22	27	27	6	1	3	-	-
Editae, right side	-	6	14	24	31	10	7	-	-	-
Femora, left side	1	5	8	11	21	16	10	14	4	2
Femora, right side	3	2	6	11	26	19	11	3	7	4

Means and standard deviations (95% limit) for the above results are as follows:

editae, left side $\bar{x} = 7.27 \pm 0.8$.

editae, right side $\bar{x} = 7.5 \pm 0.8$.

femora, left side $\bar{x} = 8.63 \pm 0.4$.

femora, right side $\bar{x} = 8.62 \pm 0.4$.

CHAPTER 4.

A Check List of British Chloropidae

This chapter consists of a check list of the British Chloropidae referred to in this thesis including undescribed species, and a summary of host associations of British Chloropidae.

CHLOROPIDAE
OSCINELLINAE
LIPARA Meigen, 1830
  GYMNOPODA Macquart, 1835
lucens Meigen, 1830
  tomentosa (Macquart, 1835)
rufitarsis (Loew, 1858)
similis Schiner, 1854
CALAMONCOSIS Enderlein, 1911
  STIZAMBIA Enderlein, 1935
aprica (Meigen, 1830)
aspistylina Duda 1935
duinensis (Strobl, 1909)
minima (Strobl, 1909)
nitida (Meigen, 1830)
  glyceriae Nartshuk, 1958
  laminiformis Collin, 1946 nec Becker, 1908
SIPHONELLA Macquart, 1835
oscinina (Fallén, 1820)
POLYODASPIS Duda, 1833
ruficornis (Macquart, 1835)
(sulcicollis (Meigen, 1830))
v. anglicus Collin, 1946
FIEBRIGELLA Duda, 1921
  GONIOPSITA Duda, 1930
palposa (Fallén, 1820)
parcepilosa Collin, 1946
LASIAMBIA Enderlein, 1936
baliola Collin, 1946
brevibucca Duda, 1932
SIPHUNCULINA Rondani, 1856
aenea (Macquart, 1835)

TRACHYSIPHONELLA Enderlein, 1936
carinfacies Nartshuk, 1964
pygmaea (Meigen, 1830)
  flavella (Zetterstedt, 1848)
ruficeps (Macquart, 1835)
scutellata (von Roser, 1840)
  pumilionis: Zetterstedt, 1848, nec (Bjerkander, 1778)
  pumilio auctt.
  schineri (Hendel, 1931)
OSCINIMORPHA Lioy, 1864
(albisetulosa Duda, 1932)
v. hollandica Duda, 1932
arcuata (Duda, 1932)
minutissima (Strobl, 1900)
sordissima (Strobl, 1893)
APHANOTRIGONUM Duda, 1932
brunneum Collin, 1946
fasciella (Zetterstedt, 1848)
femorella Collin 1946
inerme Collin 1946
meijerei (Duda, 1932)
nigripes (Zetterstedt, 1848)
  griseum Collin, 1946
v. brachypterum (Zetterstedt, 1848)
  v. curtipenne Collin, 1946
trilineatum (Meigen, 1830)
  annulifera (Zetterstedt, 1848)
OSCINISOMA Lioy 1864
cognata (Meigen, 1830)
  vitripennis (Meigen, 1830)
germanica (Duda, 1932)
gilvipes (Loew, 1858)
CONIOSCINELLA Duda, 1929
frontella (Fallén, 1820)
gallarum (Duda, 1932)
halophila Duda, 1932
mimula Collin, 1946
sp. 1
sordidella (Zetterstedt, 1848)
TRICIMBA Lioy, 1864
  NOTONAULAX Becker, 1903
cincta (Meigen, 1830)

v. apicalis (von Roser, 1840)
sulcella (Zetterstedt, 1848)
lineela (Fallén, 1820)
CRASSIVENULA Sabrosky, 1940
NEUROPACHYS Thalhammer, 1913
brachyptera (Thalhammer, 1913)
DICRAEUS Loew, 1873
OEDESIELLA Becker 1910
DICRAEINUS Enderlein, 1936
PAROEDESIELLA Enderlein, 1936
fennicus Duda, 1932
ingratus (Loew, 1858)
napaeus Collin, 1946
raptus (Haliday, 1838)
scibilis Collin, 1946
styriacus (Strobl, 1898)
tibialis (Macquart, 1835)
pallidiventris (Macquart, 1835)
abdominalis (Zetterstedt, 1848)
vagans (Meigen, 1838)
xanthopygus (Strobl, 1909)
vallaris Collin, 1946
GAURAX Loew, 1863
BOTANOBIA Lioy, 1864
dubia (Macquart, 1835)
ephippium (Zetterstedt, 1848)
fascipes (Becker, 1910)
niger (Czerny, 1906)
ERIBOLUS Becker, 1910
gracilior (de Meijere, 1918)
hungaricus Becker, 1910
nana (Zetterstedt, 1838)
sudeticus Becker, 1910
slesvicensis (Becker, 1910)
TROPIDOSCINIS Enderlein, 1911
albipalpis (Meigen 1830)
basalis (Zetterstedt, 1860)
antennata Collin, 1946
kerteszi (Becker, 1910)
nigrifrons (Duda, 1933)

scotica Collin, 1946
zurcheri (Duda, 1933)
OSCINELLA Becker, 1909
angularis Collin, 1946
angustipennis Duda, 1932
cariciphila Collin, 1946
frit (Linnaeus, 1758)
hortensis Collin, 1946
maura (Fallén, 1820)
albiseta (Meigen, 1830)
nigerrima (Macquart, 1835)
nitidissima (Meigen, 1838)
posticata Collin, 1939
pusilla (Meigen, 1830)
trochanterata Collin, 1946
vastator (Curtis, 1860)
LIOSCINELLA Duda, 1929
anthracina (Meigen, 1830)
atricilla (Zetterstedt, 1838)
atripes (Duda, 1932)
atricornis (Zetterstedt, 1838)
platythorax Nartshuk, 1958
fasciola (Meigen, 1830)
fascipes (Meigen, 1830)
femoralis Collin, 1946
HAPLEGINELLA Duda, 1933
laevifrons (Loew, 1858)
ELACHIPTERA Macquart, 1835
brevipennis (Meigen, 1830)
cornuta (Fallén, 1820)
v. nigromaculata Strobl, 1894
diastema Collin, 1946
megaspis (Loew, 1858)
pubescens (Thalhammer, 1898)
rufifrons Duda, 1933
scrobiculata (Strobl, 1900)
tuberculifera (Corti, 1909)
uniseta Collin, 1939
MELANOCHAETA Bezzi, 1906
capreola (Haliday, 1838)
aterrima (Strobl, 1880)
coei (Nartshuk, 1965)

GAMPSOCERA Schiner, 1862
inornata Corti, 1909

CHLOROPINAE
CAMAROTA Meigen 1830
curvipennis (Latreille, 1805)
  flavitarsis Meigen, 1830
PLATYCEPHALA Fallén, 1820
planifrons (Fabricius, 1798)
  culmorum Fallén, 1820
umbraculata (Fabricius, 1794)
  agrorum Fallén, 1820
MEROMYZA Meigen, 1830
bohemica Fedoseeva 1960
coronoseta Hubicka 1969
curvinervis (Zetterstedt 1848)
  hybrida Péterfi 1961
femorata Macquart 1835
laeta Meigen 1838
nigriventris Macquart 1835
palposa Fedoseeva 1960
pluriseta Péterfi 1961
pratorum Meigen, 1830
saltatrix (Linnaeus 1761)
sorocula Fedoseeva 1962
triangulina Fedoseeva 1960
variegata Meigen 1830
sp. 1
sp. 2
EURINA Meigen 1830
lurida Meigen 1830
CRYPTONEVRA Lioy, 1864
  HAPLEGIS Loew, 1866
consimilis (Collin, 1932)
diadema (Meigen, 1830)
  rufifrons (Loew, 1866)
flavitarsis (Meigen, 1830)
  divergens (Loew, 1866)
nigritarsis (Duda, 1933)
tarsata (Fallén, 1820)
  laevigata (Fallén, 1820)
sp. 1

LASIOSINA Becker, 1910
approximatonervis (Zetterstedt), 1848)
cinctipes (Meigen, 1830)
limbata (Meigen, 1830)
inconstans (Loew, 1866)
heleocharis Nartshuk, 1964
ruficeps (Zetterstedt, 1848)
DIPLOTOXA Loew, 1863
messoria (Fallén, 1820)
MELANUM Becker, 1910
fumipenne (Loew, 1866) (?)
laterale (Haliday 1833)
EUTROPHA Loew 1866
fulvifrons (Haliday, 1833)
CETEMA Hendel, 1907
CENTOR Loew, 1866
cereris (Fallén, 1820)
elongata (Meigen, 1830)
myopina (Loew, 1866)
neglecta Tonnoir, 1921
paramyopina Collin, 1966
transversa Collin, 1966
sp. 1
EPICHLOROPS Becker, 1910
puncticollis (Zetterstedt, 1848)
ANTHRACOPHAGA Loew, 1866
frontosa (Meigen, 1830)
strigula (Fabricius, 1794)
cingulata (Meigen, 1830)
CHLOROPS Meigen, 1803
OSCINIS Latreille, 1804
adjuncta Becker, 1910
brevimana Loew, 1866
calceata Meigen, 1830
centromaculata Duda, 1933
citrinella (Zetterstedt, 1848)
bipunctata v. fennica (Duda, 1933)
fasciata Meigen, 1830
gracilis Meigen, 1830
hypostigma Meigen, 1830
minuta Loew, 1866

interrupta Meigen, 1830
  hirsuta Loew, 1866
laeta Meigen, 1830
  discicornis Loew, 1866
meigeni Loew, 1866
  nasuta: auctt., nec (Schrank, 1781)
obscurella (Zetterstedt, 1838)
  brunnipes auctt. sensu Duda 1933 nec (Zetterstedt, 1848)
planifrons Loew, 1866
  lineola (Zetterstedt, 1848)
pumilionis (Bjerkander, 1778)
  lineata (Fabricius, 1781)
  taeniopus Meigen, 1830
rufina (Zetterstedt, 1848)
scalaris Meigen, 1830
  didyma (Zetterstedt, 1848)
serena Loew, 1866
speciosa Meigen, 1830
  brunnipes (Zetterstedt, 1848)
v. nigrithorax Strobl, 1894
triangularis Becker, 1910
troglodytes (Zetterstedt, 1848)
varsoviensis Becker, 1910
sp. 1
THAUMATOMYIA Zenker, 1833
  CHLOROPISCA Loew, 1866
glabra (Meigen, 1830)
hallandica Andersson, 1966
  obscurella: auctt. nec (Zetterstedt, 1848)
notata (Meigen, 1830)
  circumdata (Meigen, 1830)
  ornata (Meigen, 1830)
rufa (Macquart, 1835)
  abbreviata (Zetterstedt, 1848)
trifasciata (Zetterstedt, 1848)
  parvula (Zetterstedt, 1848)
Genus ?
sp. 1
sp. 2

Host associations of British Chloropidae.

Most Chloropidae are associated with Gramineae (Nye, 1958) but some genera have larval stages in decaying vegetable matter, fungi, galls or are predatory or parasitic. The following summary is not exhaustive since I have omitted records where there is serious doubt about their accuracy. No references are given in the summary, but all records are mentioned in Nye (1958), Balachowsky and Mesnil (1935), Nartshuk (1972) - the latter is the most comprehensive treatment - or in the main part of this thesis. Records are divided into British (B) and non-British (F). While I have checked most British records, I have checked very few non-British records.

Chloropidae	Host association	
Lipara lucens	Gall on *Phragmites communis* L.	(B)
L. *rufitarsis* and *L. similis*	Gall on *P. communis* but smaller	(B)
Calamoncosis aprica	*Draba incana* L., bred foliage	(B)
C. nitida	*Glyceria aquatica* L., ensheathed inflorescence	(B)
C. minima	Inquiline in *Lipara* galls on *P. communis*	(B)
Polyodaspis ruficornis	Bred imported walnuts	(B)
	Decaying plant and animal material.	(F)
Lasiambia brevibucca	Bred tunnels of Scolytid beetles on *Ulmus* infected with Dutch Elm disease.	(B)
Oscinimorpha minutissima	*Salvia sclarea* L.	(F)
Aphanotrigonum meijerei	*Elymus arenarius* L.	(F)
A. nigripes	*Calamagrostis epigeios* (L) *Elymus* sp.	(F)

Chloropidae	Host association	
A. trilineatum	*Festuca pratensis* Huds., *Poa pratensis* (L), *Calamagrostis epigeios* (L), *Elymus* sp., *Eriophorum vaginatum* L.	(F)
Oscinisoma cognata	*Scirpus* ssp., *Typha latifolia* L. *T. angustifolia* L., *Sparganium* sp.	(F)
Conioscinella frontella	*Holcus lanatus* L. stems	(B)
	Anthoxanthum odoratum L., *Phleum pratense* L.	(F)
C. gallarum	Bred *Andricus* and *Biorhiza pallida* (Olv.) (Cynipidae) galls on *Quercus*.	(B)
C. halophila	Bred spider's egg cocoon	(B)
C. mimula	*Anthoxanthum odoratum* L. stems	(B)
	Bromus sp.	(F)
Tricimba cincta	*Colchicum autumnale* (L) *Russula foetens*	(B)
T. lineela	'Fungi' *Symplocarpus* sp., *Lyroperdon gemmatum* Batsch	(F)
Dicraeus fennicus	*Agropyron repens* (L) seeds	(F)
D. ingratus	*Bromus erectus* Huds., *B. inermis* Leyss. seeds	(F)
D. styriacus	*Elymus arenarius* L.	(F)
D. tibialis	*Bromus erectus* Huds., *B. inermis* Lyess., *Helichotrichon pubescens* (L) seeds.	(F)
D. vagans	*Arrhenatherum elatius* (L) J. + C. Presl. seeds	(B)
D. vallaris	*Helichotrichon pubescens* (L)seeds	(F)
Gaurax niger	Nest of Dormouse	(B)
G. dubius	*Pictoporus* on *Betula*	(B)
G. fascipes	Birds' nests, 'Laburnum bark'	(B)
Eribolus nana	*Carex* ssp., *Sparganium* ssp.	(F)

Chloropidae	Host association	
Tropidoscinis albipalpis	leaf Urtica dioica L. secondary invader of Poaceae	(B) (F)
T. kertezi	Deschampsia caespitosa (L)	(F)
T. zurcheri	Inquiline in galls of Lipara lucens and L. similis on Phragmites	(B)
Oscinella angularis	Phalaris arundinacea L. stems	(B)
O. frit.	Many wild and cultivated Gramineae; stems and seeds	(B) (F)
O. maura	Dactylis glomeratus L. in stems	(B)
O. nigerrima	Phleum pratense L.	(F)
O. nitidissima	Agrostis tenuis Sibth., A. stolonifera L. A. canina L., stems Festuca rubra L., Poa pratensis L. Anthoxanthum odoratum L., Holcus lanatus L., Dactylis glomerata L., Lolium perenne L.	(B) (F)
O. posticata	Bred from mole's nest	(B)
O. pusilla	Agropyron repens (L), A. intermedium (Host.), A. pectiniforme Roetn. et Schult., Hordeum brevisubulatum (Trin.) Lolium perenne L., Elymus sibiricus, Poa pratensis L., P. trivialis L., P. angustifolia L., Festuca pratensis Huds. Phalaris arundinacea (L)	(F)
O. trochanterata	Phalaris arundinacea (L)	(B)
O. vastator	Lolium perenne L., L. italicum A.Br., L. multiflorum Lam., Festuca rubra L., F. pratensis Huds., Phleum pratense L.	(F)
Lioscinella anthracina	Carex sp.	(B)
L. atricornis	Eriophorum sp.	(F)

Chloropidae	Host association	
Hapleginella laevifrons	Bred hybrid Larch cones	(B)
Elachiptera cornuta	Oenanthe crocata L. stems Decaying vegetable matter	(B)
E. megaspis	Nasturtium officinale R. Br. (?)	(B)
E. scrobiculata	Andropogon sorghum Brot.	(F)
E. tuberculifera	Decaying vegetable matter	(F)
E. uniseta	Bred nest of Emberiza schoeniclus (L.)	(B)
Camarota curvipennis	Barley and Oat shoots	(B)
	Agropyron repens L., Rye, Wheat and Barley ears	(F)
Platycephala planifrons	Phragmites communis L.	(B)
P. umbraculata	Phragmites communis L.	(F)
Meromyza femorata	Dactylis glomerata L.	(F)
M. laeta	Agrostis vulgaris With., stems, Festuca rubra L.	(F)
M. nigriventris	Phleum pratense L.	(F)
M. pratorum	Bromus carinata Hook. & Arn., Ammophila arenaria L. Calamagrostis epigeios (L) Roth, C. neglecta G., C. arundinacea Roth., C. canescens Trin. Hierochloe odorata (L), Elymus arenarius L.	(F)
M. saltatrix	Poa pratensis L., Festuca rubra L., Festuca pratensis Huds., Alopecurus pratensis L., Agropyron repens (L.)	(F)
M. variegata	Dactylis glomerata L. Phleum pratense L.	(F)
M. palposa	Nardus stricta L.	(F)
M. pluriseta	Hierochloe odorata L.	(F)
M. triangulina	Dactylis glomerata L., Festuca rubra L. F. ovina L.	(F)

Chloropidae	Host association	
M. sorocula	Deschampsia caespitosa L.	(F)
Eurina lurida	Phragmites communis L.	(F)
Cryptonevra consimilis	Inquiline in Lipara similis galls on Phragmites	(B)
C. diadema	Phragmites communis L.	(F)
C. flavitarsis	Inquiline in Lipara similis & L. rufitarsis galls on P. communis	(B)
C. tarsata	Carex sp.	(F)
Lasiosina approximatonervis	Heleocharis obtusa Schultes, H. smalli Britt.	(F)
L. cinctipes	Barley and Oats	(B)
	Hordeum murinum L., Calamagrostis epigeios L., C. arundinacea Roth., Glyceria maxima (Hartm.), Bromus inermis Leyss., Festuca sp., Agropyron sp.	(F)
L. heleocharis	Heleocharis sp.	(F)
L. ruficeps	Eriophorum vaginatum L., E. latifolium Hoppe, E. polystachium L.	(F)
Diplotoxa messoria	Heleocharis sp. Heleocharis macrostachya Britt.	(F)
Cetema cereris	Poa trivialis L., Alopecurus pratensis L., Agrostis alba L., Agrostis sp.	(F)
C. elongata	Agrostis tenuis Sibth., A. stolonifera L., A. canina L.	(B)
	Agropyron repens (L) Beauv., Hordeum murinum L., Poa pratensis L., Agrostis stolonizans Bess. A. vulgaris With.	(F)
C. neglecta	Lolium perenne L., Festuca pratensis Huds., Poa trivialis L., Agrostis spp.	(B)

Chloropidae	Host association	
Anthracophaga frontosa	*Carex* sp.	(F)
A. strigula	*Brachypodium* sp., *Agropyron* sp. *Brachypodium sylvaticum* (Huds.) *B. ramosum* Roem et Schult	(F)
Chlorops brevimana	*Phalaris arundinacea* L.	(B)
C. gracilis	*Calamagrostis epigeios* L.	(F)
C. hypostigma	*Dactylis glomerata* L.	(F)
C. interrupta	*Agropyron*, *Phragmites communis* L.	(F)
C. planifrons	*Carex* sp., *C. inflata* Huds.	(F)
C. pumilionis	Wheat, Barley, Rye, *Agropyron repens* L.,	(B)
	Aegylops sp.	(F)
C. speciosa	*Deschampsia caespitosa* L.	(B)
Thaumatomyia ssp.	All predatory on underground aphids (Homoptera)	(B)(F)

CHAPTER 5.

Introduction to Oscinellinae and Group 1 genera

The subfamily Oscinellinae is distinguished from Chloropinae by the costa which is extended to the end of vein m_{1+2} (Collin, 1946). In a few species of Dicraeus the costa stops just short of the vein m_{1+2} but I follow Nartshuk (1967) in placing Dicraeus in the Oscinellinae.

The species are generally of a dark colouration, small in size, and until Collin (1946) revised the subfamily they were difficult to identify. The generic concepts in Collin's paper are in my opinion basically sound, but there are some points of difference in this thesis. Collin (1946) has keyed the British genera, but his key is difficult to use and does not work for all included species. Nevertheless I have been unable to construct a better key, and I consider that a purely artificial key may be the only solution.

In order to break up the text into chapters I have grouped the genera into 6 groups. Some of these, e.g. Gaurax, represent distinct groups, recognisable when the exotic Chloropidae are considered, but certain others are more for convenience, e.g. groups 5 and 6. A synopsis of these groups follows; the intergeneric relationships are considered more fully in Chapter 16.

Genus groups of Oscinellinae

1. Lipara, Calamoncosis, Siphonella, Fiebrigella, Polyodaspis, Siphunculina and Hapleginella.
   Setae on the edges of the frontal triangle, which is usually shining and long, and vibrissal angles often produced. Cerci of male genitalia usually approximated

and femoral comb absent or in the form of a patch on a prominence. Orbital setae numerous.

2. <u>Trachysiphonella</u>, <u>Aphanotrigonum</u>, <u>Conioscinella</u>, <u>Tricimba</u>, <u>Tropidoscinis</u>.

   Frontal triangle bare or almost bare, dusted. Vibrissal angles produced or not produced. Orbital setae less numerous. Genitalia with a tendency to reduction of the cerci, varied. Femoral comb often a patch, but may be absent; varies within genera.

3. <u>Dicraeus</u>.

   Radial vein very long. Complex, large male genitalia with the cerci reduced or elongate, bare. Large pregenital tergite. Femoral comb patch or absent.

4. <u>Gaurax</u>.

   No femoral comb. Genitalia with short editae and long, bare and curved cerci. Frontal triangle usually dusted.

5. <u>Oscinella</u> and <u>Lioscinella</u>.

   Shining frontal triangle. Femoral comb present, in rows. Cerci well developed. Orbital setae few, but even in size.

6. <u>Eribolus</u>, <u>Oscinisoma</u>, <u>Elachiptera</u>, <u>Gampsocera</u>, <u>Melanochaeta</u>.

   Frontal triangle shining or dusted. Orbital setae often of uneven length. Femoral comb always present and often in the form of a patch. Tendency to thickened arista.

Group 1 genera

Lipara, *Calamoncosis*, *Siphonella*, *Polyodaspis*, *Fiebrigella*, *Lasiambia*, *Siphunculina* and *Hapleginella*.

This group is difficult to define. It contains genera which mostly have a shining frontal triangle, though some species of *Lipara* have a dusted frontal triangle. There are other reasons for including *Lipara* in this group, since it is clearly related to *Calamoncosis* and there is a good graduation between *Lipara*, *Calamoncosis* and *Siphonella*. *Hapleginella* does not seem to fit into this group on external features, but I have found sufficient other characters to warrant its inclusion. While *Lipara*, *Calamoncosis*, *Siphonella*, *Siphunculina* and *Hapleginella* may be defined with some degree of accuracy, it is very difficult to find good characters to distinguish *Polyodaspis* and *Lasiambia*. In Britain we have only a very few species in this group, and so I think it is best to leave a generic revision till the world fauna can be examined, and use the genera in Collin (1946) and Andersson (1977).

Lipara and *Calamoncosis* are very similar, and while they are easy to separate they are not as easy to define. *Lipara*, *Calamoncosis* and *Siphonella* have small setae on the frontal triangle, more than 12 orbital setae on each side and a femoral comb or indications of one, the comb being absent in the other genera. There are two groups of species in *Lipara*, consisting of *L. lucens* and *L. similis* which have the pubescence on the mesonotum arranged in rows of alternate direction and have sinuate side margin extensions to the hupandrium, and *L. rufitarsis* which has neither of these characters. Thus, as Doskocil and Chvala (1971) point out, the arrangement of pubescence cannot be used to distinguish the genus. In the male genitalia the IX tergite has approximated cerci, as in the other genera of the group, and the gonites are densely setose. Perhaps the best distinguishing character is the wide facial keel in this genus, but this is a quantitative rather than a qualitative character.

Calamoncosis differs from Lipara by the narrow facial keel, prominent vibrissal angles which are rounded in Lipara and the much longer proboscis. In Calamoncosis the editae are not as broad at the tip as in Lipara, and the base of the aedeagus is arrow-shaped. The latter character may be used to distinguish the genus on a world basis but Siphonella has a similar aedeagus. The femoral comb has much shorter setae than in Lipara and it is usually on a larger prominence. This seems to be a more homogeneous genus than Lipara.

Siphonella is distinguished by its long geniculate proboscis, and the genitalia bear some resemblance to Calamoncosis, while the femoral comb, as discussed in that chapter, is intermediate between Calamoncosis and the remaining genera, which have no indications of a femoral comb.

Lipara Meigen 1830.

L. lucens Meigen 1830.

This is the largest species in the genus and is the type species. It is easily distinguished from the other species by the dense yellowish pubescence. Collin (1946) pointed out that Gymnopoda tomentosa Mcq. must be L. lucens, and I support this view. The type of _G. tomentosa_ seems to be lost. The size quoted by Macquart can only have been applied to _L. lucens_, and he mentioned the yellow colour, while none of the other species of _Lipara_ and _Calamoncosis_ are yellow.

Meigen (1830) described _L. lucens_, and I have looked for the type in his collection in Paris but did not find it. Some of Meigen's species were described from specimens in Winthem's collection, which is now in Vienna, and in this collection there was a female of _L. lucens_ labelled 'Lipara lucens Meigen coll. Winth/type'. This is the species usually referred to as _L. lucens_, and so it has been correctly interpreted.

The genitalia of _L. lucens_ (fig. 9) may be distinguished from the other species in the genus by the following characters. The cerci (fig. 18) are more widely separated apically than in _L. similis_, and the hairs are longer and finer. The hypandrium (fig. 10) is much broader at the base than in _L. similis_ and the sinuate side margins extend down both sides of each arm. The gonites are densely setose as in the other species, but the apex is more bare. The gonites narrow to the tip in _L. lucens_ while in _L. similis_ they end broadly. The editae of _L. lucens_ (fig. 13) tend to be broader and have denser, finer setae than _L. similis_.

L. lucens is the commonest species of the genus; it may be swept from _Phragmites_ stems in May and June and the larva causes the well known cigar-shaped gall. Blair (1932, 1944) records a range of other insects from these galls. The gall, being large and conspicuous, is more often recorded than the adult insect which appears to be retiring in habits. L. lucens has a wide distribution in Southern England.

L. similis Schiner, 1854.

In L. similis the alternate rows of setae are similar to L. lucens, but are whitish and not yellow, and this species is not so densely haired and dusted. The genitalia of L. similis (fig. 11) are similar to those of L. lucens, but the cerci (fig. 19) are less densely haired, the apical part of the lateral arms of the hypandrium (fig.12) are strongly curved inwards and the apex of the gonites is broad. The setae on the end of the gonites extend further to the tip than in L. lucens. The edita is shown in fig. 16.

The type series of L. similis is in the Vienna Museum. There are 12 males and 3 females labelled 'similis det Schiner Austria Alte Sammlung type' and all are the species referred to above as L. similis. The species has been interpreted correctly.

L. rufitarsis (Loew, 1858)

This species is distinguished from the other Lipara species by the even arrangement of the hairs on the mesonotum. The genitalia (figs. 15, 17) are easily distinguished from L. lucens and L. similis since the margins of the hypandrium (fig. 14) are not sinuate. The gonites are deeply incised on the outer margin and bear long setae at the base but short ones at the apex. The lateral arms end in a strong curve but there is no flattened extension as in the other two species. The hypandrium of L. rufitarsis is longer than wide, while in the other two species it is wider than long. The cerci (fig. 20) of L. rufitarsis are much deeper than wide when examined from below, but the cerci are not completely fused, and they bear long setae as in the other two species.

The types of L. rufitarsis have been examined by Doskocil and Chvala (1971) and a lectotype has been selected.

There is a fourth species in the genus, L. pullitarsis, described by Doskocil and Chvala (1971) and this is very similar to L. rufitarsis. The cerci (fig. 21) are completely fused, and the species may be separated externally from L. rufitarsis by the wider facial keel. I have examined series of L. rufitarsis in the British Museum and the Verrall-Collin collection at Oxford, but I cannot find any L. pullitarsis from Britain. Since Mook has found this species in Holland, it may be found in Britain at a future date, and I include it in the key below, taken from Doskicil and Chvala (1971) and also illustrate the cerci of the two species.

Both L. similis and L. rufitarsis cause a gall on Phragmites, smaller than that of L. lucens. These species are rarely recorded but are found scattered through Southern England in Phragmites marsh.

Key to the species of Lipara

1 (4) Thoracic pubescence arranged in rows of alternate direction.

2 (3) Pubescence brassy yellow, large species over 5 mm.... lucens Mg.

3 (2) Pubescence whitish, small species under 5 mm long .. similis Sch.

4 (1) Thoracic pubescence uniformly directed backwards.

5 (6) Facial keel broad and nearly parallel sided, about as broad as ½ third antennal segment. Male genitalia with fused cerci. ...... pullitarsis D & C

6 (5) Facial keel distinctly narrow, widening above and below, not as broad as ⅓ third antennal segment. Male genitalia with distinctly separated cerci... rufitarsis Loew.

Calamoncosis Enderlein 1911

The type of this genus is rufitarsis Loew. This species is now placed in the genus Lipara, and so the genus should be a junior synonym of Lipara. The genus Stizambia Enderlein 1911 is available with type minima (?). However, Enderlein (1911) seems to have identified minima Strobl as rufitarsis (Sabrosky, 1941) and so Calamoncosis may be retained. There is no doubt that the genus may be easily and conveniently separated from Lipara, and since it has been known for some years as Calamoncosis I believe that this name should be retained if possible.

The species are not easy to separate and the genitalia are rather uniform in the British species. Collin's key to species (1946) will distinguish the species, and a modified form of it is given at the end of this section, while Nartshuk (1962) has revised the Palaearctic species. I agree with Nartshuk's (1962) definition of the genus, but would point out that Siphonella oscinina has an arrow-shaped base to the aedeagus very similar to that of Calamoncosis (fig. 24).

C. nitida (Meigen, 1830)

This is the commonest species in the genus and can be found by sweeping in marshes. Collin (1946) bred it from

Glyceria aquatica. The yellow halteres and third antennal segment, together with the sclerotised and flattened ovipositor of the female distinguish this species. There is variation in the length of the frontal triangle, the extent of the yellow colour and in size. The jowls are narrow for this genus, and the 1+2 notopleural setae separate the species from C. aprica.

The male genitalia (fig. 22) have the cerci fused, as in the other species, and there are usually two pairs of longer setae. The editae (fig. 25) are longer than in the other species and are pointed at the tip. The hypandrium (fig. 23) is open with a narrow but deep incision in the lower margin, and the expanded central part of the aedeagal apodeme is more straight sided and rectangular than in the other species of the genus. The female ovipositor (fig. 29) is flattened and sclerotised.

In the Vienna Museum collection there are four specimens labelled 'type nitida coll Winth'. All are the species described above, with 1+2 notopleural setae and sclerotised ovipositor, and I recognise this as a British species. The description of Meigen could apply to several species, and the type has not been examined for many years. Some authors treated this species as a junior synonym of S. oscinina Fall., but it is a Calamoncosis.

Duda (1932) examined the types and considered them to be the C. aprica Mg., not without justification since most of the type series of aprica is C. nitida. The types of C. nitida are under the name aprica in the Vienna museum. Collin (1946) considered the British specimens of this species to be C. laminiformis Becker. The latter species has black antennae, halteres and legs, and so this interpretation cannot be correct. Collin must have realised this later since the specimens in his series are under a manuscript name.

Nartshuk (1958) (1962) described this species as C. glyceriae, but since nitida is the older name C.glyceriae is a junior synonym of it. I have not seen the type of C. glyceriae, but the description and illustrations of genitalia are adequate to recognise the species.

C. aprica (Meigen, 1830)

The short frontal triangle of C. aprica places it near to C. nitida, but the darkened halteres and 1+1 notopleural setae are sufficient to separate the species, while the ovipositor of the female is not sclerotised as in C. nitida.

In the Vienna collection there are 6 specimens labelled 'type aprica coll Winth'. 5 of these are C. nitida females with the sclerotised ovipositor and 1+2 notopleural setae. However the remaining specimen is a female with a normal ovipositor and 1+1 notopleural setae, but there is a second, smaller posterior seta. Despite this, in my opinion this species is the common interpretation of C. aprica, and this specimen may be designated lectotype in future. There is an extra label on this specimen with the word 'aprica' on it, and this may be the original specimen described by Meigen. Both C. nitida and C. aprica have a notch on the anterior margin of the pregenital tergite. The genitalia of C. aprica are shown on fig. 26-28.

C. minima (Strobl, 1909)

The frontal triangle in this species is variable in length, as pointed out by Nartshuk (1962), and the terminal setae on the scutellum vary in size and position. C. minima has 1+2 notopleural setae and the scutellum is long. The male genitalia (fig. 30) have fused cerci but they are rather longer than in the other species of this genus and there may be more than one pair of setae on them. The editae (fig. 32) are small and irregularly triangular in shape. The hypandrium (fig. 31) is open, with the lower margin having a shallow incision, which may be absent.

C. minima has been bred from galls of Lipara and is a common species.

The type series of this species consists of three pins with one, two and three specimens on respectively. The single specimen is C. minima and is a female, though it is labelled 'Lipara minima m. Admont 12/8 male'. The two specimens are labelled 'Lipara minima Str. male Admont 25/6 Strobl'. Both of these have a sclerotised ovipositor, but the antennae and halteres are dark and the notopleurals are 1+1. It seems unlikely that these specimens are the C. nitida, as not only would the yellow parts have to be darkened but it is improbable that one setae has been lost from four pairs. The species does not run out in Nartshuk's key (1962). Of the three specimens, which again are all female, two are C. minima, while the other is a different species again with non-selerotised ovipositor, one posterior notopleural seta and frontal triangle ½ length of frons. It could be C. aprica but the frontal triangle is short and shining. It is clear that the type series contains several species as well as C. minima. I think the best course again is the selection of one lectotype to retain the species in the commonly accepted sense of C. minima (Collin, 1946 and Nartshuk, 1962).

C. duinensis (Strobl, 1909)

This species is easily distinguished from the other species of the genus by the long frontal triangle and the whitish wings, which are a little longer than in the other species of the genus. The genitalia (fig. 33) have fused cerci a little broader than in the other species, and the editae (fig. 35) are more triangular. The hypandrium (fig. 34) is closed by a narrow bridge in C. duinensis, but is open in the other species of Calamoncosis, while the incision in the lower margin of the hypandrium is wide and shallow. The inner parts of the cerci are pointed.

C. duinensis is a common coastal species, but may also be found in some inland localities (Wicken Fen). I have found it by sweeping Phragmites in saltmarshes, at Arne, Dorset and in Hampshire.

The types of this species are in the Strobl collection. There are two specimens mounted on the same pin, labelled 'Siph. duinensis m. Duino female -- 02'. These are the species commonly considered as C. duinensis in Collin (1946) and Nartshuk (1962), and therefore the name has been correctly interpreted. Both specimens are female.

C. aspistylina Duda 1935

I have seen one male specimen which I refer to this species, taken at Leckford, Hampshire, Reserve E on 3.vi.1972 by P. J. Chandler in alder woodland. It is similar to C. minima, rather stouter in build, and the large thick scutellar setae are mounted on large tubercles;

these are small in C. minima.

The male genitalia of C. aspistylina are not distinguishable from C. minima in my opinion, but a longer series of male C. aspistylina may reveal some quantitative differences. Nartshuk (1962) pointed out that the size and position of the scutellar setae varies in C. minima, suggesting that C. aspistylina may only be a variety. Zuska (1969) figured the scutellum of both species and concluded that the differences were so great they were distinct species. I have failed to find genitalia differences but I agree with Zuska (1969) that they are two species. Nartshuk (1962) noted that the male genitalia of Calamoncosis are uniform and difficult to separate.

Key to the British species of Calamoncosis.

1 (4) Frontal triangle $\frac{2}{3}$ or less length of frons.

2 (3) Frontal triangle only half length of frons. Two strong posterior notopleural setae. Halteres yellow. Female ovipositor blade-like, sclerotised and polished. ...... nitida Mg.

3 (2) Frontal triangle about $\frac{2}{3}$ length of frons. One stronger posterior notopleural. Halteres black or brownish. Female ovipositor normal ...aprica Mg.

4 (1) Frontal triangle $\frac{3}{4}$ length of frons or more.

5 (6) Scutellum elongate with 10 - 12 thickened marginal setae arising from tubercles ..... aspistylina Duda

6 (5) Scutellum with the 4 - 6 apical setae arising from small tubercles.

7 (8) Wings whitish. Scutellum semicircular. Thorax less densely punctate, tip of front femora usually dark ...... duinensis Strobl

8 (7) Wings not whitish. Scutellum longer than wide. Thorax more densely punctate and shining, tip of front femora yellow. .... minima Strobl.

Siphonella oscinina (Fallén, 1820)

This species may be easily distinguished by the very long geniculate proboscis. The jowls are more strongly produced than in Calamoncosis and the genae are very wide. The male genitalia have the cerci (fig. 49) fused and small, while the editae (fig. 51) are strongly curved and have a distinctive notch at the tip when viewed from the posterior aspect. The hypandrium (fig. 50) is closed by a narrow bridge, and has an arrow-shaped aedeagus base similar to Calamoncosis, but the lower margin of the hypandrium is wider in Siphonella than in Calamoncosis, though in Siphonella there is a deep central incision in the mid-line in the aedeagus side.

The type of S. oscinina has been examined by Andersson (1963) and is the species referred to above, therefore the species has been correctly interpreted.

O. nitida Mg. has been considered to be a synonym of S. oscinina, but as shown under Calamoncosis nitida Mg it is a distinct species.

Polyodaspis Duda

This genus may be distinguished from Lipara, Calamoncosis and Siphonella by the smaller number of orbital setae (less than 10), the shining frons and the short face. The facial keel extends down to the clypeus in Polyodaspis, while in Fiebrigella it does not. The male genitalia have the cerci fused basally but each cercus has a separate tip, and the division between them is deeper that in the other genera of the group. The hypandrium is open and has a lateral flange. There is no femoral comb.

P. ruficornis (Macquart, 1835)

This species may easily be recognised by its scutellum, which has two apical setae placed closely together, and a large number of smaller, much shorter setae. The male genitalia have approximated cerci (fig. 52) fused at the base, but there is a clear and deep division between them at the tips, and they are much smaller in proportion to the rest of the IX tergite than those of P. sulcicollis. The editae (fig. 54) are larger than in P. sulcicollis and longer than wide, papillate at the tip. The hypandrium (fig. 53) is longer than wide, open, with an incised lower margin.

The records of this species are all bred from imported walnuts, and I believe it is the only species of Chloropidae in Britain known only from imported specimens. I have not been able to examine the type of P. ruficornis since many of Macquart's types are lost, but the species found in Britain is the same as that found on the Continent.

P. sulcicollis var. anglicus Collin 1946.

Collin (1946) described this species as a variety of P. sulcicollis Mg. The first basal cell is narrower than in P. ruficornis, and the apical setae on the scutellum are widely spaced. I have only seen the 6 males and 6 females in Collin's collection; these varied in the colour of the larger setae, which may be dark or white, but otherwise were as Collin described. The genitalia have the bases of the cerci fused (fig. 55), but the apices are widely separated for this group of genera, and bear a single long stout seta. The editae (fig. 57) are very short and stout, with a rounded end unlike the papillate end of the edita of *P. ruficornis*. The hypandrium (fig. 56) is rounded, broader than long and open; the lower margin lacks the deep incision of *P. ruficornis*.

The type of *P. sulcicollis* Mg. is in the Meigen collection in Paris. It is similar to Meigen's description, but while Meigen described this species as having a dull frons and clear wings, the frons is shining, though not as shining as the frontal triangle, and the wings are milky. These differences cannot be satisfactorily explained by the age of the specimen. Collin described his var *anglicus* as differing from the typical form in having yellow at the front of the head, yellow front to frons, jowls and face and paler bands on tibiae and tarsi. Meigen's type specimen has brownish legs, not black as described but there is no evidence of paler bands as in the British specimens. There is a large yellow object adhering to the front of the frons of Meigen's type and partly obscuring it; this could be the remains of the exerted ptilinum or just a piece of dirt, and therefore the specimen could be teneral.

Collin (1946) stated that his series showed little variation, but as both the leg colour and the colour of the macrosetae vary considerably, I do not agree with him. Since I have no further British specimens to compare with Collin's, and have no Continental material of *P.sulcicollis* for comparison of genitalia, I retain Collin's name for the moment, but when more material becomes available I think it will be found to be within the range of variation of *P. sulcicollis*.

Fiebrigella Duda 1921.

This genus was restricted by Collin (1946) to *F.palposa*

Fln. and F. parcepilosa Collin, though Duda included sulcicollis Mg. Collin distinguished the genus by the form of the facial keel, which in Polyodaspis is broadly triangular and separates the antennal foveae, while in Fiebrigella it is smaller and does not separate the antennal foveae. The genitalia of the two groups of species are very similar, and there seems little grounds for placing them in separate genera. The basally fused but apically spaced cerci and the flange on the lateral margins, about ½ way down, of the hypandrium separates the genera Polyodaspis, Fiebrigella and Lasiambia.

F. palposa (Fallén 1820)

This species has a very wide frons, long palpi and the first basal cell narrow. The jowls have a whitish band below the eye, which is well developed in F. palposa but absent in F. parcepilosa. The male genitalia (fig.39) are similar to Polyodaspis and have small rounded editae (fig. 41). The hypandrium (fig. 40) is open, with a wide lower margin deeply incised. I have seen few records of this species, which appears to be confined to the north and west coasts of Britain and Ireland.

F. parcepilosa Collin 1946.

This species was described from a single female, and I have seen no further specimens for the male genitalia. The type is in the Collin collection at Oxford and agrees with Collin's description. An additional difference is that the haltere of F. palposa is pale and that of F. parcepilosa is dark.

Lasiambia

The genus is only doubtfully distinct from Fiebrigella

The head is shorter than in Fiebrigella and the jowls are narrower.

L. brevibucca Duda 1932.

The external differences between L. brevibucca and L. baliola are slight, but there are differences in the male genitalia. L. brevibucca has tibiae pale at both ends, while L. baliola has the tibiae completely black. L. brevibucca has slender yellow palpi, and multiserial setae on jowls, while in L. baliola the palpi are stouter and brownish, and the setae on the jowls are uniserial. The male genitalia have the cerci in L. brevibucca (fig.42) and L. baliola (fig. 45) fused at the base and separated apically, but the space between them is V-shaped and rounded in L. brevibucca, and U-shaped and more square in L. baliola. The editae of L. brevibucca (fig. 42,44) are short and curved strongly and abruptly towards the cerci, while in L. baliola (fig. 45, 47) they are a little longer but more gently curved. The hypandrium in both species has broad lower margins, more deeply incised in L. baliola (fig. 46) than in L. brevibucca.(fig. 43).

I have not yet seen the type of L. brevibucca. There is one recent record of this species, bred from the trunk of an Elm tree suffering from Dutch Elm disease. I found several specimens from Monk Soham, Suffolk, in Morley's Collection (Ipswich Museum).

L. baliola Collin 1946.

The type specimens of this species are in Collin's collection at Oxford; they are in good condition and agree with the descriptions, except that most of the specimens have pale brownish tibiae. The jowls have a dusted whitish band on almost the whole upper half of the jowls below the margin of the eye in _L. baliola_, while in _L. brevibucca_ the jowls are narrower and this band occupies almost the whole of the jowls. Two features are unusual in the male abdomen of this species; the pregenital sternite (S_{7+8}) is produced to a point in the mid line (fig. 48) and the membrane which separates the tergites and the genitalia is greatly expanded, as in _Thaumatomyia_, and is coarsely granulated.

Siphunculina Rondani

Siphunculina aenea (Macquart, 1835) may be recognised by the very short vein r_{2+3}, the produced vibrissal angles and the whitish wings. This species appears to be rare in Britain, and the only records I have seen in addition to Collin's are 3 males from Bookham Common, Surrey, 10.X.1948, L. Parmenter. The male genitalia are completely different from the other species in this group; the cerci (fig. 36) are small and widely separated, rounded, as in some species of _Conioscinella_. The inner parts of the cerci are widely separated and poorly developed, and the editae (fig. 38) are large and narrow. The hypandrium (fig. 37) is open, but narrowly so, without a lateral flange, and the gonites are long with two or three very long slender setae on the outer side. There is no femoral comb. The differences between this species and the remaining genera of the group are large, and yet I think it is best placed in this group on the grounds of the very similar external appearance, the lack of a femoral comb and the orbital setae.

There is only one British species, _S. aenea_ Mcq. The type specimen is probably lost.

Hapleginella laevifrons (Loew, 1858).

The position of this genus is open to doubt. Collin (1946) placed it near Oscinella, possibly because it has a long shining frontal triangle and rounded vibrissal angles. There are setae on the edges of the frontal triangle, and many orbital setae, while the femoral comb is absent and the cerci of the genitalia (fig. 58) are approximated. All these features are more reminiscent of group 1 rather than Oscinella, and therefore I include Hapleginella in group 1. The shape of the cerci is quite characteristic for this species, and this may be regarded as an isolated genus. The edita is shown in fig. 59.

There is only one British species and it is widely distributed. Collin (1946) recorded sweeping it from conifers, while Sabrosky (pers. comm.) says that a Nearctic species is frequently bred from pine cones. I have seen specimens in the British Museum (Natural History) bred from hybrid Larch cones. I have not yet seen the type of H. laevifrons.

CHAPTER 6

Group 2 genera: Trachysiphonella, Aphanotrigonum, Oscinimorpha, Conioscinella, Tricimba, Tropidoscinis.

This is the largest group of genera, and consequently the most difficult to characterise. The orbital setae are less numerous in this group compared to group 1, and the frontal triangle is almost always dusted, usually small and always bare. The vibrissal angles are usually rounded but may be produced. The genitalia are varied, but usually the editae are long and simple and the cerci are separated. The femoral comb is most noteworthy for its extreme variability in the group, both between and within genera.

Trachysiphonella Enderlein

The genus is usually distinguished by the colouration, which is similar to that of Chlorops sp., but in T. ruficeps the mesonotum is almost completely black. There are always extensive yellow areas on the pleurae, however. This genus includes some of the smallest British Oscinellinae, and is one of the most difficult to identify. Collin (1946) and several previous authors have treated this as one species with a number of forms, but this cannot be correct since there are genitalia differences between the segregates, and therefore I treat them as different species. Material in this genus is very sparse, and since the species are very small the genitalia are often fragile and damaged. As a result I have not completed a genitalia study of this group. The European species are particularly variable, and there may be geographical variation in the genitalia of this genus on the Continent. I distinguish four species in

Britain, though two of them may need to be split at a future date (T. scutellata and T. ruficeps.) The femoral comb is homogeneous in this group, always in the form of a patch with few setae.

Key to the British species of Trachysiphonella:

1 (4) Pleurae yellow with a black mark on mesopleuron only.

2 (3) Vibrissal angles only slightly produced; thoracic stripes black. ... T. pygmaea Mg.

3 (2) Vibrissal angles considerably produced; thoracic stripes reddish. ... T. carinfacies Nartshuk

4 (1) Pleurae with black marks on ptero-, hypo- and sternopleurae in addition to mesopleuron.

5 (6) Vibrissal angles only slightly produced; mesonotum yellow with narrowly separated black stripes; legs mainly yellow ... T. scutellata von Roser

6 (5) Vibrissal angles produced and whole head flattened; mesonotum darkened, with stripes confluent or nearly so; legs darkened .... T. ruficeps Mcq.

T. pygmaea Meigen 1830.

The mainly yellow pleurae with only one black mark and the vibrissal angles hardly projecting beyond the face (fig. 62), distinguish this species. There are some other dark marks on the pleurae, but these are much paler than the mesopleural mark. The male genitalia are weakly chitinised, and were collapsed in all the specimens I dissected, so it is difficult to characterise them and compare, but they are certainly distinct from the next species. The space between the cerci is rather square, and the indentation on the outside of the cerci is small.

This species has long been known as flavella Zett.

The type of this species was examined by Andersson (1966) and found to be the species usually considered under this name. Andersson also examined the type of Chlorops pygmaea Mg. and found this to be the same species, so flavella Zett. is a junior synonym of pygmaea. I have seen the latter type and agree with this interpretation. The type specimen has badly damaged pleurae, and the mesonotal mark cannot be seen, but the jowls are not produced as much as in the next species and the legs are yellow.

T. carinfacies Nartshuk, 1964.

Nartshuk (1964) distinguished this species by the more produced vibrissal angles (fig. 63 from Nartshuk, 1964) and the deeper indentation on the outer side of the cerci of the male genitalia (fig. 67 from Nartshuk, 1964) when compared to T. pygmaea. The specimen Collin (1946) recorded from Fleam Dyke, Cambs. 19.VII.1937 has these characters, and its genitalia are shown in figs. 68 - 70, although I am unable to compare Nartshuk's description since it is in Russian. I have seen no further British specimens of this species, and would like to know the range of variation. The Collin specimen has reddish stripes on the mesonotum, while in T. pygmaea they are black to brownish. I have not seen the type.

T. scutellata von Roser 1840

This species is more variable than Collin (1946) indicated, but the separated mesonotal stripes (at least in front), the paler legs and the frontal triangle darkened only at the ocellar area distinguish this species. The legs may be darkened on the femora. The male genitalia (fig. 64) have the cerci long and rounded and only narrowly separated, while the editae (fig. 66) are long. The hypandrium, of which two specimens are shown in figs. 61 and 65, is closed in most specimens.

Andersson (1966) has shown that pumilio Zett. is an invalid emendation of Chlorops pumilionis Bjerk., and must be suppressed. The next name is scutellata von Roser, and Andersson has examined the types of this species and selected a lectotype. It is the same as the species found in Britain and on the Continent, and therefore our species must be known as T. scutellata.

This is the commonest species of the genus in Britain, and I have found it on windows at Egham, Surrey. One specimen was seen to alight on a stone veranda and settle in bright sunlight. It was positively identified but escaped. These appear to be the only habitat records.

T. ruficeps (Macquart, 1835)

The thoracic stripes of this species are almost always confluent on the disc, and most of the frontal triangle is blackish; the legs are extensively darkened and the vibrissal angles are produced, giving the head a very produced and flattened profile. The male genitalia have small rounded cerci much more widely separated than in T. scutellata and the space between the cerci is U-shaped. The inner parts of the cerci are fused and the editae are similar to T. scutellata. The hypandrium is closed.

I have not seen the type of this species, which is one of Macquart's, so the type may be lost, but the Continental specimens I have dissected were similar to the British specimens in the characters used above, and the genitalia were the same. I recognise T. ruficeps as a species distinct from *T. scutellata* on the grounds of the produced vibrissal angles and the genitalia, but it is a variable species in colour and there may be another species resembling *T. ruficeps* in Britain.

Aphanotrigonum Duda, 1932.

Duda (1932) erected this genus to separate *trilineatum* Meigen from the other species of *Conioscinella* and *Tricimba*. Collin (1946) extended the limits of the genus to include 6 other British species. These have more dusted pleurae than *Conioscinella*. The genus is found over most of the palaearctic region. At the generic level it is difficult to find good genitalia characters to separate the genera *Aphanotrigonum* and *Conioscinella*, but the presence of a small sclerite (here called the pregenital sternite) attached to the anterior margin of the hypandrium, and the closed hypandrium (except in *A. meijerei*) distinguish the genus. Only *A. trilineatum* is widespread in this country, but the other species may be found in coastal localities. Data on the dates of occurrence of *Aphanotrigonum* sp. are as follows:

Table 3. Time of occurrence of *Aphanotrigonum* sp.

Month:	1	2	3	4	5	6	7	8	9	10	11	12
Species:												
A. meijerei						+						
A. trilineatum		+	+	+	+	+	+	+				
A. nigripes				+	+		+		+			
A. brunneum							+					
A. fasciella							+	+				
A. femorella							+	+				
A. inerme						+	+	+	+			

Table 4. Number of setae in the femoral comb of *Aphanotrigonum*

No. setae:	7	8	9	10	11	12	13	14	15
Species:									
A. meijerei	None								
A. trilineatum					3	2		2	2
A. nigripes							1		2
A. brunneum		1	1						
A. fasciella	1	1			1	3	2		
A. femorella				2	2	1	2		1
A. inerme			1	3	4		2	2	1

Sub-generic division of *Aphanotrigonum*.

The British species of *Aphanotrigonum* may be divided into the following 4 groups:

Group 1. *A. trilineatum*, *A. nigripes*.

Group 2. *A. meijerei*.

Group 3. *A. brunneum*.

Group 4. *A. fasciella*, *A. femorella*, *A. inerme*.

The species in group 1 have 1+2 notopleural setae, abdomen flattened dorsally and much wider than deep, all longer setae black and frontal triangle often reaching more than ½ way down frons. The male genitalia have well-separated parallel or slightly convergent cerci with free internal processes, and the intersegmental membrane has prominent microsetae, giving it a granular appearance.

In group 2 the head and thoracic setae are much reduced and many are absent; the remaining setae are small and all whitish. Abdomen cylindrical, frontal triangle shorter than ½ length of frons. 1+1 notopleural setae. Male genitalia with small, rounded well-separated cerci, open hypandrium, while the other species have a closed hypandrium. No femoral comb. Jowls much wider than third antennal segment is deep.

In group 3 the orbital setae are sharply differentiated in size, the posterior ones being much larger and more widely spaced than the anterior ones. The pubescence is brownish, rather than greyish. The male genitalia have the IX tergite strongly transverse, with small cerci.

Group 4 contains species that can be distinguished by the widely spaced apical scutellar setae, more separated than the hind ocelli, 1+1 notopleural setae, abdomen cylindrical and well-developed pregenital sternite. The cerci are divided into two parts, and the internal parts of the cerci are fused.

Group 1. A. trilineatum (Meigen 1830) and A. nigripes (Zetterstedt, 1848)

These two species are rather similar, and the genitalia do not offer any good diagnostic features; the species are very closely related. Collin's characters do not always separate these species since the brown mesonotal stripes are not always strongly in evidence, and I have seen a A. nigripes with faint dark stripes, but in the absence of better characters I separate these species as above. Usually the abdomen of A. trilineatum is more heavily dusted than in A. nigripes. The number of scutellar setae in these species is very variable, with 6 to 10 setae, all shorter than the scutellum.

The genitalia of A. trilineatum (fig. 71) and A. nigripes (fig. 74) show more variation than is usual in Chloropidae, and it is not possible to distinguish the two species. The IX tergite of A. nigripes is more transverse than that of A. trilineatum, with less slender and pointed cerci; the internal parts of the cerci are more slender. The hypandrium of A. trilineatum is shown in fig. 72. The pregenital tergite in these species is large and semi-circular, but the pregenital sternite is scarcely more sclerotised than the intersegmental membrane. Most of the specimens of A. nigripes that I have seen have had a double row of small setae posterior to the setae of the femoral comb. These setae are longer than the setae of the femoral comb, but have smaller bases, and they are similar in distribution to the setae of the femoral comb. This feature is absent in A. trilineatum.

The types of A. trilineatum are in Vienna. There are 8 specimens in the type series under the name trilineata, 6 of which are the British species, while the others are A. nigripes, so a specimen of A. trilineatum may be designated lectotype. Andersson (1966) has examined the type of Oscinis annulifera Zett 1848 and it is A. trilineatum Meigen.

The species described as A. griseum by Collin in 1946 was shown by Andersson (1966) to be the same as A. nigripes Zett. 1848, which takes precedence. Also the type of O. brachyptera is the same species as Collin's A. griseum var. curtipenne; Andersson has seen the types of both Collin's species and compared them with those of Zetterstedt. I have not seen any other European species of Aphanotrigonum with which these species can be confused.

The species in this group may be found from spring to autumn, at least in the case of A. trilineatum, while all the other species of Aphanotrigonum are restricted to the summer months, probably indicating that their life-history is dependant on the growth cycle of a food-plant. This idea is supported by the fact that while A. trilineatum is commonly found in litter in marshy areas, the other species are only found by sweeping them from salt marsh plants. Many of the species of Chloropidae found in litter have larval stages, so far as is known, in decaying vegetable matter, and are found over most of the year, but the species of Chloropidae which can only be swept are more restricted in their flight period and live in live plant tissue in the larval stage. The records of A. nigripes are from coastal areas, but I have found it in the New Forest as well.

Group 2.

This group contains only A. meijerei (Duda 1932), a little known British species only recorded from the Norfolk coast; I have not recaptured it. All the specimens I have seen had distorted genitalia, folded in the midline, and consequently it is difficult to draw them. Fortunately there are good characters on the editae (fig. 76), on the base of which is a crease from which 4 strong setae arise. While several other species of Aphanotrigonum have similarly shaped editae, none have the four setae. The hypandrium of A. meijerei (fig. 75) is characteristic, with open arms (closed in all other species of Aphanotrigonum) and the tips of the arms broadened. The gonites are very long, extending beyond the rest of the genitalia, and the whole apparatus is longer than wide; in the other British species of Aphanotrigonum it is wider than long. In both genitalia and other characters A. meijerei is the most isolated species of Aphanotrigonum and its relationships are obscure. I have not yet seen the type.

Group 3.

Like A. meijerei, A. brunneum Collin 1946, is an isolated species of Aphanotrigonum, and its relationships are obscure. The edita (fig. 79) is very similar in general shape to that of A. meijerei, with a strong median groove, but there are no long setae at the base. The head setae, especially the orbital setae, are on the whole better developed than in the other species of Aphanotrigonum, and certainly more so than in A. meijerei, where they are almost absent. The hypandrium of A. brunneum (fig. 78) is closed and wider than long, whereas in A. meijerei it is open and longer than wide; the gonites of A. brunneum are not so well developed as in A. meijerei. The cerci (fig. 77) are set at an even more obtuse angle than in the species of group 4, but they lack the double structure of that group. A. brunneum has a femoral comb with probably fewer setae than in the other species, but still in 2 rows and in a very similar arrangement, so it is probably not very distinct in this respect.

Group 4. A. fasciella (Zetterstedt, 1848), A. femorella Collin 1946 and A. inerme Collin 1946.

The most compact group of species in this genus and the relationships of the species are rather difficult to define.

A. fasciella Zett. is a smaller species with yellow jowls, antennae and legs (except hind femora) and wide yellow hind margins to the tergites. The other two species have these parts more or less darkened. All three species are rather variable. I have dissected English and

Continental specimens of _A. fasciella_ and English specimens (including Collin's types) of _A. inerme_ and _A. femorella_ and find that these species can easily be distinguished on their genitalia.

It seems that some Continental specimens of _A. fasciella_ may have entirely yellow legs, but I have not seen this form from Britain. Some Continental _A. fasciella_ have darkened mid and hind femora, and I have seen this form from Britain, but the genitalia were the same as the other British specimens. Many teneral specimens of Chloropidae are much paler than the mature specimens, but the genitalia are usually the last part to harden and colour, and as they were hard in the specimens referred to above it is more likely that _A. fasciella_ is a variable species. Similarly, I have a _A. femorella_ with mainly yellow legs. In _A. fasciella_ and _A. femorella_ there is a small, usually black (but in some _A. fasciella_ yellow) seta on the underside of the 1st tarsal segment about $\frac{1}{3}$ of the length along on the middle leg. This seta may not always be seen in dried specimens but in mounted legs it is always visible. Collin (1946) used the hind tibial seta to distinguish _A. fasciella_ and _A. femorella_, but while this seta is usually well developed in _A. inerme_ but less so in _A. femorella_, I have _A. inerme_ with a very small seta and _A. femorella_ with a very well developed seta. The dusted prothoracic episterna of _A. inerme_ and the shining prothoracic episterna of _A. femorella_ seem to be constant characters, except in greased specimens. The yellow hind margins of the tergites in _A. femorella_ and the black or grey hind margins in _A. inerme_ are poor characters for distinguishing these species; the tergites are often obscured by thick grey dust on both species, and many of the female *A. femorella* I have seen have had grey or black hind margins.

The genitalia of the three species are basically similar with widely separated angled cerci and the internal parts of the cerci fused. *A. inerme* has long, curved, narrow editae (fig. 91) while *A. fasciella* (fig. 87) and *A. femorella* (fig. 83) have short, broad editae with one edge thickened, while along the thickened edge there is a projection from the inner surface of the edita $\frac{2}{3}$ of the way along the thickened edge; there is also a small apical projection at the end of the thickened edge. The cerci of *A. inerme* (fig. 89) are only slightly divergent, and broadly separated at their base, while the fissure separating the cerci into two areas is not well developed, so the cerci have a smooth rounded outline. In *A. femorella* (fig. 81) and *A. fasciella* (fig. 85) the bases of the cerci are closely approximated, but the angle between the inner surfaces of the cerci is much greater than in *A. inerme*, and the cerci are much more sharply and deeply divided into two parts. The editae of *A. femorella* and *A. fasciella* are difficult to separate, but in general the apical projection is small and pointed in *A. femorella* (fig. 83) and larger and more rounded in *A. fasciella* (fig. 87). The cerci of *A. femorella* (fig. 81) are rounded at the apex of the inner edge, but in *A. fasciella* (fig. 85) they are pointed, and I have found this to be a constant difference between the two species.

The pregenital sternite is well developed in these species, and there is a considerable amount of variation within each species. In *A. inerme* the pregenital sternite (fig. 92) is always smaller than in the other two species and is incised along the midline for only $\frac{1}{4}$ at most of its length. In *A. femorella* the pregenital sternite (fig. 84) is usually incised about $\frac{1}{2}$ its length and always more than $\frac{1}{3}$; while in *A. fasciella* (fig. 88) the sternite is incised for $\frac{2}{3}$ to almost its entire length.

It is clear that *A. femorella* is more closely related to *A. fasciella* than to *A. inerme*, but *A. inerme* is more closely related to *A. femorella* than to *A. fasciella*. Using the various genitalia and other characters described above, it is possible to construct a figure to illustrate the relationships as follows:

inerme

2/9 0/9

femorella fasciella

7/9

where the upper number in the fraction is the number of characters each species pair has in common.

Andersson (1966) has examined the type of *A. fasciella* and considers it to be correctly interpreted. I have examined the types of *A. femorella* and *A. inerme* and, with the reservations noted above, consider them to be well distinguished by Collin.

All three species are confined to saltmarsh on the south and east coast of England.

Key to the British species of _Aphanotrigonum_ Duda

1(2) All head and thoracic setae whitish and reduced. Jowls much wider than third antennal segment is deep ... _A. meijerei_ Duda

2(1) Some head and/or thoracic setae black. Jowls narrower or as wide as third antennal segment is deep.

3(6) 1+2 notopleural setae. 6-10 marginal setae on scutellum, each shorter than ½ length of scutellum. Abdomen broad, flat on disc, lateral margins sharply angled, heavily sclerotised.

4(5) 3-5 brown stripes on mesonotum .. _A. trilineatum_ Mg.

5(4) Mesonotum unicolourous grey ... _A. nigripes_ Zett.

6(3) 1+1 notopleural setae. Fewer marginal setae, the apical pair often more than ½ as long as the scutellum. Abdomen narrow, cylindrical, convex above and not heavily sclerotised.

7(8) Apical scutellar setae pair less widely separated than postvertical setae; pubescence brownish ... _A. brunneum_ Col.

8(7) Apical scutellar setae more widely separated than postvertical setae; pubescence greyish.

9(10)(11) Prothoracic episterna dusted, abdominal tergites usually without yellow hind margins, no pretarsal seta but a hind tibial seta ... _A. inerme_ Col.

10(9)(11) Prothoracic episterna shining, abdominal tergites usually with narrow yellow band, a pretarsal spur to hind tibiae, legs extensively darkened ... _A. femorella_ Col.

11(9)(10) Prothoracic episterna shining, abdominal tergites with wide yellow margins, a pretarsal spur to mid tibiae, legs yellow with mid and hind femora darkened ... _A. fasciella_ Zett.

Oscinimorpha Lioy 1864.

Collin (1946) noted that this genus may need to be divided, and on the evidence presented here it does not appear to be monophyletic. I treat the species in the genus Oscinimorpha and discuss their relationships more fully in later chapters.

O. albisetulosa var hollandica Duda 1932.

The whitish head setae, dusted pleurae and yellow front to head are distinctive features of this species, but all these characters are also found in Aphanotrigonum. The male genitalia are not similar to any one species of Aphanotrigonum, but each feature is found in one or other of the species of Aphanotrigonum. O. albisetulosa var hollandica has large well developed cerci (fig. 93), similar to those of A. trilineatum, while the inner parts of the cerci are fused as in Aphanotrigonum group 4. The closed hypandrium (fig. 94) is very similar to many species of Aphanotrigonum, and the editae (fig. 95) have signs of a basal crease and long basal setae as in some Aphanotrigonum species. The most important differences between O. albisetulosa var hollandica and Aphanotrigonum is the single row of femoral setae in the former, but A. meijerei has no femoral comb. Another similarity is ecological; this species is found on coastal saltmarshes, usually in company with Aphanotrigonum species.

The type specimen of this species is in the Vienna collection. I have examined it and can confirm that it is the same species as is found in Britain.

O. sordissima (Strobl 1893)

The facial keel is extended to the clypeus in this species, but the lower pleurae are continuously shining unlike the last species. The pleurae of Aphanotrigonum are extensively dusted, while Conioscinella has shining pleurae. For this reason O. sordissima could be included in Conioscinella.

The dark setae, jowls, frons and palpi distinguish this species from O. albisetulosa var hollandica, and the male genitalia show some resemblances to Aphanotrigonum group 4. The cerci (fig. 102) are small and rounded, showing some indications of a division into two parts. The inner parts of the cerci are small and are not fused. The edita (fig. 106) is widened at the base on one side. There is a thickening of the intersegmental membrane along the anterior of the hypandrium. The hypandrium of a British specimen is shown in fig. 105 and of the type in fig. 103. I do not consider the differences in shape important. Aphanotrigonum group 4 is similar to the above, but the hypandrium is closed in Aphanotrigonum group 4.

The type series of this species consists of 5 specimens on 4 pins. The first pin has one male lavelled 'Siph. sordissima m. Villack 1 female'. The second pin has two male specimens labelled 'Vassack 10. 5 Siph. sordissima m male n. sp.'. The third has 2 females labelled 'Villach Tief female' and the fourth 1 female labelled 'm Sud male Steiermark Prof G. Strobl'. All are the species considered by Collin (1946) to be British, and so this species has been correctly interpreted.

O. arcuata (Duda 1932)

Described as a species of Conioscinella. It is/ a much larger and yellower species than O. minutissima, and there is a small dusted patch on the upper sternopleuron. The male genitalia are rather distinctive and do not bear a great resemblance to Conioscinella, but could be included in this genus. The cerci (fig. 96) are large, with parallel inner margins and the inner parts small and poorly developed, widely open. The cerci of Aphanotrigonum group 1 are similar, but the inner parts are more developed in this group. Conioscinella gallarum has long cerci, with the longest point towards the mid-line as in O. arcuata, and so the male genitalia are not so divergent from Conioscinella as they seem. Other species of Conioscinella have small rounded cerci. The editae (fig. 98) are simple, wide and rather curved. The hypandrium (fig. 97) is open, with an incision in the lower margin and narrow lateral arms; the aedeagus seems to be rather heavily sclerotised in many of the specimens, and the gonites are well developed and broad.

The type of O. arcuata is in the Vienna Museum collection. There is one specimen labelled 'Provence, Frejus (Var) 9.VI.24. Zerny Conioscinella arcuata Duda' and with a red label. It is a male and in good condition; it appears to be the same species as that found in Britain, answering to Collin's definition and the description, with a small dusted patch on the sternopleuron. The only doubt lies in the fact that this specimen has 2 rows of femoral setae; British ones have one row. I do not think this is of importance in this instance. I have seen O. arcuata from several localities in the south of England.

O. minutissima (Strobl, 1900)

This species is much smaller and darker than O. arcuata, and the sternopleurae are also shining. The male genitalia have small, rounded cerci (fig. 99), undeveloped, much as in other species of Conioscinella; but the inner parts of the cerci are well-developed and fused. No other Conioscinella has fused inner parts to the cerci, but they are a feature of Aphanotrigonum group 4. The hypandrium (fig. 101) is open, as in Conioscinella, and the lower margin is hardly incised, with narrow lateral arms. The length of the inner prong of the lateral arm is about $\frac{1}{4}$ the width of the hypandrium, and is very similar to O. arcuata in this respect. The widened portion of the aedeagal apodeme is very wide in this species. The edita is narrow (fig. 100).

The types of this species are in Strobl's collection at Admont. There are 4 specimens on three pins, and a separate label 'Siph. minutissima m. Spalato, female'. The first pin has one female specimen labelled 'Lebenico G. Strobl'. The second is a male labelled 'Siph. minutissima n. sp. m. male jul. 3/07'. The third pin has two females labelled 'Osterr Litorale Strobl'. The second specimen is clearly the holotype, and agrees with the description and the British species, though it lacks a head. The other specimens are all the same species, although the first specimen has darkened legs, and Collin (1946) stated that all females of this species have yellow legs. I have seen British specimens which I refer to this species with darkened legs. The species has been correctly interpreted.

<u>Conioscinella</u> Duda 1929

Collin (1946) restricted this genus to 5 British species. The vibrissal angles may be produced or rounded. The proboscis is usually much longer than in <u>Tropidoscinis</u>. The frontal triangle is usually short and always densely dusted. The pleurae are dusted above but continuously shining below, which separates the genus from <u>Aphano-trigonum</u>. The male genitalia have small rounded cerci in most species, though <u>C. gallarum</u> has large cerci. The editae are usually simple, but they are narrowed in <u>C. sordidella</u>, as in <u>Oscinisoma</u>, but to a much lesser extent, while in <u>C. halophila</u> they are different from all the other species, short and rounded. The hypandrium is open in all the species except <u>C. gallarum</u>, and is rather similar to that of <u>Oscinella</u>. The femoral comb varies in this genus; it may be in the form of one row but is a patch in some species and absent in others.

<u>C. gallarum</u> (Duda 1932)

The shining thorax of this species distinguishes it from all other <u>Conioscinella</u>, and all the longer setae are whitish. It resembles <u>O. arcuata</u>, which has yellow legs also, but the proboscis and palpi are not as long. The male genitalia have the IX tergite rounded (fig. 110), with long cerci with the longest part nearest to the midline of the tergite. The inner parts of the cerci are short but very broad, and are not fused. The editae (fig. 112) narrow to the tip, but do not differ greatly from the other species of <u>Conioscinella</u>. The hypandrium (fig. 111) is closed. The gonites are very long, and the lower margin of the hypandrium is slightly incised. I have not seen the type of this species, but Continental specimens are the same species. C. gallarum was recorded by Collin (1946) as associated with Andicus galls on Oak, but he did not give any specific records. In the British Museum (Natural History) collections there are some specimens bred from galls (New Forest, Denny Wood 15.IV.1963 C.R. Vardy Ex. 2nd yr Biorhiza pallida (Olv.) (em. 27-29, iv.1963).

C. halophila Duda 1932

This is the most aberrant Conioscinella species and should be placed in a separate subgenus. The fine brown setae on the margins of the scutellum in addition to the peripheral setae distinguish it from all Conioscinella species and most other Oscinellinae. The male genitalia have an exceedingly transverse, curved IX tergite (fig. 113), with small cerci, a little larger than in the other species of this genus, and set more widely apart and sloping. The inner parts of the cerci are scarcely developed. The most distinctive feature of the genitalia are the editae (fig. 115); they are ovoid in shape, very large, and the articulations are more in the horizontal plane than the vertical. The IX tergite is at least twice as wide as the hypandrium. The hypandrium (fig. 114) is longer than wide, and is pointed at the lower margin while the lateral arms are wide, open, pointed at the tip. The gonites narrow to the tip. The form of the genitalia, and the external characters are so different that this species could be placed in a new genus, but the cerci and frontal triangle place it in Conioscinella.

Collin (1946) states that C. halophila was bred from spider's eggs by Mr. Hamm, but he gave no details. I have seen specimens in Hamm's collection in the Hope

Department, Oxford, and can confirm the record. The type of C. halophila is in the Vienna Museum, labelled 'Type 25.12.82 Handl. Aust. mf Wien' and is in good condition. It is the same as the British specimens of this species.

C. sordidella (Zetterstedt 1848)

This species is most closely related to C. frontella, but the frons is completely yellow in C. sordidella, while in C. frontella it is only yellow at the front. The jowls are wider in C. sordidella and the head hairs are yellowish. The male genitalia of the two species are very similar, and differ only in small details. The IX tergite of C. sordidella (fig. 116) is wider than in C. frontella, and the cerci are small and rounded as in most Conioscinella sp., but the inner parts of the cerci are slender in C. sordidella and turned over at the tip, while in C. frontella they are broadened to the tip and do not turn. There are good differences in the editae (fig. 118) which in C. sordidella are smaller and narrow to the tip, which is pointed, but in C. frontella they are rounded and broad at the tip, and are more strongly curved. The hypandrium (fig. 117) of C. sordidella is rather longer than wide, while in C. frontella (fig. 120) it is as long as wide. In both species the hypandrium is open, but the ends of the lateral arms in C. sordidella are short and spatulate, while in C. frontella they are narrower, longer and turned over at the tip. The lower margin of the hypandrium of C. sordidella is wider than that of C. frontella and has a shallower incision, while it is straight in C. frontella.

I have not examined the type of C. sordidella, but Andersson (1966) has examined the holotype - it is the species Collin (1946) considered under this name and so the British species has been correctly interpreted. Duda (1932) considered this species to be a synonym of C. cinctella (Zett.), but this is not correct.

C. frontella (Fallén 1820)

This is the type species of the genus. It varies in the colour of the legs, those of the female being yellower than the males, as Collin (1946) described. Collin (1946) described a second species, C. mimula which resembles C. frontella, but is smaller and the legs of the female are entirely yellow; the palpi have pale setae. The series of C. frontella and C. mimula show these differences well, but other specimens of C. frontella in the British Museum have intermediate features, and vary more in leg colour than Collin's series. A careful comparison of the genitalia of the type series of C. mimula and specimens of C. frontella failed to show any constant differences between them, except in size. The other species of Conioscinella may be easily distinguished by male genitalia, and so the status of the species must be in doubt. Finally, Andersson (1962) examined the type of C. frontella and states it is the European species considered under this name; but one of the paratypes is a female and has yellow legs and yellow setae on the palpi. Andersson indicates that this means C. mimula is a junior synonym of C. frontella. The edita of C. frontella is shown in fig. 121.

Conioscinella sp. 1.

A single specimen from The Burren, Co. Clare, has not been identified. It has the dark colouration of

Oscinimorpha sordissima, but has rounded vibrissal angles. The male genitalia (figs. 107-9) resemble *C. sordidella*, but the inner parts of the cerci (fig. 107) are broader and the gonites (fig. 108) are broader.

The species is unplaced until further specimens are available.

Tricimba Lioy 1864.

This genus is distinguished by the three deeply incised grooves on the mesonotum. However, there are some other species of Oscinellinae which may possess this character - notably *Conioscinella halophila* which usually has three longitudinal grooves, and they occur in some specimens of *Aphanotrigonum brunneum* and *A. trilineatum* Collin (1946) noted that two species in this genus, *T. cincta* and *T. lineela*, are very different and could be placed in different genera. The third species I include, *T. brachyptera*, is clearly related to *T. lineela*, and Dr. Andersson of Lund informs me (pers. comm.) that the exotic species of the genus he has studied mainly belong to the *lineela* group. It is worth retaining *cincta* in *Tricimba* if only because the mesonotal grooves are a distinct generic character.

Study of the head of this genus has shown a character common to *T. lineela* and *T. brachyptera*. This is a series of cell-like ridges behind the eye on the gena - there is a row of setae, one to each ridge. I have not seen this character in other Chloropidae.

The genus is of some medical importance since some exotid species are parasites of poisonous spiders and may be used in biological control. The larvae feed on the eggs of the spiders. (V.V. Hickman 1970)

<u>T. lineela</u> (Fallén 1820)

There are 4 - 5 stout pale whitish orbital setae in this species, the wings are fully developed with a widened upper basal cell and the scutellum bears short setae in a characteristic pattern. The legs are more slender than in <u>T. cincta</u> and there are 1+1 notopleural setae in <u>lineela</u>, 1+2 in <u>cincta</u>. The pleurae of <u>T. lineela</u> are more heavily dusted than those of <u>T. cincta</u>, and the shining area below is not continuous.

As in <u>T. brachyptera</u> the pale orbital setae and heavy dusting place this species nearer to <u>Aphanotrigonum</u> than <u>Conioscinella</u>, while the short scutellar setae in <u>Aphanotrigonum</u> support this view.

The male genitalia are very similar to <u>Siphonella oscinina</u> - both have small basally fused cerci, occupying a prominence on the IX tergite, while the editae (<u>lineela</u>, fig. 127) are strongly curved and notched at the tip. I do not attach any importance to this similarity, and have placed the species in different groups of genera. The inner parts of the cerci (fig. 125) are large and pointed in <u>T. lineela</u>, but they are not fused. <u>T. lineela</u> has a broad, rounded hypandrium (fig. 126) with blunt narrow outer arms. It is less angular in outline than the hypandrium of <u>T. brachyptera</u>. There is no femoral comb.

Collin (1946) records specimens on windows. There are specimens in Morley's Collection in Ipswich caught on windows at Monk Soham, Suffolk, in March, April, May, June, August, September and October. It was present in a sample of suction trap collection from a field of leguminous crops in Reading, Berks, and I have swept it from rough grassland in Egham, Surrey. One specimen was found on an umbelliferous flower at Wheatfen Broad, Norfolk, 5.IX.1973.

There have been some differences of opinion over the identity of this species. Collin (1946) considered that Duda (1932) had misinterpreted the species, since Fallén's original specimen was from Scandinavia and Collin thought the species did not range so far north. Andersson (1963) has examined Fallén's types. There was no specimen under T. lineela, but under the series of C. frontella there was a single specimen of T. lineela. Andersson noted that the specimens in Fallén's collection have been rather disorganised in the past, and it seems likely that this specimen is the holotype of T. lineela. Andersson treats it as such, and I support this view. Therefore, the interpretation of Collin (1946) and Duda (1932) of T. lineela is correct.

T. brachyptera Thalhammer 1913.

This species has previously been placed in a separate genus Crassivenula (=Neuropachys), characterised mainly by the absence of the second longitudinal wing vein. However, the wings are greatly reduced, usually shorter than the thorax, and it seems to me dubious to base a genus on a venational character when the wings are so reduced. Apart from the three longitudinal grooves, the species has a cell-like arrangement of ridges behind the eye very similar to T. lineela; the setae are very reduced, but those present are short, stout and pale as in lineela; there is no femoral comb and the genitalia do not differ so much from lineela. I am indebted to Dr. Andersson for pointing out the similarity of this species to T. lineela. The reduced head setae are very similar to

Aphanotrigonum meijerei, which also lacks a femoral comb, but I find the species fits better into Tricimba. A description of this species follows:

Head as long as deep and wider than long, black behind, yellow in front and entirely dusted. Frons rather longer than wide, black, yellow on the front $\frac{1}{4}$, sides parallel. About 10 orbital setae, very short, a small outer vertical seta equal in length to the distance between the hind ocelli. Frons setae arranged in longitudinal rows. All head setae whitish, very short and stout. Frontal triangle obscured by dust and inconspicuous. Front of frons slightly projecting. Bases of antennae obscured by the projecting frons, yellow, darkened above on the second segment. Third antennal segment much wider than long and thick, yellow infuscated above and with short, pale pubescence. Arista nearly as long as the eye, darkened, with longer pubescence than the third antennal segment. Face very concave, short, yellow and dusted. Jowls yellow on front $\frac{2}{3}$, black behind, as wide as 3rd antennal segment is long. Lower half of jowls covered in short, pale setae, multiserial, with one longer seta at the front. Mouth opening longer than wide, palpi stout, yellow with dense pale setae. Proboscis brownish and shining. Clypeus black and dusted. Eye rather large and almost bare of pubescence. Occiput black and dusted, a row of numerous postocular setae.

Thorax narrower than the head, mesonotum wider than long, black dusted, greyish. Three lines of punctures down mesonotum with setae, and scattered setae on rest of mesonotum. No longer humeral seta, but several short ones. Humeri dusted. Notopleurae dusted, with 1+1 short setae.

A small postalar and prescutellar seta. Pleurae shining, with dusting on the upper margin and a small patch on the sternopleurae. Legs yellow, darkened basally on mid and hind femora and centrally on the hind tibiae. Setae pale. Wing greatly abbreviated with reduced venation and rather darkened membrane, reaching not further than the end of the 2nd abdominal segment. Haltere whitish, strap-like, with reduced knob.

Scutellum much wider than long, apical setae placed wide apart, disc rather flat with scattered pale setae, rugose. Metanotum shining, black and short.

Abdomen large and rather clubbed, black and dusted grey. Tergite 3 rather shorter than 4, and tergite 5 about twice as long as 3; each tergite with scattered white setae. Male abdomen with dusted IX tergite, female with long slender palpi with several long rather wavy setae apically.

The male genitalia have the IX tergite (fig. 128) rounded, not as broad in proportion as in _T. lineela_. The cerci are sharply pointed and divergent, more so than in _T. lineela_, but in both species the inner parts are fused basally. The edita (fig. 130) is simpler than in _T. lineela_, with no notch at the tip. The hypandrium (fig. 129) is irregularly hexagonal, with straight pointed arms and broad aedeagus. Pregenital sclerite is slightly chitinised, irregular. In general the genitalia resemble _T. lineela_, and support the inclusion of _brachyptera_ in _Tricimba_.

The first specimen of this species I have seen was taken on _Pinus nigra_ at Kew Gardens, London, 11.vi.1972 by

V. F. Eastop, no. 13,246. At the time I was unable to identify it and considered it to be a chance exotic introduction. In 1973 I found the species in Suffolk, at Lakenheath Warren and Foxhole Heath. As far as I am aware these are the only records from Britain for this species.

At Lakenheath the species is restricted to a very specialised habitat - small hollows, filled with _Carex arenaria_ L. on the edge of the lichen heath. It is found in roots and dead vegetation and is very retiring in nature. There can be no doubt that the species has been overlooked in Suffolk - it is unlikely to be a recent introduction, and as I have paid particular attention to insects in ground level vegetation I would probably have found it elsewhere if it was present. Moreover, the Breckland heaths of which Lakenheath is a good example support a unique flora and fauna, including many species found nowhere else in Britain. The record from Kew Gardens is very difficult to explain, particularly since it was taken on a tree branch while the captor was searching for aphids (Eastop, pers. comm.)

The species was described from a single specimen from Simontornya in Hungary on 20 February, 1912, and does not appear to have been captured since (Thalhammer, 1913). A further species in the genus _Neuropachys_ was added by Vanschuytbroek, 1945, also from a single specimen. I have not seen the types of these two species.

T. cincta (Meigen 1830)

T. cincta is a much stouter species than _T. lineela_, and the orbital setae are more numerous - about 7, while the upper basal cell is not widened. The legs vary in colour, from entirely yellow to black with paler knees and tibiae, as noted by Collin (1946), though I have seen specimens intermediate between his typical specimens and the var. apicalis. There is also a sexual difference in leg colour. The number of rows of microsetae between the grooves on the mesonotum is not a good character for separating T. lineela and T. cincta. While T. lineela has affinities with Aphanotrigonum, T. cincta is more closely related to Conioscinella. The orbital setae are short and fine, the lower pleurae are more continuously shining than in T. lineela and the genitalia agree better with Conioscinella. The colour of the humeri is rather variable in this species; in some specimens it is distinctly yellowish.

The male genitalia are very different from T. lineela. The IX tergite of T. cincta (fig. 122) is longer than wide, while in T. lineela it is wider than long. In T. cincta the cerci are well developed, well separated, large and longest in the inner side, rather as in C. gallarum. The inner parts of the cerci are long and wide, rounded at the end. The editae (fig. 124) are simple, slightly curved and not notched at the tip. The hypandrium (fig.123) is parallel sided, closed, with an incision in the lower margin. There is a femoral comb of two rows of setae, while in T. lineela the comb is absent.

I have examined Meigen's collection in Paris and the Winthem collection in Vienna, but did not find the type of this species.

T. cincta is a common species; it may be found by sweeping in grassland, and I find it commonly on windows. There is a breeding record in the B.M.N.H. collection: Long Sutton, Hants. 10.IX.1939 J.R. Goodliffe ex Colchicum *autumnale*. This is the only breeding record I have seen.

Tropidoscinis Enderlein

Collin (1946) included six species in this genus. The frontal triangle is dusted but less so than in *Conioscinella* and the frontal triangle is nearly always longer in *Tropidoscinis*. Most of the species of *Conioscinella* have a large number of small orbital setae, but *Tropidoscinis* has fewer - about 4-8 longer setae more like *Oscinella*. I cannot agree with Collin that this genus is more closely related to *Oscinella* than to *Conioscinella*, since the male genitalia are much more similar to *Conioscinella*, typically having small and low profiled cerci, the hypandrium closed as in most *Conioscinella* and the inner parts of the cerci poorly developed, except for *T.antennata* and *T. kertezi*. *Oscinella* often has large cerci and an open hypandrium. The femoral comb differs from both these genera.

The genus may perhaps be divided into three parts, one containing *T. antennata*, one *T. zurcheri* and the other the remaining species in the genus. *T. antennata* has a partly yellow antenna, and the femoral comb is in the form of a small patch while the remaining species have dark antennae and the femoral comb with two rows of closely packed, numerous setae. Moreover, the edita of *T.antennata* is narrow, rather as in *Oscinisoma*, and ends in a point, but the edita narrows gradually in *T. antennata*; in *Oscinisoma* it is constricted very near the base.

Table 5. Femoral comb setae numbers in Tropidoscinis

T.sp.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	No. setae
antennata	2	2	3																
kertezi							1		2	1	3	4	7	5	5	4		1	
albipalpis												2	1		1				
nigrifrons										2	2			1					

Notes on the species.

T. antennata Collin 1946

The yellow colour of the antennae clearly distinguishes this species from the other British species; the front of the frons is also yellow. The jowls are much wider and paler in T. albipalpis, while in T. antennata the palpi are darkened but they are pale in T. albipalpis. The IX tergite of the male is rounded in T. antennata (fig. 157) while the editae (fig. 159) are narrowed apically and pointed. The cerci are small and poorly developed, rounded, but the inner parts are fused though rather small. The hypandrium (fig. 158) is broader than in the other species of this genus, and the gonites though narrow are wider than in the remaining species.

I have illustrated the male genitalia of some specimens from Egham, Surrey, since these are most suitable for reproduction. However, my drawings of the type specimens in Collin's collection at Oxford differ slightly from the specimens illustrated. The hypandrium of the type is closed, but in detail it does not appear to be very different. The IX tergite is the same in the two specimens, with slender editae in apical view. In surface view the edita is as broad as in the other species of Tropidoscinis.

I consider them to be the same species.

The type specimens of this species are in the Collin-Verrall collection at Oxford, and are in good condition. They are all from Newmarket, Suffolk. I have further specimens in my collection from Egham, Surrey, 21.VI.1971, and Charlton Forest, Sussex 27.VII.1972. There are specimens in the British Museum, from Lundy Island. It would seem to be a widespread species, found in June and July by sweeping in grassland.

T. albipalpis (Meigen, 1830)

Most species of Tropidoscinis have an enlarged third antennal segment, and in this species it reaches its largest size; it is made more conspicuous by the deep black colour of the antennae compared to the yellow face. The jowls are very wide for this genus - about $\frac{1}{2}$ the depth of the third antennal segment, and are yellow in the male, darker in the female, and in both sexes not such a clear yellow as in the preceding species. The palpi also are yellow and darker in the female. The species is very variable in size.

The male genitalia have a rounded IX tergite (fig.160), with small cerci which have a flattened outline; they are wide and well separated. The inner parts of the cerci are not fused; they are small, narrowed to the tip and turned over at the point. In posterior view the editae are slightly hooked on the posterior point, and are produced to a blunt point, but they are much broader than in T. antennata (fig. 162). The hypandrium (fig. 161) is compact; it differs from the other species of this genus in the divergent sides of the apparatus. The lower margin is short, and the gonites are much more narrow than in *T. antennata* and project beyond the anterior margin of the hypandrium, as in the next species *T. kertezi*. The editae are broader in *T. albipalpis* than in the other species of this genus.

The type specimen of *T. albipalpis* is in the Winthem collection in Vienna. It is a male in good condition, labelled 'albipalpis coll Winth type'. It is the same as the species which occurs in Britain. Andersson (1966) has examined the type of *O. basalis* Zett. and finds it is the same species as *T. albipalpis*.

I have found this species to be the commonest species of *Tropidoscinis*; it may be found by sweeping grasses, particularly on the edge of woods, and it is a common species on roadside verges on mixed vegetation. Wendt (1968) recorded it from a variety of habitats in Germany, including marshland, and Collin (1946) records it from coastal localities.

T. kertezi (Becker, 1910)

This is a much darker species than *T. albipalpis*, the yellow colour at the front of the head being much darker, though the frons is still narrowly pale at the front as in *T. albipalpis* and *T. antennata*. The jowls are brownish yellow, but never black. As in *T. albipalpis* the third antennal segment is large and black, but smaller than in *T. albipalpis*, and as the face is brownish yellow the contrast is not as striking. The jowls are narrower than in *T. albipalpis*. *T. kertezi* has a darkened, brownish wing membrane. The arista of *T. kertezi* may be very pubescent so that it greatly resembles *Elachiptera* scrobiculata, but the arista itself is not thickened.

The male genitalia have more curved editae (fig. 163) than in the other species. The cerci are flat and wide as in *T. albipalpis*, but they are much more produced from the surface and the corners are more sharply angled, not rounded as in *T. albipalpis*. The posterior margins of the cerci are curved to the posterior as in *T. albipalpis*, but they are rounded apically and do not narrow to the tip as in *T. albipalpis*. The hypandrium (fig. 164) is broadly closed, with parallel sides and rounded broad angles, as in *T. antennata*, but the long gonites are more similar to *T. albipalpis*. The inner parts of the cerci are open as in *T. albipalpis* but broadly triangular and not excavated on the inner side. The edita is shown in fig. 165.

I have not yet seen the type of *T. kertezi*. The species seems to be more confined to marshy situations than *T. albipalpis* and may be swept from *Juncus* and *Holcus*.

T. nigrifrons (Duda, 1933)

T. nigrifrons is a much darker species than the last three; the frons and jowls are entirely dark. The frontal triangle is very lightly and unevenly dusted, and Collin (1946) records a pair with large shining patches on each side of the ocelli. Specimens with smaller shining patches on each side of the ocelli are common. As Collin (1946) pointed out, these specimens could be placed in the genus *Oscinella* except for the convex front margin of the frons. However, the male genitalia of the genera *Tropidoscinis* and *Oscinella* may be distinguished and *T. nigrifrons* is in my opinion better placed in *Tropidoscinis* than in *Oscinella*.

The genitalia of *T. nigrifrons* bear more resemblance to _T. kertezi_ than _T. antennata_ and _T. albipalpis_. The cerci (fig. 166) are rounded, larger than in the other species of _Tropidoscinis_ and set at a greater angle than in the other species. The inner parts are very small, pointed and poorly developed. The editae (fig. 168) are rounded at the tips as in _T. kertezi_, but they are much longer than in the other species of _Tropidoscinis_ and the posterior margin is nearly straight. The hypandrium (fig. 167) is similar to that of _T. kertezi_ with parallel sides and rather square lower margins, but the gonites are not as long and there is no indentation in the lower margin. The gonites are narrower in _T. kertezi_.

I have not yet seen the type of _T. nigrifrons_. It seems to be restricted to coastal localities, such as Flatford Mill, from Suffolk to Glamorgan.

T. scotica Collin 1946.

Collin described this species from two Scottish females and I have not seen any further specimens which may be referred to this species. It is much darker than the other species of _Tropidoscinis_, having almost completely black legs, and the two specimens in Collin's collection agree with his description of this species. Since no males are known I have not seen the male genitalia of this species.

T. zurcheri

Collin (1946) noted that this species resembles _Oscinella angustipennis_ Duda. Most specimens have a completely dusted frontal triangle - the exceptions have shining patches on each side of the ocelli as in the specimens of _T. nigrifrons_ noted by Collin (1946). The anterior margin of the frons of Oscinella is concave, and this is also true of T. zurcheri, but the other species of Tropidoscinis considered above have a convex anterior margin to the frons. In the size of the third antennal segment of T. zurcheri is better placed in Oscinella.

The male genitalia of T. zurcheri have a rounded IX tergite (fig. 169); the cerci are much longer than in the other species of Tropidoscinis and there is a deep excavation between them. They are not so well differentiated from the IX tergite as in the majority of Oscinella species, and the inner parts of the cerci are scarcely developed. The editae (fig. 171) are large, bent basally and parallel sided to the rounded apex. The hypandrium (fig. 170) is similar to that of T. antennata in being narrowly open - the other species of Tropidoscinis have a closed hypandrium. The hypandrium of T. zurcheri closely resembles that of Oscinella, in that the basal margin is broad and the hypandrium narrows to the apex. The femoral comb has one row of setae in Oscinella and zurcheri, and two rows in Tropidoscinis, but the arrangement of the setae is more irregular in zurcheri than in Oscinella.

I consider that the dusted frontal triangle is of little taxonomic significance in this case, and the species should be transferred to the genus Oscinella in a new sub-genus.

Collin (1946) bred this species from galls of Lipara lucens and L. similis. T. zurcheri is found in the vicinity of reedbeds, but is not often recorded; the records are from southern England. I have not yet seen the type of this species.

Key to the British species of *Tropidoscinis*:

1(6) Front of frons and jowls yellow to brownish yellow.

2(3) Front half of frons yellow, jowls half as wide as 3rd antennal segment is deep and pale yellow, slightly darkened in females.

... *albipalpis* Mg

3(2) Front of frons narrowly yellow or brownish, jowls less than half as wide as 3rd antennal segment is deep.

4(5) Antennae yellow basally on the 3rd segment, palpi yellow, anterior two pairs of tibiae and all tarsi yellow

... *antennata* Coll.

5(4) Antennae black, large and arista pubescent; palpi black, and all tibiae darkened ... *kertezi* Beck

6(1) Frons and jowls black.

7(10) Frontal triangle extending to front of frons; subapical wing cell widening at tip.

8(9) Both ends of four anterior tibiae and first 2-3 joints of middle tarsi conspicuously yellow. Orbital setae longer. ... *zurcheri* Duda

9(8) Legs black with ohly the base of front tibiae obscurely yellowish. Orbital setae shorter.

... *scotica* Coll.

10(7) Frontal triangle not extending to front of frons; subapical cell not widening out towards tip.

... *nigrifrons* Duda

CHAPTER 7.

Group 3. Dicraeus Loew, 1873

In many respects this genus is rather isolated and I have placed it in a single group rather than enlarging one of the others to include it. The long vein r_{2+3} makes the last two costal segments only half as long as the preceding one, distinguishing this genus from all the other British Oscinellinae. The cerci are either long and bare or very small and reduced, and the editae are much modified. The genitalia are generally much more prominent than in other Oscinellinae. The frontal triangle is usually dusted, and the vibrissal angles are not produced. The pregenital tergite (S_{7+8}) is very large. The key in Collin (1946) separates the species satisfactorily.

Collin (1946) suggested that the genus did not need subdividing into subgenera, but I do not agree. Nartshuk (1967) has divided it into three subgenera, all of which occur in Britain. This subdivision was based entirely on genitalia characters, and it is difficult to define the subgenera on other characters. The British species may be placed in subgenera as follows:

1. Dicraeus subgenus Dicraeus Loew 1873
   - D. ingratus Loew
   - D. tibialis Macq.
   - D. raptus Hal.
2. Dicraeus subgenus Paroedesiella Enderlein 1936
   - D. vagans Mg.
   - D. styriacus Strobl.
   - D. napaeus Col.
   - D. opacus Beck.

3. *Dicraeus* subgenus *Eudicraeus* Nartshuk 1967.

   D. fennicus Duda

   D. scibilis Col.

In the subgenus *Dicraeus* the cerci are long, narrow and bare, and the editae are long also. The cerci are reduced in the other two subgenera. The editae are long and complex in *Eudicraeus*, while in *Paroedesiella* they are short and bear thickened setae. Although other characters do not separate the subgenera satisfactorily, *Dicraeus* has narrower jowls than the other two subgenera, and the venation has either the outer cross-vein missing or the costa not continued to the end of vein m_{1+2}. The subgenera *Paroedesiella* and *Eudicraeus* are more difficult to separate, and I know of no useful characters to separate the British species of this group. As mentioned in the chapter on femoral combs, the femoral comb follows these subgenera to some extent. None of the British species of the subgenus *Dicraeus* has a femoral comb, and in the other species it is in the form of a patch. *Paroedesiella* has a large number of setae arranged on a prominence, while *Eudicraeus* tends to have fewer setae, not on a prominence.

Becker (1910) and Seguy (1934) place this genus in the Chloropinae on the grounds that the costa may not reach the end of vein m_{1+2}; there is little support for this view, and the structure of the male genitalia and the presence of a femoral comb place this genus in the Oscinellinae. Nartshuk (1967) notes that the broad pregenital 'sternite' (probably Nartshuk meant tergite) is found in other Oscinellinae while the cerci are separated and the editae articulated.

The relationships of this genus are obscure. Nartshuk (1964) described a species of Aphanotrigonum with an elongate radial vein, *A. longinerve*, considering this to be a connection between the two genera. A species of *Trachysiphonella* (Harkness and Ismay, 1976) has genitalia similar to *Dicraeus* and may indicate a relationship between these genera. *Aphanotrigonum* and *Trachysiphonella* are placed in group 2 in this thesis, but since there is little further evidence of relationship I leave *Dicraeus* in its own group. It should be noted that Nartshuk's statement that *Aphanotrigonum* has a closed hypandrium does not apply to *A. meijerei*. I do not think the open or closed hypandrium is as important as Nartshuk (1964) implies.

TABLE 6 Femoral comb setae in *Dicraeus*

No. setae	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+
D. ingratus	None															
D. tibialis	None															
D. raptus	None															
D. vagans	(see survey in Chapter 3)															
D. styriacus		1		1	4	1										1
D. napaeus						1		1		1						
D. opacus					1		1	1	2							
D. fennicus				1	2	2	3	4	1	1	1	1				
D. scibilis	1				3			1	2							

TABLE 7 Dates of occurrence of *Dicraeus*:

Month	1	2	3	4	5	6	7	8	9	10	11	12
D. ingratus						+	+					
D. tibialis					+	+						
D. raptus							+	+				
D. vagans			+			+	+					
D. styriacus					+							
D. napaeus							+					
D. opacus					+	+	+					
D. fennicus						+	+	+	+			
D. scibilis						+	+					

Dicraeus Loew

D. ingratus (Loew, 1858)

The species is the darkest in the subgenus *Dicraeus*, and the costa does not reach the end of the vein m_{1+2}. The genitalia (figs. 135 - 137) are very similar to those of *D. raptus*, but the editae are longer in *D. ingratus* and the cerci a little broader.

D. ingratus is infrequently recorded, but the records are well scattered (Chippenham Fen, Wicken Fen, Box Hill (Surrey) and near Reading) and it is probably quite common on chalk grassland. This is an early species - June and July - and has been bred from the grasses *Bromus erectus* and *B. inermis* in Russia (Agafonova, 1962) where it is a pest. The flight period is the same as the flowering period of *B. erectus*.

D. tibialis (Macquart, 1835)

The costa reaches the end of the vein m_{1+2} in this species, which distinguishes it from *D. ingratus* and *D. raptus*. The jowls are yellow and are wider than in the other two species. The male genitalia (figs. 138 - 140) have longer editae than *D. raptus* and the cerci are wider than in that species, while the longer tuft of setae on the inside of the editae at about the middle of its length is absent in *D. tibialis* but well-developed in the other two species of this subgenus. The editae are more strongly curved when viewed from the side (fig. 139) than in *D. ingratus* (fig. 136).

D. tibialis is found earlier than *D. ingratus* and is also recorded from a wide range of localities in the south of England. It has been bred from the two *Bromus* sp. mentioned under *D. ingratus*, and also from *Helictotrichon pubescens* in Russia. I have not seen the type.

D. raptus (Haliday, 1838)

This species may be separated from the rest of the species by the lack of an outer crossvein (M-Cu), while the costa does not reach the end of the vein m_{1+2}. The male genitalia (figs. 132-134) are rather similar to those of *D. tibialis*, but the setae on the editae (fig. 132) are better developed, the editae are less curved and the cerci in side view (fig. 133) are more curved. In *D. ingratus* the apex of the edita is more pointed than in *D. raptus*, and the setae are better developed. Differences between the genitalia of these three species, however, are slight.

Records of *D. raptus*, as with the three other species in this subgenus, are mainly from the south of England on chalk grassland, but I found it in a ride in the Charlton Forest, Sussex, and it has been recorded from Chippenham Fen and Hereford. I have seen no breeding records for this species.

Paroedesiella Enderlein

This subgenus contains four British species out of a world total of five; the other species is Nearctic. The British species contain three closely related species and one isolated species. D. styriacus, D. napaeus and D. opacus are difficult to separate. The editae are distinguished from the other subgenera by the possession of a posterior process, and short, stout setae.

D. vagans (Meigen, 1830)

One of the commonest species of Dicraeus, it may be distinguished from all the other species by the mainly yellow pleurae, legs and humeri. The female has a long ovipositor, at least as long as the rest of the body. The male genitalia (fig.151-153) have more reduced cerci than in any other species, while the editae are rounded but with a long posterior process, and the setulose setae are variable in number (Chapter 3). The femoral comb is on a smaller prominence than in the other species in this group.

The type of D. vagans is not in the Meigen collection at Paris, nor in Winthem's collection at Vienna. However there is a pin in the Paris collection, with a card mount labelled 'vagans' and '2758 40', but no specimen; there is a spot of glue in the mount and embedded in this is an insect tibia. This cannot be a diptera tibia, since it has an outer row of stout short setae, but it bears a close resemblance to the tibia of some Hemiptera. It is probable that the type is either lost or destroyed.

I have not yet seen the type of D. xanthopygus (Strobl 1909), but from the description it is probably D. vagans.

D. vagans has been bred from Arrhenatherum elatius (L.) in Russia, and I have found females ovipositing on this plant in this country, while larvae may easily be found at the right time of year. I have only found this species where there is Arrhenatherum, though it is not always found where there is Arrhenatherum. The time of flight coincides with the flowering of this plant.

The remaining species of Paroedesiella are more closely related and are difficult to separate. D. styriacus has wide yellow jowls, D. opacus has narrower jowls entirely darkened, while D. napaeus has the lower hind half of the jowls dark and the remainder yellow; the dark part is rugose. There are slight differences in the male genitalia of the three species. Unfortunately D. napaeus and D. opacus vary somewhat in all of these characters. Duda (1932) described the jowls of D. styriacus as 'gelb, gelbbraun rotbraun oder schwarz braun oder gelb und unten schwarz gesaumt,' i.e. jowls yellow, yellowish brown, red brown, or black brown or yellow and black marked beneath. This description could apply to all the species above and probably includes at least the three British species, so it seems that the species have been placed under the same name in Continental collections.

D. styriacus (Strobl, 1898)

This species is the lightest coloured of the group, and while the jowls are often obscurely darkened they are not completely darkened as in D. opacus or bicoloured as in D. napaeus. The IX tergite of the male genitalia (fig. 141, 142) is rounded in outline, the edita (fig. 144) is rounded in outline, semicircular and with a relatively deep indentation. The figure of the IX tergite in Collin (1946) omits the small cerci which are present in the types of D. styriacus and D. vallaris, though greatly reduced. The hypandrium is similar in all three species.

Nartshuk (1967) has bred this species (under the name D. vallaris) from Helichotrichon pubescens, and the emergence time of the species corresponds to the flowering of the grass. There are comparatively few British records; Collin (1946) records it from the Devil's Ditch, Cambs. and Hogley, Oxford, and there is a specimen from Bookham, Surrey, in Parmenter's collection. My specimens are all from Box Hill, Surrey, so the species may be confined to chalk grassland. The time of flight is very limited (May) and this may explain the scarcity of records.

There are 7 specimens in the type series of D. styriacus. Three females are on one mount, labelled 'm Sud female Steiemark Prof. G. Strobl'. Two female specimens are on the same mount, labelled as above, and one male and one female, also labelled as above. They are all the same species, which is not the same as Collin's (1946) interpretation. The species Collin (1946) described as D. vallaris is the same species. Nartshuk (1967) followed Collin. The male specimen, whose genitalia I figure (fig. 141 & 143), may be selected as lectotype.

The type series of D. vallaris is in the Hope Department, Oxford, and is the same species as the one described above. Collin did not select a holotype and so a male lectotype may be selected.

D. opacus Becker, 1910

This is a much darker insect than D. styriacus or D. napaeus, and Collin (1946) distinguished it from both these species by the entirely black antennae, with which I would agree. However, the colour of the front of the face and the frons is variable, and I have specimens with pale front to frons and face, but entirely black antennae and genitalia corresponding to this species rather than D. napaeus. More important is the fact that the width of the jowls varies and the upper part of the jowls may be paler than the lower, which leads to confusion with D. napaeus. In both D. napaeus (fig.149) and D. styriacus the lateral edges of the IX tergite are square, while in this species (fig. 142) they are curved and bulge near the base of the editae. The editae (fig. 147) are rounded and have a moderate incision as in D. styriacus, but the inner side of the edita is more rounded than in either of the other two species.

Collin (1946) recorded this species from the Devil's Ditch, and I have 8 specimens from Box Hill, Surrey, in June and one from Chapman's Pool, Dorset, in July. Again it seems to be confined to chalk grassland. I have not seen Becker's type of this species yet.

D. napaeus Collin 1946.

Collin described this species from a single male (Cornbury Park, Oxford, 4.vii.1904). The species was differentiated from D. styriacus (= D. vallaris of Collin) by its darker colouration, particularly the jowls which are yellow anteriorly and above, black posteriorly and below. The specimens of D. opacus which I have examined included some with partly pale jowls, approaching D. napaeus in this respect. D. styriacus normally has paler antennae than D. opacus, but I have seen specimens I consider to be D. opacus with brownish basal joints to the antennae. These characters are therefore subject to variation in this group of species.

The male genitalia of D. napaeus were figured by Collin (1946). The figure of the IX tergite, reproduced in fig. 149, shows no cerci. This is due to the orientation of the specimen, which I have remounted and figured (fig. 148). The specimen has small cerci, as in other species of the group. Collin's figures of the IX tergite of D. napaeus (fig. 149 of this thesis) and D. opacus (fig. 142 of this thesis) are drawn from different orientations. I find little difference between my specimens of D. opacus (fig. 145) and the type of D. napaeus (fig. 148). The status of D. napaeus is doubtful, and unless further specimens with new characters are found I think it should be considered a form of D. opacus.

Eudicraeus Nartshuk

The two British species of this subgenus have very long and thick editae which have limited articulation with the IX tergite, which is very large.

D. fennicus Duda 1932

The long whitish wings of this species are a good character, and the pale tibiae distinguish it from D. scibilis. The male genitalia (fig. 154) have more slender editae than D. scibilis, with a dense patch of setae on the inner side. The shape of the editae, which are very complex, is sufficient to distinguish this species from *D. scibilis*.

D. fennicus has been bred from *Agropyron repens* in Russia by Nartshuk (1960) and was taken on *A. pungens* by Parmenter (1955). I have found it common on *A. repens*. This is presumably the foodplant in Britain, and the late flowering period of these grasses (July to August) is reflected in the late flight period of the fly (June to September).

I have not yet seen the type of *D. fennicus*.

D. scibilis Collin 1946.

This species is much darker than *D. fennicus* and does not have whitish wings. The antennae are darkened at the tip and the middle and hind tibiae are darkened. The male genitalia are very similar to those of *D. fennicus* but the shape of the editae is different; they are broader and more spatulate apically. The hypandrium of these two species (*D. fennicus*, fig. 155) has a lateral flange. This may be due to the fact that the IX tergite is very large, and the flange is the connection between the narrower hypandrium and the IX tergite.

Most records of this species are from coastal localities, often in company with the last species, and it may have the same foodplant since it is also on the wing later in the year than most *Dicraeus*. The type specimens of this species are in Oxford in the Verrall-Collin collection. I have examined these specimens and they fit the description given by Collin and the figure of the male genitalia.

The genus Dicraeus has a distinctive life-history; the known larvae live in the developing seeds of Gramineae. Nartshuk (1967) has summarised the information on the life-histories of this genus, and in this chapter it is shown that in general there is a good correlation between the flight period of Dicraeus and the flowering period of their hosts. Nartshuk (1967) showed that in the collections available to her there was a bias in the sex ratio towards females. In 1973 a colony of D. vagans at Egham, Surrey was sampled to determine the sex ratio during the flight period. The sample plot of Arrhenatherum elatius was swept over a marked path for five minutes in the morning and evening and the results combined.

Table 8 Sex ratio of D. vagans.

Day:	1	2	3	4	5	6	7	8	9	10	11
Males	51	53	88	157	205	250	268	203	157	42	28
Females	44	48	103	172	204	257	271	189	171	57	30
Males/Females	1.2	1.1	0.9	0.9	1.0	1.0	1.0	1.1	0.9	0.7	0.9

Day 1 is 28.vi.1973; the figures in the body of the table are numbers of specimens.

The ratio of total males to females (1502 : 1546) is slightly in favour of females, but less so than in Nartshuk's samples. However, Table 8 shows that the sex ratio is high at the beginning of the flight period and lower at the end; this is a common pattern in insects, the males often emerging before the females and dying earlier.

CHAPTER 8.

Group 4. Gaurax Loew 1863.

In the Check-list (Kloet and Hincks, 1976) I placed dubius Macq. and fascipes Beck. in Botanobia Lioy and niger Czerny in Mimogaurax Hall. I now believe that all three species should be placed in Gaurax. Gaurax and Pseudogaurax Malloch form a rather isolated group of genera with hairy eyes, head deeper than long and cerci often elongate and incurved. Pseudogaurax has a thickened arista and an elongate scutellum. Some species have been recorded as parasites of spider egg cocoons (Hickman, 1970) or mantid oothecae. The genus Gaurax may be distinguished by: head deeper than long; eyes hairy; antennae with kidney-shaped pubescent 3rd segment; scutellum rounded, short. Editae variable but usually square with or without protuberances; cerci long, narrow and incurved; femoral comb absent.

G. niger Czerny 1906

This is a black species with yellow legs. The head is much deeper than long, more so than in G. dubius and G. fascipes, and the jowls are very narrow. The antennae are yellowish basally, the third segment is brown with a long pubescent arista. The setae and microsetae on the thorax and scutellum are yellowish in the male to brownish in the female; the longer head setae are brownish. The legs are yellow with a dark mark above on the apical third of the hind femora.

The IX tergite (fig. 275) is similar to the other Gaurax species in the form of the cerci, these being long, bare and incurved. The editae (fig. 277) are short and rounded apically, as in G. dubius and both species have long setae on the inner side of the editae. The hypandrium (fig. 276) has reduced arms and the gonites are fused to the base of the aedeagus and the hypandrial wall, as in G. dubius (fig. 279).

G. niger is known to me from the specimens mentioned by Collin (1939) and a single specimen from Ayot Green, 23.vii.1949 collected by C. N. Colyer. I have not seen the type specimen.

G. fascipes Becker, 1910.

Smith (1964) has revised G. fascipes and G. dubius. Unfortunately in his key the character 'frontal triangle shining' or 'dusted' has been transposed; G. dubius has a dusted frontal triangle and G. fascipes a shining frontal triangle. I have seen one male G. dubius with a slight mark on the base of the hind tibia, but otherwise the key works. G. fascipes is found from May to August in England and Wales. At Flatford Mill, Suffolk, on 5.viii.1977 I swept the species in large numbers from a path through a dense blackthorn thicket. Specimens in Collin's and Morley's collections were taken on windows. E. B. Basden has reared G. fascipes from the nests of a blackbird and a linnet at Farnham Royal in Buckinghamshire. I have not seen the type specimen. The edita (fig. 281) has an elongate outer corner.

G. dubius (Macquart, 1835)

I can record this species from April to August in England and Wales; it has been bred from Pictoporus fungi. I have not seen the type specimen. The male genitalia (figs. 278 IX tergite, 279 hypandrium, 280 edita) differ in detail from G. fascipes (Smith, 1964)

Key to the British species of <u>Gaurax</u>:

1(2) Pleurae and scutellum black. Jowls at middle narrower than front tibiae. Head and eyes nearly twice as deep as long.

..... <u>niger</u> Czerny

2(1) Pleurae yellow with dark marks, scutellum usually yellow. Jowls at middle wider than front tibiae. Head slightly deeper than long.

3(4) Frontal triangle shining; thoracic pubescence shorter; one dark mark on mesopleuron.

..... <u>fascipes</u> Becker

4(3) Frontal triangle lightly dusted; thoracic pubescence longer; dark marks present on meso-, sterno-, ptero- and hypopleuron.

.... <u>dubius</u> (Macq.)

CHAPTER 9.

Group 5, *Oscinella* and *Lioscinella*

Oscinella Becker, 1909.

The genus *Oscinella* contains a large number of species with a shining frontal triangle, 4 - 5 longer orbital setae and a concave front margin to the frons. The frontal triangle is usually entirely shining, but I consider *zurcheri* Duda belongs in *Oscinella* for the reasons already stated (Chapter 6) - this species has a dusted frontal triangle. Two other species of *Oscinella*, *O. trochanterata* and *O. angularis* have a partially dusted frontal triangle in many specimens. It seems therefore that this character is rather variable in *Oscinella*. *Tropidoscinis* has an entirely lightly dusted frontal triangle and the frons has a convex to straight anterior margin; it differs also in the male genitalia, but the orbital setae are very similar to *Oscinella*. The concave anterior margin of the frons is a constant character in this genus. *Lioscinella* is very similar to *Oscinella*, and the more sloping face is a quantitative rather than a qualitative difference. The differences in the male genitalia of these two genera are not great, but *Lioscinella* has two rows of setae in the femoral comb, while *Oscinella* (Table 9) has one row, except in *O. posticata*.

The genus *Oscinella* is rather homogeneous and it is not possible to subdivide it into species groups. *O. frit*, *O. nigerrima*, *O. pusilla*, *O. grossa*, *O. cariciphila* and perhaps *O. angularis* could be placed in one species group on similarities in the male genitalia.

I have not included a key; Collin (1946) has keyed the British species.

TABLE 9: Femoral comb setae of Oscinella Becker.

Femoral setae: No. of setae:	4	5	6	7	8	9
Species:						
O. nitidissima	-	2	3	-	-	-
O. trochanterata	1	3	2	-	-	-
O. maura	-	3	1	1	-	1
O. frit	-	10	17	6	2	-
O. angustipennis	-	-	1	-	-	-
O. cariciphila	-	-	1	-	-	-

Oscinella maura (Fallén, 1820)

This species is easily recognised by the long silvery white pubescence on the apical two-thirds of the arista. The basal part of the arista is also pubescent, but it is darker, brownish. As in O. grossa the surface of the mesonotum bears minute punctures, and is dusted. The frontal triangle is long, reaching almost to the front of the frons. The wings are somewhat darkened, as dark or darker than in O. angustipennis. The halteres are brownish in colour, and all the other British Oscinella have yellow knobs to the halteres. Leg colour in this species is subject to some variation - in the bulk of the specimens seen the legs were black with the tarsi and tip of middle tibia brown, but both parts may be yellow or black. A comparison of the male genitalia of these forms revealed no differences, and I therefore conclude that they are due to continuous variation.

The male genitalia have a rather square IX tergite (fig. 172) with large and divergent cerci which are heavily sclerotised. The inner parts of the cerci are fused into a square central projection towards the anus. The editae (fig. 172) are strongly curved inwards as in O. frit and O. nitidissima, but in maura the bend is half-way along the edita, while in O. frit and O. nitidissima it is nearer to the base, at about one-third the length of the edita. In side view (fig. 174), the edita is nearly parallel sided, about four times as broad as long and rather extended on the posterior margin, similar to that of O. frit and O. nitidissima. The hypandrium (fig. 173) is similar to those of the other Oscinella species; it is open, with well developed gonites and a thickened lower margin. The outer margin is rather narrower than in most species of Oscinella, and the lower margin is less heavily sclerotised than in Tropidoscinis.

Collin (1946) treated this species under the name albiseta Mg. Andersson (1963) revising Fallén's species showed that there are specimens of this distinctive species in Fallén's collection and designated a lectotype - but there were four species in Fallén's series of maura. One of these, with punctured mesonotum, yellow tarsi and black arista, is probably the 'species allied to frit' of Collin (1946), and is almost certainly O. maura Mesnil. Collin's (1946) statement that Meigen, by naming the species with white arista, limited the name maura to the frit-like species with black arista, is in contravention of the rules of zoological nomenclature. Andersson (1963) did not agree with this interpretation, and considered albiseta to be a synonym of maura, a view which I support. The type series of O. albiseta Mg. is in the Paris Museum and consists of two female specimens. The specimen labelled albiseta unfortunately has both aristae missing, while the other has the characteristic white arista. Both specimens have darkened wings, wide jowls and punctured mesonotum, and agree with Collin's interpretation of the species. It is therefore a synonym of O. maura (Fln).

O. maura is a common species in rough grassland and hedgerows, usually where the foodplant, Dactylus glomerata, is common. There are many records of the breeding of O. maura from Dactylus (Mesnil & Balachowsky 1935). It is on the wing in May, June and July.

O. angustipennis Duda

This very distinctive species has long brownish wings with a concave anterior margin, and the two anterior long veins are strongly curved anteriorly to the costa. It is much smaller than O. maura, with a black, less pubescent arista, and the wings are longer and narrower in proportion. The mesonotum is dusted and lacks the heavy punctures of O. maura.

As in the other species of Oscinella the cerci of the male genitalia (fig. 175) are well developed and sclerotised, though they are more rounded and widely separated than in O. frit. The editae (fig. 177) are nearly as broad as long and are densely setose on the base of the inner side, while the edita is more curved than in O. trochanterata. In O. trochanterata the edita (fig. 180) is triangular in outline but in O. angustipennis it is rounded apically. The inner parts of the cerci are fused, in two lobes. The hypandrium (fig. 176) is longer than wide and the lower margin is incised. The male genitalia resemble the other species of *Oscinella* except for the broad edita.

This species is very infrequently recorded. My only specimen was swept from *Glyceria* marsh on 7.7.1974 at Earlham, Norfolk, and Collin's (1946) records also appear to come from marshy localities. I have not yet seen the type specimen.

O. nitidissima (Meigen, 1838)

O. nitidissima is a brightly shining species with an undusted mesonotal disc, a long frontal triangle and partly yellow legs. The length of the frontal triangle varies between seven-eighths the length of the frons and the length of the frons. Collin (1946) noted two forms of this species, one with narrow, more dusted jowls and partly yellow tibiae, the other with wider, more shining jowls and black tibiae. The type of *nitidissima* belongs to the first form, while *O. trigonella* Duda, 1933, is probably available for the second form. Unfortunately I have seen too few specimens of the second form to be certain that two species are present in Britain. Moreover, the characters which separate these forms are subject to some variation.

The male genitalia of *O. nitidissima* are similar to those of *O. frit*, having a rounded IX tergite and large cerci which are narrowly separated and divergent. Figs. 187-189 are typical of the *nitidissima* form, while Figs. 190-192 show the *trigonella* form. The two forms appear to differ in the shape of the editae, which are rounded apically in *nitidissima* but narrowed in *trigonella*. The hypandrium of *nitidissima* is broader than that of *trigonella*. These differences may be constant, in which case *trigonella* is a species distinct from nitidissima, but I have seen too few preparations of trigonella.

O. nitidissima is a common species in England, Wales, Scotland and Ireland, from April to October. It is found in marshes, fens, rough grassland and waste ground. The trigonella form is rare in southern England.

The type specimen of O. nitidissima is in Paris and agrees with the above interpretation. The jowls are rather wider than average, but they are dusted and the tibiae are mainly yellow, so it can be placed in the nitidissima form.

O. posticata Collin 1939.

This species was primarily distinguished from O. nitidissima by the more dusted mesonotum and the shorter frontal triangle (Collin, 1939). The dusting on the mesonotum varies between a narrow line before the scutellum to a wide band occupying half the length of the mesonotum; it is usually greater in extent in females. The length of the frontal triangle also varies, between one-and three-quarters of the length of the frons, but it is always much shorter than in O. nitidissima.

The male genitalia of O. posticata are very different from other Oscinella, and the small cerci and closed hypandrium are very similar to Tropidoscinis. In O. posticata (fig. 184) the cerci are small and are directed posteriorly; they are widely separated and much less sclerotised than those of O. nitidissima (fig. 187). The inner parts of the cerci are not fused, and are small, rounded and inconspicuous; while in O. nitidissima they are fused in the midline and the whole structure of the cerci is much more strongly sclerotised. The cerci are widely separated in _O. posticata_, but ohly narrowly so in _O, nitidissima_. The editae (fig. 186) of _O. posticata_ are evenly curved, obliquely truncated at the apex leaving an angled posterior corner apically, which gives a hooked appearance to the cerci. In _O. nitidissima_ the editae (figs. 187, 190) are curved sharply near the base and taper from the middle to a rounded apex.

The hypandrium (fig. 185) differs from the other _Oscinella_ in being closed - it is open in most _Oscinella_ -and closed in most _Tropidoscinis_. The gonites of _O. posticata_ are small and narrow, not extending beyond the apical margin of the hypandrium, while in _O. nitidissima_ they are much more developed. _O. nitidissima_ has a more heavily sclerotised aedeagus than _O. posticata_.

There is a single row of setae in the femoral comb of _O. nitidissima_, but in _O. posticata_ the femoral comb is absent. This is the only species in this group of genera which lacks a femoral comb.

The many differences between _O. posticata_ and the remaining species of _Oscinella_, including _O. nitidissima_, are almost of subgeneric importance, but the species resemble each other closely in appearance and in the detailed morphology of the head and thorax, while the colouration is almost identical. Possibly this is a case of two species which resemble each other so closely that they have evolved great differences in genitalia to prevent interbreeding. They are found in the same habitat.

O. posticata is not a common species in Britain. I have swept it from <u>Glyceria</u> in July and August at Earlham and Keswick, Norfolk. Mr. J. H. Cole captured a female at Gt. Paxton, Huntingdon, on 25.vi.1966 (no. 4227) and I have seen specimens from Knowle Park, Kent, 5.vi.1968 (1 male) and Runnymede, Surrey, 8.vii.1973 (2 male, 1 female), both taken by Mr. P.J. Chandler.

This species was originally described from specimens bred from a mole's nest near Beaconsfield, Bucks, by Mr. Basden, in June 1934. I have seen the type series in Collin's collection and find that it agrees with my specimens. However, Collin (1946) notes that the small "Haken" (= cerci) are bare, and this is not the case, either with my series or Collin's type series. The setae are certainly much smaller and less marked than in <u>O. nitidissima</u>. Possibly the microscope Collin used did not have sufficient resolving power to show the small setae.

<u>O. trochanterata</u> Collin, 1946

The bright yellow anterior trochanters distinguish most specimens of this species, but unfortunately I have seen specimens in which the legs are darker, and the trochanters are brownish. However, the femora are always broadly yellow or dark yellow at the tip, and the incised upper surface of the fourth segment of the middle tarsi of the male is a constant character. The tibiae may all have dark central bands. The mesonotum is dusted and punctured, rather as in <u>O. grossa</u>, but the dusting is heavier and the puncturation finer. There is variation in the length of the frontal triangle, from three quarters the length of the frons to the tip, and also a variable amount of dusting on the apex and lateral margins of the frontal triangle. The antennae are large and intensely black.

The male genitalia are more heavily sclerotised than in any other British species of Oscinella, the IX tergite (fig. 178) being broader than long, broadest above the base of the editae and narrowing towards the dorsal side, so that the outline is rounded triangular. The cerci are shallow in profile, deeply sclerotised and more widely divergent than in O. frit. The inner parts of the cerci are fused and broad, heavily sclerotised. The editae (fig. 180) differ from all the other species of Oscinella I have examined in their triangular outline; they are scarcely more than twice as long as wide, and do not bear such a prominent basal patch of setae as O. angustipennis. The hypandrium (fig. 179) has a more thickened lower margin than in the other Oscinella species, but the broad incurved outer arms and the prominent aedeagus complex are typical of Oscinella.

The type series of O. trochanterata is in Collin's collection at the Hope Department of Entomology, Oxford, and I find it agrees with the specimens in my collection. Collin had dissected one male specimen of O. trochanterata in his series, and I intend to designate this specimen as lectotype.

This is a local species which may be swept from Phalaris in marshy habitats. There is a breeding record from this plant in Collin (1946). I have found it commonly at Virginia Water, Surrey, and Earlham, Norfolk, while Mr. J.H. Cole has records from Huntingdon, Brampton Flood Meadow, 30.vi.1968 (1 female) and Portholme, 18.viii.1970

(1 male). There is an old specimen in C. Morley's collection, now in Ipswich Museum, from Tuddenham Fen, Suffolk, 19.vi.1915 (1 male). With the records given by Collin (1946), the species has a wide distribution across southern England.

O. angularis Collin, 1946

Collin (1946) considered this species to be related to O. trochanterata, but it seems to me that it has a closer relationship to the frit -group than O. trochanterata. It is smaller than O. trochanterata and the dusting on the frontal triangle is more extensive - as in O. trochanterata there is variation in the extent of the dusting, which may occupy up to half the length of the frontal triangle. The legs are darker, with the front trochanters dark and the tibiae only narrowly pale - the species may easily be mistaken for O. frit if the excised fourth joint of the middle tarsi, and the dusting on the frontal triangle is overlooked. Except for the dusting on the frontal triangle, this species appears less variable than O. trochanterata, though I have seen fewer specimens.

In the IX tergite (fig. 178) of O. trochanterata the greatest width is near the base of the editae, but in O. angularis the IX tergite (fig. 181) is rounded, as in O. frit. The cerci are long and deeply divided as in O. frit, and the apex of the inner parts bears two minute projections, found in the O. frit group but not as well developed in O. trochanterata. The edita (fig. 183) is much nearer that of O. frit than that of O. trochanterata; its maximum width is at about half the length, and the edita is four times as long as wide, as in O. frit; O. trochanterata has a triangular edita. However, in posterior view in situ, the edita is only slightly curved, and it lacks the sharp basal bend of the edita of the frit - group. The hypandrium (fig. 182) has incurved outer arms, prominent aedeagal complex and widened lower margin, as in the majority of species of Oscinella. This species has a shorter aedeagus than other Oscinella.

Collin's (1946) statement that the species O. angularis and O. trochanterata are closely related must be modified by the description of the male genitalia above, which shows O. angularis to more closely resemble O. frit, at least in the genitalia. I find the partial dusting of the frontal triangle, absent in frit, and the excised fourth tarsal segment of the middle leg, to be good distinguishing characters, but I would not place O. angularis in the same subgenus with O. trochanterata.

The type series of O. angularis is in the Verrall-Collin collection in the Hope Department of Entomology, Oxford, and agrees with Collin's description. I have also seen three males and one female from Rhyl (The Cut), Flintshire, 30.viii.1968, B. H. Cogan. I caught a male at Virginia Water, Surrey, on 17.viii.1971 and three males at Earlham, Norfolk, on 7.vii.1974. As in the case of O. trochanterata my specimens were swept from Phalaris, which is the foodplant recorded by Collin. The existing records again indicate a wide distribution in southern England. It is necessary to select a lectotype of this species from Collin's type series.

O. cariciphila Collin 1946

This species is most closely related to O. grossa Mesnil, but it has jowls about the same width as the tip of front tibia, while in O. grossa the jowls are more than twice as wide. The tibiae, according to Collin (1946) are either entirely yellow on the front and mid- legs or faintly darkened about the middle of the tibiae, but I have seen specimens I refer to this species with both front and middle tibiae obscurely darkened for most of the central area of the tibia. The genitalia of all these specimens agree, and are distinct from _O. pusilla_ genitalia. The mesonotum is more finely punctuate than _O. grossa_ and the wings are short and broad.

The male genitalia most closely resemble those of the _frit_ - group. The IX tergite (fig. 193) is rounded, with divergent cerci, the apex of the inner parts with two small processes as in _O. frit_. The editae are strongly bent near the base as in _O. frit_, and in surface view they are about as long and broad as _O. frit_. In _O. grossa_ the editae are shorter and broader. The hypandrium (fig. 194) is open, with incurved outer arms and prominent gonites.

I have very few records of _O. cariciphila_. I have seen one male from Totton, S. Hampshire, trapped in a sunhouse on 27.6.1952 (C.R. Vardy); I caught one male at Egham, Surrey, on 23.vi.1971, and one at Keswick, Norfolk, on 24.vi.1974. Collin's original series was taken on June 27th, 1942, so the species appears to have a very narrow flight period. This is probably due mainly to scarcity of records. Collin recorded it in association with _Carex_.

The type series of _O. cariciphila_ is in Collin's collection in the Hope Department of Entomology, Oxford, and agrees with his description, except that I find the jowls to be rather wider than the width of the front tibiae in some specimens. A lectotype will be selected.

O. vastator (Curtis, 1860)

I have seen a number of specimens which answer Collin's and Curtis's interpretation of this species, with jowls as wide as third antennal segment, hind tibiae only narrowly yellow at each end and mesonotum less densely punctuate than O. grossa. However, like Collin (1946) I have not seen sufficient specimens, and have no clear genitalia preparations, to understand the differences between this species, O. frit and O. pusilla. Collin noted that the editae are wider in O. vastator than in O. frit. I have not yet examined the type specimens of this species.

O. grossa Balachowsky & Mesnil, 1935

This species is the largest of the group with extensively yellow tibiae. The jowls are wide, but not quite as wide as the third antennal segment, though the width varies. The mesonotum, particularly in females, is heavily and coarsely punctured in comparison with O. pusilla, and the legs are stouter than in O. pusilla and O. cariciphila. The entirely yellow anterior and middle tibiae distinguish this species from all other Oscinella except pale specimens of O. pusilla, which have narrower jowls. The females of O. grossa are markedly larger than the males, and the division of the mesonotal puncturation into stripes, shown in Balachowsky and Mesnil (1935) is better developed. The hind tibiae of this species are always broadly yellow at both ends, up to one quarter of the length of the tibia.

The male genitalia resemble those of O. frit in the rounded IX tergite (fig. 195) and the large divergent cerci, with small processes at the apex of the inner parts of the cerci. The editae (fig. 197) are much broader in proportion than in _O. frit_, but are bent near the base as in the other species related to _O. frit_. In _O. pusilla_ the edita (fig. 200) is much longer and narrower. The hypandrium (fig. 196) is open with incurved outer arms and prominent gonites, similar to _O. frit_. The separation between the tips of the outer arms is usually greater in _O. grossa_ than in _O. pusilla_.

As noted later, the name of _O. pusilla_ was used by Collin (1946) for this species, but is not available. _O. grossa_ Mesnil is a well described species, and there can be little doubt that the name may be correctly applied. I have not yet seen the type of this species.

O. grossa was recorded by Mesnil as feeding on _Aira_ and barley, and I have swept specimens from marshy areas as well as old grassland. It is not so common as the next species, _O. pusilla_, but has a wide distribution in southern England.

O. pusilla (Meigen, 1830)

The jowls of this species are narrower than in _O.grossa_ but wider than in _O. cariciphila_, and it may be further distinguished from the latter species by the coarser punctuation of the mesonotum. The leg colour is also intermediate, varying between yellow and yellow with black bands on the tibiae. Collin described the species as _O.hortensis_ as having yellow tibiae in the male with a more or less distinct dark band, which is less distinct in the female and often entirely absent. I find that both sexes may have entirely yellow front and middle tibiae. Moreover, a series caught at Arne, Dorset, on 2.8.1971 (A. J. Pontin) and specimens from Wolferton, Norfolk on 21.6.1974 (J.W.I.) include some males with almost entirely dark anterior tibiae, and females with the dark markings on these tibiae much more extensive than usually. All these specimens have the mesonotal puncturation of O. pusilla, as distinct from O. frit, and the male genitalia are similar to typical specimens of O. pusilla. This form occurs mainly on saltmarshes. It is clear that this species varies in the leg colour. The width of the jowls is also subject to some variation, and I have one male with wide jowls, from Wolferton, as in O. grossa, but the genitalia and other characters agree with O. pusilla.

The male genitalia are primarily distinguished by the very long and narrow editae (figs. 200, 203); those of O. grossa and O. frit are much broader. The cerci (figs. 198, 201) are large and divergent, as in O. frit, and there are two small processes on the apex of the inner part of the cerci. The hypandrium (figs. 199, 202) is open, with a broadened lower margin and incurved lateral arms; in most of my preparations these arms end in a distinct point, but as this is a point of attachment to the IX tergite I am unconvinced that this is a reliable diagnostic feature. Other species of Oscinella usually have the arm ending in a blunt tip. Figs. 198 - 200 are the saltmarsh form, figs. 201 - 203 are the inland form. There are slight differences in the shape of the cerci, but it is difficult to separate the forms on characters of the male genitalia.

There is one male specimen in Vienna under pusilla labelled 'frit var pusilla Mg' and I accept this specimen as the type. It is in agreement with my interpretation of the species except that the jowls are rather narrower than average, the ratio of the third antennal segment's depth: jowl width is 4.0 : 1.5. This is rather close to the proportions of _O. cariciphila_, but the mesonotum is punctured, the middle tibiae are yellow and the front tibiae are narrowly black. Only the apex of the hind tibia is yellow. This specimen is certainly not the same as Collin's interpretation of _O. pusilla_ and is much nearer his _O. hortensis_. There may well be other Palaearctic species in this group, and dissection of this specimen is not warranted until a more comprehensive revision of the group is available. For the moment I propose to consider _O. hortensis_ as a synonym of _O. pusilla_, and use the name _grossa_ Mesnil for the species Collin (1946) referred to as _O. pusilla_ Mg.

There is a specimen in Meigen's collection in Paris; it is the same as my interpretation of the species with darkened anterior tibiae and lightly punctured mesonotum. This specimen is damaged and only the thorax, abdomen and three legs remain. It indicates that Meigen intended the name _pusilla_ to refer to a small species (c. 1.5 mm in both Paris and Vienna specimens) which is the same as _hortensis_ Collin.

I have examined the type series of _O. hortensis_ Collin in the Hope Department of Entomology, Oxford, and find that they agree with Collin's (1946) description and my interpretation of _O. pusilla_ Mg. One male specimen will be selected as lectotype.

O. frit (Linnaeus 1758)

The limits of this very common and variable species probably present the most difficult problem in the taxonomy of British Chloropidae, and I am unable to satisfactorily divide the species into forms or subspecies. The hind tibiae are dark, rarely paler at the tip, but the anterior and middle tibiae may be obscurely yellowish, though never as yellow as in the pusilla group of species. The proportions of the wing, the width of the jowls and the size are all subject to considerable variation. I do not treat the various forms (e.g. var exigua Collin 1946) as distinct because I have yet to see a form that did not intergrade with the remainder, and I have not found constant genitalia differences between any forms.

The male genitalia show some variation in the shape of the edita (fig. 209) and the development of the cerci; the differences do not appear to be constant. The IX tergite (fig. 207) is rounded, with divergent cerci, and the hypandrium (fig. 208) is open with incurved outer arms as in the remaining species of Oscinella.

Future research may show that more than one species has been confused under the name O. frit. Since the species has been bred from a range of host plants, it would be useful to compare series bred from different plants by morphometric methods. The bred series that exist are probably too short to be significant. It is possible that this is simply a highly variable species which differs according to the food plant and other factors.

I have not seen the type specimen of O. frit.

O. nigerrima (Macquart 1835)

The legs of this species are usually entirely black; it is more dusted on the mesonotum, and the legs are thicker than in O. frit. There is certainly a distinct species, related to O. frit, as described by Collin (1946). There is less variation in this species than in O. frit, though the legs in some specimens may have dark brownish tarsi. The male genitalia are not readily distinguishable from O. frit, and the differences between the two species figured, in the cerci (fig. 204) and the arms of the hypandrium (fig. 205), are probably due to individual variation. The edita is shown in fig. 206.

This is a common species, though not so abundant as O. frit, and it may be found early in the spring and again in late summer (April/May and July/August).

The type specimen of this species seems to be lost, like many of Macquart's species of Chloropidae.

Lioscinella Duda

Duda (1929) proposed this name for a subgenus of Oscinella but discontinued its use in 1932. Sabrosky (1940) designated L. sulfurihalterata Enderlein as type species for the group including L. anthracina, and the genus was used in this sense by Collin (1946). It is closely related to Oscinella, but it has a more sloping face with more universal pubescence on the thorax and longer pubescence on the third antennal segment. The British species, with the exception of L. atricilla Zett, have a shining mesonotum with metallic reflections; in all the British species the mesonotal proportions are longer than wide, but in Oscinella the mesonotum is often shorter than wide.

The male genitalia are uniform in Lioscinella, but they do not offer any good characters for separating this genus from Oscinella. The cerci are less widely separated in Lioscinella, while the hypandrium is wider but open as in Oscinella. Sabrosky (1940) noted that the genus needs revising, and I suspect that many species could be placed in either genus. For the British species it is a convenient division, and I retain it. The femoral comb of Oscinella has one row of 4-9 setae, while Lioscinella has two rows of 9-19 setae - this is the only qualitative difference I can find.

Key to the British species of Lioscinella:

1 (4) Legs yellow; only femoral comb of male darkened.

2 (3) Jowls linear: eye larger and more reniform: frontal triangle reaching almost to front of frons, arista with longer pubescence. Genitalia as figs. 210 - 212 ... anthracina Mg.

3 (2) Jowls wider: eye smaller and more oval: frontal triangle 5/6 length of frons: frontal setae longer: antennae larger: arista with shorter pubescence. Genitalia as figs. 213 - 214 ... atricornis Zett.

4 (1) Legs darkened, at least on middle femora.

5 (8) Legs mainly yellow: Disc of mesonotum dusted only narrowly in front of scutellum.

6 (7) Humeri and notopleural area dusted. Male genitalia with narrow aedeagal apodeme at base of aedeagus as fig. 217. Usually only middle femora darkened, jowls wider than palpi. ... fasciola Mg.

7 (6) Humeri and front part of notopleural area shining. Male genitalia with broad aedeagal apodeme at base of aedeagus as in fig. 220. Four posterior femora and sometimes anterior femora with darkening; hind tibia marked on sensory patch in some specimens.

Jowls linear. .... _femoralis_ Col.

8 (5) Legs entirely darkened. Thoracic disc extensively dusted behind and on sides. Eyes small and jowls wider as in _atricornis_, antennae smaller and arista pubescent as in _anthracina_. Frontal triangle about 2/3 to 3/4 length of frons. ... _atricilla_ Zett.

L. anthracina (Meigen, 1830)

L. anthracina and _L. atricornis_ form a closely related species pair: the characters given to separate them in the key are the best ones, but the male genitalia are fairly distinct. The outline of the IX tergite of _L. anthracina_ (fig. 210) is more rounded than that of _L. atricornis_ (fig. 213). The cerci of _L. anthracina_ are rounded and separated by a rounded incision, but the cerci of _L. atricornis_ are more square and angular; they are more parallel sided, obliquely truncated at the tip with the longer side medial. The editae of _L. anthracina_ (fig. 212) are more curved than in _L. atricornis_ (fig. 215) and end in a more pointed apex, while in _L. atricornis_ the apex is more rounded. The hypandrium is shown in fig. 211.

This is the commonest species of the genus in the south of England, and may be taken by sweeping in damp woodland glades from _Urtica_ and other long herbage; it is also found in carr and may be found in marshy areas, but more rarely.

The type specimen of this species is in the Winthem collection in Vienna - it is labelled 'anthracina coll Winth' and is a female. The long frontal triangle is characteristic of the species, but it does notreach to the tip of the frons, and the antennae are very large, the jowls narrower than the palpi. However the humeri and notopleuron are shining, while in the typical British specimens they are dusted. I have seen some British specimens with shining humeri and notopleurae, and therefore conclude that this character varies in L. anthracina. This character is used to separate L. fasciola and L. femoralis. Duda (1932) included more than one species under this name.

L. atricornis (Zetterstedt, 1838)

Andersson (1966) examined the type of this species and considered it to be the species Collin (1946) recorded from Scotland. The male genitalia are described above and the hypandrium is shown in fig. 214. Nartshuk (1958) described a third species, L. platythorax, with depressions on the hind mesonotum. From this description Andersson considered L. platythorax a probable synonym of L. atricornis; but he did not illustrate male genitalia. Nartshuk's illustrations of the male genitalia of L. anthracina and L. atricornis/platythorax agree with the specimens I have seen. The depressions are not well developed in British specimens except in some teneral ones. The records from Sweden and Russia are from bogs associated with cotton grass (Eriophorum) and these agree with the British distribution in highland Scotland.

L. femoralis Collin, 1946.

Collin (1946) distinguished L. femoralis from L. fasciola by the more extensive dark colouration of the legs in L. femoralis, the shining humeri and notopleurae of L. femoralis. The leg colour is subject to some variation in both species, and I do not regard it as a good character for the separation of these species. One female specimen from Egham, Surrey, 2.6.72 has pale fore femora, darkened mid femora and only a slight indication of darkening on the hind tibiae. A female from Loch Park, Banffshire, 12.-14.8.1937. R. L. Coe has all the femora darkened and the hind tibiae broadly banded. Both these specimens have shining humeri and otherwise agree with my interpretation of L. femoralis; they are the extremes of variation known to me at present. The dusted humeri of L. fasciola and the shining humeri of L. femoralis seem to me to be the best character for distinguishing these two species externally.

The male genitalia of the two species are very similar; the only difference I can find that is constant in all the specimens is the relative width of the aedeagal apodeme at the base of the aedeagus. In L. femoralis (fig. 220) the base is much wider than in L. fasciola (fig. 217). Some specimens of L. femoralis have more widely separated, smaller cerci (fig. 219), with the space between them narrowing gradually from the base, but in L. fasciola the cerci (fig. 216) are closer, larger and in one specimen they approximate apically. The inner parts of the cerci are similar in having a sclerotised apical process which is incurved to the midline of the IX tergite and in L. femoralis there is a pronounced convexity to the inner margin of the inner part of the cerci. In L. fasciola the inner part of the cerci is at least as convex on the outer margin as on the inner. Differences between the editae of the two species (fig. 218, L. fasciola; fig. 221, L. femoralis) do not seem to be significant. The hypandrium of both species has rather parallel sides and a slightly incised base, but the margin may be more thickened in

L. fasciola than L. femoralis. The inner process of the lateral arms of the hypandrium is narrow and more pointed in L. femoralis (fig. 220), but in L. fasciola (fig. 217) it is broad and ends roundly.

The IX tergite of L. anthracina is similar to that of L. femoralis and L. fasciola, but the apex of the inner part of the cerci is longer in L. anthracina and less incurved. The cerci are more pointed at the tip in L. femoralis and L. fasciola. The genitalia in this genus are subject to more variation than in many other genera of Chloropidae, but still offer good characters for identification.

The type specimens of L. femoralis from Newmarket are in the Collin-Verrall collection at Oxford and agree with the other British specimens under this name. A lectotype is to be selected. I have two specimens from Egham, Surrey, 2.6.72, and one further female 18.5.71 from the same locality. The habitat was Juncus tussocks in a wet meadow, but other investigations of this type of habitat at this time of year have not resulted in further specimens; Wendt (1968) recorded the species from Phragmites in a similar situation, and therefore the species appears to be found in vegetation in marshy localities. Collin (1946) found it in a 'disused pond'. As well as the German record (Wendt, 1968) there are records from Russia by Stakelberg (1958) and Nartshuk (1962), and it may be widely distributed but rare in the Palaearctic.

L. fasciola (Meigen, 1830)

Collin (1946) noted that this species may have darkened hind femora; typically they are yellow, whilst L. femoralis has darkened hind femora. My specimens show some variation in this respect.

The type specimens of L. fascipes is in the Paris Museum under the name Chlorops fasciola. It is a male in good condition but with the aristae and a hind leg missing and the specimen is dirty. This specimen is the same as the British species referred to as L. fasciola and is a synonym of this species. The type specimen of L. fasciola is in the Vienna Museum in the Winthem collection. There are two males labelled 'Type fasciola coll Winth'. They agree with Collin's and my interpretation of this species.

The few specimens of this species I have captured have all been swept from marsh vegetation such as Glyceria, Juncus, etc., but this is not a common species.

L. atricilla (Zetterstedt, 1838)

This species is easily distinguished from the other species of Lioscinella by its dark colouration (black legs) and the extensive dusting on the posterior part of the mesonotum. The male genitalia resemble the other species of Lioscinella, though they are distinctive in small featured. The cerci (fig. 222) have a lower profile and are more rounded than the other Lioscinella, but the editae (fig. 224) are very similar. The aedeagus is as broad basally as apically and is comparatively short. The hypandrium (fig. 223) is broader than in the other species of Lioscinella.

Collin (1946) considered this species under the name atripes Duda. Andersson (1966) examined the type of atricilla and considered it to be the species which Duda

(1933) called atripes. The species is one of the rarest British chloropids and is known only from the Highlands of Scotland.

CHAPTER 10.

Group 6. Oscinisoma, Eribolus, Elachiptera, Melanochaeta and Gampsocera.

This group is centred on the genus Elachiptera which usually has a thickened, pubescent arista, a rugose scutellum with the apical setae arising from small warts, head broader than high with a few longer orbital setae, femoral comb always present, usually having the setae arranged in rows and rather variable male genitalia; cerci well developed, hypandrium open or closed and editae usually simple. Melanochaeta is probably nearest to Elachiptera, but the smooth scutellum, the uniform size of the orbital setae and the male genitalia show resemblances to Oscinella. The flattened mesonotum and broad head of Eribolus and Oscinisoma resemble Elachiptera, and additionally Eribolus may have irregular orbital setae and Oscinisoma has the apical scutellar setae on small warts, both characters being found in Elachiptera. Gampsocera has a pubescent arista like Elachiptera but Andersson (1977) has shown that it is more closely related to Gaurax.

Oscinisoma Lioy, 1864.

Oscinisoma was erected by Lioy with type species O. vitripennis Mg. and may be distinguished from Oscinella by the width of the head and the peripheral tubercles on the scutellum. Collin (1946) recognised two British species in this genus, O. cognata Mg. and O. germanica Duda, although the latter species was described in the genus Discogastrella. I have found a third British species which resembles _Eribolus_, but an examination of these three species convinces me that they may conveniently be retained in _Oscinisoma_, and the following characters are an outline of the genus as applied to the British fauna:

Head much wider than long and deep, jowls sloping sharply to mouth-edge. Long axis of eye diagonal. Mesonotum markedly rugose, with dense setae arising from small prominences. Disc of mesonotum more or less flattened, in some species to the same extent as in _Eribolus_. Pleurae extensively shining, partly dusted. Legs yellow, slightly darkened in some species. Scutellum much wider than long, rugose like mesonotum and with the apical setae arising from small tubercles in most specimens. Orbital setae small, but may be of unequal length. Abdomen long, usually shining. Femoral comb in the form of a patch, always present. Male genitalia with large cerci, the terminal setae borne on a small tubercle. Editae very slender, scarcely wider than deep except at base, where it is constricted near base. Hypandrium closed. Pregenital sternite large and broad.

The systematic position of this genus is rather obscure. _O. cognata_ resembles _Oscinella_ in having a shining frontal triangle, but _O. germanica_ has a completely dusted frontal triangle. The third species has a very flattened thorax like _Eribolus_, but is more shining than any species of _Eribolus_ and has genitalia which closely resemble the other three species. _Eribolus_ has the wide head and sloping jowls of _Oscinisoma_, but lacks the tubercles of the latter genus and has broad editae and usually an open hypandrium. The rugose mesonotum and scutellum of _Oscinisoma_ are in contrast to the smooth mesonotum and scutellum of Eribolus, but it seems clear to me that they may have many similarities. Sabrosky (1948) placed Eribolus near to Elachiptera on the grounds of the uneven length of the orbital setae in these genera, a character which is indicated in some species of Oscinisoma.

While the external characters of these genera seem to merge, the genitalia of Oscinisoma are very distinct and may easily be distinguished from related genera.

Key to the British species of Oscinisoma:

1 (2) Frontal triangle completely dusted. Wings long and narrow, reaching beyond end of abdomen in most specimens. ... O. germanica Duda

2 (1) Frontal triangle shining at least in front of the anterior ocellus. Wings either long or short.

3 (4) Humeri shining, wings short and broad, usually shorter than abdomen. ... O. cognata Mg.

4 (3) Humeri dusted, wings longer than abdomen and mesonotum flattened on hind $\frac{3}{4}$ of disc. .. O. gilvipes Loew

O. germanica (Duda, 1932)

Duda (1933) placed this species in Discogastrella Enderlein, but he considered the dusted frontal triangle to be of generic importance, and as outlined above, this species is closely related to O. cognata. The male genitalia have a rectangular IX tergite (fig. 228), more like O. gilvipes than O. cognata. The cerci are more widely spaced than in the other two species, and the internal parts of the cerci end broadly. The editae (fig. 230) are relatively slender, but broader than in the other two species, and less curved. The hypandrium (fig. 229) is rounded basally, more angled in the other two species, while the side margins are sinuate in O. germanica. The aedeagal apodeme is smaller than in the other two species.

O. germanica is widespread in Britain and has been recorded from Cornwall, Banffshire, Herefordshire, Dumbarton and Surrey. The records I have seen were for the months April to October, while records of O. cognata are for the whole year. At Virginia Water, Surrey, I found a pair of O. germanica in copula on 31.v.1973 in a tussock of Juncus sp. at the edge of the Obelisk Pond. Another specimen was swept from Juncus at Mytchett, 28.vi.1972. These appear to be the only habitat records for this species; it seems to have similar habits to the other species in the genus.

I have not yet seen the type of O. germanica. There is much variation in the colour of the legs in this species; most specimens have yellow legs, but many from Scotland have the femora and tibiae darkened, and one from Herefordshire has almost completely darkened legs. I have dissected some of these darkened specimens, but cannot find any difference between them and pale legged specimens.

O. cognata (Meigen, 1830)

This is the commonest species in the genus. It is very similar to O. gilvipes, but has a much more abbreviated form and shining humeri. There is some variation in this species in the colour of the third antennal segment, which may be entirely yellow. The male genitalia may be distinguished from the other species by the rounded outline of the IX tergite (fig. 231), with larger and more widely separated cerci. The tip of the cercus is more pointed, and the apical tubercle is larger. The editae (fig. 233) are curved and narrow. The hypandrium (fig. 232) is more rectangular than that in _O. germanica_, with straight side margins and narrow lateral flanges; the apodeme of the aedeagus is broad. The inner parts of the cerci narrow towards the centre of the IX tergite. In the Winthem collection in Vienna there are three specimens of this species labelled 'cognata type'. All are the species referred to above as _O. cognata_, and so the species has been correctly interpreted. Another specimen in the same series is labelled '_vitripennis_ type'; this is the same species, and so the synonymy usually accepted is correct and _O. vitripennis_ Mg, is a junior synonym of _O. cognata_ Mg.

O. cognata is common in wet areas in Britain. It may be found in tussocks, decaying marsh vegetation and _Phragmites_ litter throughout the year. It is rarely found by sweeping, since it lives in deep litter. However in the spring I have seen single specimens and mated pairs of this species walking up grass stems in bright sunlight, and this reversal of normal behaviour may be part of the mating behaviour of this species.

O. gilvipes (Loew, 1858)

Loew described this species from one male, giving as differences from _O. cognata_ the more elongate form and completely yellow third antennal segment of _O. gilvipes_. Since _O. cognata_ has a considerable degree of variation in the colour of the third antennal segment, it is not surprising that most authors have considered _O. gilvipes_ to be a junior synonym of _O. cognata_. Specimens in the Verrall Bequest to the B.M.N.H. labelled _O. gilvipes_ are in fact _O. cognata_.

On 29.x.1973 I caught 20 specimens of a species near to

O. cognata at Hardley Floods, Norfolk. Examination of this series showed that the species could be distinguished from *O. cognata* by the dusted humeri, the elongate form and the sexual dimorphism in the colour of the third antennal segment - yellow in the male and apically darkened in the female. The genitalia show constant differences from *O. cognata*, and I consider that it is *O. gilvipes*. The male genitalia are larger than in the other species of the genus. The IX tergite (fig. 234) is rectangular, as in *O. germanica*, and the cerci are smaller and more approximated than in the other two species; also they are directed more towards the head of the insect. The inner parts of the cerci are broad towards the tip. The lower edge of the hypandrium (fig. 235) is rectangular as in *O. cognata*.

Externally this species greatly resembles *O. cognata*, but since the differences in genitalia between the three species are equally great they must be considered separate species. A fuller description of the species, including the female, is given below.

Description of *O. gilvipes*.

Male: Head nearly twice as wide as deep and rather longer than deep. Frons black behind, yellow on front quarter to third, dusted, sides parallel and fore margin convex, longer than wide. Frontal triangle black, extending two-thirds to three-quarters down frons, slightly convex at sides, rounded at tip, shining but dusted on ocellar triangle and two patches extending forwards between the anterior and posterior ocelli. Orbital setae about 10, small, but two or three on each side may be longer, as in some *Eribolus* species. Surface of frons with small dark yellow setae.

Ocellar setae small, crossed, outer vertical seta large, inner vertical and postvertical setae not developed. Eye with long axis at about 45° to the vertical, longer than wide, reddish brown and with pale dense pubescence. Antennae large, yellow, third antennal segment deeper than long, arista and surrounding part of third antennal segment black, arista with sparse pubescence. Second antennal segment with a long dark seta on top. Face short, yellow, dusted and retreating. Jowls sloping strongly towards mouthedge, dusted, about as wide as third antennal segment is deep, wider behind, yellow on front half and black behind. Setae on jowls yellow, in several rows, longer at front. Back of head black, dusted. Palpi yellow with pale setae, mouth parts brownish with pale setae.

Mesonotum longer than wide, shining with irregular dusted patches, the hind three-quarters of the disc flattened as in <u>Eribolus</u>. Setae numerous and irregular, punctured at the bases to give a rugose appearance to the mesonotum. Humeri and most of notopleuron dusted. No longer humeral seta, 1+1 notopleural setae, the posterior one larger. Thorax in profile shallower than in <u>O</u>. <u>cognata</u>. Pleurae shining black, lower sternopleurae dusted and some dusting on lower pleurae beneath haltere. Legs yellow with pale setae, darkened apically on tarsi, sensory patch on hind tibiae well developed. Wing much longer than in <u>O</u>. <u>cognata</u>, longer than the abdomen in some specimens, hyaline with pale yellow veins. Haltere yellow.

Scutellum black, wider than long, rugose like mesonotum with pale setae. Peripheral setae arising from small tubercles in some specimens. Metanotum short, black and shining.

Abdomen long with pale setae. Disc of tergites dusted, but on the sides shining with the dusting confined to the anterior margin of each tergite and the rest shining; a similar pattern is found in O. cognata. Pregenital sternite and IX tergite dusted, large. Female: similar to the male, but differing in the colouration of the third antennal segment, which is darkened on the upper outer half, and in the abdomen which is broader than that of the male and ends in a slender apical pair of palps.

Eribolus Becker, 1910

The position of this genus in the Oscinellinae has given rise to some doubt. The dusted frontal triangle and the slender arista are similar to the genera in Group 2 of this thesis, but one species has a shining frontal triangle and the arista is often thickened in the non-British species. The flattened appearance, though a subjective character, appears to be the best one for distinguishing the genus. The orbital setae are usually uneven in length, and some may be much longer than the others, but they are not arranged symmetrically as in Elachiptera. In revising the Nearctic species, Sabrosky (1948) used the longer orbital setae as a distinguishing character, but in a later paper (1950) he described a new species, E. californicus with even orbital setae.

Elachiptera has some affinities with Eribolus, in the orbital setae and the thickened arista of some species, but the scutellum is not quadrate in Eribolus as it is in Elachiptera, and the body form of Elachiptera is not flattened. The genitalia of Eribolus do not show any important resemblance to any of the other genera in this group, and they are so variable between species that I can find few common characters. The hypandrium is closed, except in E. nanus, and the cerci are usually large, with the inner parts open. The femoral comb is always present and the setae are in rows, as in Elachiptera. In the genera Eribolus, Elachiptera and Oscinisoma the head is much wider than deep and the long axis of the eye is diagonal. One species of Oscinisoma has the mesonotum flattened as in Eribolus. Collin (1946) has produced a good key to the British species.

E. nanus (Zetterstedt,1838)

This species is easily distinguished from the other species of Eribolus by the yellow front to the frons and the wide jowls. The genitalia have a closed hypandrium (fig. 240), and the cerci are rounded. The femoral comb (fig. 468) is also distinctive, with 3+1 rows of setae. The editae (fig. 239) are elongate.

The type of this species has been examined by Andersson who confirmed that it is the same species usually considered under this name.

E. sudeticus Becker has been considered a synonym of this name. The figures given by Sabrosky (1948) for the genitalia of E. sudeticus from North America agree with the specimens of E. nanus from Britain, as does the description and so the species may be Holarctic.

There are no recent records for E. nanus, which in Britain seems to be known only from Herefordshire.

E. hungaricus Becker, 1910

E. hungaricus is very similar to E. slesvicensis but may be distinguished by the characters in Collin's key (Collin, 1946). The genitalia are not as distinctive as in the other species, but the shape of the cerci (fig. 242) and their pointed inner parts are distinctive. The hypandrium (fig. 243) is open and rather similar to that of E. slesvicensis but is somewhat shorter in proportion and the arms of the hypandrium approach the mid-line less in E. hungaricus than in E. slesvicensis. In E. hungaricus the editae (fig. 244) are simple and not expanded on the posterior side.

I have not yet seen the type of this species.

Collin (1946) records this species from the coast of Essex, Suffolk, and Dorset, as well as Chippenham Fen. I have a female from Frensham Little Pond, Surrey, and Mr. J.H. Cole took a female in Huntingdon at St. Neots Holt in willow carr.

E. slesvicensis Becker, 1910

The paler front tibiae are the best character to distinguish this species from E. hungaricus. The male genitalia are very distinctive, with the edita (fig. 238) having a flattened and blade-like shape, little longer than broad and with a thickened anterior edge. The hypandrium (fig. 237) is longer than wide and only narrowly open, while the aedeagus is more sclerotised than usual.

I have not seen the type of E. slesvicensis, and do not know of any recent records of this species.

E. gracilior (de Meijere, 1918)

The species Collin (1946) added to the British list is easily distinguished by its shining frontal triangle which has a dusted ocellar area. It fits de Meijere's description in most characters, but not in others. de Meijere described the frontal triangle of gracilior as extending to the front of the frons, but in Collin's specimens the frontal triangle extends only two-thirds down the frons. The wing of gracilior figured by de Meijere has vein r_{4+5} curved strongly to the costa, but in Collin's specimens it curves only slightly. The outer crossvein is half the length of the apical segment of m_{3+4}, but in Collin's specimens it is less than half. The hind tibiae of the type are described as almost yellow, but they are broadly black in Collin's specimens. These differences are not so great that they could not be ascribed to variation, but it is possible that Collin's species is not the same as de Meijere's. Collin does not say that he has seen the type of *E. gracilior*.

Collin's species is clearly an *Eribolus*, and the shining frontal triangle distinguishes it from all the other species of the genus. The male genitalia are very characteristic, with an open hypandrium (fig. 246) and the apices of the cerci (fig. 245) widely divergent, but the inner surfaces are narrowly separated and parallel at the base. The edita is shown in fig. 247. The species is known in Britain only from 6 males taken at Newmarket by Collin.

Elachiptera Macquart 1835.

Elachiptera contains a large number of medium sized species found throughout the world in a variety of habitats, but mostly in damp situations. The larvae seem to be mainly scavengers on decaying plant material, particularly after the plants have been damaged by other insects. The arista is thickened and pubescent and there are up to 10 orbital setae, of which one to three are more developed than the rest. The frontal triangle is usually shining, the mesonotum is variable, shining or dusted or shining with dusted patches. The scutellum is usually roughened and truncated, with apical setae mounted on tubercles in most species. The abdomen is collate in some species. The genitalia are very diverse, with the editae and cerci well developed. A femoral comb is present in all species, and varies from 1 row to a large patch of setae.

The genus originally included all the species related to _Oscinella_ with thickened aristae, but _capreola_ Haliday has been placed in _Melanochaeta_. _Melanochaeta capreola_ has the thickened arista of _Elachiptera_, but the orbital setae are small and even, the scutellum is rounded and without tubercles, and the cerci of the male genitalia are large and rounded, a feature which is found in most _Oscinella_ species but not any of the British species of _Elachiptera_. The femoral comb has one row of setae and this is similar to _Oscinella_, while _Elachiptera_ typically has two rows of setae. Since the species does not fit easily into either genus and is easily separated from them, I think it is best to retain the genus _Melanochaeta_. Collin (1946) placed _Gampsocera_ near to _Elachiptera_, since it has thickened arista, but Andersson (1977) has shown that it is related to _Gaurax_.

Elachiptera is a diverse genus and sub-generic division is difficult. _E. pubescens_ differs from the other species of the genus in having a partially dusted frontal triangle, rounded scutellum, one row of femoral setae and projecting palpi. Its genitalia resemble those of _E. megaspis_ and _E. brevipennis_, and so it is clearly related to _Elachiptera_. The genus _Lasiochaeta_ (Corti, 1909) was erected to contain this species, and is available for use as a subgenus. Andersson (1977) considers it to belong in Melanochaeta.

Some authors have considered the partially fused tergites of some species in this group to be of generic and even familial importance, but there is a range of species showing this character which are diverse in other characters, and so I do not place any great reliance on it. E. brevipennis has a convex, sclerotised abdomen with some fusion of the first three tergites, but the remaining tergites are freely articulated. In E. megaspis the first three tergites are fused, and the articulation of the remaining tergites up to the pregenital tergite is very reduced, so the convex abdomen cannot flex. The sternites and genitalia are very weakly sclerotised and collapse against the tergites in dried specimens. Anatrichus erinaceus, a species from Africa, has the first two tergites fused and covering the remainder and this is the extreme condition.

E. cornuta is closely related to E. diastema, E. tuberculifera and E. rufifrons, and it would be very convenient to split these species from the remainder of Elachiptera but I am unable to find any suitable grounds for this move since the remaining species show similarities with the E. cornuta group.

The genitalia of Elachiptera are so variable between the species that they are of no help in subgeneric division, and the only solution is to retain all the species except E. pubescens in the typical subgenus.

TABLE 10

Elachiptera Femoral comb setae.

No. of setae:

Species:	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+
pubescens	1	1	1																	
brevipennis					1		2	1	2	1										
uniseta								1	1	1		3	1							
megaspis					1	2	1	1	1											
scrobiculata						1	3	1												
tuberculifera						1		7	1											
cornuta 'a'													1	1	1	3	6	7	6	38
cornuta 'b'		1	4	2	1	1														
diastema					5	9	9	13	7	6	1									
rufifrons								1												

TABLE 11

Time of occurrence of Elachiptera species

Month:

Species:	J	F	M	A	M	J	J	A	S	O	N	D
pubescens			+		+		+	+	+			
brevipennis	+	+	+	+	+	+	+	+	+	+		+
uniseta			+	+	+	+	+	+	+		+	
megaspis			+	+	+	+	+	+	+	+	+	
scrobiculata			+	+				+	+			
tuberculifera		+	+	+	+	+	+	+	+	+	+	+
cornuta	+	+	+	+	+	+	+	+	+	+	+	+
diastema	+	+	+	+	+	+	+	+	+	+	+	+
rufifrons						+		+	+			

The numbers in the body of Table 10 are numbers of specimens.

E. pubescens (Thalhammar, 1898)

This species may be distinguished by the characters already mentioned. The original description fits both the British and the Continental specimens that I have seen, and I know of no differences between British and Continental specimens. I have not yet seen the type. The species is found in coastal areas from spring to autumn in the south of England, but records are scarce. The male genitalia are similar to those of most *Elachiptera* in having short, broad cerci (fig. 248), but differ from the other species of *Elachiptera* in having short, broad editae, reaching their greatest width at about one third of their length, while the other British species of *Elachiptera* have editae which are broadest at their base. The IX tergite of the male is broadest near the top, as in *E. brevipennis* and *E. megaspis*. The edita is shown in side view in fig. 250 and the hypandrium is shown in fig. 249.

E. pubescens may be found by sweeping in a range of habitats, but is most common in saltmarsh. I have also found it in the coastal heath at Studland and at Arne, Dorset.

E. brevipennis (Meigen, 1830)

This species is easily identified by the shortened wings. In fact it is a very variable species, showing marked continuous variation in wing length. I cannot relate this variation to any seasonal, morphological or sexual factors, but such variation is often found in short-winged Diptera. Other features of this species may well be related to its inability to fly, for instance the thorax is greatly reduced in width compared to the other species of the genus, and the setae are comparatively better developed. The sensory patch on the hind tibiae is well developed in this species.

The species is often a uniform shining brown colour with darker scutellum, but the abdomen may be blackish.

The genitalia have the IX tergite (fig. 251) similar to that of E. pubescens, being widest above, and the cerci are at a similarly wide angle, but the editae (fig. 253) are longer in E. brevipennis, as in the other species of Elachiptera. The hypandrium is shown in fig. 252.

Most of the recorded habitats of E. brevipennis are under litter in marshes, where it is a retiring species, but I have also found it to be common in coastal areas, running about the leaves of Festuca and other grasses in the sunshine. There is a record in the B.M.N.H. collection of E. brevipennis running about in the sun with ants.

Elachiptera brevipennis is the type-species of the genus, and the type specimens are in the Winthem collection in the Vienna Museum, where I examined them. There are seven specimens labelled 'type' and 'brevipennis'. All are the species referred to above and usually considered to be E. brevipennis.

E. scrobiculata (Strobl, 1900)

This is a very little known British species, with records from marshy localities, often in company with E. brevipennis. Specimens from Chippenham Fen, 3.1910, in the B.M.N.H. have thickened and pubescent aristae, while a range of specimens in Collin's and my collection from a variety of habitats have the arista only pubescent. The number of orbital setae, the two rows of femoral comb setae and the trapeziform roughened scutellum are characters typical of Elachiptera, and on the evidence the species must remain in this genus. The genitalia of all the specimens seen were similar, and Continental specimens belong to the same species as the British specimens examined. I have seen Strobl's type of this species and consider it has been correctly interpreted. The genitalia of E. scrobiculata are simple in structure for this genus, but have a closed hypandrium (fig. 262), unlike most other species of Elachiptera in which it is open. The cerci (fig. 261) are short and broad, with a very wide angle between the inner surfaces. The internal processes are free as in the other species of Elachiptera but are not as well developed. The edita is shown in side view in fig. 263.

E. scrobiculata varies in the colour of the front of the frons, which may be black or narrowly brown, and in the colour of the legs, which are usually black or brown with paler ends to the tibiae, though I have specimens with entirely blackish legs and a few with paler legs.

This species is found in dense decaying vegetation in marshes and fens, particularly where the upper parts are still growing. At Frensham Little Pond, Surrey, in 1973 I found it in association with E. uniseta, but while E. uniseta has a restricted habitat E. scrobiculata was found over a much wider area.

E. megaspis (Loew, 1858)

E. megaspis is easily distinguished from the other species of Elachiptera by the long, narrow scutellum with the marginal setae on large tubercles, the yellow humeri and front of frontal triangle, and the collate abdomen. It resembles E. brevipennis in the collate abdomen, E. uniseta in the structure of the scutellum, but in colouration and other characters it more closely resembles E. cornuta.

All the British specimens of E. megaspis I have seen have entirely yellow legs. Variation in this species is confined to the extent of the yellow colouration on the pleurae, humeri and frons. The sternites and genitalia of *E. megaspis* are much less sclerotised than usual in this genus, and they are easily damaged. The upper surface of the abdomen is black, and the underside is pale yellow and flattened against the tergites.

The basic structure of the genitalia is similar to *E. cornuta*, but the inner edges of the cerci (fig. 258) are U-shaped, while in *E. cornuta* (fig. 266) they are V-shaped. The hypandrium (fig. 259) of *E. megaspis* is closed. The edita is shown in fig. 260.

Most of the records of *E. megaspis* are from the spring and summer, but I have found it in deep marsh litter in March in Surrey. Usually it is found by sweeping and is particularly associated with water cress, *Nasturtium officinale*, from which it may be swept. I have seen breeding records from this species of plant, but it cannot be the only food-plant, since I have found *E. megaspis* in areas without *Nasturtium*. R.L.E. Ford has bred *E. megaspis* from stems of *Phellandrium*, though some of the specimens from this record in the B.M.N.H. were *E. cornuta* and *E. tuberculifera*. I have not yet seen the type of *E. megaspis*.

E. cornuta (Fallén, 1820)

This is the commonest species in the genus, but there can be little doubt that there is more than one species in the usual interpretation of this species. In addition the limits of these species with the closely related *E. diastema* and *E. tuberculifera* are difficult to define, since the group shows great variability.

The species I recognise as *E. cornuta* has a shining mesonotum, much longer than broad, with longitudinal dusted stripes, yellow legs often with black bands on the femora, but usually with the extreme apex of the femora yellow. Scutellum long trapeziform or shield shaped, with the setae mounted on small tubercles. Genitalia with inner edges of the cerci V-shaped, straight or nearly straight and at a wide angle.

Variation in this species occurs in the colour of the legs, which may be entirely yellow, or with black bands as described above (vars. nigripes and nigromaculata). I can find no reason for considering these to be anything other than colour forms of *E. cornuta*. The shape of the scutellum is very variable, and may approach the shape of *E. tuberculifera* which is shield shaped with the setae on tubercles. In *E. cornuta* the setae are rarely on such large tubercles, however. Extreme specimens may have the scutellum short and broad, as in *E. diastema*. The extent of the mesonotal stripes also varies, but in no specimen does the dusted area behind extend forwards more than one-third the length of the mesonotum. Worn specimens may have no dusting, but the underlying pattern of punctures may then be seen. The species is also very variable in size, and in body proportions.

The femoral comb of this species is interesting in showing a transition between two or three rows and the breakdown of the arrangement into a patch. There is typically a large number of setae, about 30. The *cornuta* var 'a' of Table 10 is the form most usually encountered, and shows considerable variation in the number of setae, but may be distinguished from *E. diastema* on number of setae. The form *cornuta* var 'b' (Table 10) has so far mainly been seen from specimens overwintering in stems of Phragmites which had been bored by Lepidoptera larvae. The genitalia of these specimens were similar to those of typical *E. cornuta*, and I can find no differences of specific rank between the two forms. The constant difference in the number of setae indicates that this form is at least a distinct variety; the problem requires further research.

The genitalia of *E. cornuta* are as variable as its other characters, and it is difficult to distinguish *E. cornuta* and *E. tuberculifera*, as discussed under the latter species. The hypandrium (fig. 267) is open with expanded margins, and varies in shape and proportion. The editae (fig. 268) are long and similar to the other species in this group in the arrangement of the setae, all being variable. A constant difference between this species and *E. diastema* is the shape of the inner surface of the cerci, which is V-shaped in *E. cornuta* (fig. 266) and U-shaped in *E. diastema* (fig. 269). The apical seta of the cerci is placed farther from the midline in *E. cornuta* than in *E. diastema*.

Andersson (1963) has examined the type of *E. cornuta* Fallén and has confirmed that it is the species usually referred to under this name; but later (personal communication) he has recognised that there is more than one species in this group.

E. cornuta is found in a wide variety of situations; mostly in marshy areas, but it is frequent in wet heathland. The species is most easily found by sweeping but is very active and soon flies out of the net. I have seen specimens feeding on flowers, but not as a general rule, and in most of the habitats it can be caught with a pooter in dense vegetation. The variety cornuta 'b' is found in early spring in dead Phragmites stems, but later it may be pooted from among the roots of dead vegetation, and in May both varieties may be found in this habitat.

E. tuberculifera (Corti, 1909)

This species is very close to E. cornuta and may only be distinguished from it with difficulty.

The scutellum is always shield shaped, and the six apical setae are usually on conspicuous tubercles. I have seen a very few specimens of E. tuberculifera in which the tubercles were much reduced, and in these forms the scutellum much resembles that of E. cornuta, but in other characters the specimens proved to be E. tuberculifera. The best specific character between the two species is the dusting of the mesonotum, which is completely dusted in E. tuberculifera but shining with three dusted lines in E. cornuta. In both species the dusting is rubbed off in old or worn specimens, and since, like the dusting of E. cornuta, it is underlaid by a pattern of punctures, such specimens of E. tuberculifera are difficult to determine. The legs of E. tuberculifera are always yellow, while E. cornuta may have black bands. The character used by Collin (1911) in the length of the frontal triangle, longer in E. tuberculifera than in E. cornuta, is of no value since both species are variable in this respect.

The femoral comb of E. tuberculifera is more like that of E. diastema than E. cornuta, having about 11 to 14 setae in two rows, but some Continental specimens may have more than 20 and so little reliance can be placed on this character.

Differences between the genitalia of E. cornuta and

E. tuberculifera are slight, and both species vary. The most constant difference I have found is the shape of the inner edges of the cerci (fig. 272), which are straight in E. cornuta but have a slight bend at about the middle in E. tuberculifera. The differences shown in figs. 272 and 266 in the internal part of the cerci are not constant, but show the more usual aspect in these species. I have found no differences in the shape of the hypandrium (fig. 273, tuberculifera) in these species. The edita (fig. 274) varies in shape.

E. tuberculifera is a common species. It is found by sweeping in marshy areas, and may be locally abundant together with E. cornuta. The most characteristic habitat, however, is in sweepings of coarse vegetation in the margins of dense damp woodland, and from the lower branches of trees.

E. diastema Collin, 1946

This species resembles a stouter, shorter winged form of E. cornuta but may be distinguished on external characters. Fig. 463 shows the relation between the head width and wing length of E. cornuta and E. diastema.

The character used by Collin (1946) referred to the disposition of the scutellar setae; in E. diastema the separation of the apical setae is about twice the distance between the apical seta and the subapical one, while in E. cornuta the distance is about the same. The basic difference is that the scutellum of E. cornuta is long and narrow and that of E. diastema short and broad. A specimen of E. cornuta in the B.M.N.H. collection has the setae arrangement of E. diastema, and so this character is of little value in determining these species.

The legs of E. cornuta may be yellow but often have black bands, and these bands are always present in E. diastema, in which they usually extend over the extreme ends of the hind femora, while in E. cornuta there is a narrow apical yellow band.

The dusting on the mesonotum is similar in these species, which have a shining mesonotum with longitudinal bands of dusting, but whereas in E. cornuta the bands are only narrowly fused posteriorly, in E. diastema they are broadly connected. The mesonotum of E. cornuta is longer than wide, and in E. diastema it is little longer than wide.

There is a constant difference in wing length in these species. Measurements of the wing length showed slight overlap, but the length of the third wing vein plotted against head width (fig. 463) separated the two species.

The genitalia of a range of specimens were examined, and constant differences were found between the two species. The hypandrium (fig. 270) of E. diastema is closed, little longer than wide and has the margins only slightly expanded. The hypandrium (fig. 267) of E. cornuta is open, much longer than wide and has the margins more expanded. The IX tergite of E. diastema (fig. 269) is more rounded, and the angle between the inner surfaces of the cerci in E. cornuta is V-shaped but in E. diastema it is U-shaped. These differences are constant in the material examined. The editae (figs. 271, diastema, 268, cornuta) are very similar.

E. diastema is a widespread species of Chloropidae and may be found in a range of habitats. It is nearly always found in deep vegetation, and cannot be captured by sweeping, except at times when the vegetation is very low, for instance in late winter and in very dry weather, when it may be swept occasionally. Most of my specimens were found in old grassland among *Arrhenatherum* tussocks and *Festuca*, and I have seen it near the coast in *Agropyrum* and marram grass. I have records for England, Wales and southern Scotland.

I have examined Collin's series of this species in the Collin-Verrall collection at Oxford and the genitalia illustrated are characteristic of the type series. One male should be selected as lectotype of this species. The species Nartshuk (1964) described as *E. breviscutellata* can only be *E. diastema*, but I have yet to see Nartshuk's type.

E. rufifrons Duda, 1933.

This species is very similar to *E. cornuta* but the frontal triangle is yellow and the mesonotum is dusted except for the lateral shining stripes. There are only 3 recorded British specimens, as in Collin (1946), and I have seen no further British specimens. The genitalia (figs. 264 and 265) are very similar to those of *E. cornuta*, and I have not seen any constant differences between them. In view of the constant external differences between these species I retain this species as distinct from *E. cornuta*. I have not yet seen the type of *E. rufifrons*.

E. uniseta Collin, 1939.

E. uniseta was described from 3 males and 2 females bred by Mr. E.B. Basden from the nest of a reed bunting (*Emberiza schoenicus* L.) at Black Park, Buckinghamshire, VI. 1933. This is the only published British record I have seen, but there are records from Germany (Wendt, 1968) and Hungary (Draskovits, 1964). In the B.M.N.H. there are three further specimens from Britain from Orford, Suffolk, 19.VIII.1908 (J.J.F.X. King). In the period March to May, 1973, the species was recaptured in larger numbers at Virginia Water and Frensham Little Pond, Surrey.

The original description of _E_. _uniseta_ compared it to _E_. _bimaculata_ (Loew, 1845), a species with a Mediterranean distribution, not recorded from Britain. _E_. _bimaculata_ has two pairs of orbital setae, while Collin (1939) described _E_. _uniseta_ as having one pair of orbital setae. The 5 syntypes of _E_. _uniseta_ in the Collin-Verrall collection of the Hope Department of Entomology, Oxford, all have one pair of orbital setae. I have examined Continental series of _E_. _bimaculata_ in the British, Paris and Vienna collections, and all had two pairs of longer orbital setae, except for one specimen in Vienna with two setae on one side and three on the other. Duda (1933) redescribed this species and stated it had two pairs of longer setae.

However, one male of _E_. _uniseta_ in King's series has two longer setae on one side and one on the other. A survey of the specimens in my collection gave the following results:

Number of setae	1+1	1+2	2+2
Number of specimens	154	41	17

These results show that the number of orbital setae in this group of species is variable, and since this is the only character used by Collin to distinguish _E_. _uniseta_ from _E_. _bimaculata_ the status of the former is in doubt. Wendt (1968) recorded 16 specimens of _E_. _uniseta_ and referred to the single orbital seta, so probably her specimens did not vary. To try to resolve the situation the genitalia of a range of specimens were dissected, and two forms were distinguished. The European specimens of _E_. _bimaculata_ had the IX tergite as in fig. 254 while the British specimens of E. uniseta had genitalia corresponding to fig. 255. The types of E. uniseta were dissected but I have not yet seen the types of E. bimaculata. The type of Chlorops bilineatus Bigot is apparently E. bimaculata since it has 2 pairs of orbital setae, but I have not dissected the specimen. Becker (1908) and Collin (1939) noted this synonymy. A male of E. uniseta from Black Park, Buckinghamshire, VI. 1933 has been designated (Ismay, 1976) and labelled lectotype, and its genitalia are illustrated in figs. 255 and 257. In conclusion, E. uniseta is shown to be a valid species distinguishable from E. bimaculata by differences in genitalia, but the number of orbital setae is shown to be unreliable character for separating these species.

E. uniseta varies somewhat in colour; the anterior of the two pairs of black mesonotal patches may be entirely absent or enlarged and fused with the posterior patch into a wide band. The frontal triangle may be entirely yellow, but usually the ocellar area is darkened and a dark streak may extend down the frontal triangle. A few specimens have an entirely darkened frontal triangle, pale shining brown, and in these specimens the pleurae are almost completely darkened. In life the male has faint greenish reflections on the eye, in the female these reflections are rosy. The male testes can be seen clearly through the thin cuticle of the abdomen, reddish in live insects and black in dried specimens.

The two colonies of E. uniseta found in the period March to May 1973 were both in Phragmites beds. One colony was at Virginia Water in the margin of the lake above the outlet to the falls. 12 specimens were found sparsely distributed in roots of _Acorus_, above the water level but in a very wet habitat. 23 specimens were found at a much higher density in a small _Phragmites_ bed amongst dead fallen vegetation at the water edge, between 2 and 30 cm. above the water level.

The second colony was at Frensham Little Pond. In this locality there are extensive _Phragmites_ beds, but a lengthy search failed to produce any _E. uniseta_ until a small area of _Phragmites_ and _Carex paniculata_ L. was found to contain _E. uniseta_ at a high density, the flies being more abundant in the _Phragmites_ at the water edge but they were also found up to 2m. inland among _Carex_ and coarse grass. 177 specimens were found in this locality at heights of 2 to 20 cm. above the ground in dense vegetation. In shallow water 0 to 10 cm. deep there was dense _Phragmites_ but no dead vegetation and no _E. uniseta_ were found there.

The above records show that _E. uniseta_ is confined to a narrow area at the edge of the water in _Phragmites_ beds and adjacent areas. Wendt (1968) recorded this species from _Phragmites_ beds and associations in lake margins, and in decaying _Carex acutiformis_ under snow, both records from Germany. The original record of Basden was from the nest of a reed bunting, but this could have been due to the larvae breeding in the reeds rather than the nest. Reed buntings nest in _Phragmites_ and other reeds near the shore in dense cover, in much the same habitat as my records of _E. uniseta_. No nests were seen in this investigation, and a handful of dead vegetation from Frensham contained several living flies when brought back to the laboratory.

E. uniseta is a retiring species of fly and can only be found by searching low down in the vegetation with a pooter or aspirator. When its habitat is disturbed the fly may hide beneath litter or walk up grass stems, but flies rarely. I have not found it by sweeping, which may account for the lack of records. Total records for this species now cover all the months of the year except July, November and December.

Key to the British species of *Elachiptera*

1(12) Humeri and pleurae entirely black.

2(3) Frontal triangle yellow, mesonotum dusted with a shining stripe extending backwards from the humeri

.... *E. rufifrons* Duda

3(2) Frontal triangle black, mesonotum without above pattern.

4(5) Scutellum smooth and rounded, frontal triangle dusted with central shining circular patch in front of ocelli.

... *E. pubescens* Th.

5(4) Scutellum rugose, frontal triangle shining.

6(7) Femora brownish to black, antennae brownish.

... *E. scrobiculata* Str.

7(6) Femora yellow or yellow with black bands, never unicolourous brown or black. Antennae yellow, black on top of segments 1 to 3 and arista.

8(9) Mesonotum completely lightly dusted, scutellum shield shaped, marginal setae on large tubercles and legs entirely yellow. ... *E. tuberculifera* Corti.

9(8) Mesonotum dusted in rows, rest shining, scutellum sides straight, rarely curved, peripheral setae on smaller tubercles.

10(11) Wing and mesonotum long, legs yellow or darkened on femora, but apex of femora (hind) always yellow.

... E. cornuta Fall.

11(10) Wing and mesonotum short, legs always with darkened patches on f_2 and f_3, that on f_3 covering the apex.

... E. diastema Col.

12(1) Humeri partly yellow or brown, pleurae with yellow or brown areas or entirely brown.

13 (14)(15) Wings abbreviated, scutellum shorter than wide, dark yellow to dark brown species with partly collate abdomen and unicolourous scutellum. ... E. brevipennis Mg.

14(13)(15) Wings long, scutellum longer than wide, apical setae on large tubercles which are yellow, rest of scutellum black, abdomen entirely collate.

... E. megaspis Loew

15(13)(14) Wings long, scutellum longer than wide, apical setae on large tubercles, abdomen not collate. Mesonotum yellow, dusted, a black shining patch above the noto-pleuron, and sometimes a second black patch behind this.

... E. uniseta Col.

Gampsocera Schiner, 1862.

Collin (1946) placed Gampsocera near to Elachiptera, probably since the arista is thickened and pubescent in both genera. Andersson (1977) placed Gampsocera in the same group as Gaurax after studying the male genitalia, but considered the Gaurax and Elachiptera groups to be closely related. I have seen only one damaged female of this species, but Andersson's figures of the male genitalia certainly show a greater resemblance to Gaurax than to

Elachiptera, particularly in the hypandrium.

There is only one British species, known from only one specimen. *G. inornata* Corti was taken at Mulgrave Woods, Yorkshire, on 11.11.05 and I have seen no further British specimens. The specimen is a female and so I have not seen the male genitalia. Notes on the specimen are as follows:

Frons yellow, frontal triangle black with yellow patches on each side of the ocelli. About five orbital setae of equal length, as in *Oscinella* but the setae stouter and stronger. Antennae yellow, black above on the third antennal segment, which is considerably produced at the base of the arista, and the arista blackened. Head very deep behind, deeper than long, jowls wide behind but narrow in front. Mesonotum black, shining, humeri and alar callus and a patch in front of scutellum yellow. Pleurae yellow with black markings, mostly shining, legs yellow, infuscated. Scutellum black, rounded and shining. Abdomen brownish, shining, with pale setae.

I have not seen the type specimen of this species.

Melanochaeta Bezzi, 1906

Melanochaeta is a genus which has been considered intermediate between *Elachiptera* and *Oscinella* (Collin, 1946). The arista of the British species is greatly thickened, as in *Elachiptera*, but the orbital setae are even in number, as in *Oscinella.* The scutellum is rounded in *Melanochaeta* but quadrate in *Elachiptera* (except for *E. pubescens*).

The world species of *Melanochaeta* are not easy to distinguish from *Elachiptera*. Sabrosky (1948) included species with slender arista and states that the orbital setae may have two longer pairs or all be the same length, so that the characters used to distinguish the single British species cannot be used on the world fauna.

Melanochaeta capreola Haliday is rarely recorded in Britain, but as the records are widely spread in the south of England it may only be overlooked. There are two forms of this species, one with shining mesonotum and one with dusted mesonotum. I have compared the male genitalia of specimens of both forms and have not found significant differences between them, and so I think that only one species occurs in Britain. The male genitalia of M. capreola have large and rounded cerci (fig. 225), which bear more resemblance to those of Oscinella than to those of Elachiptera. The open hypandrium is shown in fig. 226 and the edita in fig. 227. The single row of femoral setae is the same as that of Oscinella, and it seems as though the British species of Melanochaeta is more closely related to Oscinella than to Elachiptera.

I have not yet seen the type of M. capreola Hal. Most authors consider M. atterima (Strobl 1880) to be a synonym of M. capreola, and the type of this species is in Strobl's collection at Admont. It is labelled 'Elachiptera atterima Strobl 2980/vi/139 Typus' and is in good condition, though slightly obscured by dust. The sex is difficult to distinguish. It is the same as the species which occurs in Britain.

Nartshuk (1965) described a new species of Oscinella, O. coei from Jugoslavia. The type specimens of this species, a female holotype and a female paratype, are in the B.M.N.H.

They are both _Melanochaeta_ _capreola_ and _O_. _coei_ is a junior synonym of _M_. _capreola_.

My specimens of _M_. _capreola_ were taken on dense undergrowth in woodland glades. The types of _O_. _ooei_ were taken in glades in mixed forest.

CHAPTER 11

Introduction to Chloropinae

The subfamily Chloropinae is mainly characterised by the ending of the costa at vein r_{4+5}, while in Oscinellinae it is continued to vein m_{1+2}, except in some species of Dicraeus. The IX tergite is usually bowl-shaped with the cerci fused into a median lobe and the editae are usually small, flattened and applied closely to the IX tergite. The hypandrium is open.

The generic limits of British Chloropinae are perhaps easier to define than those of Oscinellinae, and the genitalia offer some good generic characters. Two species remain unplaced because of lack of material. As in the Oscinellinae, the genera are grouped into higher categories, and a synopsis of these is given here. The key to the genera of British Chloropinae is artificial and does not work with other fauna.

Genus groups of Chloropinae

1. Camarota

Arista blade-like. Veins r_1 and r_{2+3} approximated, curved to costa. Scutellum with apical setae on disc. Editae elongate, free from IX tergite apically. Cerci well developed. Hypandrium with broad lower margin.

2. Platycephala, Meromyza and Eurina.

Frons sometimes produced. Anterior wing veins sometimes curved to costa. Frontal triangle with setae (except in Meromyza). Hind femora enlarged except in Eurina. Editae projecting in Platycephala and Meromyza. Cerci reduced to a median, variably shaped area.

3. <u>Cryptonevra</u>

Frontal triangle long, with a single row of setae on the lateral margins. Mesonotum black. Editae globular, granulose. Cerci small, fused and discrete. Aedeagus with a sclerotised distiphallus in some species.

4. <u>Lasiosina</u>

Orbital setae enlarged, reduced in number. Crossveins approximated in some species. Editae fused or partially fused to IX tergite, sometimes granulose.

5. <u>Diplotoxa</u>

Crossveins approximated, orbital setae small and numerous. Frontal triangle large, shining. Hypandrium with gonites and aedeagus fused.

6. <u>Eutropha</u>

Antennae with arista not longer than rest of antennae. Jowls broad, head setae small. Head and thoracic setae whitish. Postgonites short and curved.

7. <u>Cetema</u>

Mesonotum rugose, black. Second tibia with curved black ventro-apical spur. Male genitalia often greatly enlarged, IX tergite with a pair of lateral processes in addition to editae and cerci. Hypandrium long, postgonites with large thick apical setae, directed anteriorly.

8. <u>Epichlorops</u>, <u>Melanum</u>, <u>Anthracophaga</u>, <u>Chlorops</u>.

Frontal triangle bare. Crossveins of wing not approximated. Scutellum convex. Postgonites placed laterally to pregonites.

9. <u>Thaumatomyia</u>.

Scutellum flattened on disc and apical setae approximated. Third antennal segment longer than wide. Abdomen with eversible vesicles in the intersegmental membrane anterior to male genitalia, granulose. Cerci reduced, postgonites placed beyond pregonites.

Key to the British genera of Chloropinae

1 (4) Hind femora enlarged in comparison with other femora and hind tibiae correspondingly curved. (fig. 1).

2 (3) Frontal triangle, mesonotum, scutellum, ptero- and mesopleurae with punctures. Antennae elongate with third segment twice as long as deep, arista whitish and pubescent. Mesonotum uniform reddish. ... Platycephala Fln.

3 (2) Without above punctures. Mesonotum yellow with red or black longitudinal stripes, which may be more or less fused. Third antennal segment $1\frac{1}{2}$ to twice as long as deep, arista slender. Hind femora with black spicules below. ... Meromyza Mg.

4 (1) Hind femora not greatly enlarged in comparison with other femora, hind tibiae not curved to fit against the femora.

5 (6) 2nd and 3rd longitudinal wingveins approximated, wing membrane darkened and convex. Frons greatly produced, arista black, bladelike, thickened and pubescent.. ... Camarota Mg.

6 (5) Veins r_1 and r_{2+3} well separated and without combination of other characters.

7 (8) Frons produced to a point in front of head, frontal triangle nearly twice as long as wide, covered in small setae except for a central groove reaching almost to the front of the head. Abdomen long and

depressed, species over 7 mm. long ... Eurina Mg.

8 (7) Without central groove to frontal triangle and less than 7 mm long.

9(10) 3-4 long orbital setae ... Lasiosina Beck

10(9) Orbital and other head setae shorter.

11(22) Disc of mesonotum entirely black.

12(15) Humeri black.

13(14) Frontal triangle extending more than 2/3 down frons, longer setae on head and mesonotum black. Jowls narrower, not divided by a vertical line .. ... Cryptonevra Lioy

14(13) Frontal triangle up to 2/3 length of frons, shining, longer setae on head and mesonotum white, mesonotum with conspicuous whitish microsetae. Jowls wide, yellow in front and black behind, divided by a vertical line beneath eye .. ... Eutropha Loew

15(12) Humeri yellow with a black mark. Frontal triangle long, black and shining.

16(17) Crossveins of disc of wing separated by less than length of posterior crossvein. Mesonotum with 3 dusted longitudinal grooves ... Diplotoxa Loew.

17(16) Crossveins separated by more than the length of the posterior crossvein. Mesonotum not grooved.

18(19) Jowls produced in front to a point beyond the margin of the eye. Mesonotum smooth and dusted, microsetae very small. ... Melanum Beck.

19(18) Jowls not produced in front. Mesonotum shining but roughened due to larger setae.

20(21) A curved shining black apical ventral spur to the middle tibia. Male genitalia often enlarged . ... Cetema Hend.

21(20) Only a small straight black seta on the middle tibia. Male genitalia smaller. .. Epichlorops Beck.

22(11) Disc of mesonotum yellow, with more or less extensive black or red longitudinal stripes.

22(25) Scutellum flattened on disc, apical scutellar setae approximated.

23(24) Scutellum bare on disc, lateral margins of occiput black. ... Chloropisca Loew

24(23) Disc of scutellum with setae, occiput margins yellow laterally. ... Thaumatomyia Zenk.

25(22) Scutellum not flattened on disc; apical scutellar setae well separated.

26(27) Jowls, face and frons edged with a thickened margin. Wing veins thickened and brownish. Arista white, pubescent. Frontal triangle black, grooved on lateral margins, partly dusted ... Anthracophaga Loew

27(26) Without above combination of characters; usually more lightly dusted species.

28(29) Width of jowls more than half that of third antennal segment; third antennal segment not longer than wide ... Chlorops Mg.

29(28) Width of jowls half or less that of third antennal segment; third antennal segment may be longer than wide ... genus near to Thaumatomyia

Camarota Meigen 1830

The arista is blade-like and flattened, with long black pubescence. The wings are darkened, convex, with veins r_1, r_{2+3} and r_{4+5} curved anteriorly and veins r_1 and r_{2+3} closely approximated. The head is depressed and the frons is produced, the angle of the face to the vertical is very large - about 75°. The scutellum has apical setae placed in the centre of the disc of the scutellum, which is poorly differentiated from the mesonotum.

The male genitalia of Camarota curvipennis (Latreille, 1805), the only British species, show perhaps the most extreme divergence from the other Chloropinae genera. The editae (fig. 282) are long, curved and have articulations with the IX tergite at the base, though their degree of movement is considerably less than in the Oscinellinae. They are also more circular in cross-section than the editae of the Oscinellinae. The hypandrium (fig. 283) has a greatly enlarged lower margin (nearly half the length of the hypandrium). This broad lower margin has some small setae near the base of the lateral arms, a feature which appears to be unique to the genus. The basiphallus is more strongly sclerotised than in most Chloropidae and has a castellated distal margin. The arms of the hypandrium are extended towards the mid-line so that they almost meet. The gonites are long and narrow.

C. curvipennis is found from May to October in southern England. It is rarely recorded and has been bred from cereals in Britain and on the Continent. The type of C. curvipennis is in Paris; it is labelled 'curvipennis Latr.' and has been correctly interpreted. In the Winthem collection in Vienna there is a specimen labelled 'Gallia flavitarsis Coll Winth. type Camarota flavitarsis Mg.' This is the type of flavitarsis and is the same species as Camarota curvipennis.

<u>Platycephala</u> Fallén 1820

The hind femora are enlarged but without black setulae beneath. The frons is large, flat, with the frontal triangle occupying nearly all the frons. There are small setae set in punctures on the frontal triangle, mesonotum, scutellum, pteropleurae and sternopleurae. The antennae are elongate with the third segment at least twice as long as deep, the arista yellow at the base but white apically, thickly pubescent, arising near the base of the dorsal surface of the third segment. In the wing veins r_1, r_{2+3} and r_{4+5} are curved anteriorly.

<u>P</u>. <u>planifrons</u> (Fabricius, 1798)

A slightly larger species than <u>P</u>. <u>umbraculata</u>, with the frons more produced, the apex of the third antennal segment rounded and the punctures on the head and thorax more pronounced. In <u>P</u>. <u>umbraculata</u> the frons is scarcely produced, the apex of the third antennal segment narrows and the punctures on the head and thorax are less pronounced. British specimens of both species are reddish-brown, but specimens from southern Europe are yellowish. These colour forms have similar genitalia so only two species appear to exist.

The male genitalia seem to be closest to <u>Meromyza</u> but do not have the characteristic postgonite. The IX tergite has small editae in both species and the cerci are fused, the internal parts stouter in <u>P</u>. <u>umbraculata</u> (fig. 286) than in <u>P</u>. <u>planifrons</u> (fig. 284). In <u>P</u>. <u>planifrons</u> (fig. 285) the gonites are attached very close to the mid-line of the hypandrium, but in <u>P</u>. <u>umbraculata</u> (fig. 287) they are more widely separated.

The type of P. planifrons F. is in Paris and has been correctly interpreted. Andersson (1963) has examined the type of P. culmorum Fln. and confirms that this is a synonym of P. planifrons. P. planifrons is local in England and Wales, being found from June to September in the vicinity of Phragmites. It has been bred from Phragmites in Europe.

P. umbraculata (Fabricius, 1794)

Although Kloet and Hincks (1945) and earlier check-lists included this species, there does not appear to be a published British record. I have seen one recent specimen (Severn Bank, Awre, Gloucs. 19.viii.1973, J.H. Cole) and there are specimens in the Dale collection, Hope Dept. (Charmouth and Seaton). I accept the species as British; it appears to be found with P. planifrons on Phragmites but much more rarely and only in south-west England.

The type of P. umbraculata is in Paris and has been correctly interpreted. Andersson (1963) confirms that P. agrorum Fln. is a synonym.

Key to the British species of Platycephala:

1 (2) Third antennal segment about twice as long as deep, rounded apically and not narrowed to the apex. Frons longer than wide, produced in front of eyes in a semi-circle for more than half the length of eye; punctures on thorax large, black. ... P. planifrons F.

2 (1) Third antennal segment more than twice as long as deep, truncated apically and conspicuously narrowed to apex. Frons as wide as long, slightly produced in front, with amaller, lighter punctures than P. planifrons. ... P. umbraculata F.

Meromyza Meigen 1830

In Meromyza the third antennal segment is longer than wide and the arista is only shortly pubescent. The frons is sometimes produced in front. The sternopleurae and pteropleurae are bare. Wing veins r_1, r_{2+3} and r_{4+5} are curved anteriorly to the costa, and the crossveins are more or less approximated. The hind femora are enlarged and thickened, with the tibiae correspondingly curved, while the femora have black setulose setae in two rows beneath. The male genitalia are distinctive, with cylindrical editae and the postgonites projecting downwards on either side of the aedeagus (Andersson, 1977).

This large genus contains many Palaearctic species, difficult to identify except by the male genitalia. I have seen at least 14 British species, including seven which have been described from Eastern Europe and two apparently undescribed species. In most cases the shape of the postgonite is sufficient to identify the species, but there are other useful characters in the IX tergite, while the aedeagus is more distinctive than usual in Chloropidae. Fedoseeva (1966) has described the larvae of eight species and (1966) given the known distribution. Several further species could occur in Britain.

I have not attempted to group the species as the genus appears to be very homogeneous; Smirnov and Fedoseeva (1967) were also unable to divide the genus into groups. Where species appear to be closely related, this is indicated in the text.

Meromyza pratorum Meigen, 1830

Large specimens (over 5 mm.) from Britain with a produced frons and green colouration have usually been referred to this species. Examination of the male genitalia showed two forms corresponding to M. pratorum and M. sorocula Fedoseeva, as illustrated in Nartshuk (1970). The species are difficult to separate on other characters. The hypopleural mark is usually yellowish in M. pratorum and blackish in M. sorocula while M. pratorum is usually a larger and stouter insect with a more produced frons.

The male genitalia are similar but show many small points of difference. The IX tergite is longer in M. pratorum (figs. 328 and 329) than in M. sorocula (fig. 330) and in both species there are long dense setae above the editae; the setae are usually pale but in some specimens of M. pratorum they are blackish. The post-gonite of M. pratorum (fig. 288) is large, with the posterior process cup-shaped and partly surrounding the anterior one. My figure appears slightly different from the figure in Nartshuk (1970), but this difference may be due to the mounting technique since some Eastern European workers mount dissections between two coverslips, possibly compressing the specimen. The central part of the post-gonite is more arched in M. pratorum, and has more definite striations than on M. sorocula (fig. 289). The aedeagus is curved in both species, but in M. pratorum (figs. 303 and 304) the base of the aedeagus is greatly swollen laterally and is more than twice as wide as the apex (in ventral view). These swellings are present in M. sorocula (figs. 305 and 306) but are much less well developed, so that the aedeagus is about as wide at the base as at the apex, with a narrowed central portion.

M. pratorum is a coastal species recorded from Cornwall to the north of Scotland. The records of this species swept from marram grass (*Ammophila arenarea* (L.) Link) are correct, but all inland records investigated referred to *M. sorocula*, except for one specimen of *M. pratorum* from Llanbedr, Brecknock.

I have seen a female specimen in Meigen's collection in Paris which I consider to be the type. This has all the characters of the British *M. pratorum*, including a central stripe to the abdomen and no lateral spots after tergite 2, an elongate frons and black mesonotal bands. I did not note the colour of the hypopleural mark but I have a note 'Pleurae yellow with an orange patch on the sternopleuron'. If the specimen has a black hypopleural mark it would probably have been noted, and therefore the specimen is probably *M. pratorum* sensu Nartshuk (1970).

Meromyza sorocula Fedoseeva, 1962.

This species differs from *M. pratorum* as described above. I have not seen the type of *M. sorocula*, but the original description figured the postgonite. I have also compared British specimens with a specimen from Poland, determined by J. Hubicka. The postgonite is shown in fig. 289.

The species may be recorded from inland localities in the south of England. Existing records are from damp habitats, marshes and woodland rides, fitting in well with Continental breeding records from *Deschampsia caespitosa* (L.) Beauv.

Meromyza coronoseta Hubicka, 1969.

I introduced this species to the British list (Cogan & Dear, 1975) on the basis of two male specimens, one from Flatford Mill and one from Brancaster. Mr. J.H. Cole (pers. comm.) has dissected the latter specimen and finds that it is *M. nigriventris*. I visited Flatford Mill in August 1977 and took further specimens of *M. coronoseta*.

The species is green in life, fading to yellow, with dark tips to the palpi, a central black stripe down the abdomen and mainly or wholly black mesonotal stripes. I am unable to distinguish it from *M. variegata* or *M. saltatrix* on colour or form. However, the male genitalia are highly distinctive.

The IX tergite (fig. 331) is deeper than long with elongate rounded editae. The basal, posterior parts of the editae, partly concealed by the IX tergite in lateral view, bear dense thickened black setae; the nearby setae on the IX tergite are also darkened. The postgonite (fig. 290) is elongate, with the basal process (posterior) reduced to a small projection scarcely as long as wide, while the anterior process is long and curved, bearing a cluster of setae dorsally near the base. The aedeagus (fig. 307) is slightly and evenly curved, broader at the base than the apex, and triangular in cross-section.

At Flatford Mill I took this species on Middle Marsh (grid reference 62/081329) by sweeping mixed *Agropyron* sp. and *Phragmites communis* on 5.VIII.1977. I have not seen the type specimeh, but I have compared a specimen determined by Hubicka with the British specimens.

<u>Meromyza</u> <u>curvinervis</u> (Zetterstedt, 1848)

This medium-sized species has black tips to the palpi, black heavily dusted mesonotal stripes (the central one ending before the scutellum), the hind femora not greatly enlarged and the central markings on the abdominal tergites elongate. The male genitalia are highly distinctive. The postgonite (fig. 291) has a large square anterior process, produced into a curved point anteriorly, while the posterior process is elongate, slightly curved and directed ventrally and slightly posteriorly. The IX tergite (fig. 336) is square in lateral view and the editae are large and rounded. The aedeagus (fig. 308) has a large swollen basal and a narrow apical portion; but there is a membranous distiphallus beyond this narrow part, therefore the swollen and the narrow parts form the basiphallus. This species does not seem to be closely related to any other British species of <u>Meromyza</u>. It has not previously been recorded from Britain.

Zetterstedt (1848) described this species from a single male; this was re-examined by Andersson (1966) who illustrated the genitalia. Andersson's illustration compares very well with the British specimen, and I therefore use Zetterstedt's name. There can be little doubt that <u>M</u>. <u>hybrida</u> Péterfi is the same species (new synonymy) but I have not yet examined the type of <u>M</u>. <u>hybrida</u>.

The only British specimen of <u>M</u>. <u>curvinervis</u> was taken at Suffolk, Lakenheath Warren, 18.vii.1965. L. Parmenter No. 68773.

M. femorata Macquart, 1835.

This species is larger than M. saltatrix and M. variegata; it is principally distinguished by its very broad hind femora and the reddish mesonotal stripes which are sometimes darkened on the lateral margins. The palpi are apically black for one-third or more of their length. The pleurae are usually yellow with reddish markings, sometimes darkened on the sternopleura and the hypopleura, and with a small black mark low down on the mesopleura.

The male genitalia most closely approach M. variegata. The postgonite (fig. 293)is larger in proportion and the anterior process is broader apically than in M. variegata (fig. 295). The aedeagus (fig. 309) is moderately curved in lateral view and nearly parallel-sided in ventral view (fig. 310), not constricted as in M. variegata. The IX tergite (figs. 332 and 333) is somewhat square in outline and has rather large, square editae. I have compared the postgonite with figures given in Russian papers (Fedoseeva, 1960, Nartshuk, 1970) and the British species agrees well with their figures. I have not been able to examine the type specimen, which from Macquart's original description agrees with the British specimens. Macquart (1835) did not note the colour of the palpi, but compared the species with saltatrix (which he described as having darkened palpi) so Duda (1933) may have been in error in describing the palpi as yellow.

M. femorata is a common and widely distributed species in south-eastern England in late June to September and may be swept from rough grassland. On the Continent it has been bred from _Dactylis glomerata_.

M. saltatrix (Linnaeus,1761)

M. saltatrix is similar to _M. variegata_, but the palps are broadly darkened at the tip while the palps of _M. variegata_ are pale or only obscurely darkened at the tip. The mesonotal bands are black in _saltatrix_ and the median band reaches the scutellum. The abdominal markings consist of three black spots on each segment, varying in intensity, while the pleural markings are also subject to variation from reddish to black. The hind femora are not as swollen as in _M. femorata._

The male genitalia of _M. saltatrix_ are very distinctive. The postgonite (fig. 294) is very large in proportion, the anterior process has a straight lower margin and is expanded laterally at the tip, so that it appears to have been turned at the point which ends in a broad truncation when seen from below. The posterior process is smaller and is directed ventrally and slightly posteriorly. The aedeagus is more curved in lateral view (fig. 311) than that of _M. femorata_ and in ventral view (fig. 312) it is swollen at the base. The editae (figs. 334 and 335) are more pointed than in _M. femorata_.

The name _M. saltatrix_ has been used for a variety of species but the true _M. saltatrix_ is not as common as some other species of _Meromyza_; however, it has a wide distribution in southern England and Wales.

I have not seen the type of _M. saltatrix_. It is possible that the type is not the species illustrated by Fedoseeva (1960) or Nartshuk (1970), and in this case an application should be made to the International Commission of Zoological Nomenclature to fix the common interpretation of the species. The postgonite of the British specimens agrees with the figures given by Fedoseeva (1960) and Nartshuk (1970).

M. variegata Meigen, 1830.

Like M. saltatrix, this is a smaller species than M. femorata. It is distinguished by the pale or only obscurely darkened palpi, while the mesonotal stripes vary in colour from completely black to reddish, darkened laterally. The pleural markings vary from mainly reddish to black, and the abdomen has three rows of black spots, which, as in M. saltatrix, vary in intensity.

The postgonite (fig. 295) is similar to that of M. femorata but has a more pointed apex to the anterior process. The aedeagus is distinguished by a strong median constriction seen in ventral view (fig. 315), and is more curved in lateral view (fig. 314) than M. saltatrix (fig. 311) or M. femorata (fig. 309). The editae (figs. 337 and 339) are squared apically, but more narrowly so than in M. femorata.

I have compared British specimens with the illustrations of the postgonites in Fedoseeva (1960) and Nartshuk (1970), and find that they agree. I have also examined and dissected the type specimen of M. variegata in the Paris Museum, and do not consider this to be the same species. The type is clearly the species treated as M. femorata by Russian authors, so that a change of name may be required.

The species here called M. variegata is a common and widespread species in southern England, and is found in both dry and wet grassland.

M. laeta Meigen, 1838.

No specimens of this species from Britain were seen, though it has been recorded as British: all the British specimens identified as M. laeta belonged to other species. There is a single specimen from Italy, Zuel, nr. Cortina, 1-3, viii.1969. V.F. Eastop, dissected and determined by J. Hubicka in the British Museum, and I have taken the following notes from this: The specimen is rather smaller than M. saltatrix, with red mesonotal bands, blackish laterally. The palpi are yellow with the tip narrowly black. The pleurae are yellow, there is no mesopleural black mark, but there are reddish marks on the sternopleurae and hypopleurae. The hind femora are much less thickened than in M. saltatrix.

The male genitalia are mounted between two coverslips and are compressed; only details of the postgonites and the aedeagus are easily visible. The postgonite (fig. 292) is similar to that of M. variegata (fig. 295) but the apex of the anterior process is smoothly rounded. The aedeagus in lateral view (fig. 313) is curved and narrow.

The interpretation of M. laeta Mg. in Nartshuk (1970) agrees with the Zuel specimen referred to above. The type specimen of M. laeta Mg. is in the Paris Museum and is a female. It agrees well with the notes given above, and may be the same species. However, since I find the male genitalia the only reliable guide to identification in the genus I am unable to interpret this specimen.

M. nigriventris Macquart, 1835.

This is a smaller species than M. saltatrix and very variable in colour. The mesonotal stripes are usually black and narrowly separated, but may be fused, leaving the mesonotum black with small marginal yellow marks, or the mesonotal bands may be replaced with reddish colouration from the centre of the mesonotum. The frontal triangle is very rugose, usually dark basally and yellow apically; in dark specimens it is black with a small yellow apical spot. There is a dark central mark on the occiput. The pleurae are yellow with black mesopleural, pteropleural and sternopleural marks, the latter red centrally in pale forms. The hind femora are narrower than in M. saltatrix, and in dark specimens the legs are infuscated. The abdomen varies from yellow with three black marks on each tergite, to black with the posterior margins of the tergites yellow, or completely black.

The postgonite (fig. 296) is small, with a trapeziform anterior process ending in a narrow projection, while the posterior process is narrow and pointed, directed antero-ventrally alongside the base of the anterior process. The aedeagus is strongly curved in lateral view (fig. 316) and nearly parallel-sided in ventral view (fig. 317). The most distinctive feature of the species is the strong inwardly directed hooked shape of the editae seen in apical view (fig. 340). In lateral view (fig. 338) the editae are small and rounded at the tip, with a small posterior projection.

Macquart's original description fits the British specimens of this species quite well, but as there are more species confused under this name it is important that the type specimen should be examined. I have not been able to locate the type of this species in the Verrall-Collin-Bigot collection or in Paris.

In Britain the species *M. coronoseta*, *M. palposa*, *M. pluriseta* and *M. triangulina* could be confused with *M. nigriventris* unless the male genitalia are examined. Old collections may contain some of these and other species under *M. nigriventris*.

M. nigriventris is one of the most common and widely distributed species of *Meromyza* in Britain and is found in damp grassland, fens, dry grassland, verges up to moors at higher elevations. It has been reared from a variety of grass species on the Continent.

M. pluriseta Péterfi, 1961.

A small species indistinguishable in form and colour from *M. nigriventris*, but easily distinguished by the form of the male genitalia.

The postgonite (fig. 300) is remarkable for the reduction of the posterior process, which is a small rounded projection hardly separated from the anterior process. The anterior process is curved ventrally and anteriorly, bearing setae at its base. The aedeagus is only slightly curved in lateral view (fig. 318) and in ventral view (fig. 319) the base is swollen and angular. The editae are very large, rounded and broad in lateral (fig. 341) and apical (fig.342) view and bear no trace of an inward projection.

The postgonites of British specimens of this species agree with the illustration in Nartshuk (1970) and with a Polish specimen of *M. pluriseta* determined by Hubicka. I have not seen the type specimen.

I have never taken M. pluriseta and have seen only the following British specimens (all males): Suffolk, Flatford Mill, 8.vii.1951, L. Parmenter No. 38319, ditto. 15.vii.1951 No. 39190. Kent, All Hallows, 20.viii.1950 L. Parmenter No. 35830.

M. palposa Fedoseeva, 1960

A small species indistinguishable in form and colour from M. nigriventris and M. pluriseta, but distinguished by the form of the male genitalia.

The postgonite (fig. 297) is very small, with the anterior process narrow and curved ventro-anteriorly. The posterior process is small, narrow and rounded, directed ventrally and slightly anteriorly, in much the same direction as the anterior process. The aedeagus is strongly curved in lateral view (fig. 320), and in ventral view (fig. 321) the base is swollen. The editae are very large; larger in both lateral (fig. 343) and apical (fig. 344) view than in M. pluriseta, and without a projection on the inner surface.

I have compared the British specimens with the illustration of the postgonite in Nartshuk (1970) and find that they agree, also with a Polish specimen determined by Hubicka.

M. palposa is known as British from three male specimens: Caernarvon, Llyn Ystumlyn, 8.vii.1976, J.W. Ismay (23/5238). Suffolk, Flatford Mill, 19.vii.1951, L. Parmenter No. 39858. Surrey, Mitcham Common, 7.vii.1947. L. Parmenter No. 22880.

M. triangulina Fedoseeva, 1960.

This species cannot be distinguished from M. nigriventris, M. pluriseta or M. palposa except by characters of the male genitalia.

The postgonite (fig. 299) is rather similar to that of M. palposa, but the orientation is rather different. The posterior process is closer to the anterior process, and the lower margin of the anterior process is straighter in M. triangulina than in M. palposa. Great care is necessary in distinguishing the postgonites of these two species since from certain orientations the postgonite of M. palposa can be mistaken for M. triangulina. The main difference is the space between the two processes; this is flatter in M. palposa than in M. triangulina. The aedeagus is moderately curved in lateral view (fig. 322) in M. triangulina and in ventral view (fig. 323) the base is much less dilated than in M. palposa. Perhaps the most reliable difference between the two species is in the editae; in M. triangulina these are very narrow in apical view (fig. 346) and small with a posterior process in lateral view (fig. 345), while in M. palposa (fig. 344) they are very large and rounded in both views. In M. triangulina the IX tergite is more flattened anteriorly - posteriorly than in M. palposa.

I have not seen the type of M. triangulina but the British specimens agree with the figure in Nartshuk (1970).

M. triangulina is a common species in England, Wales and Ireland.

M. bohemica Fedoseeva, 1960.

This is a medium sized species indistinguishable from M. variegata on characters other than the male genitalia. The palpi are yellow, sometimes slightly darkened at the tip, while the third antennal segment is darkened above.

The mesonotal stripes are black laterally, replaced with reddish on the disc of the mesonotum. The pleurae are yellow, with a black mark low on the mesopleurae, the sternopleurae being reddish, sometimes black at each end. The hind femora are similar to those of M. variegata. The abdomen has three dark marks on each tergite.

The male genitalia are similar to those of M. variegata but differ in detail. The postgonite (fig. 301) has a large trapeziform anterior process with the tip curved laterally, while the posterior process is as large as that of M. variegata but directed more ventrally. The aedeagus is curved, anvil-shaped in lateral view (fig. 326), as in M. variegata (fig. 314), but in apical view (fig. 325) it is more parallel-sided, with a slight swelling at the base. The editae are wider than in M. variegata but in lateral view have a squared outline as in variegata (fig. 347); in apical view (fig. 348) the editae are rather small.

I have not seen the type specimen of M. bohemica but British material agrees with the figure in Nartshuk (1970) and with a specimen of M. bohemica from Poland determined by Hubicka.

The only British records of M. bohemica are four males from Parmenter's collection: Surrey, Riddlesdown, 13.vii.1964. L. Parmenter 3 males nos. 58216, 58218, 58219; Surrey, Mitcham Common, 7.vii.1947. L. Parmenter no. 22879.

M. Species 1.

A species which cannot be identified from descriptions or figures of male genitalia, and which, therefore, should be described as new. The palpi are pale and the third antennal segment has a rather straight upper margin. The mesonotum has black, rather heavily dusted stripes, the central one reddish anteriorly. The pleurae are yellow with a small black mark low down on the mesopleuron; the sternopleural mark is reddish, sometimes black anteriorly and posteriorly. The femora are more swollen than in most species of the genus, though less so than in M. femorata. The abdomen has a black central line and lateral spots.

Male genitalia are distinguished by the shape of the postgonite (fig. 302). The anterior process is large, narrow, double curved and ends in an acute, rounded tip. The posterior process is large, broad and apically rounded, directed anteriorly and ventrally. The aedeagus (fig. 326) is similar to that of M. variegata, but more curved in lateral view. The IX tergite (fig. 349) is elongate with rounded editae.

I have seen two male specimens of this species: Essex, Benfleet 19.vii.1936, L. Parmenter no. 5661: Surrey, Chobham Common 15.vii.1971, J.W. Ismay.

M. Species 2.

A small pale species which may be near to M. mosquensis Fedoseeva. The palpi are entirely pale and the head is almost completely yellow, with the face very upright, nearly vertical in profile. The mesonotal stripes are reddish, black laterally. The pleurae are yellow with a small black mesopleural mark low down and a reddish sterno-pleural mark. The abdomen has three dark spots on each tergite, and the hind femora are moderately enlarged, less than in M. femorata.

The male genitalia are principally distinguished by the anterior process of the postgonite (fig. 298) which has a slightly concave upper margin and a strongly convex lower margin; the posterior process is large, nearly straight and directed ventrally. The aedeagus is similar to that of _M_. _variegata_ but is straighter-sided in apical view (fig. 327). The IX tergite (figs. 350 and 351) is somewhat elongate and the editae are small, rounded and curved posteriorly.

It is possible that this species is _M_. _mosquensis_, but the figure in Nartshuk (1970) is rather different from the British specimens - it has a smaller, more curved posterior process to the postgonite and the anterior process bears a much greater resemblance to _M_. _variegata_ than those of the British specimens. However, the profile of the face of _M_. _mosquensis_ figured in Nartshuk (1970) is very similar to the British specimens. No specimens of _M_. _mosquensis_ are avilable for comparison. I am therefore considering this British species as undescribed.

I have seen four male British specimens: Suffolk, Lakenheath Warren, 18.vii.1965 L. Parmenter no. 68765; ditto, 27.vii.1965 nos. 67124, 67125; Surrey, Thursley 31.vii.1960 L. Parmenter no. 52752.

Eurina Meigen 1830

The genus is distinguished by the elongate frons; the frontal triangle has a longitudinal central groove and small setae on the lateral margins. The antennae are elongate, the third segment is usually longer than wide, and the arista is simple. The meso- and usually the pteropleurae have small setae, in small punctures. The hind femora are not enlarged. The wings have veins r_{2+3} and r_{4+5} not curved strongly to the costa. The gonites and the aedeagus are fused.

A small genus of large flies found in the Palaearctic Region. Only one species, E. lurida Meigen, 1830, occurs in Britain. The frontal triangle is long and narrow and pointed, and the hind femora are simple, while in Platycephala the frontal triangle is large and occupies almost the whole of the frons, being rounded at the front, while the hind femora are greatly swollen and the tibiae correspondingly curved. The setae are set in large punctures in Platycephala and in small ones in Eurina.

E. lurida may be distinguished from the other members of the genus by the following characters: the frontal triangle is brown and shining in contrast to the dull frons; the mesonotum is brown, dusted, with three black stripes, the central one not reaching the scutellum; the abdomen is brown and shining, paler ventrally, and the legs are brown.

The male genitalia appear to be highly modified, and do not resemble those of Meromyza and Platycephala. The IX tergite (fig. 352) is flattened, with short setae, and the editae are long, narrow and directed posteriorly. The cerci appear to be represented by a smooth band extending across the posterior margin of the IX tergite; no suture is visible which isolates a central area. This feature is unique in my experience of Chloropidae. The hypandrium (fig. 353) is broad and compact; the arms are short, directed towards the centre and beneath the gonites. The gonites are fused with the base of the aedeagus, which does not appear to have free movement (similar to Diplotoxa messoria) and the aedeagal apodeme is very stout.

The relationships of E. lurida are obscure. It may not be closely related to Platycephala and Meromyza - the long narrow body shape is quite common among Diptera associated with Phragmites.

The type specimen of E. lurida is in Paris. I have examined the specimen, a male, and consider it to be the same species as the British specimens.

E. lurida is a rare species in Britain and I have seen no specimens collected later than 1933. Records are as follows: Kent, Plumstead 23.v.1903 1 male, A. Beaumont; ditto 23.v.1893 3 females, A. Beaumont; London, Lewisham 24.v.1893 1 female, A. Beaumont; Hants, Beaulieu 20.v.1904 1 male, J.E. Collin; Hants, Hengistbury Head 6.vi.1933 1 male, 1 female, J.E. Collin; Hants, Hayling Island 5.v.1874 1 female, C.W. Dale; [Hants, nr. Lymington Salterns] 11.vi.1832 1 male (?) 1 female, J.C. Dale. The data in square brackets was taken from the Dale manuscripts where there is an entry for E. lurida; the date is on the specimen and in the manuscripts. No habitat data for E. lurida are available but it is probably found in saline Phragmites beds. It has been bred from Phragmites on the Continent.

CHAPTER 12.

Groups 3 - 5. *Cryptonevra*, *Lasiosina* and *Diplotoxa*

Group 3: *Cryptonevra* Lioy, 1864

In this genus the mesopleuron is bare, the hind femora and the arista are simple and the orbital setae are not enlarged. The frontal triangle extends to the front of the frons and has a single row of setae along the lateral margins. The mesonotum is black, with short pubescence. The crossveins of the wing are approximated in some species. The male middle tarsi have enlarged setae on the fourth segment. The editae are elongate, globular and granulose. The aedeagus is large and sclerotised, pubescent in some species.

Collin (1932) revised the British species (under the name *Haplegis*). The status of the species related to *C. flavitarsis* is not resolved, and they are treated as separate species in this thesis. The genus contains two distinct groups of species, centred on *C. tarsata*, which has a rounded third antennal segment, and *C. flavitarsis*, which has the third antennal segment produced on the upper distal corner. The male genitalia also distinguish these two species groups. In *C. tarsata* the aedeagus is relatively simple, less than half the length of the hypandrium. The IX tergite has a rod-like structure extending along the mid-line, from the cerci for a distance equal to half the depth of the IX tergite. The homology of this structure is not clear, and it is unique in British Chloropidae. It is lacking in the *C. flavitarsis* group of species, but these have a unique aedeagus which is longer than half the length of the hypandrium, and divided into a basiphallus and a distiphallus, both sclerotised. No other British Chloropidae have a sclerotised distiphallus. The _C._ _flavitarsis_ group have thickened apical setae beneath the tarsal segments of the males. These setae project downwards in some specimens and seem to be easily lost.

In the figures of _C._ _consimilis_ and _C._ _diadema_ the aedeagus has been figured separately from the rest of the hypandrium, and the aedeagus has been omitted from the figures of the hypandrium of _C._ _flavitarsis_ and _C._ _nigritarsis_.

Key to the British species of _Cryptonevra_:

1 (4) Front of frons and base of third antennal segment reddish.

2 (3) Mesonotum shining, tarsi stout and entirely yellow. Middle tarsi of male with segments 2-4 having stout black ventral setae. ... _diadema_ Loew

3 (2) Mesonotum dusted, tarsi slender and yellow with last segment black. Middle tarsi of male with only segment 4 having black setae. ... _nigritarsis_ Duda

4 (1) Front of frons and base of third antennal segment black.

5 (8) Third antennal segment rounded, frontal triangle smoother. Crossveins widely separated, wings not whitish.

6 (7) Frontal triangle less shining, setae on lateral margins of the frontal triangle short, little longer than other setae on frons. ... _tarsata_ Fln.

7 (6) Frontal triangle intensely shining, setae on lateral margins longer than those on frons. .. _glabra_ Duda

8 (5) Third antennal segment produced on upper distal corner, frontal triangle roughened. Crossveins approximated, wings whitish.

9 (10) Anterior tibiae black, abdomen with dark setae. ... _flavitarsis_ Mg.

10 (9) Anterior tibiae yellow or narrowly black-banded, abdomen with pale setae. ... consimilis Collin

C. flavitarsis (Meigen, 1830)

This species may be distinguished from C. consimilis by the dark abdominal setae and the black (or narrowly yellow) front tibiae. Unfortunately there are intermediate specimens, which resemble C. flavitarsis but have more extensively yellow anterior tibiae while C. flavitarsis may have pale setae on the IX tergite. The status of C. consimilis is in doubt and Nartshuk (1970) considers it to be a synonym of C. flavitarsis.

The male genitalia are very similar to those of C. consimilis and C. nigritarsis. The aedeagus appears to be identical in C. flavitarsis, C. consimilis (figs.362 and 363) and C. nigritarsis. In C. flavitarsis (fig. 367) there is a small internal projection on the postgonites, while in C. consimilis (fig. 365) this projection is absent. The IX tergite of C. flavitarsis (fig. 366) is similar to that of C. consimilis (fig. 364).

Collin (1932) recorded C. flavitarsis from Lipara lucens galls and from Phragmites not galled by L. lucens, but there are also specimens in the Verrall-Collin collection (Oxford) bred from 'L. similis galls on Reed, Wicken 1.vi.1932' and 'L. rufitarsis galls on Reeds Devon v.45'. It is clear that C. flavitarsis is not confined to L. lucens galls, and the significance of the other biological differences between C. flavitarsis and C. consimilis in position of pupation noted by Collin (1932) is not understood.

Meigen (1830) described C. flavitarsis from specimens in Winthem's collection. There are two males and two females in Vienna labelled 'flavitarsis Coll. Winth type'. These are the species commonly referred to as C. flavitarsis, and therefore the name has been correctly interpreted (Duda, 1933, Collin, 1932).

C. flavitarsis is common on Phragmites in southern England and Wales.

C. consimilis Collin, 1932

A species closely related to C. flavitarsis and possibly only a colour variety of it. Collin (1932) recorded C. consimilis from galls of Lipara similis, but C. flavitarsis has also been reared from galls of L. similis. All rearing records of C. consimilis were from galls of L. similis. C. consimilis is retained as a distinct species in this thesis, but further work on the early stages is needed.

The type specimens of C. consimilis are in the B.M.N.H. There are three males and two females labelled 'Wicken Cambs. Bred vi.1929, G.M.Spooner, B.M. 1929-442'. One male is labelled 'co-type' and the other two males are labelled 'Bred from reed stems inhabited by Lipara similis. One specimen should be selected as lectotype. The species is recorded from Wicken and Chippenham Fens in Cambridgeshire.

C. nigritarsis (Duda, 1933)

In C. flavitarsis the mesonotum is shining, while in C. nigritarsis it is dusted. In C. nigritarsis the last tarsal segment is darkened, the tibiae are yellow apically, and the basal antennal segments, jowls and the front of the frons are reddish. The tarsi of C. flavitarsis are yellow and the remaining parts mentioned above are black.

Nartshuk (1970) considered C. nigritarsis to be a synonym of C. flavitarsis. The differences between the two species are small but appear to be consistent.

The male genitalia of C. nigritarsis are very similar to C. flavitarsis and C. consimilis. The IX tergite (fig. 369) appears to have the editae directed downwards and they lack the small point of C. flavitarsis (fig. 366). This difference could be due to the orientation of the genitalia, but I have examined the IX tergite of C. nigritarsis in clove oil under a binocular microscope and can find no trace of the small point on the editae of C. flavitarsis. The hypandrium (fig. 368) is indistinguishable from that of C. flavitarsis and the aedeagus does not appear to differ, but the distiphallus broke away from the basiphallus during dissection and no detailed comparison was made.

C. nigritarsis is clearly closely related to C. flavitarsis and C. consimilis but it has a distinct appearance, and I am retaining it as a separate species.

The types of C. nigritarsis are in Vienna; there are 13 specimens under nigritarsis labelled 'type'. All agree with the notes above.

There is one male and one female of this species in the B.M.N.H.: S. Hants., Keyhaven 17.vii.1951. C.N. Colyer, and a further male in the Verrall-Collin collection: Cambs., Wicken Fen, 20.vi.1950 J.E.Collin. The latter specimen was segregated from C. flavitarsis but was not named.

C. diadema (Meigen, 1830)

C. diadema is the palest British species of Cryptonevra, with more extensive reddish colouration of the jowls, basal antennal segments and front of the frons than in C. nigritarsis. The setae on the mesonotum and abdomen are pale, and the tarsi are broad.

The male genitalia are similar to those of C. flavitarsis, C. consimilis and C. nigritarsis, but are distinct in small details. The IX tergite (fig. 358) is squarer in overall shape than those of C. flavitarsis, C. consimilis and C. nigritarsis, while the inner parts of the editae are more slender. The hypandrium (fig. 359) differs in the shape of the apical (aedeagal) end of the aedeagal apodeme. The aedeagus has a distinct basiphallus and distiphallus (figs. 360 and 361) as in C. flavitarsis, but differs in shape. The distiphallus of C. diadema has a pubescent appearance due to small processes, as in Tephritidae, but I am unable to detect these processes in C. flavitarsis, C. consimilis or C. nigritarsis.

C. diadema is a common species in southern England, particularly on coastal marshes. I have not seen any rearing records.

In Vienna there is a single female under C. diadema labelled 'diadema coll. Winth type', which I consider to be the type of C. diadema. It is the British species considered above. The type of C. rufifrons (Loew, 1866) was not examined.

The four species, C. flavitarsis, C. consimilis, C. nigritarsis and C. diadema form a discrete species group.

C. tarsata Fallén 1820

This species is easily distinguished from the C. flavitarsis group by the rounded third antennal segment and entirely black head. A careful examination of the British specimens shows that there may be two species in the group. One of these has a more roughened, less shining frontal triangle and the setae on the lateral margins of the frontal triangle are not longer than those on the frons. This species is treated here as typical C. tarsata Fln. The other segregate has a more shining, less roughened frontal triangle, and the setae on the lateral margins of the frontal triangle are longer than those on the frons. This segregate agrees with C, tarsata var glabra Duda 1933, and I consider it under the name C. glabra. However, there is some variation in the texture of the frontal triangle in C. glabra; it may be shining but slightly roughened, or entirely smooth and shining. C. tarsata is always more roughened than C. glabra.

The male genitalia of C. tarsata closely resemble those of C. glabra. The IX tergite (fig. 354) is deeper than broad in apical view, and the editae are produced to an acute point. The IX tergite of C. glabra (fig. 356) is swollen and nearly as broad as deep, while the editae end in a rounded hook. The inner parts of the editae are more strongly sclerotised in C. tarsata than in C. glabra, and are nearer to the mid-line of the IX tergite in C. tarsata. The hypandrium of C. tarsata (fig. 355) is squárer in outline and the base of the aedeagus is mushroom-shaped. In C. glabra the hypandrium (fig. 357) is more rounded in outline and the base of the aedeagus is rounded.

Andersson (1963) has examined the type of C. tarsata Fln. and considered it to be correctly interpreted. However, Andersson does not describe the frontal triangle or mention C. tarsata var. glabra Duda so that the type specimen should be re-examined.

_C_. _tarsata_ is a rare species, known to me only from specimens in the Verrall-Collin collection, collected by J.E. Collin: Suffolk, Barton Mills 19.vii.1936 (3 males); Suffolk, West Stow 6.vi.1922 (1 female); Walan (?) 21.vi.1904 (1 male); Suffolk, Newmarket S. (Suffolk) L. (Lodge) dry pond 18.vi.1943 (1 male).

_C_. _glabra_ Duda 1933

This species is distinguished from _C_. _tarsata_ above. It is local in damp woodland in southern England, and nearly all the records of _C_. _tarsata_ refer to this species. I have not seen the type of _C_. _glabra_. A full description of _C_. _glabra_ follows:

Male: Head wider than long and as long as deep, black with dark setae. Frons as long as wide, projecting slightly in front of the eyes, matt, very dark brown with small setae. Orbital setae numerous, small, reclinate. Frontal triangle large, occupying almost entire hind margin of frons, shining, extending to the front of frons, lateral margins slightly convex. A row of black proclinate setae on the lateral margin of the frontal triangle, longer than the orbital setae, irregular. Ocellar setae small, divergent. A strong outer vertical seta. Antennae black, second antennal segment deeper than long with small black dorsal seta, third antennal segment rounded with short pubescence, as long as deep, arista arising near the base of the upper margin, slightly pubescent, dark basally and paler apically. Face dark brown, concave, wider than deep. Eye deep reddish brown, deeper than long, long axis slightly sloping backwards, bare. Jowls distinctly narrower than depth of third antennal segment, matt below eye anteriorly, shining black posteriorly and below, with black setae, more than uniserial. Gena below nearly as wide as jowls, narrowing on hind upper margin of eye. Proboscis brownish with pale setae, palpi black and small.

Mesonotum rather longer than wide, black, shining, slightly dusted brownish in front of scutellum, roughened and with short black setae. Humeri black, shining, with one longer black seta. 1+2 notopleural setae. Pleurae very shining, black, sternopleura with long pale setae below. Legs mainly black, tips of femora, apex of tibiae and tarsi except tips yellowish, with dark and pale setae. Middle tarsi with dark setae ventrally on segments 1-4, but these are not as stout as in C. flavitarsis. Wing brownish with brownish-black veins, cross-veins well separated by a distance equal to more than twice the length of the outer cross-vein. Haltere yellowish-white with a black stem.

Scutellum broader than long, black, shining except near base on disc where it is dusted brownish, with small dark setae. Apical setae rather close, a smaller subapical pair developed. Metanotum shining black.

Abdomen shining black with dark setae.

Group 4: Lasiosina Becker, 1910.

This genus has bare mesopleurae, slender hind femora and the arista is not thickened. The head setae are better developed than in the other genera of Chloropinae, and in particular the orbital setae are represented by three or four pairs of enlarged setae, longer than the ocellar setae. There are no setae on the lateral margins of the frontal triangle. The cross-veins of the wing may be approximated or separated. The male genitalia have reduced cerci and the editae, which may be fused to the IX tergite, are sometimes granulose. The aedeagus is weakly sclerotised and the female ovipositor is laterally compressed and heavily sclerotised in some species.

The genus contains two distinct groups of species. L. cinctipes has separated cross-veins, editae fused to the IX tergite and postgonites turned over at the tip. L. ruficeps, L. approximatonervis and L. heleocharis have approximated cross-veins, editae less completely fused to the IX tergite and postgonites not turned over at the tip. Andersson (1977) retained cinctipes in Lasiosina and transferred ruficeps, approximatonervis and heleocharis to Pseudopachychaeta Strobl, 1902. While I agree that these two groups of species are distinct, I retain all species in Lasiosina for the present. Andersson's separation of these genera rests mainly on the degree of fusion of the editae to the IX tergite and the fusion of the pre- and postgonites. The genus Lasiosina s.l. occurs in the Palaearctic, Ethiopian and Oriental regions, and a fuller survey of the male genitalia is needed before the generic limits are understood. The degree of separation of the cross-veins is a variable character in this subfamily (see Diplotoxa and Cryptonevra, Chapter 12).

Key to the British species of Lasiosina:

1 (6) Cross-veins approximated, the distance between them less than half the length of the anterior cross-vein.

2 (3) Mesonotal bands fused and heavily dusted, leaving pale patches ohly on the notopleuron, in front of the humeri

and the scutellum. Legs and wings darkened.

... L. ruficeps Zett.

3 (2) Mesonotal bands separated at least in front, and less heavily dusted; legs yellow or with slight dark markings.

4 (5) Female ovipositor shining and blade-like, setae on jowls usually including some dark setae ... L. heleocharis Nart.

5 (4) Female ovipositor with cylindrical dusted cerci, setae on jowls usually entirely pale ... L. approximatonervis Zett.

6 (1) Cross-veins not approximated, the distance between them more than half the length of the anterior cross-vein. Jowls wider than depth of the third antennal segment.

... L. cinctipes Mg.

L. ruficeps (Zetterstedt, 1838)

Duda (1933) regarded L. ruficeps as a form of L. approximatonervis but Andersson (1966) re-examined the type and considered that it was a distinct species. Specimens agreeing with Zetterstedt's description occur in Britain. L. ruficeps differs from L. approximatonervis and L. heleocharis in its darker colouration. The frontal triangle is entirely brownish in L. ruficeps, while in L. approximatonervis and L. heleocharis there is usually some trace of paler colouration at least towards the side margins. The mesonotal bands are fused, leaving small pale patches only on the notopleuron, in front of the humerus and in front of the scutellum. The mesonotum is more heavily dusted than in L. approximatonervis and L. heleocharis. The middle and hind legs are extensively darkened and rather stouter than in L. approximatonervis and L. heleocharis. The jowls are wider in L. ruficeps.

The male genitalia of L. ruficeps are very similar to those of L. approximatonervis and L. heleocharis. The IX tergite appears to be identical in the three species, though the editae of L. ruficeps (fig. 374) appear less granulose in the specimen illustrated. As in L. cinctipes (fig. 373) the bases of the gonites of L. ruficeps (fig. 375) are placed near the mid-line, but the tips are not curved over as in L. cinctipes. The lower margin of the hypandrium (fig. 375) is squarer in outline in L. ruficeps than in L. approximatonervis (fig. 379) and L. heleocharis (fig. 381). This appears to be the only distinctive feature of the male genitalia of L. ruficeps. The ovipositor of L. ruficeps is similar to that of L. approximatonervis (fig. 376).

L. ruficeps is a rare species in Britain. It is found in spring (April) on peat bogs in Scotland and northern England, but there are also records from marshes in southern England later in the year.

L. approximatonervis (Zetterstedt, 1848)

In Kloet and Hincks (1977) the name L. approximatonervis includes three species, L. approximatonervis, L. heleocharis and L. ruficeps. While L. ruficeps may be distinguished by its colouration, L. approximatonervis and L. heleocharis may be separated only by the ovipositor of the female. In L. approximatonervis the female cerci are cylindrical and dusted, but the ovipositor of L. heleocharis is blade-like, heavily sclerotised and shining. No other constant differences between the two species were found. The male genitalia did not differ significantly in the range of specimens examined. The colour of the frons, the width and dusting of the mesonotal bands, the leg colour, the costal sector ratios, the degree of curvature of the anterior wing veins and the position of the cross-veins did not separate the female specimens examined. The most reliable character was the colouration of the setae on the jowls; in all female L. approximatonervis these are pale, but in L. heleocharis there are usually some dark setae mixed with the pale ones. Five of the 22 female L. heleocharis examined had entirely pale setae, and I do not consider the character to be reliable enough to separate male specimens.

L. approximatonervis is an uncommon species in England and Wales. Andersson (1966) examined the type specimen but did not describe the female ovipositor.

L. heleocharis Nartshuk, 1964.

This is distinguished from L. approximatonervis above. It is clear that further work on these species is needed. The difference in the ovipositors may indicate different life-histories. L. heleocharis is recorded most frequently from Scotland, but there are records from Yorkshire and Norfolk.

I have not seen the type of L. heleocharis.

L. cinctipes (Meigen, 1830)

The frontal triangle of L. cinctipes is yellow with a black tip and ocellar area. The third antennal segment and the palpi are yellow in the male and black in the female.

The IX tergite (fig. 372) is elongate, the cerci are greatly reduced and the editae are fused to the IX tergite. The hypandrium (fig. 373) is lyre-shaped with an incised lower margin. The gonites are extended beyond the base of the aedeagus and curve round the apex of the aedeagal apodeme.

The type specimen is in Vienna; it is a female labelled 'cinctipes Coll. Winth type' in the series of _L. cinctipes_. I consider it to be the British species. _L. cinctipes_ is common in southern England, and is usually found on grassland. It may be found throughout the year since I have records for every month except November, December and January.

Group 5: _Diplotoxa_ Loew, 1863

This genus has approximated cross-veins, as in _Lasiosina approximatonervis_, but the orbital setae are scarcely developed and are very numerous. The number of orbital setae in _Lasiosina_ is lower, usually 3-4 long setae and several very short ones. The male genitalia show that there is little reason for placing _approximatonervis_ in _Diplotoxa_. The frontal triangle of _Diplotoxa messoria_ is black and shining, but in _Lasiosina_ it is at least partly yellow and dusted. _Diplotoxa_ has a rugose mesonotum, black and grooved, while the mesonotum of _Lasiosina_ is smooth, yellow with black longitudinal bands, and dusted.

D. messoria (Fallén, 1820)

The male genitalia of _Diplotoxa messoria_ are distinct from _Lasiosina_. In both genera the cerci are fused and small, but they are larger in _Diplotoxa_ (fig. 370). The editae are small and hardly project beyond the margin of the IX tergite. The hypandrium (fig. 371) has the gonites and aedeagus fused into a rigid structure quite different from the free gonites and aedeagus of *Lasiosina*.

D. messoria is a common species from June to August in acid marshy areas; it is found in England, Wales, Scotland and Ireland. Andersson (1963) has examined the type specimen of *D. messoria* and confirms that it is the species commonly considered under that name (Duda, 1933).

CHAPTER 13.

Group 6: Eutropha Loew, 1866.

The arista is very short in this genus, not longer than the rest of the antenna. The jowls are wide and bicoloured, and all the setae are white. The male genitalia are rather generalised with well-developed fused cerci, editae large and slightly granulated, while the pre- and the postgonites are in line and the aedeagus is small compared to that of Cryptonevra.

E. fulvifrons Haliday, 1833

The single British species is easily distinguished by the characters noted above. The IX tergite (fig. 382) is rounded, with pointed incurved editae which are rather granulated, though not as distinctly granulated as in Lasiosina. The cerci are fused, better developed than in Lasiosina. The inner parts of the editae are large and divergent. The postgonites are curved and short, the pregonites long and slender. The aedeagus is larger than in Lasiosina but smaller than in Cryptonevra flavitarsis.

E. fulvifrons is found on coastal sand dunes from May to August around the coast of the British Isles; it does not appear to have been recorded inland. I have not seen the type specimen.

Group 7: Cetema Hendel, 1907

In Cetema the frontal triangle is large, black and shining. The mesonotum is rugose, granular, black and slightly shining. The legs have a strong, black curved ventroapical spur on the second tibia. The male genitalia are distinctive, with processes on the IX tergite and apically hooked gonites bearing 3-4 recurved setae at the apex.

The genus has been considered near to *Chlorops*, but the male genitalia are quite distinct from those of *Chlorops*. The large processes on the IX tergite are extensions of the IX tergite, and are not modified cerci or editae since these are also present. The gonites are specialised, and the indications of a transverse division of the gonites are quite different to the longitudinal divisions of the gonites in *Chlorops*. The British species form a homogeneous group which does not require to be subdivided. Collin (1966) revised the British species, but my work has shown many more characters, particularly in the male genitalia. Collin's key to males is reliable but I am uncertain that the key to females separates *C. neglecta* and *C. paramyopina*.

C. cereris (Fallén, 1820)

The correct spelling is as above; in the most recent (1977) edition of Kloet & Hincks I misspelt the name *C. cereis*. This species is easily distinguished from the other species in the genus by its white arista; otherwise it resembles a large *C. elongata*, with black microsetae on the abdomen. Unlike *C. elongata*, however, the male of *C. cereris* has long hairs fringing the anterior and middle tibiae. The palpi are pale in the male but more or less darkened in the female.

The male genitalia of *C. cereris* are smaller than in *C. myopina*. The IX tergite processes (fig. 384) are long, slender and curved smoothly inward apically. In

Cetema I have found the structure of the tip of the edita and the tip of the lateral arm of the hypandrium to be specifically distinct; however the differences are difficult to describe. The hypandrium (fig. 385) is long and narrow, with the lateral flanges of the arms less developed than in *C. myopina*.

C. cereris is widespread, with records from England, Wales and Scotland from June to August, but it is uncommon. I have no certain idea of the preferred habitat, though two of my records were of specimens swept from coarse grasses under trees on chalk grassland. Andersson (1963) has examined the type specimen of *C. cereris* and confirms that it is correctly interpreted.

C. myopina (Loew, 1866)

A large species with pale abdominal microsetae, black arista and extensively darkened legs. The male genitalia are distinct; much larger than in the other species, and there is a fringe of long hairs to the anterior and middle tibiae. I have seen no British specimens of this species with pale legs.

The male genitalia are large and robust. The processes of the IX tergite (fig. 386) are thick basally, suddenly bent inwards at about half their length, and the apical part is narrow. The tip of the edita is pointed. The hypandrium (fig. 387) is more heavily sclerotised than in the other species of the genus, and the lateral arms bear broad flanges.

The species is still known only from Scotland (in June and July). I have not seen the type specimen.

C. paramyopina Collin, 1966.

This species is distinctive in the male, but I am doubtful whether Collin's (1966) key distinguishes the females from those of myopina (Continental specimens of C. myopina may have pale legs) and C. neglecta. The differences between male paramyopina and neglecta in tergite length are reliable, but the IX tergite of neglecta is variable in colour and cannot be used to distinguish the species. I have seen male neglecta with a black IX tergite (specimens later dissected).

The male genitalia probably approach most closely those of C. neglecta. The IX tergite (fig. 388) is less robust than in C. myopina, with the processes not sharply angled. The hypandrium (fig. 389) is rather broader in proportion than in other species of this genus, with the lateral flanges well-developed.

C. paramyopina remains a rare species in Britain. I have seen additional specimens from Ireland (Co. Down, Killard 9.vii.1971 R. Nash, from coastal saltmarsh). I have examined the type series in the Verrall-Collin collection and they agree with Collin's description.

C. neglecta Tonnoir, 1921

A small species with pale abdominal microsetae, usually yellowish (but sometimes black) IX tergite in the male and male anterior and middle tibiae having fringes of long hairs. Collin (1966) separated the females of C. neglecta from the females of the other species of Cetema having pale abdominal microsetae by the length of the frontal triangle. In C. neglecta this is usually longer and more pointed than in C. paramyopina, but I have seen considerable variation in this character and do not consider it reliable. Also, Collin's key states that C. paramyopina females are larger than C. myopina; this is not the case and Collin may have meant that C. paramyopina is larger than C. neglecta.

The male genitalia of C. neglecta have narrow, pointed processes on the IX tergite (fig. 390), broad flanges on the hypandrial arms (fig. 391) and distinctively shaped tip to the hypandrial arms. C. neglecta is a common species in England, Wales, Scotland and Ireland from June to August. It is found in grassland and rough pasture, wood edges and saltmarshes. I have not seen the type specimen, but Zuska (1966) has seen the type series and from his comments it is clear that the male specimens have a darkened IX tergite.

C. elongata (Meigen, 1830)

A small species with dark abdominal microsetae, black, small male IX tergite and no fringe of hairs on the anterior and middle tibiae. It is distinguished from C. transversa by the head profile (Collin, 1966), but there is another species near to C. elongata which can only be distinguished from the latter by the male genitalia.

The male genitalia of C. elongata are similar to those of C. neglecta, but the processes on the IX tergite (fig. 392) are broader apically, and there is a distinct isolated sharp spur at the tip of the edita, reduced in C. neglecta. The hypandrium (fig. 393) has much narrower lateral arms than in C. neglecta, pointed at the apex.

C. elongata is a common species in England, Scotland, Wales and Ireland. It is found in a variety of habitats but is most common in grassland from June to September. The type specimen of *C. elongata* is in Vienna, and I have examined it. It is a male and agrees with Collin's (1966) interpretation of this species. However, as I have a second species near to *C. elongata* the type specimen should now be dissected.

C. Species 1.

I have seen two male specimens with distinct genitalia which otherwise fall within the range of variation of *C. elongata*. One of these (from Hunts.) had a rather more produced frons than *C. elongata*, but this distinction does not hold for the other specimen.

The male genitalia (fig. 394) differ from *C. elongata* chiefly in the shape of the apex of the lateral arm of the hypandrium (fig. 395), which is pointed with an inner process sharply bent anteriorly at the tip. In *C. elongata* this inner process is much wider and is evenly curved throughout its length.

I have seen two males of this species: Surrey, Egham 25.vi.1973 J.W. Ismay; Hunts., Monks Wood N.N.R. 6.vii.1968 J.H. Cole, 5099.

C. transversa Collin

This species is still known only from one male specimen. It is possible that it is merely a deformed specimen of *C. elongata*, but as it is unique I have refrained from dissecting it. I have examined the specimen and consider that apart from the shape of the eyes and head it falls within the range of variation of *C. elongata.*

CHAPTER 14.

Group 8: Epichlorops, Melanum, Anthracophaga and Chlorops

This genus group is characterised by the laterally placed pre- and postgonites (Andersson, 1977). *Chlorops* has a yellow mesonotum with black bands, sometimes fused or replaced with reddish bands. *Anthracophaga* is separated from *Chlorops* on trivial characters. *Melanum* and *Epichlorops* have a black mesonotum, but the vibrissal angles are produced in *Melanum* and rounded in *Epichlorops*. *Epichlorops* has a rugose mesonotum like that of *Cetema*, but has no strong spur on the middle tibiae and the male genitalia are more related to *Chlorops*.

Epichlorops Becker, 1910

The frontal triangle in this genus is large, black and shining. The mesonotum is roughened as in *Cetema* but the pattern is stellate and not granular. The middle tibia lacks a large, curved ventro-apical spur.

The single British species *E. puncticollis* (Zetterstedt, 1848) resembles *Cetema* but is more closely related to *Chlorops* in the structure of the male genitalia. The IX tergite (fig. 401) has small projecting editae, as in *Chlorops*, and lacks the processes of the IX tergite of *Cetema*. In the hypandrium (fig. 402) the gonites are placed laterally, as in *Chlorops*, and the gonites lack the large backwardly directed setae of *Cetema*.

E. puncticollis is an uncommon but widely distributed species, found in England, Wales and Scotland up to the extreme north. In England it is found in woodland, but in Wales and Scotland it is also found in open bogs and marshes. Andersson (1966) has examined the type specimens of this species.

Melanum Becker, 1910

The mesonotum of *Melanum* is black on the disc, and the frontal triangle is large, black and shining. The jowls are produced anteriorly to an acute point below or in front of the base of the antennae. The male genitalia of the type species are flattened posteriorly on the IX tergite.

This small genus is distinguished from *Chlorops* by the projecting jowls, very projecting in the type species, *M. laterale*, which also has a smooth, dusted mesonotum almost devoid of microsetae. The IX tergite of *M. laterale* in lateral view (fig. 396) is flattened and has a strong marginal carina. The editae are black apically, and heavily sclerotised (fig. 397). The hypandrium (fig. 398) has a distinctive shape, but the gonites are divided longitudinally as in *Chlorops*. The genus appears to be most closely related to *Chlorops*.

There is a second British species which runs to *Melanum* in my key to genera (Chapter 11), the specimens of which, in the Verrall-Collin collection, were labelled *M. fumipenne* Loew. I do not consider this species to be congeneric with *laterale* Hal. but it is included here.

M. laterale (Haliday, 1833)

The distinctive features of this species are described above. I have not seen the type specimen.

M. laterale is a local species with a wide distribution around the coast of England, Wales, Scotland and Ireland. It is found on sand-dunes and slacks from June to September.

M. fumipenne (Loew 1866)

In the Verrall-Collin collection (Oxford) there are three males and one female under this name. These specimens are smaller than M. laterale and have a shining mesonotum. The jowls are less produced than in M. laterale.

The male genitalia resemble those of Chlorops. The editae (fig. 399) are small, with an apical projection similar to that found in Chlorops. The cerci are not well differentiated, and the simple bowl-shaped IX tergite is unlike M. laterale, but resembles Chlorops. The hypandrium (fig. 400) is distinctively shaped, but the longitudinally divided gonites resemble those of Chlorops.

The above notes indicate that the present species is more closely related to Chlorops than to M. laterale. The projecting front to the jowls is a character found, to a lesser degree, in some species of Chlorops. C. troglodytes has a more sharply angled vibrissal angle than other British Chlorops. The specimens of M.fumipenne vary in the colour of the mesonotum; one has indications of paler bands, as in Chlorops. In this thesis the species is included in Melanum, but there can be little doubt that it is better placed in Chlorops.

While I refer to this species as M.fumipenne after Collin, the specimens show some differences from Loew's original description. Loew (1866) described M.fumipenne as having wider jowls than M.laterale, extensively darkened legs and clouded wings. The British specimens have jowls as wide as M.laterale, legs yellow with vague dark marks on the femora, darkened tips to the tarsi and hyaline wings. There is no evidence that Collin had seen the type specimen of M. fumipenne and I have not seen it, therefore the identity of these British specimens is doubtful. The four specimens were all taken at Nethy Bridge, Inverness, by J.W. Yerbury on the following dates: 3.viii.1904 (1 male), 19.vii.1905 (1 male), 7.viii.1911 (1 male, 1 female).

Key to the British species of Melanum:

1 (2) Larger species with almost bare, dusted mesonotum. Vibrissal angles strongly produced. ... laterale Hal.

2 (1) Smaller species with shining mesonotum, less strongly produced vibrissal angles. ... fumipenne Loew ?

Anthracophaga Loew, 1866

A. strigula F. has been considered to belong to a genus distinct from Chlorops Mg. (Duda, 1933). The frontal triangle is large and dusted, with lateral grooves. The arista is thickly pubescent and the lower margin of the jowls is thickened. However, the male genitalia do not show any important differences from Chlorops. In both genera the editae are small with an apical tooth, the cerci are fused and small and the gonites are divided longitudinally. Chlorops frontosa Mg. appears to be closely related to Anthracophaga strigula and should be placed in the same genus. I do not consider Anthracophaga generically distinct from Chlorops (Andersson, 1977), but retain the name for a sub-genus of Chlorops containing strigula F. and frontosa Mg. The two British species are easily distinguished by the following key:

Key to the British species of Chlorops (Anthracophaga):

1 (2) Scutellum black, with central yellow stripe, abdominal tergites 2-6 black with contrasting yellow hind margins. Frontal triangle dusted except for lateral margins. ... strigula F.

2 (1) Scutellum yellow, with central black stripe, abdominal tergites 3 and 4 entirely black on disc, abdomen with yellow lateral margins. Frontal triangle dusted only around ocelli. ... frontosa Mg.

A. strigula (Fabricius, 1794)

A darker and more heavily dusted species than A. frontosa. The basal part of the arista is usually brownish in A. strigula, yellowish in A. frontosa. A. strigula has black microsetae on the mesonotum and the sides of the abdomen; these are pale in A. frontosa.

The male genitalia of both species are dark and more heavily sclerotised than in most Chlorops. The IX tergite is black in both species, broader and shorter in A. strigula (fig. 403) than in A. frontosa (fig. 406) and the cerci are larger in A. frontosa than in A. strigula. The hypandrium is similar in shape in both species: shallow, concave with the inner lateral arm long and incurved and the outer lateral arm short. The outer gonites are broad basally in A. strigula (fig. 404) and extend to the base of the lateral arm, but in A. frontosa (fig. 405) they are much narrower basally and are removed from the lateral arms. The inner gonites are rounded in A. strigula but straighter and more angular in A. frontosa.

Anthracophaga strigula is an infrequently recorded species found from April to June in Southern England. The type specimen is in Paris; I have compared it with British specimens and consider the name has been correctly applied. The type of cingulata Meigen, 1830, is in Paris and has been correctly interpreted as a synonym of A. strigula.

A. frontosa (Meigen, 1830)

A common species in southern England in May and June. I have swept it from *Glyceria* sp. bordering lakes and streams. The type specimen is in Vienna and it has been correctly interpreted.

Chlorops Meigen, 1803

This is the largest genus of British Chloropidae and there are certainly further species to be discovered. The following account omits a few specimens I am unable to identify and which cannot be described because of lack of material. While the male genitalia are useful for distinguishing some species, in others they could lead to some confusion in separating closely related species. In *Chlorops* the third antennal segment is deeper than long, in a few species it is as deep as long. The frontal triangle is coloured yellow to black and is bare, sometimes with ridges. The vibrissal angles are rounded to slightly projecting. The mesonotum is yellow with five black or red bands, sometimes fused. The scutellum is convex with the apical scutellar setae not approximated. The IX tergite is rounded, shallow, the editae are plate-like with an apical tooth. The hypandrium has longitudinally divided gonites and the aedeagus is usually short.

Chlorops is difficult to subdivide into species groups. There are certainly some pairs of closely related species. *Anthracophaga* is considered to be a subgenus of *Chlorops* (Andersson, 1977).

The key which I have provided is ohly an artificial one and is designed for easy use. It will not work for a few aberrant specimens, and I have further species of whose status and limits I am unsure. Specimens should be carefully checked against a named collection.

Key to the British species of Chlorops:

1 (8) Hind part of mesopleuron with small scattered black setae.

2 (5) Scutellum with more than 10 setae on disc.

3 (4) Antennae yellow basally. Frontal triangle 2/3 length of frons, yellow with black median line and margins. Sternopleural mark partly shining above. ... laeta Mg.

4 (3) Third antennal segment black. Main part of frontal triangle about ½ length of frons, with a linear portion extending further. Sternopleural mark entirely dusted. ... adjuncta Beck.

5 (2) Scutellum with less than 10 setae on disc.

6 (7) Antennae yellow ventrally, palpi yellow. Femora and fore coxae yellow. Scutellum rounded, but disc only slightly convex. ... species 1.

7 (6) Antennae black, palpi darkened or black. Femora maculated and front coxae darkened at base. Scutellum strongly convex on disc. ... varsoviensis Beck.

8 (1) Mesopleuron bare.

9 (16) Antennae yellow, sometimes slightly darkened but without any extensive discrete black area.

10(11) Mesonotal stripes shining reddish, frontal triangle yellow with black apex, hind corners, central stripe and ocellar area. Sternopleural mark reddish yellow. ... rufina Zett

11(10) Without the above combination of characters.

12(13) Frontal triangle yellow, only darkened around the ocelli, small. Sternopleural mark entirely shining yellow. Large, pale yellow species. ... gracilis Mg.

13(12) Frontal triangle more extensively darkened and at least the upper edge of the sternopleuron black.

14(15) Frontal triangle large, yellow, brownish around margins, tip and a central line. Sternopleural mark reddish below. Mesonotal stripes heavily dusted. Frons often produced in front ... <u>interrupta</u> Mg.

15(14) Frontal triangle black at tip, margins and central line. Sternopleural mark entirely black and mesonotal stripes shining. ... <u>citrinella</u> Zett.

16(9) Antennae with third antennal segment partly or entirely black.

17(20) Basal parts of arista yellowish, remainder dirty white with white pubescence. Mesonotal stripes dusted grey, narrowly separated. Frons flat; frontal triangle large, extending more than 3/4 the length of frons, yellow with black ocellar area and tip.

18(19) Sternopleural mark entirely black. ... <u>planifrons</u> Loew

19(18) Sternopleural mark reddish beneath. ... <u>triangularis</u> Beck.

20(17) Arista black; without the above combination of characters.

21(24) Mesonotum shining with dense microsetae which are separated by less than half their length. Large species, often heavily darkened. Frontal triangle long, reaching nearly to front of frons. Jowls wider than third antennal segment is deep and with black microsetae along lower margin.

22(23) Costa continued beyond r_{4+5} for 1/4 to 1/3 the distance between r_{4+5} and m_{1+2}; third antennal segment yellowish near base on inner side; sternopleural mark yellowish below.. <u>meigeni</u> Loew

23(22) Costa scarcely produced beyond r_{4+5}; third antennal segment and sternopleural mark black.
... _speciosa_ Mg.

24(21) Mesonotum with sparse microsetae usually separated by about their length, without the above combination of characters.

25(28) Sternopleural mark entirely dusted. Frontal triangle 2/3 length of frons, concave-sided, usually with a median groove. Mesonotal stripes dusted. Anterior tarsi with segments 1, 4 and 5 dusted.

26(27) Sternopleural mark and usually antennae black.
... _pumilionis_ Bj.

27(26) Sternopleural mark and antennae extensively yellow beneath. ... _novaki_ Strobl

28 (25) Sternopleural mark shining at least above; without the above combination of characters.

29(32) Third antennal segment as deep as depth of jowls.

30(31) Mesonotal stripes dusted. Frontal triangle black except along hind margin. Third antennal segment large. Species over 2mm. long. (Compare _C. troglodytes_)
... _brevimana_ Loew

31(30) Mesonotal stripes shining. Frontal triangle black centrally with yellow margins. Third antennal segment small, as long as deep. 2mm. long or less. Last tarsal segment darkened. ... _hypostigma_ Mg.

32(29) Third antennal segment narrower than jowls.

33(34) Mesonotal stripes grey dusted. Frontal triangle small, narrow, with black central onion-shaped mark, margins yellow. Sternopleural mark yellowish red, with or without black upper margin.
... _serena_ Loew

34(33) Mesonotal stripes shining or without the above combination of characters.

35(38) Tergites yellow with black anterior border.

36(37) Sternopleural mark entirely black .. scalaris Mg.

37(36) Sternopleural mark extensively or entirely yellow. ... centromaculata Duda

38(35) Tergites yellow with irregular anterior markings or black on disc.

39(42) Abdomen blackish on disc.

40(41) Frontal triangle long, 3/4 length of frons. Frons produced more in front of eyes, jowls less produced. Mesonotal stripes wider (nearly confluent) and more dusted. ... obscurella Zett.

41(40) Frontal triangle short, 2/3 length of frons which is less produced. Jowls more produced and scarcely wider than third antennal segment is deep. Mesonotal stripes more widely separated and more shining. ... troglodytes Zett.

42(39) Abdomen yellow, with obscure anterior markings to the tergites and a small anterolateral dark spot on tergites 3-5. Antennae yellow on segments 1 and 2 and often on the inner basal part of the third antennal segment. Frontal triangle ½ length of frons, black, margins straight. .. calceata Mg.

C. laeta Meigen, 1830

Although this species was included in Kloet and Hincks (1945) I can find no published British record. However, there are two female specimens in the B.M.N.H. with data 'Nethy Bridge 18.8.1906' and 'Forres 6.8.1904' both collected by J.J.F.X. King. These key out to laeta in Duda (1933) and I accept them as that species, though the specimens differ in some points from the description in Duda. There are few mesopleural hairs, not numerous ones, and the apex of the frontal triangle is yellow, not black. The wing veins are yellowish, not black.

I have not dissected the male genitalia of this species due to lack of material, nor did I find the type specimen in Winthem's collection in Vienna.

C. adjuncta Becker 1910

This species and the next have probably been treated as C. fasciata Mg., but I am unsure of the status of C. fasciata and did not find the type in Meigen's collection. The form adjuncta in Duda (1933) is certainly a distinct species, and until the confusion is resolved by an examination of the types, I use the name adjuncta Becker. The species has a pale, whitish yellow ground colour in most specimens; the mesonotal stripes are more heavily dusted than in the other species of the C. fasciata group. The ocellar triangle and a small area projecting between the front and rear ocelli is slightly dusted or has a different texture to the remainder of the frontal triangle. The antennae are rather variable in colour, the first and second segments may be black or yellow basally, but the third segment is black. The sternopleural mark is entirely dusted.

The IX tergite (fig. 407) is broad, short, with the lower corners produced to cover the editae. The editae are large, with an expanded inner part, and apically a large, stout, slightly curved, hook. The cerci form a large fused plate. The hypandrium (fig. 408) has an angled lower margin and almost straight lateral arms. The gonites are broadly rounded at the tip, and the aedeagus is about half as long as the gonites, and narrow.

This species seems to be not uncommon in southern England and Wales, and my records are all from dry grassland, often calcareous. I have not seen the type.

C. Species 1

Nye (1958) has described the larva of an unidentified species of *Chlorops* bred from basal tillers of *Festuca tenuifolia* Sibth. The larvae of the other species placed near *fasciata* Mg. are not known, but these adults reared from *Festuca* are quite distinct. The antennae are much smaller than in *C. adjuncta* and are yellow beneath on all segments; the frontal triangle is small, about half the length of the frons, entirely black, and the mesonotum is more lightly dusted than in *C. adjuncta*. The legs are yellow or very slightly infuscated on the femora. The jowls are produced in front, so that the distance from the tip of the vibrissal angle to the eye margin is greater than the depth of the jowls beneath the eye; in *C. varsoviensis* the jowls narrow to the front and are not at all produced at the vibrissal angle.

The IX tergite (fig. 410) is broader than long, yellow, with long incurved apical hooks on the editae. The cerci form a large fused plate. The hypandrium (fig. 409) is rounded on the lower margin with rather straight arms and pointed gonites; the aedeagus is shorter than in *C. adjuncta*.

The species is known to me from four male specimens, all bred from *Festuca tenuifolia* in May, 1954, by I.W.B.Nye at Silwood Park, Berks. Two are in the B.M.N.H. and two are in the Hope Department, Verrall-Collin collection.

C. varsoviensis Becker, 1910

This is a small, dark species, usually with black palpi; in some specimens the palpi are only partly darkened, however.

The dark parts of the body are strongly marked and the species may be very extensively darkened in some specimens. The mesonotum is only lightly dusted, and the colour of the sternopleural mark varies from entirely black to partly reddish, dusted below. The colour of the abdomen differs between the sexes.- in the male it is yellow with central black markings on the tergites, often extensive, but females have a unicolourous reddish-orange abdomen, usually without any darker markings.

The IX tergite (figs. 411 and 414) is semicircular in shape with the tips of the editae produced into rounded, inwardly pointed projections. The hypandrium (figs. 412 and 413) has a rounded lower margin and the inner gonites are curved below the aedeagus, which is long. Figs. 414 and 413 show the IX tergite and hypandrium of a male from Wales; this differs in some detail from the other specimens of C. varsoviensis and was thought to represent a new species. However, the gonites are similar and the differences in the shape of the lower margin of the hypandrium and the outer arms may be due to orientation.

C. varsoviensis has been found in Wales, Northern England and Scotland, but it seems to be confined to acid bogs and calcareous flushes at moderate (500 - 1000 ft.) altitude. I have not seen the type specimens.

C. rufina (Zetterstedt, 1848)

C. rufina is a small species with mainly reddish markings. The mesonotal stripes are shining, the main part of the frontal triangle extends about two-thirds the length of the frons and the jowls are little wider than the depth of the third antennal segment. There is a black mark low on the mesopleura and the hypopleural mark is reddish.

The male genitalia seem to resemble most closely C. citrinella. The IX tergite (fig. 439) is semicircular. The editae bear incurved, pointed processes, with a convex surface subapically on inner and outer surfaces; the latter, as in C. citrinella is papillate. The cerci are represented by a very small median plate. The hypandrium (fig. 440) has a rounded lower margin, a very short outer lateral arm and the inner one is long, nearly straight. The gonites are widely separated by the broad, round aedeagus.

C. rufina is a rare species in southern England with a late flight season in August. I have not taken this species, but records seem to be mainly from fen localities. Andersson (1966) has examined the type specimen, and confirms that it has been correctly interpreted.

C. gracilis Meigen, 1830

The largest, and except for C. rufina, the palest Chlorops found in Britain. The frontal triangle is very small, narrow behind and with concave lateral margins, while the mesonotal stripes are roughened but scarcely dusted. The abdomen is often entirely yellow or has irregular dark central markings on the tergites. The pleurae are yellow with dark marks only on the hypopleuron.

The IX tergite (fig. 435) is broader than long, the lower margin is produced beyond the editae which have a stout, incurved apical process. The cerci form a rather large median plate. The hypandrium (fig. 436) is wider than long with broad lateral arms; the outer gonites are broad basally and the inner gonites are short and rounded apically. The aedeagus is parallel-sided.

Records indicate that this species is found in damp woodlands and fens in July and August over the south of England. I have seen the type specimen and am able to confirm that it has been correctly interpreted.

C. interrupta Meigen, 1830

This large species is rather variable. The frons is typically produced in front for half the length of the eye, but may be scarcely produced at all; the mesonotal stripes are usually black and heavily dusted, but may be replaced centrally with red. The abdomen varies from mainly yellow to almost completely black. The frontal triangle is large, straight-sided and reaches almost to the front of the frons. The third antennal segment is usually yellow, but may be brownish apically.

The IX tergite (fig. 433) is broader than long, with large editae with no conspicuous processes. The editae meet below the cerci and the faces bear a number of small teeth. The cerci form a small plate. The hypandrium (fig. 434) is distinctive; it is longer than broad; the outer lateral arm is very short and the inner one is long and gently curved. The gonites are attached near to the mid-line of the hypandrium and the outer gonite is small and appears closely applied to the very large inner gonite. The aedeagus is short and convex sided.

C. interrupta is a local species in southern England, found only on calcareous grassland. The type specimen is in Vienna and it has been correctly interpreted.

C. citrinella (Zetterstedt, 1848)

A small species much resembling C. rufina, particularly in the frontal triangle and the structure of the IX tergite. The mesonotal stripes are shining, the jowls are only slightly wider than the third antennal segment and the sternopleural mark is entirely dark.

The IX tergite (fig. 437) is difficult to distinguish from that of C. rufina, though the rounded process on the inner side of the edita is more angled and projecting in C. citrinella. The hypandrium (fig. 438) has a broader lower margin than is found in C. rufina and the outer lateral arm is more developed. The inner gonites are broad and rounded apically, while the aedeagus is narrower in C. citrinella than in C. rufina.

This is a rare species known from Brockenhurst, Hants. on 12.vii.1907 by J.J.F.X. King. Andersson (1966) has examined the type and confirms that it has been correctly interpreted.

C. planifrons Loew, 1866

C. planifrons has a characteristically flat frons and a more or less whitish arista. The colour of the frontal triangle varies; it may be mainly yellow, marked with black, but I have seen specimens with an almost completely black frontal triangle. The basal antennal segments are yellow more or less infuscated, and the third antennal segment is black. The abdomen is yellow with a dark basal band on each tergite. In C. planifrons and C. triangularis the female cerci are very long and slender.

The male genitalia of C. planifrons have several distinctive features. The IX tergite (fig. 429) is broad, slightly indented at the upper corners, with the editae large, rounded and smoothly produced into a rounded apical tooth. The inner parts of the editae narrow until they are linear. The cerci form a small median plate. The hypandrium (fig.

430) is longer than wide, with a rounded lower margin, narrow, sinuate inner lateral arms and long gonites. The sclerite at the end of the aedeagal apodeme has a U-shaped apical excision.

C. planifrons is an uncommon species found only in southern England. My captures have been in fenland habitats. I have not seen the type specimen.

C. triangularis Becker, 1910

From the limited material available, this appears to be a colour form of *C. planifrons*. The difference in the colour of sternopleural mark shows every graduation from entirely black to entirely reddish. I am able to find no other reliable characters to distinguish the two species externally.

The male genitalia of the specimens of *C. triangularis* closely resemble those of *C. planifrons*. The specimen figured (figs. 431 and 432) differs slightly from the figures of *C. planifrons* but I consider these differences may be due to orientation. I have not seen the type specimen. *C. triangularis* is found in the same habitat as *C. planifrons*.

C. meigeni Loew, 1866

A large, dark species often with darkened wings. The frontal triangle may be entirely black or may have a pair of yellowish patches in front of the ocelli. The extent of the mesonotal bands is variable, though never as dark as in *C. speciosa* var. *nigrithorax*.

The characters used in the key to distinguish *C. speciosa* and *C. meigeni* are rather variable. I have found two types of genitalia, as indicated below, and the external characters separate the species, though one or other of them may not apply. No specimens had the genitalia of one species and the external characters of the other as defined in the key.

The male genitalia of these species are very similar. The IX tergite is broad, with a narrow pointed apical hook to the editae of _C. meigeni_ (fig. 425), rounded and stouter in _C. speciosa_ (fig. 427). The hypandrium of _C. meigeni_ (fig. 426) has a broader lower margin than that of _C. speciosa_ (fig. 428). Both species have a sinuate lower margin to the outer gonites. The inner gonites of _C. meigeni_ are straighter and broader basally than those of _C. speciosa_. The inner lateral arms are more curved and shorter in _C. meigeni_; in _C. speciosa_ the outer arm is longer.

I have not seen the type specimen of _C. meigeni_. _C. meigeni_ is a common species in Scotland and is found more rarely in Ireland, Wales and England. It is chiefly found in woodland but also in more open country and at higher elevations.

C. speciosa Meigen, 1830

A species resembling _C. meigeni_ except for the characters given in the key. The male genitalia of _C. speciosa_ and _C. meigeni_ are more heavily sclerotised than in the other species of _Chlorops_; in this they resemble _Anthracophaga_. _C. speciosa_ is a variable species; the ground colour varies from yellow to almost black, the frontal triangle may have pale markings and the legs may be extensively infuscated. There is every graduation between specimens with yellow ground colour and widely separated mesonotal bands and specimens having nearly black ground colour (var. _nigrithorax_) and fused mesonotal bands. The male genitalia of extreme forms appear identical to me.

C. speciosa is a common species in England, Wales, Scotland and Ireland. The darker specimens are found more commonly in Scotland. The species is found in damp woods and alder carr.

I have seen the type of C. speciosa in Paris and can confirm that the species has been correctly interpreted. The types of C. nigrithorax are in Strobl's collection in Admont, Styria. I have seen these and they are the dark variety of C. speciosa.

C. pumilionis (Bjerkander, 1778)

The dusted sternopleural mark distinguishes this species from all other British species of Chlorops except C. adjuncta. C. pumilionis varies considerably in colour and form. The yellow ground colour may be darkened and the extent of the black markings may vary. Pale specimens have a yellow frontal triangle, black centrally, yellow basal segments of the antennae, yellow legs with the first, second and fifth segments of the fore legs lightly infuscated, and a yellowish abdomen. Dark specimens have a black frontal triangle, usually deeply grooved, black antennae, broad black mesonotal bands and abdomen black on disc. The darkest specimens have black anterior tarsi, slightly paler on segments 3 and 4.

The male genitalia of C. pumilionis are easily distinguished from the other species of Chlorops. The IX tergite (fig. 421) is broad; the editae end in a rounded curved hook and the inner parts are broad. The hypandrium (fig. 422) has a rounded lower margin with an expansion in the mid-line; this has a pitted appearance. The outer lateral arm is broad and spatulate and the inner lateral arm is narrow and long. The outer editae have a convex wide base and the inner editae are very broad basally.

C. pumilionis is a common species from April to October in England, Wales, Scotland and Ireland, and is found in a range of arable and grassland habitats. I have not seen the type specimen.

C. novaki Strobl, 1902

Specimens under this name were found in the Verrall-Collin collection in Oxford. They agree with pale specimens of C. pumilionis but have an extensively or completely yellow sternopleural mark. The jowls appear rather wider than in typical C. pumilionis but within the range of variation of that species. The dissected male genitalia agree with C. pumilionis, and I consider the specimens to be merely a pale form of C. pumilionis. I have seen one female specimen from Strobl's collection (apparently the only specimen extant) and find it agrees with the British specimens. I do not propose to add C. novaki to the British list.

C. brevimana Loew, 1866

The enlarged third antennal segment is characteristic of this species. Normally the disc of the abdomen is black, but it can be yellowish-brown in pale specimens. The frontal triangle is straight-sided and rather more than half the length of the frons, black, but occasionally yellowish on the hind margin.

The male genitalia are unlike any other species of Chlorops. The IX tergite (fig. 419) is broad with a tiny bifid apical hook on the editae, which have broad inner parts. The cerci form a small median plate. The hypandrium (fig. 420) is elongate, with long lateral margins and a curved inner lateral arm. The outer gonites are very large and extend nearly to the tip of the narrower inner gonites. The aedeagus is more than half as long as the hypandrium, narrow and straight-sided, with the apex obliquely truncated like the tip of a hypodermic needle.

C. brevimana has a long flight season from May to September and is found in wet grassland and fens in England, Wales, Scotland and Ireland. I have not seen the type specimen.

C. serena Loew, 1866

This is a medium-sized species with densely grey dusted mesonotal stripes. The extent of the dark marking on the frontal triangle is variable. The sternopleural mark is usually reddish with a narrow black upper margin. The abdomen is yellow with indistinct anterior markings on the tergites.

The male genitalia have a broad and short IX tergite (fig. 417), the editae with a large triangular apical hook, slightly convex externally and concave internally. The hypandrium (fig. 418) has an angular lower margin, a short outer lateral arm and the inner lateral arm is long and slightly incurved. The gonites are short and the aedeagus is short and convex-sided.

C. serena is a frequently recorded species from May to September in a variety of grassland habitats in England, Scotland and Ireland. I have not seen the type specimen.

C. scalaris Meigen, 1830

A medium-sized species with shining mesonotal stripes, lightly flecked with dusting. The antennae are small, usually yellow on segments one and two and on the base of the inner side of the third segment. Duda (1933) records specimens with entirely yellow antennae and I have seen one such specimen from Britain. This specimen will not key out in the section with yellow antennae because the frontal triangle is centrally black. The frontal triangle of *C. scalaris* is yellow behind, usually with yellow margins and a central black area with yellow marks lateral to the ocelli. The extent of the black markings varies, but the frontal triangle and the black lower occiput are usually separated by a broad yellow band, occasionally interrupted behind the ocelli.

The IX tergite (fig. 441) is broad, the editae are small with a blunt narrow incurved apical hook; there is also a large rounded papillate area nearly as long as the hook. The cerci form a very small plate. The hypandrium (fig. 442) has a rounded lower margin, small outer lateral arms and long straight inner lateral arms. The gonites are narrow and the aedeagus short and swollen.

C. scalaris is a frequently recorded species from May to September in England, Wales, southern Scotland and Ireland. It is found in most types of habitat from grassland to fens. The type specimen is in Paris; I have examined it and consider it to be correctly interpreted.

C. centromaculata Duda, 1933

The present species is either *C. centromaculata* Duda or *C. ringens* Loew. I have specimens which in Duda (1933) key out to *C. ringens* and others which appear to be *C. centromaculata* but I consider them to be the same species. Specimens of the same species were placed under *C. ringens* in the Verrall-Collin collection. I am using the name _centromaculata_ until the types have been examined.

The species is very closely related to _C. scalaris_ and may prove to be a colour form of the latter. Apart from the difference in the sternopleural mark, the frontal triangle is often longer and is usually darker; almost entirely dark with narrow yellow margins. The abdominal markings are less pronounced than in _C. scalaris_ and may be interrupted at the lateral margins.

The male genitalia are difficult to distinguish from those of _C. scalaris_ but in the limited material available to me the papillate area on the editae of the IX tergite (fig. 443) is smaller in _C. centromaculata_ and has longer papillae, while the apical hook is larger and less curved than in _C. scalaris_. The hypandrium (fig. 444) is very similar to that of _C. scalaris_.

C. centromaculata is widespread in southern England but is found only in September and October; it occurs in a variety of grassland habitats. Since _C. scalaris_ is commonest in May - July, the theory that _C. centromaculata_ is an autumn form of _C. scalaris_ cannot be ignored. I have not seen the type specimen.

C. hypostigma Meigen, 1830.

A small species with narrow jowls. The frontal triangle is yellow with a central black mark, varying from being quite small to covering almost the entire frontal triangle, and usually with a pair of paler spots lateral to the ocelli. The antennae are small, yellow to brownish black on the first two segments and black on the third segment, which may be as long as wide. The mesonotal bands are widely separated, narrowing behind and shining. The tarsi are slender with only the last joint darkened. The abdomen is yellow with blackish markings on the anterior margin of the tergites. The sternopleural mark is normally entirely black but in a few specimens I have seen it yellowish below.

The male genitalia are probably closest in structure to C. calceata and C. troglodytes. In C. hypostigma the IX tergite (fig. 423) is broad and the gonites bear a large, apically rounded, narrow apical hook. The cerci form a medium-sized plate. The hypandrium (fig. 424) has a rather straight, shallow lower margin. The outer lateral arm is very small and the inner lateral arm is long and nearly straight. The gonites are small and narrow, the inner ones gently curved. The aedeagus is short and convex-sided, and as in C. troglodytes, C. calceata and C. brunnipes the base of the aedeagus is produced to a small rounded projection.

C. hypostigma is one of the commonest species of the genus from May to September in England, Wales, Scotland and Ireland. It is found in a wide range of habitats including fenland, carr, damp woodland, wet pastures, acid bogs and dry grassland. The type specimen is in Paris; I have examined it and consider that it has been correctly interpreted.

C. calceata Meigen, 1830

This is a rather larger species than C. hypostigma and with wider jowls; the frontal triangle is more extensively black though usually the hind corners and sometimes the margins are yellow. The third antennal segment is normally brownish or yellow at the base on the inner side. The colouration of the abdomen described in the key is distinctive for this species when compared with C. troglodytes, C. hypostigma and C. brunnipes. The mesonotal stripes are wider than in C. hypostigma but narrower than in C.troglodytes and C. brunnipes.

The IX tergite (fig.445) resembles that of C. hypostigma but the hooks on the editae are broader apically and the fused cerci are rather larger. The hypandrium (fig. 446) has a more rounded lower margin than in C. hypostigma and the outer lateral arm is longer. The gonites are similar, but the aedeagus of C. calceata is longer.

C. calceata is a common species in England, Wales, Scotland and Ireland, from June to September. It is found in a range of grassland habitats, and also on saltmarshes.

C. troglodytes (Zetterstedt, 1838)

A smaller species than C. hypostigma, the jowls of C. troglodytes are slightly produced in front and the mesonotal bands are narrowly separated, more dusted than in C. calceata and C. hypostigma. The frontal triangle is completely black and extends about two-thirds down the frons. In one specimen the jowls are scarcely wider than the third antennal segment and it may run in my key to hypostigma Mg., from which it may be distinguished by the broad mesonotal stripes, dark abdomen and black hind margin of the frontal triangle.

The IX tergite (fig. 415) is similar to that of C. calceata but the hook on the editae is even broader. The hypandrium (fig. 416) has elongate lateral margins; the gonites are attached nearer to the mid-line of the hypandrium than in C. calceata and C. hypostigma, and this species has a shorter aedeagus than C. calceata.

C. troglodytes is rare in England in fens, but I have taken it more freely on calcareous flushes at medium elevations in Scotland. It is found in June and July. Andersson (1966) has examined the type specimens and reported that they have been correctly interpreted.

C. obscurella (Zetterstedt, 1848)

Duda (1933) included a species under C. brunnipes which resembled C. troglodytes but with a larger frontal triangle. I have found three British specimens which appear to belong to this species. The jowls are not as produced in front as in C. troglodytes and the head is broader. The frontal triangle is very large and black, except for a yellowish apex in one specimen.

The IX tergite (fig. 448) has a very large and broad hook on the editae, incurved, with striations on the outer side. This hook is quite different in appearance to C. calceata, C. troglodytes or C. hypostigma. The hypandrium (fig. 447) has a rounded lower margin and shorter inner lateral arms than in other species of this group. The gonites are much broader and straighter than in the other species of the group. The inner gonites are shorter and nearly parallel-sided, and the aedeagus is short.

Andersson (1966) has shown that C. brunnipes Zett. is a synonym of C. speciosa Mg., and that Thaumatomyia obscurella Zett. is the C. brunnipes of Duda. The species is rare in Britain, and I have only the following records: Kent, Swanscombe Marsh 1 male 26.vi.1964 L. Parmenter 57086; London 1 male 21.vi.1889 Brunetti coll.; Anglesey, Cors Erddreinog 1 female 5.vii.1976 J.W.I. 23/4681.

CHAPTER 15

Group 9 Thaumatomyia Zenker, 1833

This cosmopolitan genus bears a superficial resemblance to *Chlorops* but a detailed study indicates that the genera are not closely related (Andersson, 1977). In *Thaumatomyia* the frontal triangle has one or more rows of marginal setae and the third antennal segment is often longer than wide. The scutellum is flattened and the apical scutellar setae are approximated. The hind tibia has a posterodorsal sense organ. The membrane between abdominal segment five and the genitalia is granulate with an eversible vesicle on each side. The gonites are divided transversely and the aedeagus is long.

The genus is distinct from *Chlorops* in the structure of the genitalia and particularly the gonites. While *Chlorops* larvae are stem borers in Gramineae, the larvae of *Thaumatomyia* have been recorded preying on root aphids (Homoptera).

Thaumatomyia (*Chloropisca*) *glabra* (Meigen, 1830)

The genus *Chloropisca* was formerly distinguished from *Thaumatomyia* by the lack of microsetae on the mesonotum and scutellum. Sabrosky (1943) has shown that the two genera should be combined and I retain *Chloropisca* as a subgenus of *Thaumotomyia*. *T. glabra* is a variable species; it may be mainly yellow, with yellow legs and abdomen, or the abdomen and legs may be nearly black. I have found only one type of genitalia in these different forms, however.

The IX tergite (fig. 449) is longer than wide, rounded with large editae produced to a sharp point. The point or hook on the editae (fig. 452) is well developed, rounded at the apex when seen in plane view. The hypandrium (fig. 450) is elongate, with a rounded lower margin; the distal part of the gonites is long, and also the aedeagus. As in other species of the genus the cerci form a tiny central plate.

T. glabra is common in England and Wales from May to October and is found in a variety of habitats, particularly wood margins, arable fields, gardens and overgrown waste land. The types of T. glabra are in Winthem's collection in Vienna; I have examined them and consider them to have been correctly interpreted.

T. notata Meigen, 1830

This species is also highly variable in colour and can be identified only by structural characters. The best specific character I can find is the narrow jowls. The frontal triangle and the abdomen may be yellow or black, and in dark specimens the mesonotal stripes are greatly expanded.

The IX tergite (fig. 456) is similar to that of T. glabra but the editae (fig. 454) have a semicircular projection, simple in outline. The hypandrium (fig. 457) is characterised by its straight, divergent sides and narrow base, the narrow gonites and the aedeagus which is longer than in the other species of Thaumotomyia.

T. notata is the commonest British species of Thaumatomyia and is found in England, Wales, Scotland and Ireland. I have seen records from February until November, but I have no evidence that the species overwinters as an adult. It sometimes occurs in houses in vast numbers in autumn, and may have a habit of swarming under branches or eaves. I have seen specimens hovering beneath branches in small numbers, and it is possible that they enter houses by swarming under the eaves. T. notata may be found in almost any habitat, but is usually most abundant on leaves of shrubs early and late in the year. The type specimens of T. notata are in Vienna; I have seen them and can confirm that the species has been correctly interpreted. The types of T. ornata Mg. were not located, but those of T. circumdata Mg. are T. notata.

T. rufa (Macquart, 1835)

T. rufa is distinguished from T. notata by the wider jowls. The frontal triangle is usually black at the base and apex only, and the abdomen black on the disc.

The IX tergite resembles T. notata but no specimen was suitable for figuring. The edita (fig. 453) is quite distinct from that of T. notata, with only a very small projection. The hypandrium (fig. 462) is more similar to T. hallandica than to T. notata, with a rounded lower margin, swollen distal parts of gonites and a shorter aedeagus than T. notata.

T. rufa is an uncommon species found in England and Wales in June and July. I have no clear idea of the preferred habitat and have not seen the type specimen.

T. hallandica Andersson, 1966

Andersson (1966) showed that T. obscurella Zett. is a species of Chlorops and renamed this species. The jowls are wide, as in T. glabra and T. trifasciata, and the species is more or less generally infuscated brownish.

The IX tergite (fig. 458) is broad, with a small hook on the edita. In plane view the edita (fig. 455) is longer and narrower than in the other species of Thaumatomyia and has a small narrow projection as in T. rufa. The distal parts of the gonites (fig. 459) are swollen and the aedeagus is comparatively short.

T. hallandica is not uncommon in England, Wales and Scotland from May to September. Its preferred habitat is sand-dunes and dry sandy areas inland. I have found it on dry sandy grassland, chalk downland and sandy heaths. Andersson (1966) discussed the type of T. obscurella Zett. and gives a good description and figure of T. hallandica. In the Verrall-Collin collection this species is split into two segregates; I have been unable to find any reason for this and consider all the specimens to be T. hallandica.

T. trifasciata (Zetterstedt, 1848)

In this species the jowls are wider than in T. hallandica. The colour is variable and Scottish specimens may be extensively darkened. Many specimens of T. hallandica with wider jowls are misidentified as T. trifasciata, but T. trifasciata has no vertical setae.

The IX tergite (fig. 460) is longer than broad with a small apical hook to the edita. In plane view (fig. 451) this hook appears as a ridge with no sharp projection. The hypandrium (fig. 461) is similar to that of T. hallandica, but the distal parts of the gonites are less swollen and the aedeagus is longer.

T. trifasciata is an uncommon species found in England, Scotland and Wales. In Scotland I have found it on sallows at low elevations and on acid bogs on high ground. It is found in southern England, however, and the habitat appears to be ponds with overgrown margins. Andersson (1966) has examined the types of T. trifasciata and concludes that the species has been correctly interpreted.

Key to the British species of <u>Thaumatomyia</u>

1 (2) Mesonotum and scutellum bare of microsetae on disc (sub-genus <u>Chloropisca</u>) ... <u>glabra</u> Mg.

2 (1) Mesonotum and scutellum with microsetae (sub-genus <u>Thaumatomyia</u>)

3 (4) Jowls half as wide as 3rd antennal segment is deep, colouring variable. ... <u>notata</u> Mg.

4 (3) Jowls more than half as wide as 3rd antennal segment is deep.

5 (6) Outer vertical seta absent. Jowls $1\frac{1}{2}$ - 2 times as wide as 3rd antennal segment is deep. ... <u>trifasciata</u> Zett.

6 (5) Outer vertical seta present. Jowls less than $1\frac{1}{2}$ times as wide as 3rd antennal segment is deep.

7 (8) Jowls narrower than 3rd antennal segment is deep, 3rd antennal segment yellow, darkened on upper part only. Scutellum with less than 20 microsetae on disc. Frontal triangle partly yellow; mesonotum, scutellum and legs with yellow ground colour. ... <u>rufa</u> Mcq.

8 (7) Jowls wider than 3rd antennal segment is deep, 3rd antennal segment darkened, narrowly pale below. Scutellum with more than 20 microsetae on disc. Frontal triangle, mesonotum, scutellum and legs variably darkened. ... <u>hallandica</u> Andersson

Genus near to <u>Thaumatomyia</u>

Two species, possibly belonging to different genera, have not been identified and cannot be placed with certainty in any genus known to me. The first species (species 1) appears to be intermediate between <u>Chlorops</u> and <u>Thaumatomyia</u>. The frontal triangle is bare, the scutellum is convex on the disc and without approximated apical setae, as in <u>Chlorops</u>.

Like *Thaumatomyia*, the third antennal segment is longer than deep and the jowls are about half as deep as the third antennal segment. In species 2 there is one row of small setae on the margin of the frontal triangle and the jowls are very narrow (narrower than in *Thaumatomyia notata*); characters which indicate *Thaumatomyia*, but the third antennal segment is scarcely longer than deep, the scutellum is not flattened and the apical scutellar setae are not approximated, as in *Chlorops*.

I am unable to identify these two species in Duda (1933) or in Andersson (1977). Sabrosky (1951) noted several Ethiopian species which he considered intermediate between *Chlorops* and *Thaumatomyia*. The male genitalia of the two genera are very distinct, but unfortunately males are not available for dissection. Until more material is available I do not propose to publish these species. The two species may be distinguished:

1 (2) Frontal triangle bare, 3rd antennal segment at least $1\frac{1}{2}$ times as long as deep, jowls about half as deep as 3rd antennal segment. ... sp. 1.

2 (1) Frontal triangle with a row of lateral setae, 3rd antennal segment scarcely longer than deep, jowls almost linear. ... sp. 2.

Description of species 1:

Female: Head somewhat wider than thorax and large, yellow. Frons slightly longer than wide, parallel-sided, matt yellow with small black microsetae. Orbital setae and those bordering the frontal triangle rather stronger. Frontal triangle black, extending 4/5 length of frons, lateral margins convex, a square yellow spot on either side of ocellar triangle extending to lateral margins of frontal triangle. Ocellar setae black, divergent. Inner vertical setae on the hind corner of the frontal triangle and an outer, larger one. Eye large, deeper than long, reddish brown. Jowls yellow, half as wide as 3rd antennal segment is deep with small whitish microsetae along the lower edge. Occiput black centrally up to the hind margin of the frontal triangle, yellow along hind margin of eye. First antennal segment small, yellow, second brownish with one brownish seta dorsally. Third antennal segment elongate oval, yellow, darkened on the upper half on the inner side and the upper third on the outer side. Arista brownish, both arista and third antennal segment distinctly pubescent. Face in profile rather concave, yellowish white. Clypeus shining brown. Palpi yellow with pale microsetae, small. Proboscis pale yellowish brown.

Mesonotum longer than wide, shining, yellow, with five black longitudinal stripes, the separation of central and intermediate stripes narrow, scarcely wider than front ocellus. Posterior part of central stripe apparently paler but obscured by pin. Mesonotum with small brownish microsetae. Humeri with a dark spot and one longer seta. 1+2 notopleural setae, 1 supralar and 1 prescutellar. Pleurae yellow with small shining black patches on lower mesopleuron and hypopleuron. Sternopleuron with a large shining black patch and white setae above coxae. Legs yellow, only the last tarsal segment infuscated, with darker yellow microsetae. Wing hyaline, veins pale yellowish, haltere yellow with a darker stem.

Scutellum rather wider than long, rounded, yellow, disc convex. About 4 larger black apical setae equally spaced, laterals smaller. Microsetae on disc of scutellum black to dark brown. Postscutellum black and shining except along the extreme lateral and posterior margins, where it is slightly dusted.

Abdomen brownish and rather dusted on disc, yellow at lateral margins and beneath, with a darker spot laterally on the 2nd tergite, with rather long brownish setae, longer posteriorly and laterally. Cerci more than four times as long as wide, pale brownish.

Description from 2 females Suffolk, Orford, 20.vii.1908 J.J.F.X. King, specimens in B.M.N.H.

Genus near to Thaumatomyia, species 2

Female: Head slightly wider than thorax, wider than long and nearly as long as deep. Frons narrowing slightly to front, front projecting, entirely yellow. Frontal triangle deep shining brown, very large, occupying about $\frac{3}{4}$ of back of frons, lateral margins convex, apex at front of frons. Small setae on frons yellow, a row of longer inwardly directed pale brownish setae on the lateral margins of the frontal triangle. Orbital setae yellow and inconspicuous on the lower half of the frons, on the upper half about 4 longer black setae. A small diverging pair of ocellar setae, a smaller parallel proclinate pair behind the ocellar triangle. Outer verticals the largest head setae, directed outwards, and a pair of smaller setae on the hind corners of the frontal triangle. All longer head setae brownish to black. Antennae with small yellow 1st segment, 2nd segment blackish with dark setae above and pale below. Third antennal segment large, as long as deep, dark brown with a yellow suffusion spreading from the lower basal corner and covered in pale long pubescence. Arista arising very near the base of the upper margin of the antenna, dirty yellow in colour with pubescence as long as the third antennal segment. Face concave, retreating, parallel-sided, dusted and with indications of a faint carina on the upper half. Eye very large, occupying almost all the head in profile, with short scattered hairs. Jowls very narrow, about half the width of front tibia, with pale setae, dusted. Clypeus shining brown, broad. Proboscis and palpi yellow with pale setae.

Mesonotum longer than broad, shining, yellow with five black longitudinal stripes, almost confluent. Central stripe starting behind head and running to just before the level of the postalar callus. Intermediate stripes running from the humeral callus to postalar callus level, and lateral stripe about half the length of the intermediate, starting above the base of the wing and ending at the postalar callus. Mesonotum with short pale pubescence. Humeri yellow with a dark spot and a weak seta. 1+1 notopleurals, 1 supralar and 1 prescutellar, all black. Pleurae shining yellow with dark brown marks on the sterno-, lower meso- and hypopleuron, and a paler mark on the lower pteropleuron. Legs yellow with faint indications of infuscation on upper side of femora, setae pale. No obvious sensory area on hind tibia. Wing hyaline with yellow veins, iridescent, costa extending slightly beyond r_{4+5}, costal ratios 3.0; 2.5; 2.2. ta-tp:tp = 1.3: 0.5. Haltere yellow with a yellow stem.

Scutellum wider than long, yellow with brownish setae, stronger and sparser than on mesonotum, one large apical pair of black setae and several subapical pairs.

Abdomen brownish, black on disc, 1st tergite, tip of 5th tergite and lateral margins of all tergites yellow, dusted with brownish pubescence. Cerci small, yellow with pale setae.

Male: Agreeing with the female in most respects, but last tarsal segments darkened, tergites paler on an apical band, with yellow IX tergite.

Described from two specimens taken in Wytham Wood, Berks, emerged from soil under oak tree. G.C. Varley: male emerged 13.v.1949, female emerged 19.v.1949. The male is teneral and is not suitable for dissection.

CHAPTER 16

Discussion of intergeneric relationships in Oscinellinae

TABLE 12. Some character states in Oscinellinae

No. of character

Genus group	Genus	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Lipara	±	-	+	-	+	-	-	-	-	+	PB	-	-	-
1	Calamoncosis	+	+	+	-	-	+	-	-	-	+	PB	-	-	±
1	Siphonella	+	+	+	-	-	+	-	-	-	-		-	-	+
1	Polyodaspis	+	+	-	-	-	+	-	-	-	-		-	-	-
1	Piebrigella	+	+	-	-	-	+	-	-	-	-		-	-	-
1	Lasiambia	+	+	-	-	-	+	-	-	-	-		-	-	-
1	Siphunculina	+	+	-	-	-	+	-	-	-	-		-	-	-
1	Hapleginella	+	-	-	-	-	-	-	-	-	-		-	-	
2	Trachysiphonella	-	+	-	-	-	-	-	-	-	+	P	-	-	±
2	Oscinimorpha	-	+	-	-	-	+	-	-	-	+	1	-	-	±
2	Aphanotrigonum	-	+	-	-	-	-	-	+	-	±	2	-	-	±
2	Tricimba	-	+	-	-	-	-	+	-	-	±	2	-	-	±
2	Conioscinella	-	-	-	-	-	-	-	-	-	±	1	-	-	±
2	Tropidoscinis	±	-	-	-	-	-	-	-	-	+	2,P	-	-	±
5	Oscinella	+	-	-	-	-	-	-	-	-	±	1	-	-	±
5	Lioscinella	+	-	-	-	-	-	-	-	-	+	2	-	-	-
6	Oscinisoma	±	-	-	±	-	-	-	-	-	+	P	-	-	+
6	Eribolus	±	-	-	±	-	-	-	-	-	+	2,3+,P	-	-	±
6	Elachiptera	±	-	-	+	-	-	-	-	+	+	1,2,P	-	-	±
6	Gampsocera	+	-	-	-	-	-	-	-	+			-		
6	Melanochaeta	+	-	-	-	-	-	-	-	+	+	1	-	-	-
4	Gaurax	±	-	-	-	-	-	-	-	-	-		-	+	-
3	Dicraeus	-	-	-	-	-	-	-	-	-	±	P	+	±	+

Character states in Table 12

1. Frontal triangle shining (+) dusted (-)
2. Vibrissal angle produced (+) rounded (-)
3. Orbital setae numerous - more than 20 per side (+) fewer than 20 (-)
4. Orbital setae uneven in length (+) even (-)
5. Facial keel well developed throughout its length (+) narrow or absent (-)
6. Epistoma produced (+) not produced (-)
7. Mesonotum with 3 deeply impressed longitudinal grooves (+) not so (-)
8. Lower pleurae completely dusted (+) partly shining (-)
9. Arista thickened (+) not thickened (-)
10. Femoral comb present (+) absent (-)
11. Type of femoral comb P, patch B, prominence, 1,2, number of rows.
12. Radial vein elongate (+) not elongate (-)
13. Cerci (male) elongate, nearly bare (+) not so (-)
14. Hypandrium closed (+) open (-)

The genera included in group 1 of this thesis (Chapter 5) have setae on the edges of the frontal triangle, which is usually shining, and the vibrissal angles are often produced. There is usually a pronounced facial keel and the male cerci are often approximated. Lipara, Calamoncosis and Siphonella have numerous orbital setae, setae on the lateral margins of the frontal triangle and a femoral comb in a patch on a prominence (this latter feature is poorly developed in Siphonella). Siphonella and Calamoncosis have produced vibrissal angles, a long proboscis and a similarly shaped basiphallus, while Lipara has rounded vibrissal angles and may have a dusted frontal triangle but Lipara is otherwise clearly related to Calamoncosis. Andersson (1977) places these three genera in the same group.

Fiebrigella, Polyodaspis and Lasiambia have a shining frontal triangle, fewer orbital setae than the above genera and produced vibrissal angles. The male cerci are less approximated and there is no femoral comb. Fiebrigella and Polyodaspis have a narrow, poorly developed facial carina as in Calamoncosis, but in Lasiambia the facial carina is scarcely developed. These genera resemble Calamoncosis and Siphonella in having a shining frontal triangle, produced vibrissal angles and a facial carina. The differences between these genera in the number of orbital setae, the setae on the lateral margins of the frontal triangle and the femoral comb are important, but I consider the genera to be closely enough related to be placed in the same group.

Siphunculina has a shining frontal triangle, produced vibrissal angles and no femoral comb, resembling Fiebrigella, Polyodaspis and Lasiambia. The cerci are more widely separated than in the previously discussed genera, and Andersson (1977) placed _Siphunculina_ in his _Aphanotrigonum_ genus group. _Siphunculina_ is here placed in group 1 because of its shining frontal triangle and lack of a femoral comb.

The affinities of _Hapleginella_ are not clear. Andersson (1977) placed it near _Oscinella_ on the basis of its shining frontal triangle and the femoral comb. I found no femoral comb in the few specimens I have examined, but these had dark jowls while Andersson's specimens had yellow jowls. In the absence of further material I accept Andersson's placing of _Hapleginella_ in the _Oscinella_ group.

The genera placed in group 2 of this thesis (Chapter 6) usually have a dusted frontal triangle without small setae on the margins and produced vibrissal angles. There is usually a femoral comb, often in rows of setae. The orbital setae are less numerous than in _Lipara_, _Calamoncosis_ and _Siphonella_ and the hypandrium is usually closed in group 2 and open in group 1. Most species in group 2 have an indistinct facial carina.

The British _Trachysiphonella_ are easily distinguished by their yellow ground colour, and the genus is probably most closely related to _Conioscinella_; but the femoral comb of _Trachysiphonella_ has the setae in a patch, while that of _Conioscinella_ is in a row. _Oscinimorpha_ is not homogeneous; the species have projecting vibrissal angles and a femoral comb of one row of setae, but vary in other characters. _O. albisetulosa_ resembles _Aphanotrigonum_ in having dense grey dusting and whitish head setae, while the male cerci are large and well developed with fused inner parts. However, the grey dusting and white setae are common in coastal

Diptera. Andersson (1977) suggested placing _O. albisetulosa_ in a new subgenus of _Oscinimorpha_.

Aphanotrigonum contains four distinct species groups in Britain, of which _A. meijerei_ is the most distinctive and certainly should be placed in a separate subgenus. The male genitalia have large cerci in most species and usually the femoral comb is in two rows of setae. _Conioscinella_ has only one row of femoral comb setae and the cerci are usually reduced, while the vibrissal angles are produced in _Aphanotrigonum_ but usually rounded in _Conioscinella_. Both _Aphanotrigonum_ and _Tricimba_ are heavily dusted and have produced vibrissal angles, but the hypandrium is closed in most _Aphanotrigonum_, open in _Tricimba lineela_ and closed in _T. cincta_. _Aphanotrigonum_ is nearest to _Tricimba_ in the British fauna. _Tricimba_ is distinguished by the grooves on the mesonotum, but _T. lineela_ and _T. cincta_ have very different genitalia. _Crassivenula brachyptera_ is similar to _Tricimba_ in having mesonotal grooves, but the wings are abbreviated and r_1 and r_{2+3} are fused. The latter character might be expected in a species with reduced wings and is probably of no generic importance. The male genitalia of _brachyptera_ do not particularly resemble _T. cincta_ or _T. lineela_, but I consider _brachyptera_ could be placed in _Tricimba_.

Conioscinella contains three species groups in Britain. _C. frontella_ has small, widely separated male cerci, one row of femoral comb setae and a closed hypandrium. The genitalia resemble _Oscinimorpha minutissima_. _C. gallarum_ is a more shining species than the other _Conioscinella_ species; it has an open hypandrium, large cerci and no femoral comb. _C. halophila_ has small setae on the margin of the scutellum in addition to the apical scutellar setae, globular editae, small cerci and a closed hypandrium. *C. halophila* and *C. gallarum* are distinct from the *C. frontella* species group, which is probably most closely related to *Oscinimorpha*. The genus does not appear to be monophyletic.

Collin (1946) considered *Tropidoscinis* to be related to *Oscinella* since both genera have few orbital setae and the microsetae on the mesonotum arranged in longitudinal rows. Andersson (1977) placed *Tropidoscinis* in his *Oscinella* genus group. However, *Tropidoscinis* has small male cerci, a closed hypandrium and two rows of femoral comb setae. *Oscinella* has large cerci, an open hypandrium (except in *O. posticata*) and one row of femoral comb setae. *Conioscinella* has small cerci as in *Tropidoscinis*, usually a closed hypandrium and one row of femoral comb setae. The three genera are considered to be related in this thesis, so that *Tropidoscinis* appears to link *Conioscinella* (group 2) and *Oscinella* (group 5). *T. zurcheri* is apparently better placed in *Oscinella*.

The genus *Oscinella* (Chapter 9) may be defined by the concave front margin to the frons and the small number of orbital setae. The male cerci are large, the hypandrium is usually open and the femoral comb setae are in one row. *Lioscinella* has a more projecting front to the frons and a more elongate form while the femoral comb setae are in two rows. Although the hypandrium is broader in *Lioscinella* than in *Oscinella* it is very difficult to distinguish the two genera on characters of the male genitalia. Both *Oscinella* and *Lioscinella* appear to be monophyletic. They are placed in a separate group, group 5.

The genera placed in group 6 of this thesis are considered to be related to Elachiptera. Elachiptera usually has a thickened arista, but this is a variable character which occurs in other Chloropidae (e.g. Oscinella maura, Camarota). The orbital setae of Elachiptera are uneven in length, 1-3 pairs being much longer than the remaining setae: this character is homogeneous in the British species. The genus is diverse, particularly in the form of the abdominal sclerites and the scutellum is usually rugose, the editae are simple and the frontal triangle is shining. In my opinion Elachiptera is monophyletic.

Melanochaeta has been considered as a subgenus of Elachiptera (Sabrosky, 1951) and the similarity of the thickened arista is striking. Elachiptera has several longer orbital setae, while in Melanochaeta the setae are small and even in length as in Oscinella. The male genitalia of Melanochaeta capreola have large cerci and an open hypandrium, resembling Oscinella, while both genera have one row of femoral comb setae. Thus Melanochaeta can be regarded as intermediate between Elachiptera which has an open or closed hypandrium, uneven orbital setae and usually two rows of femoral comb setae, and Oscinella with usually an open hypandrium, even orbital setae, larger cerci than Elachiptera and one row of femoral comb setae. Andersson (1977) did not examine M. capreola, the type species of Melanochaeta, and discussed pubescens Thal. as a species of Melanochaeta, whereas in this thesis it is placed in Elachiptera. There are many other species which may be referred to Melanochaeta (Sabrosky, 1948, 1951) and further study is necessary to determine the relationships of Elachiptera, Melanochaeta and Oscinella.

Collin (1946) placed Gampsocera near to Elachiptera, but Andersson (1977) showed that it is most closely related to Gaurax in the structure of the male genitalia.

As in Elachiptera, Eribolus and Oscinisoma have a broad lower postgena and the orbital setae may be uneven in length. The femoral comb setae are arranged in a patch in Oscinisoma and in a patch or rows in Eribolus, while in Elachiptera the femoral comb setae are typically arranged in rows. The hypandrium may be open or closed in all three genera. The editae of Oscinisoma are narrow, but the editae of the species of Eribolus are diverse. Eribolus has the elongate, depressed body form commonly found in insects associated with Phragmites and Oscinisoma gilvipes is similar. Eribolus has a smooth scutellum and Oscinisoma a rugose scutellum. Eribolus seems most closely related to Oscinisoma, and these genera are more distantly related, in my opinion, to Elachiptera. Andersson (1977) placed Eribolus and Oscinisoma in a separate genus group, but in this thesis they are included in group 6.

The above discussion indicates that the genera in groups 2, 5 and 6 show some interconnecting forms. Andersson (1977) regarded the facial carina of his Lipara, Polyodaspis and Aphanotrigonum groups to be a synapomorphy, but the present work does not support this view. In my opinion the genus groups 2, 5 and 6 of this thesis are related but are not a monophyletic group, possibly representing a paraphyletic group in the sense of Hennig (1966). In addition group 1 shows some relationship with group 2.

The genus Dicraeus (group 3 of this thesis, Chapter 7) is characterised by the long vein r_{2+3}. The long, rather bare male cerci resemble those of Gaurax, while the dusted frontal triangle of most species resembles the genera in group 2. As in groups 1 and 2, Dicraeus has the femoral comb setae in a patch. The biology is distinctive as the larvae feed on the developing seeds of grasses. The genus contains three groups of species which are considered to be of sub-generic status, but the genus appears to be monophyletic. Nartshuk (1967) considered Dicraeus to be related to the genera in group 2 of this thesis, but Andersson (1977) places it in a separate group. From the evidence in this thesis Dicraeus is not closely related to any other genus group.

The British species of Gaurax (group 4 of this thesis, Chapter 8) also appear to be isolated from the other genera of Oscinellinae, having long, rather bare incurved cerci, gonites fused to the hypandrial wall and no femoral comb. However, Andersson (1977) places Gaurax in a genus group related to Elachiptera.

CHAPTER 17.

Discussion of intergeneric relationships in Chloropinae

TABLE 13. Character states in Chloropinae

Genus	No. of character 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Camarota	+	+	+	-	-	+	+	-	-	-	-	-	-	-
Platycephala	+	+	-	+	-	+	+	-	-	-	-	-	-	-
Meromyza	-	-	+	+	+	±	-	-	-	-	-	-	+	-
Eurina	+	+	-	-	-	+	+	-	-	-	-	-	-	-
Cryptonevra	-	-	-	-	-	-	+	-	-	-	-	-	±	-
Lasiosina	-	-	±	-	-	-	-	+	-	-	-	-	±	-
Diplotoxa	-	-	+	-	-	-	-	-	-	-	-	-	+	-
Melanum	-	-	-	-	-	-	-	-	-	-	+	-	-	+
Eutropha	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cetema	-	-	-	-	-	-	-	-	+	+	-	-	-	-
Epichlorops	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Anthracophaga	+	-	-	-	-	-	-	-	-	-	+	-	-	-
Chlorops	-	±	-	-	-	±	-	-	-	-	+	-	-	-
Thaumatomyia	-	-	-	-	-	-	+	-	-	-	-	+	-	-

Character states in Table 13

1. Arista thickened or with dense pubescence (+) not so (-)
2. Mesopleurae with scattered setae (+) bare (-)
3. Veins r_1 and r_{2+3} curved anteriorly to costa (+) not so (-)
4. Hind femora thickened (+) not thickened (-)
5. Postgonites projecting downwards (+) not so (-)
6. Frons produced (+) not produced (-)
7. Setae on lateral margins of frontal triangle (+) bare (-)
8. 3-4 orbital setae very large (+) not so (-)
9. A curved ventroapical spur to middle tibiae (+) not so (-)
10. IX tergite with a pair of non-articulated processes lateral to the editae (+) absent (-)
11. Gonites divided longitudinally (+) or transversely (-)
12. Scutellum flattened and apical scutellar setae approximated (+) not so (-)
13. Crossveins approximated (+) separated (-)
14. Vibrissal angles produced (+) rounded (-)

CHAPTER 17.

Intergeneric relationships in Chloropinae

The genus Camarota has been placed in a separate group, group 1, in this thesis. Andersson (1977) included the genus in his Platycephala group since both genera have setae on the mesopleurae, wing-veins r_1 and r_{2+3} curved up to the costa and the frons produced with a large frontal triangle occupying nearly all the frons. However, Camarota has r_1 and r_{2+3} closely approximated, the arista is blade-like, the editae are long and palp-shaped and the lower margin of the hypandrium is broad. The articulations of the editae resemble those of the Oscinellinae and I consider that there are enough characters to place Camarota in a separate group.

The genera in group 2 of this thesis tend to have an elongate body form, setae on the mesopleurae and thickened hind femora. Platycephala has a pubescent arista and the setae on the head, mesonotum and pleurae arise from small punctures. Meromyza has projecting postgonites, a unique feature, but resembles Platycephala in many features. In Platycephala and Meromyza the editae project from the IX tergite and the gonites and the aedeagus are discrete. In Eurina the gonites and the posterior part of the aedeagal apodeme form a rigid plate. Platycephala and Meromyza have a median plate representing the cerci but in Eurina it is produced into a transverse band. Eurina has an elongate frons, setae on the frontal triangle and setae on the mesopleurae as in Platycephala. In this thesis Eurina is placed in the same group as Platycephala, but the differences in male genitalia could be grounds for transferring *Eurina* to a separate group.

The genus *Cryptonevra* has setae on the edges of the frontal triangle and the editae have a granulate surface. There are two species groups in this genus. *C. flavitarsis* has a well-developed distiphallus and basiphallus and simple cerci, but *C. tarsata* has a simple basiphallus and a scarcely developed distiphallus, while there is a rod-like process from the cerci which projects towards the centre of the IX tergite. These two groups may represent subgenera. *C. diadema* has a pubescent distiphallus, which according to Griffiths (1972) should be a ground-plan condition for Chloropidae.

In the genus *Lasiosina* the orbital setae are enlarged and there are only 3 or 4 on each side. Andersson (1977) retained *L. cinctipes* in *Lasiosina* but transferred the species related to *approximatonervis* to *Pseudopachychaeta* Strobl. *L. cinctipes* has separated cross-veins, editae fused to the IX tergite and postgonites curved around the base of the aedeagus. *L. approximatonervis* has approximated cross-veins, editae not fused to the IX tergite and the postgonites are simple. However, there are many species referred to *Lasiosina* which should be examined before the genus is divided. The genus is placed in a separate group, but is probably nearest to *Cryptonevra* which also has granulate editae.

Cetema has been regarded as a sub-genus of *Chlorops* (Duda, 1933), but the male genitalia are distinctive. The processes on the IX tergite are unique, though they are absent in some species (Nartshuk, 1970). The gonites are divided transversely, unlike those of *Chlorops*, and the postgonites are apically hooked and bear short stout setae directed posteriorly. I consider the genus to be monophyletic and it is placed in a separate genus group (group 7) in this thesis.

Eutropha is also placed in a separate genus group (group 6) in this thesis. The editae are granulate as in Cryptonevra but the aedeagus is simple, the arista is short and the frontal triangle is bare. It is probably nearest to Cryptonevra.

The genus Thaumatomyia is characterised by the scutellum and the eversible vesicles anterior to the male genitalia. The male genitalia are also distinctive, with a well-developed aedeagus and scale-like editae. The larvae are predators of root aphids (Homoptera). The genus is placed in a separate group (group 9) in this thesis.

Diplotoxa (group 5) is also an isolated genus. The approximated cross-veins are a poor character in Chloropinae (Chapter 12), and do not indicate a relationship to Lasiosina approximatonervis. The fused gonites and aedeagus resemble Eurina but this relationship is not supported by other characters.

The genera Chlorops, Melanum, Epichlorops and Anthracophaga are placed in group 8 in this thesis. Chlorops has rounded vibrissal angles (rarely right-angled), the third antennal segment shorter to slightly longer than deep and editae with a process or hook. Anthracophaga is shown to be a subgenus of Chlorops (Andersson, 1977). Melanum laterale has produced vibrissal angles and an apically flattened IX tergite, but otherwise it is near to Chlorops. M. fumipenne has produced vibrissal angles but the genitalia are similar to *Chlorops*. *Epichlorops* resembles *Cetema* in form and colouration, but the male genitalia are similar to *Chlorops*. *Chlorops* is a large genus, but appears to be monophyletic.

The above discussion (Chapters 16 and 17) indicates that the British genera of Chloropinae are better defined than those of the Oscinellinae. Sabrosky (1951) considered that the Ethiopian genera of Oscinellinae were better defined than the Chloropinae, but he did not examine the male genitalia. The male genitalia of British Chloropinae offer many good characters at the generic level, but the Oscinellinae still offer many problems.

CHAPTER 18: Discussion

The primary aim of this thesis is to investigate the taxonomy of the Chloropidae which occur in Britain and to investigate the classification of Chloropidae. There are three main theories of taxonomy and classification in current use. Numerical taxonomy (Sokal and Sneath, 1963) depends on evaluating the differences and similarities between organisms. The characters used are not weighted and no account is taken of convergent or parallel evolution. Thus when two sets of characters are examined in the same group of organisms, the classifications produced may be incongruent. Combined (or evolutionary) taxonomy (Mayr, 1969) is based on the degree of overall or genetic similarity between organisms. In my opinion it is very difficult to estimate 'overall similarity' and the criteria suggested by Mayr for differentiating taxa, such as distinctness and size of gap, cannot be applied consistently. In phylogenetic taxonomy (Hennig, 1966) the classification reflects the phylogeny of organisms - members of a taxon are derived from a common ancestor. Hennig further suggests that the rank of a taxon should be determined by its age, but this is not at present practicable with Chloropidae.

While there are disadvantages to all these theories, Hennig's is the only one which provides a definition of categories above the species level, and is related to a concept (phylogeny) which can in theory (though not usually in practice) be proven. The disadvantages of phylogenetic taxonomy are that it does not allow for different rates of evolution, it is difficult to prove the phylogeny of a group and the use of dichotomy leads to a proliferation of intermediate categories. However, in my opinion phylogenetic taxonomy is more useful than other theories since more branches of biology, such as biogeography, can be related to it. I therefore follow Griffiths (1972) and Andersson (1977) in attempting to apply phylogenetic taxonomy to Chloropidae.

The phylogenetic approach to taxonomy is dependent on the isolation of monophyletic groups which have an ancestor common only to them. By examining a range of characters, those which are apomorphic (or derived) are distinguished from those which are plesiomorphic (or ancestral). A group may be considered monophyletic in relation to similar groups if it possesses one or more apomorphic characters, indicating community of descent.

From Chapters 16 and 17 it is clear that although many genus groups of Chloropidae possess apomorphic characters, such as the arrangement of the gonites in the Chlorops group, the long vein r_{2+3} in Dicraeus or the postgonite of Meromyza, these characters tend to be restricted to a few genera and no overall dichotomy of the subfamilies can be distinguished. Many characters formerly used to associate genera, such as approximated cross-veins, dusting or a thickened arista appear to have evolved on more than one occasion. The result is that in both subfamilies many groups of genera are recognisable and it is not possible to reconstruct the phylogeny. This might be expected if Chloropidae is a recently evolved family, with a reticulate pattern of generic groupings rather than a dichotomous one. However, one of the earliest known schizophorous fossils, from the Cretaceous amber of

Canada, is supposedly a chloropid (McAlpine & Martin, 1969).

Studies on the early stages of Chloropidae (e.g. Nye, 1958) do not provide many useful characters for the higher classification of Chloropidae. The larvae are of the generalised schizophorous type and while species and certain genera can be distinguished by details of morphology, colour, etc. there do not appear to be sufficient characters to distinguish generic groups or define the larvae of the family. Some genera may have characteristic life-histories, such as Dicraeus larvae, which live in the seeds of Gramineae and probably Thaumatomyia which is predacious on aphids. In other cases larvae of species in the same genus may have widely differing life-histories. For instance, Conioscinella gallarum, C. halophila and C. frontella have different life-histories, and belong to different species groups on morphological grounds. The differences in life-histories therefore support the subdivision of the genus. On the other hand, the genus Gaurax appears to be monophyletic but the two British species have different life-histories and the other species from other faunal regions differ again. Although the majority of Chloropidae are associated with Gramineae it is clear that the family is adaptable and care must be taken when correlating classification and larval habits.

In the present state of chloropid taxonomy there appears to be insufficient evidence to apply Hennig's principles of phylogenetic taxonomy. The classification of Chloropidae is particularly difficult between the subfamily and generic categories, where there are numerous genus groups. The large number of generic groupings can be explained if they have evolved by polytomy and not dichotomy. Andersson (1977, p.17) has discussed some of the theoretical problems associated with polytomy, and considers that if, in a group which evolves polytomously there is partial extinction, a derived phylogeny may be incorrect if Hennig's methods are used. If parallel evolution produces a series of species pairs with the same character alternating, and then some species become extinct, it is possible to use the plesiomorphous alternating character as an apomorphous character defining groups which are not monophyletic. Such a situation, with the same character alternating in related genera, occurs in Chloropidae.

The division of the British Chloropidae into two subfamilies, Oscinellinae with the costa ending at m_{1+2} (not r_{2+3} as given in Andersson's key to subfamilies (Andersson, 1977)) and the male cerci not fused, and Chloropinae with the costa ending before m_{1+2} and fused cerci is confirmed in this thesis. Andersson's analysis of the subfamily classification indicates that the non-British subfamily Siphonellopsinae is the sister group of the Oscinellinae and Chloropinae in combination.

Griffiths (1972) placed the Chloropidae in the prefamily Tephritoinea of the superfamily Muscoidea. The prefamily Tephritoinea was characterised as follows.

1. Aedeagus (male) extremely elongate, flexible, coiled when at rest, pubescent.

2. 7th and 8th abdominal segments (female) elongate, forming a slender retractile ovipositor; 8th sternum divided longitudinally.

3. 'Musculus hypandriotergalis' lost (?)

4. Costa broken at end of subcosta.

Character 1 is not shown by Chloropidae; in all Chloropidae examined during this study the aedeagus was short or long and inflexible (e.g. Thaumatomyia, Chlorops brevimana). However, Cryptonevra diadema has a pubescent distiphallus so that this character appears to be partially retained by Chloropidae. If a pubescent aedeagus is the ground-plan condition in Chloropidae it is strange that it is retained only in Cryptonevra, which does not otherwise have many plesiomorphous characters. Andersson (1977) did not find any further examples of a pubescent aedeagus in Chloropidae.

Character 2 is also much altered in Chloropidae; some species (e.g. Calamoncosis nitida and Lasiosina heleocharis) have a sclerotised ovipositor, but these are laterally compressed and not dorsoventrally depressed as in Tephritidae. Character 3 requires further investigation, to determine whether it occurs in a range of Chloropidae. Character 4 does apply to Chloropidae.

Within Griffiths' Tephritoinea, Chloropidae are placed in the Chloropidae family group which contains Chloropidae, Milichiidae, Carnidae and Acartophthalmidae. The main distinguishing characters of the group are the two rudimentary spermathecae in the female and the expansion of the apical end of the aedeagal apodeme of the male into a plate, called the phallapodemic sclerite. Acartophthalmidae seems the most plesiomorphous family and has many characters found in other Tephritoinea but reduced in Chloropidae, such as a flexible pubescent aedeagus, well developed subcosta and anal vein present. Andersson (1977) has shown that the male postabdomen of Acartophthalmus is near the ground-plan condition of Chloropidae. The affinities of the four families in this group are far from clear, however (Andersson, 1977).

The evidence in this thesis does not indicate that the Chloropidae are misplaced in the superfamily Tephritoidea (Steyskal, 1974).

FIGURES

The legends to the figures are on the facing page. Unless otherwise stated, the figures are of male genitalia: the IX tergite is shown in apical view, the hypandrium in ventral view and the left edita from the inner side. The data have been condensed; the county name is contracted and where specimens are bred only the date of emergence is given. The collector's name is condensed to initials and a list of full names is given below. The scale line is 0.1 mm.

Abbreviation	Name of collector	Location of material
E.A.A.	E.A. Atmore	Hope Dept., Oxford
E.B.B.	E.B. Basden	Hope Dept., Oxford
K.G.B.	K.G. Blair	B.M. (N.H.)
P.J.C.	P.J. Chandler	P.J. Chandler coll.
A.E.J.C.	A.E.J. Clark	Hope Dept., Oxford
J.A.J.C.	J.A.J. Clark	Hope Dept., Oxford
R.L.C.	R.L. Coe	B.M. (N.H.)
B.H.C.	B.H. Cogan	B.M. (N.H.)
J.E.C.	J.E. Collin	Hope Dept., Oxford
C.N.C.	C.N. Colyer	B.M. (N.H.)
J.P.D.	J.P. Dear	B.M. (N.H.)
J.C.D.	J.C. Deeming	B.M. (N.H.)
K.C.D.	K.C. Durrant	K.C.D. coll.
V.F.E.	V.F. Eastop	B.M. (N.H.)
J.H.	J. Hubicka	B.M. (N.H.)
A.G.I.	A.G. Irwin	J.W.I. coll.
J.W.I.	J.W. Ismay	Author's collection
J.J.F.X.K.	J.J.F.X. King	B.M. (N.H.)

Abbreviation	Name of collector	Location of material
G.M.	G. Mavromoustakis	B.M. (N.H.)
I.W.B.N.	I.W.B. Nye	B.M. (N.H.)
L.P.	L. Parmenter	B.M. (N.H.)
K.P.S.	K. Paviour-Smith	B.M. (N.H.)
A.J.P.	A.J. Pontin	J.W.I. coll.
K.A.S.	K.A. Spencer	B.M. (N.H.)
G.M.S.	G.M. Spooner	B.M. (N.H.)
A.E.S.	A.E. Stubbs	J.W.I. coll: B.M.(N.H.): A.E.S. coll.
E.T.	E. Taylor	Hope Dept., Oxford
C.R.V.	C.R. Vardy	B.M. (N.H.)
G.H.V.	G.H. Verrall	B.M. (N.H.) and Hope Dept., Oxford.
J.H.W.	J.H. Wood	B.M. (N.H.)
J.W.Y.	Lt.Col. J.W. Yerbury	B.M. (N.H.)

9 *Lipara* *lucens* IX tergite Brandon, Suffolk
vi. 1945 ?

10 *L.* *lucens* hypandrium Brandon, Suffolk vi. 1945 ?

11 *L.* *similis* IX tergite Wicken, Cambs. vi. 1949
G.M.S.

12. *L.* *similis* hypandrium Wicken, Cambs. vi. 1949
G.M.S.

13 *L.* *lucens* edita Brandon, Suffolk, vi. 1945 ?

14 *L.* *rufitarsis* hypandrium Beer, S. Devon iv. 1931
K.G.B.

15 *L.* *rufitarsis* IX tergite Beer, S. Devon iv. 1931
K.G.B.

16 *L.* *similis* edita Wicken, Cambs. vi. 1949, G.M.S.

17 *L.* *rufitarsis* edita Beer, S. Devon iv. 1931
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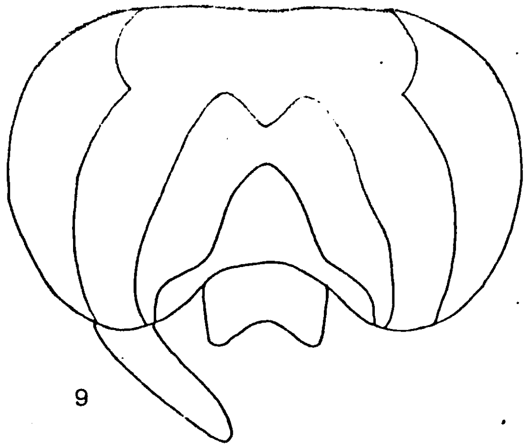

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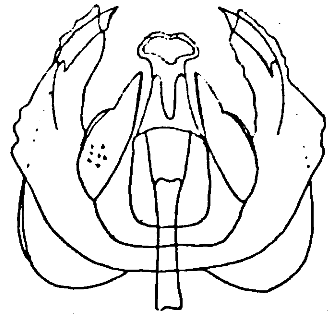

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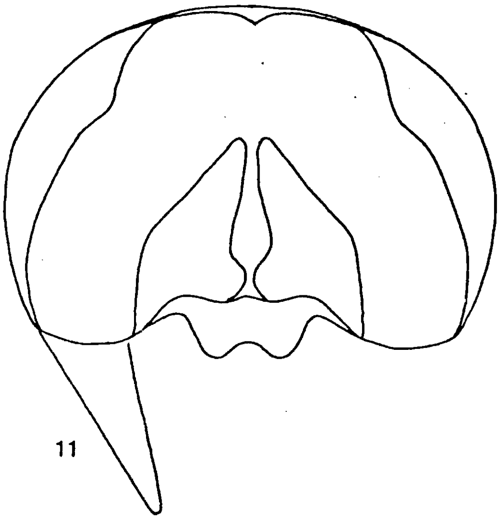

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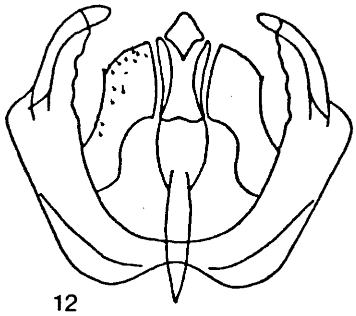

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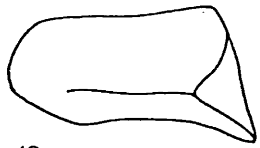

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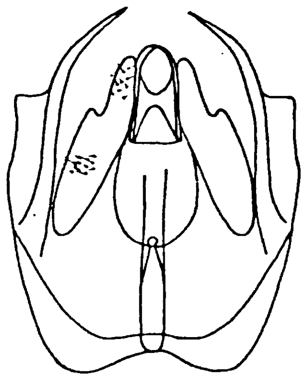

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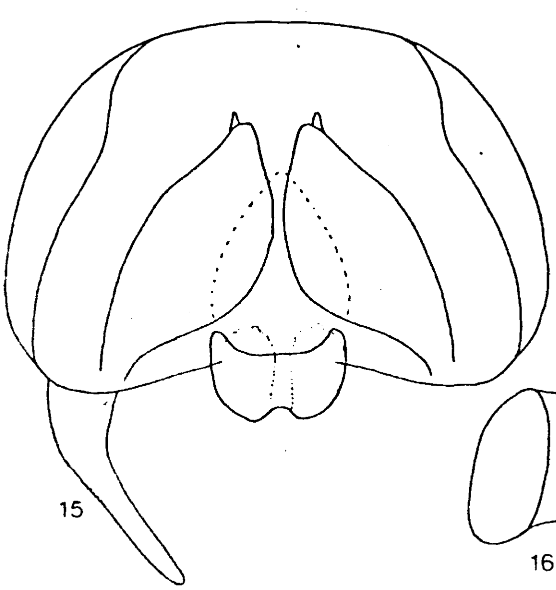

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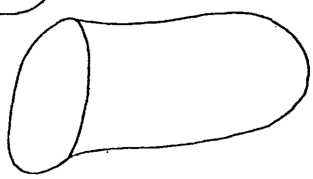

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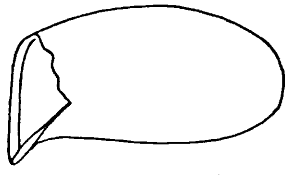

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18 Lipara lucens cerci From Doskočil and Chvala (1971)

19 L. similis cerci From Doskočil and Chvala (1971)

20 L. rufitarsis cerci From Doskočil and Chvala (1971)

21 L. pullitarsis cerci From Doskočil and Chvala (1971)

22 Calamoncosis nitida IX tergite Egham, Surrey 16.v.1971 J.W.I.

23 C. nitida hypandrium Egham, Surrey 16.v.1971 J.W.I.

24 C. nitida aedeagus lateral view Egham, Surrey 16.v.1971 J.W.I.

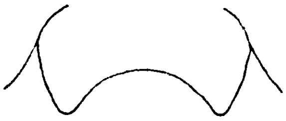
25 C. nitida edita Egham, Surrey 16.v.1971 J.W.I.

26 C. aprica IX tergite Martham Broad, Norfolk 5.vi.1974 J.W.I.

27 C. aprica cerci Martham Broad, Norfolk 5.vi.1974 J.W.I.

28 C. aprica hypandrium Martham Broad, Norfolk 5.vi.1974 J.W.I.

29 C. nitida ♀ ovipositor Egham, Surrey 12.v.1971 J.W.I.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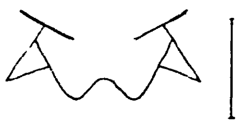
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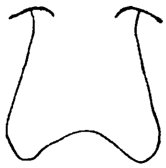
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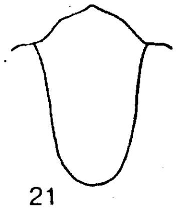
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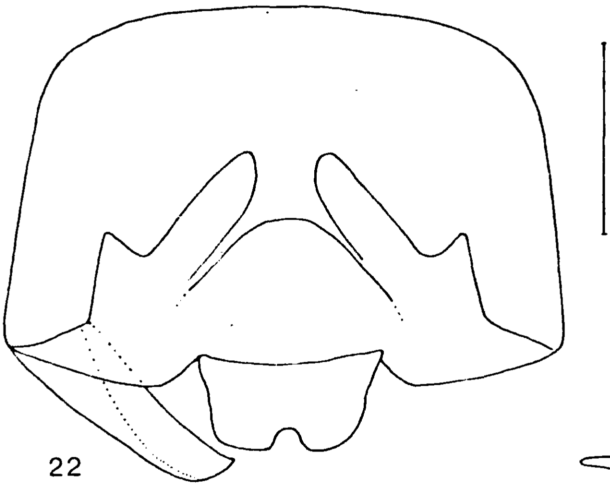
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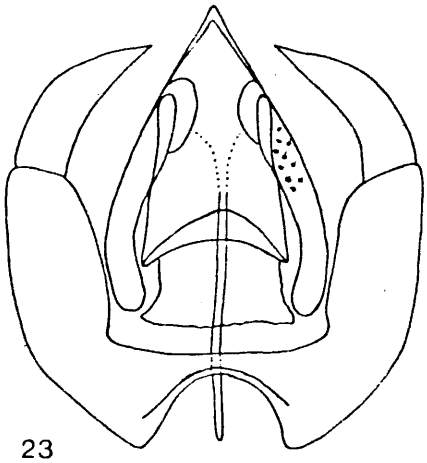
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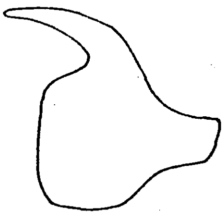
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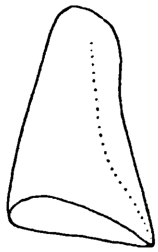
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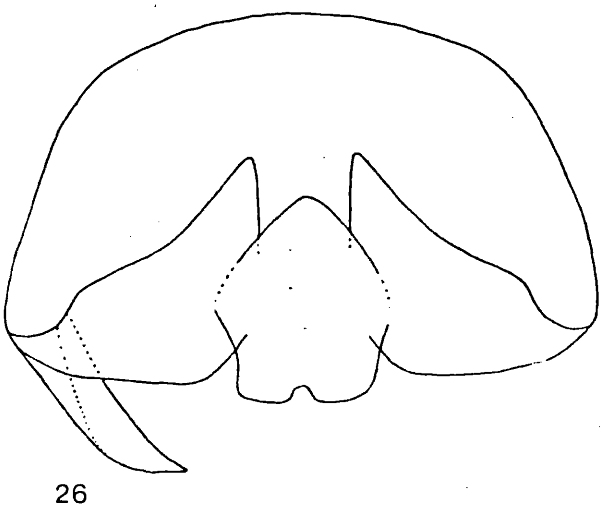
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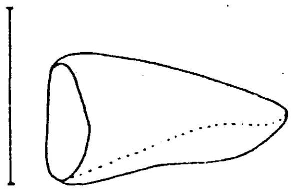
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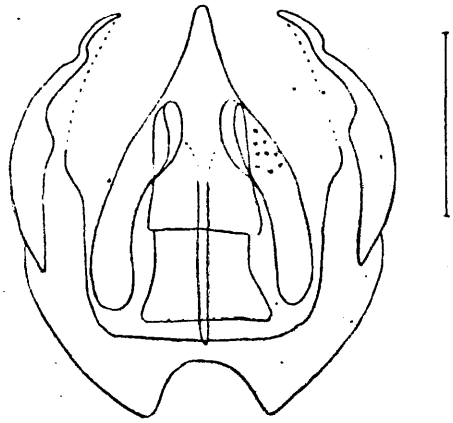
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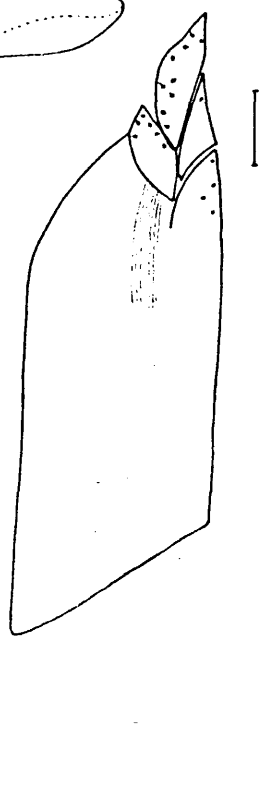
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30 <u>Calamoncosis</u> <u>minima</u> IX tergite Southampton, Hants. 20.viii.1962 C.R.V.

31 <u>C.</u> <u>minima</u> hypandrium Southampton, Hants. 20.viii. 1962 C.R.V.

32 <u>C.</u> <u>minima</u> edita Southampton, Hants. 20.viii.1962 C.R.V.

33 <u>C.</u> <u>duinensis</u> IX tergite Orford, Suffolk 22.vii.1908 J.J.F.X.K.

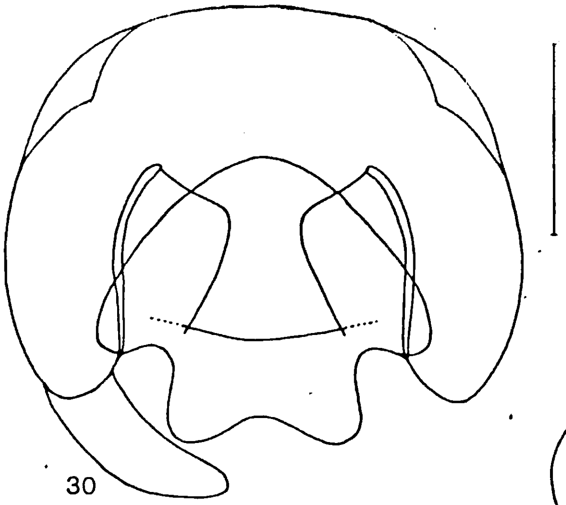
34 <u>C.</u> <u>duinensis</u> hypandrium Orford, Suffolk 22.vii.1908 J.J.F.X.K.

35 <u>C.</u> <u>duinensis</u> edita Orford, Suffolk 22.vii.1908 J.J.F.X.K.

36 <u>Siphunculina</u> <u>aenea</u> IX tergite Bookham, Surrey 10.x.1948 L.P.

37 <u>S.</u> <u>aenea</u> hypandrium Bookham, Surrey 10.x.1948 L.P.

38 <u>S.</u> <u>aenea</u> edita Bookham, Surrey 10.x.1948 L.P.



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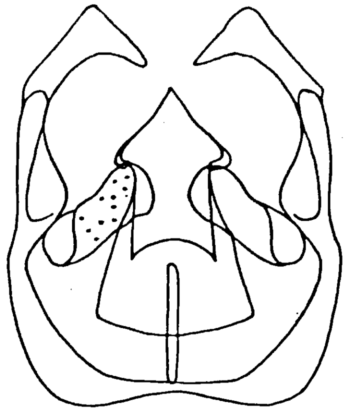

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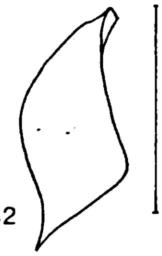

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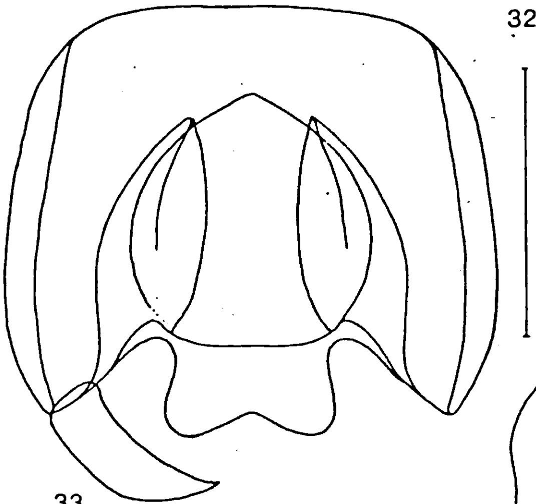

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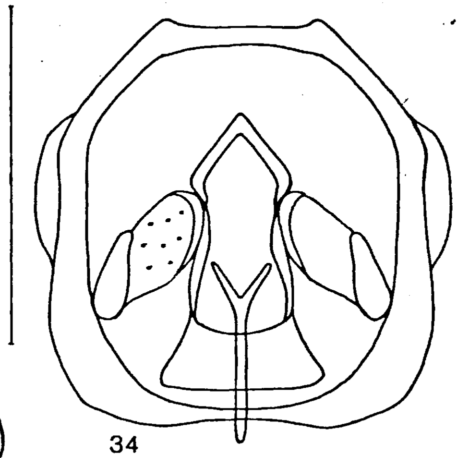

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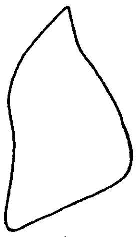

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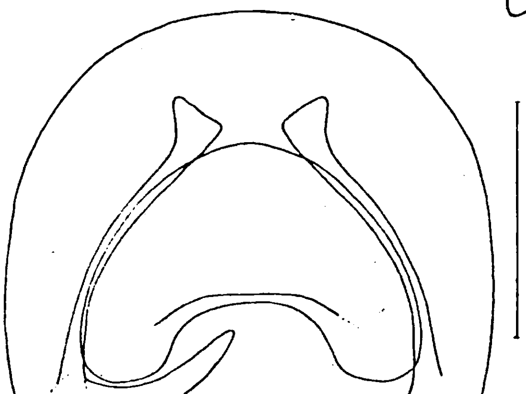

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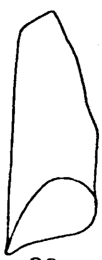

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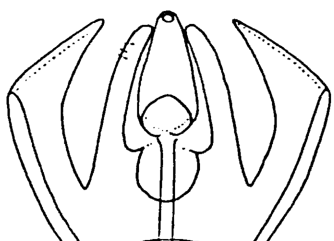

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39 Fiebrigella palposa IX tergite Golspie, Sutherland
18.viii.1900 J.W.Y.

40 F. palposa hypandrium Golspie, Sutherland
18.viii.1900 J.W.Y.

41 F. palposa edita Golspie, Sutherland 18.viii.1900
J.W.Y.

42 Lasiambia brevibucca IX tergite New Forest
vii.1908 J.J.F.X.K.

43 L. brevibucca hypandrium New Forest vii.1907
J.J.F.X.K.

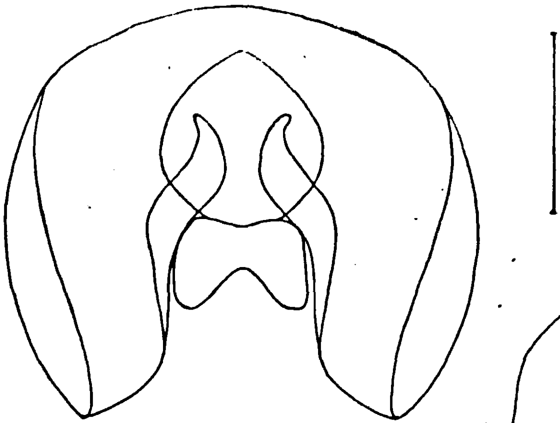
44 L. brevibucca edita New Forest vii.1908 J.J.F.X.K.

45 L. baliola IX tergite Moccas Park, Hereford
6.viii.1934 J.E.C.

46 L. baliola hypandrium Moccas Park, Hereford
6.viii.1934 J.E.C.

47 L. baliola edita Moccas Park, Hereford 6.viii.1934
J.E.C.

48 L. baliola pregenital tergite Moccas Park, Hereford
6.viii.1934 J.E.C.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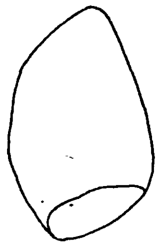
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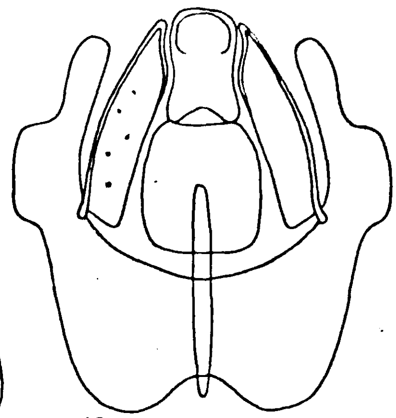
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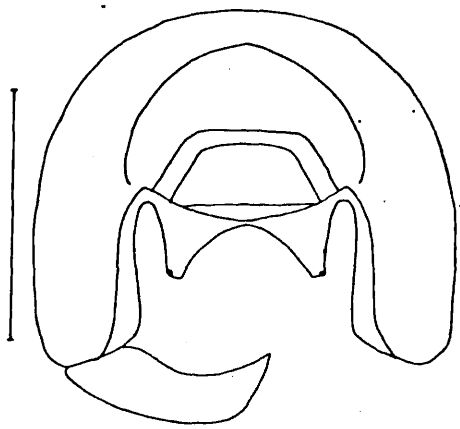
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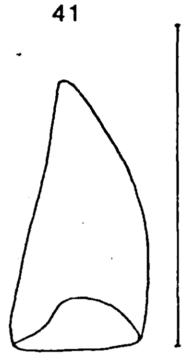
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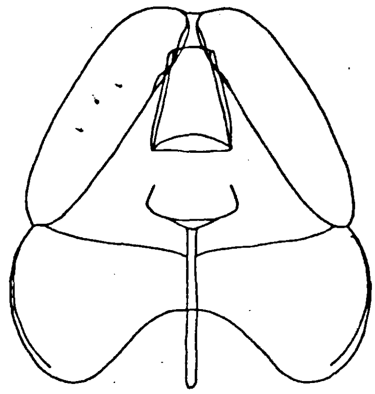
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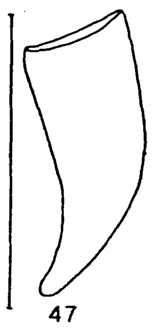
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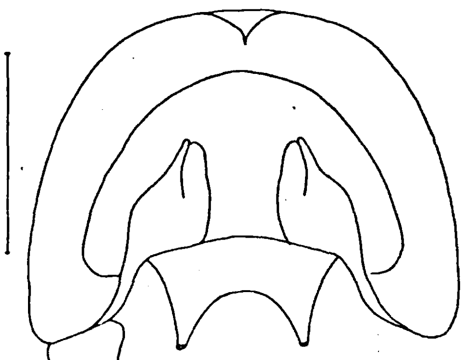
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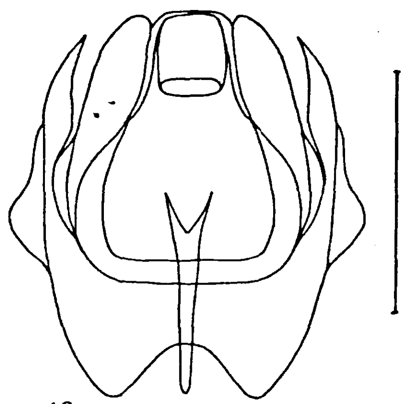
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49 *Siphonella oscinina* IX tergite Selsdon, Surrey
3-11.viii.1929 R.L.C.

50 *S. oscinina* hypandrium Selsdon, Surrey
3-11.viii.1929 R.L.C.

51 *S. oscinina* edita Selsdon, Surrey
3-11.viii.1929 R.L.C.

52 *Polyodaspis ruficornis* IX tergite London ex walnuts
28.x.1951 C.N.C.

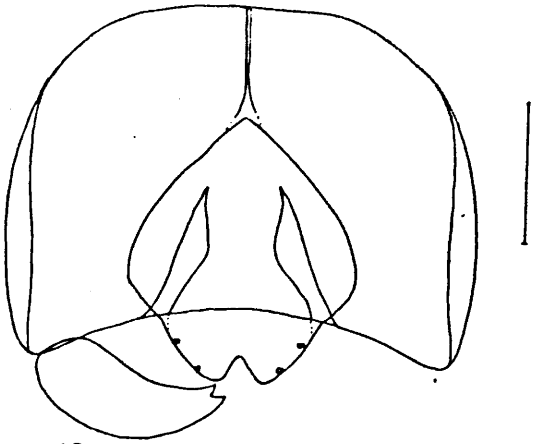
53 *P. ruficornis* hypandrium London ex walnuts
28.x.1951. C.N.C.

54 *P. ruficornis* edita London ex walnuts
28.x.1951. C.N.C.

55 *P. sulcicollis* IX tergite Dungeness, Kent
5.viii.1937 J.E.C.

56 *P. sulcicollis* hypandrium Dungeness, Kent
5.viii.1937 J.E.C.

57 *P. sulcicollis* edita Dungeness, Kent
5.viii.1937 J.E.C.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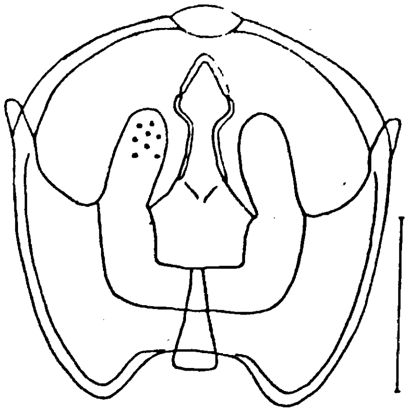
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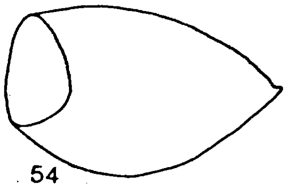
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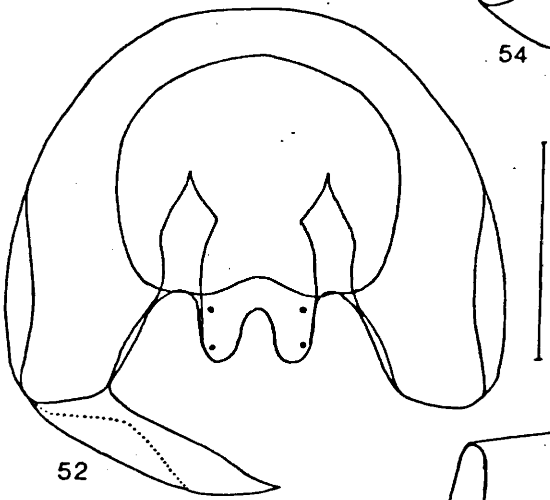
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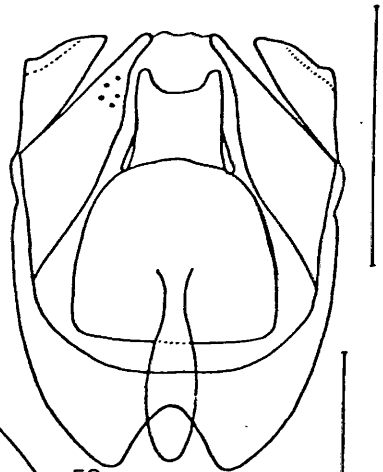
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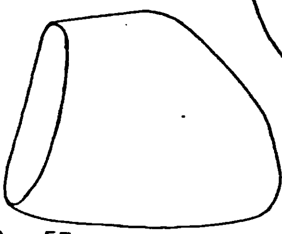
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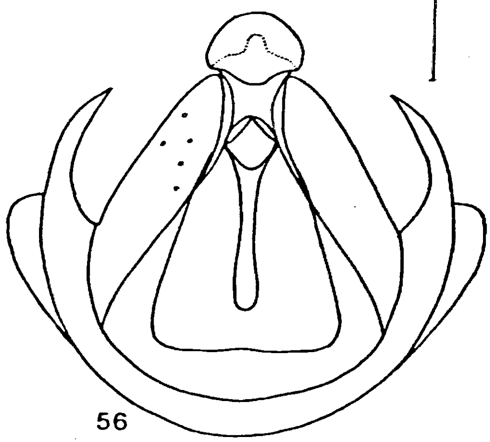
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58 Hapleginella laevifrons IX tergite Nethy Bridge, Inverness 19.vii.1922 J.J.F.X.K.

59 H. laevifrons edita Nethy Bridge, Inverness 19.vii.1922 J.J.F.X.K.

60 Trachysiphonella scutellata IX tergite Sels am Schlern, Dolomites 20-29.vii.1963 J.C.D.

61 T. scutellata hypandrium Sels am Schlern, Dolomites 20-29.vii.1963 J.C.D.

62 T. scutellata head lateral view from Nartshuk (1964)

63 T. carinfacies head lateral view from Nartshuk (1964)

64 T. scutellata IX tergite Slovenia-Postajna, Jugoslavia 13.vii - 1.viii.1958 R.L.C.

65 T. scutellata hypandrium Slovenia-Postajna, Jugoslavia 13.vii - 1.viii.1958 R.L.C.

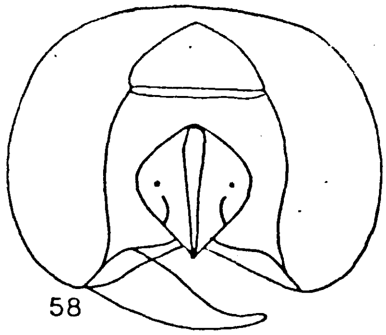
66 T. scutellata edita Slovenia-Postajna, Yugoslavia 13.vii - 1.viii.1958 R.L.C.

67 T. carinfacies IX tergite from Nartshuk (1964)

68 T. carinfacies IX tergite Fleam Dyke, Cambs. 19.vii.1937. J.E.C.

69 T. carinfacies hypandrium Fleam Dyke, Cambs. 19.vii.1937. J.E.C.

70 T. carinfacies edita Fleam Dyke, Cambs. 19.vii.1937. J.E.C.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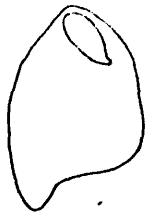
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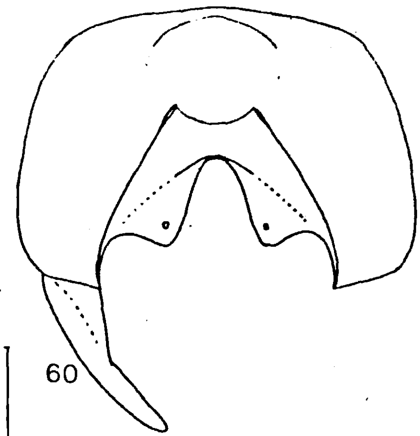
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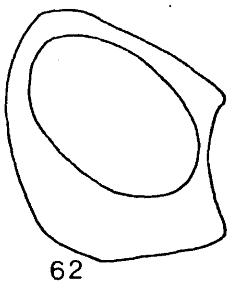
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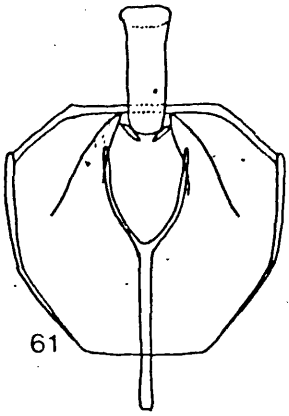
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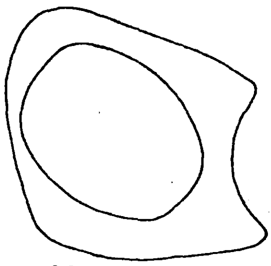
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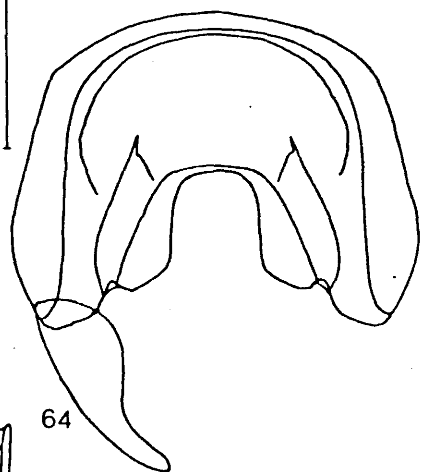
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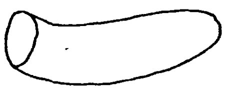
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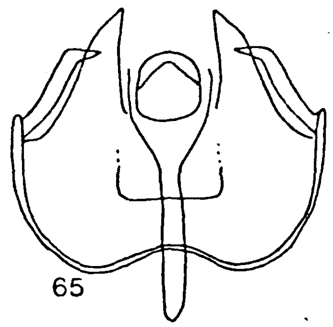
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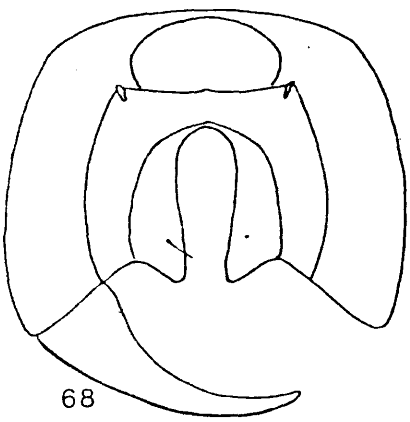
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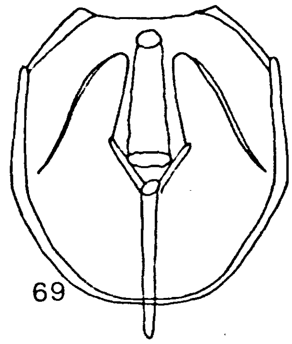
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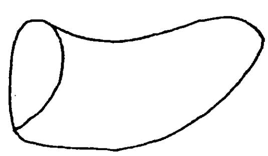
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71 *Aphanotrigonum trilineatum* IX tergite Bookham, Surrey 9.v.1942 L.P.

72 *A. trilineatum* hypandrium Chobham Common, Surrey 21.iv.1971 J.W.I.

73 *A. trilineatum* edita Chobham Common, Surrey 21.iv.1971 J.W.I.

74 *A. nigripes* IX tergite Arne, Dorset 30.vii.1973 J.W.I.

75 *A. meijerei* hypandrium Palling, Norfolk 17.vi.1904 J.E.C.

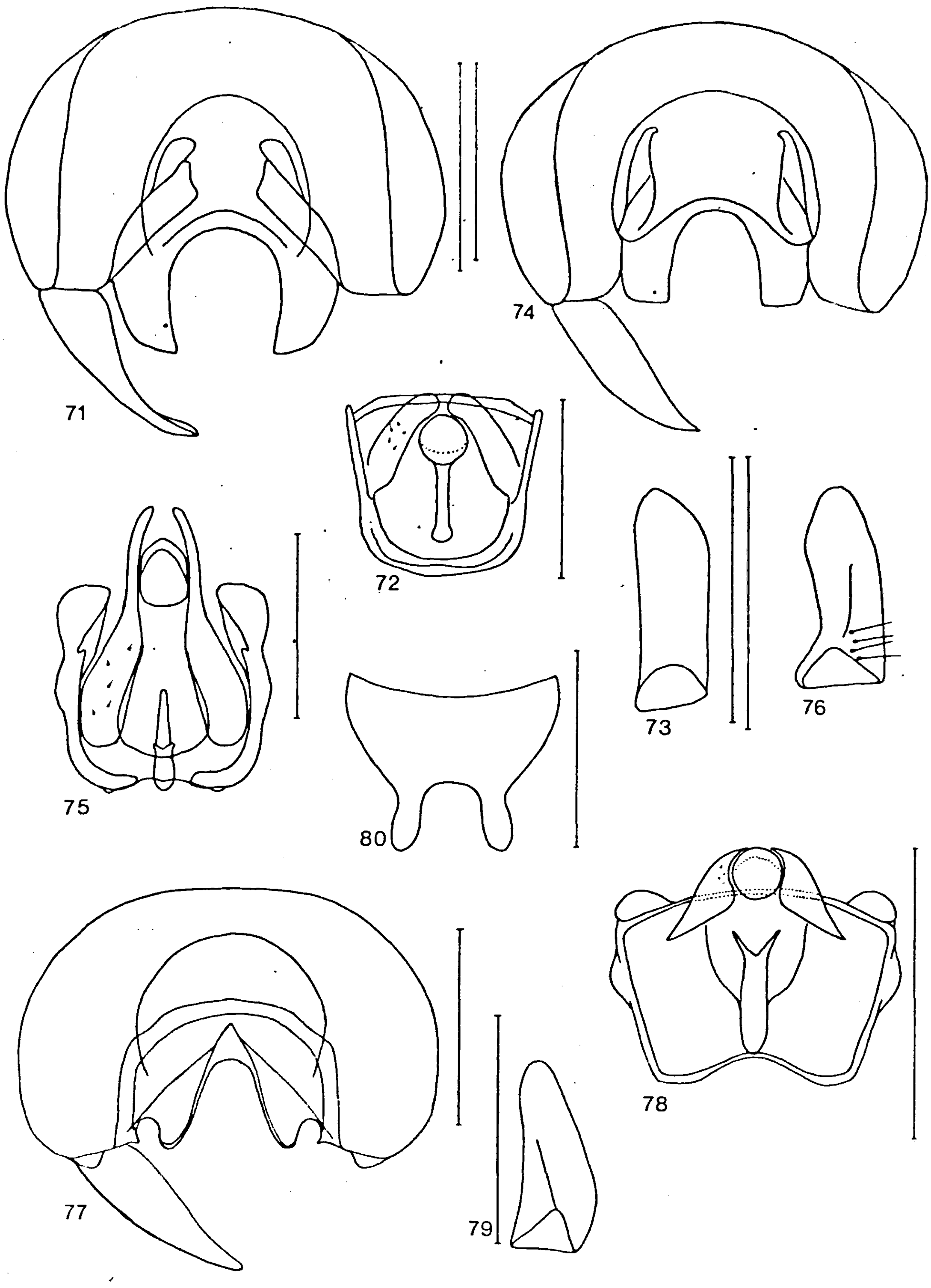
76 *A. meijerei* edita Palling, Norfolk 17.vi.1904 J.E.C.

77 *A. brunneum* IX tergite Wolferton, Norfolk 20.vi.1974 J.W.I.

78 *A. brunneum* hypandrium Wolferton, Norfolk 20.vi.1974 J.W.I.

79 *A. brunneum* edita Stiffkey, Norfolk 8.vii.1974 J.W.I.

80 *A. brunneum* pregenital sternite Wolferton, Norfolk 20.vi.1974 J.W.I.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79

81 *Aphanotrigonum* *femorella* IX tergite Arne, Dorset
16.vii.1973 J.W.I.

82 *A.* *femorella* hypandrium Arne, Dorset
30.vii.1973 J.W.I.

83 *A.* *femorella* edita Arne, Dorset
30.vii.1973 J.W.I.

84 *A.* *femorella* pregenital sternite Arne, Dorset
30.vii.1973 J.W.I.

85 *A.* *fasciella* IX tergite Arne, Dorset
30.vii.1973 J.W.I.

86 *A.* *fasciella* hypandrium Arne, Dorset
30.vii.1973 J.W.I.

87 *A.* *fasciella* edita Arne, Dorset
30.vii.1973 J.W.I.

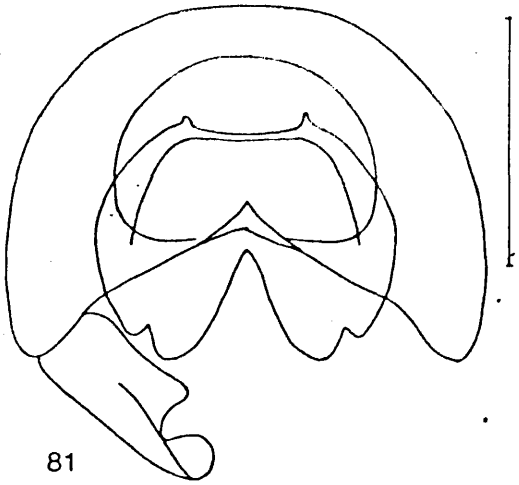
88 *A.* *fasciella* pregenital sternite Arne, Dorset
30.vii.1973 J.W.I.

89 *A.* *inerme* IX tergite Flatford, Suffolk
16.vii.1951 L.P.

90 *A.* *inerme* hypandrium Arne, Dorset
16.vii.1972 J.W.I.

91 *A.* *inerme* edita Arne, Dorset 16.vii.1972 J.W.I.

92 *A.* *inerme* pregenital sternite Arne, Dorset
16.vii.1972 J.W.I.



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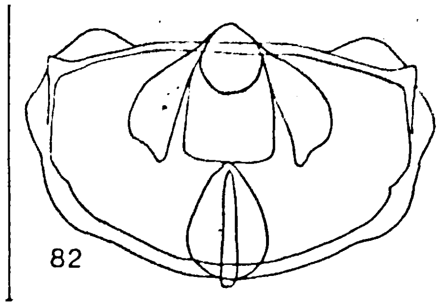

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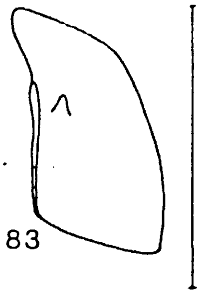

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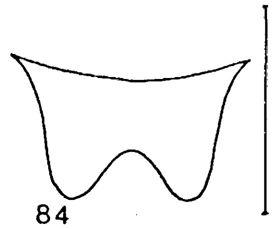

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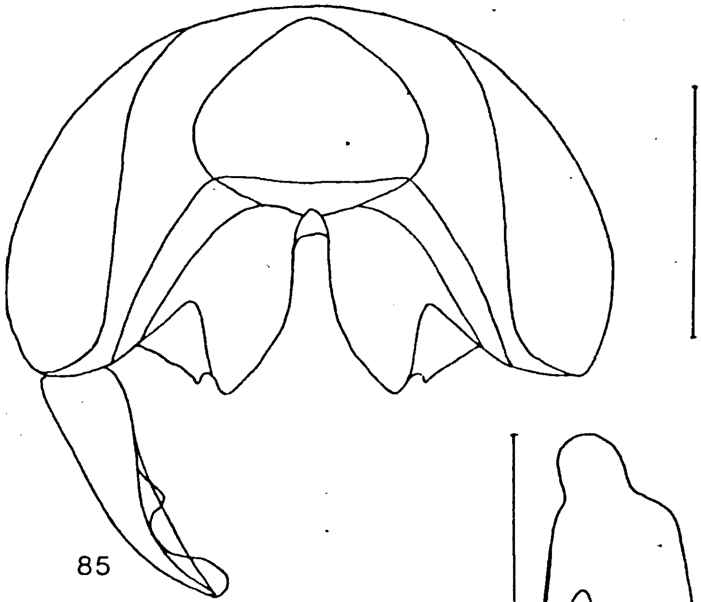

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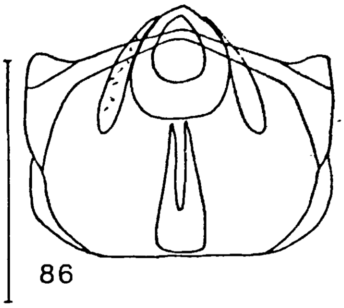

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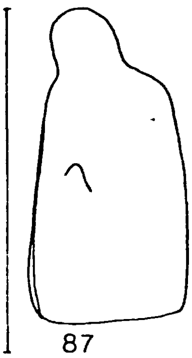

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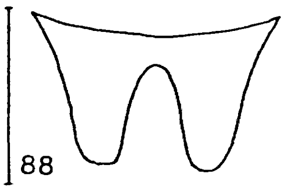

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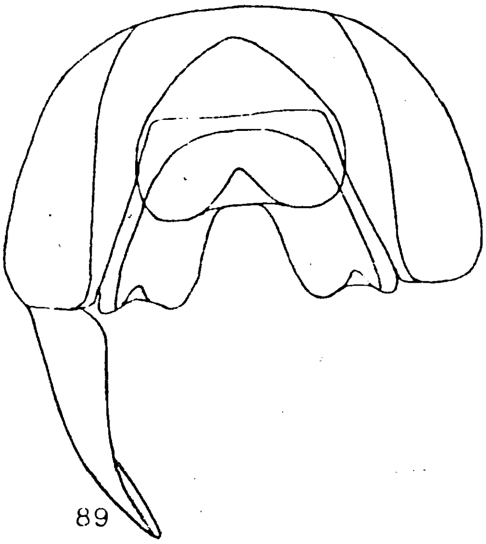

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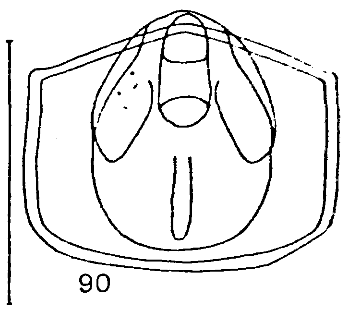

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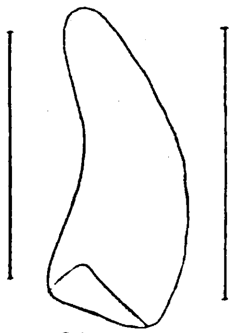

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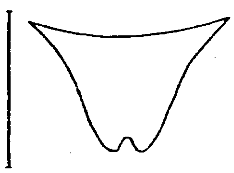


92

93 Oscinimorpha albisetulosa var. hollandica IX tergite
Orford, Suffolk 3.vii.1908 J.J.F.X.K.

94 O. albisetulosa var. hollandica hypandrium
Orford, Suffolk 3.vii.1908 J.J.F.X.K.

95 O. albisetulosa var. hollandica edita
Orford, Suffolk 3.vii.1908 J.J.F.X.K.

96 O. arcuata IX tergite Orford, Suffolk
3.viii.1908 J.J.F.X.K.

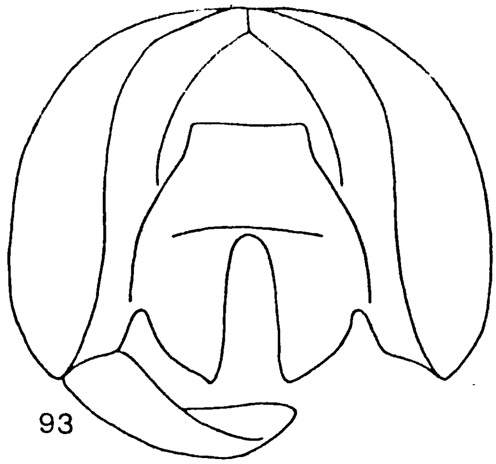
97 O. arcuata hypandrium Walton on Naze, Essex
30.vi.1909 J.W.Y.

98 O. arcuata edita Orford, Suffolk 3.viii.1908
J.J.F.X.K.

99 O. minutissima IX tergite St. Catherine's Point,
Watershoot Bay I.O.W. 24.vi.1960
J.A.J.C.

100 O. minutissima edita Box Hill, Surrey
16.vi.1972 J.W.I.

101 O. minutissima hypandrium Box Hill, Surrey
16.vi.1972 J.W.I.



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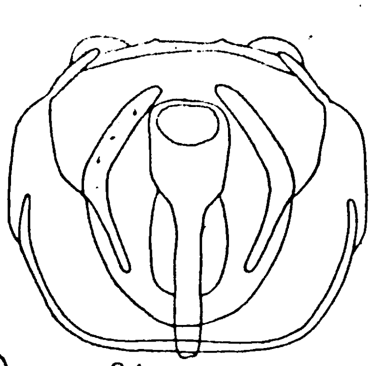

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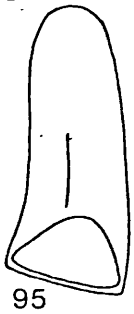

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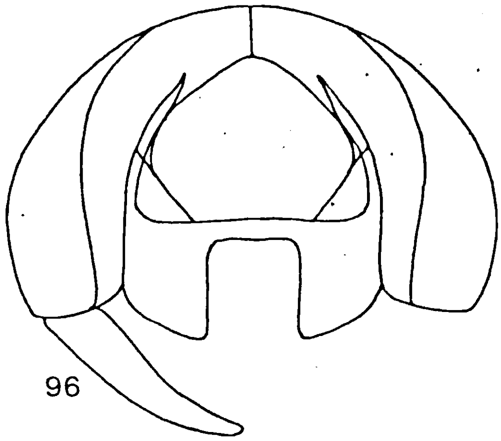

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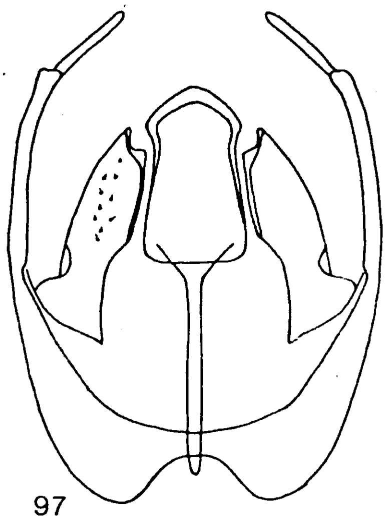

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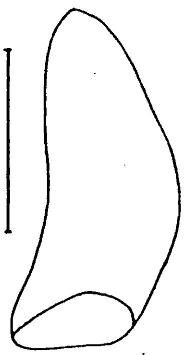

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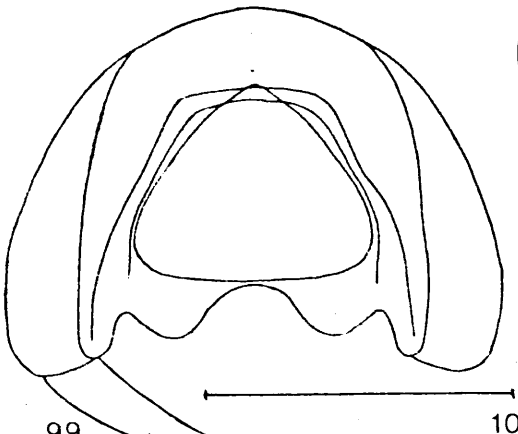

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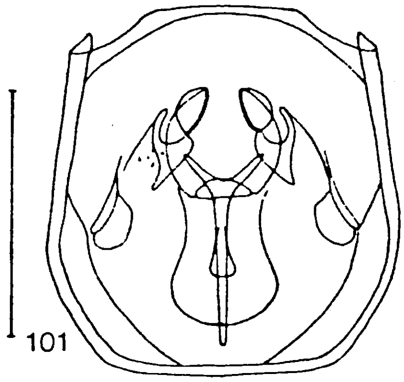


101

102 <u>Oscinomorpha</u> <u>sordissima</u> IX tergite (type specimen)

103 <u>O</u>. <u>sordissima</u> hypandrium (type specimen)

104 <u>O</u>. <u>sordissima</u> edita (type specimen)

105 <u>O</u>. <u>sordissima</u> hypandrium Sheringham, Norfolk
viii.1925 J.E.C.

106 <u>O</u>. <u>sordissima</u> edita Sheringham, Norfolk
viii.1925 J.E.C.

107 <u>Conioscinella</u> species 1 IX tergite The Burren,
Co. Clare 5-7.vii.1960 R.L.C.

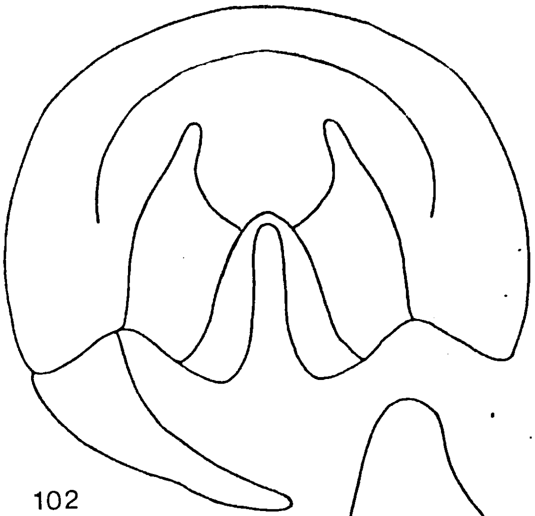
108 <u>C</u>. species 1 hypandrium The Burren, Co. Clare
5-7.vii.1960 R.L.C.

109 <u>C</u>. species 1 edita The Burren, Co. Clare
5-7.vii.1960 R.L.C.

110 <u>C</u>. <u>gallarum</u> IX tergite Barton Mills, Suffolk
20.vi.1939 J.E.C.

111 <u>C</u>. <u>gallarum</u> hypandrium Barton Mills, Suffolk
20.vi.1939 J.E.C.

112 <u>C</u>. <u>gallarum</u> edita Barton Mills, Suffolk
20.vi.1939 J.E.C.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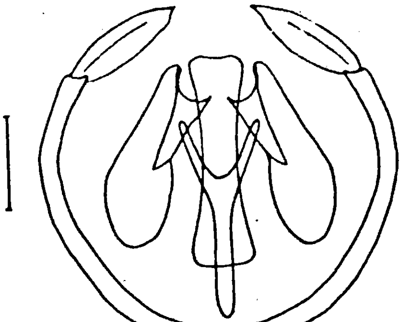
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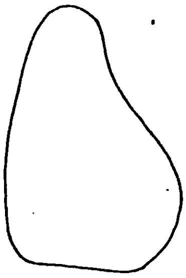
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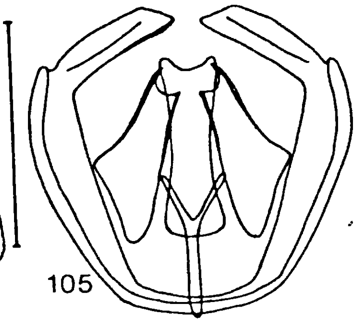
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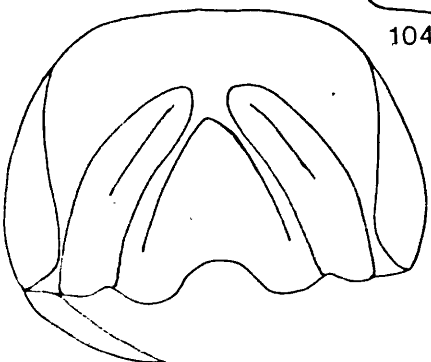
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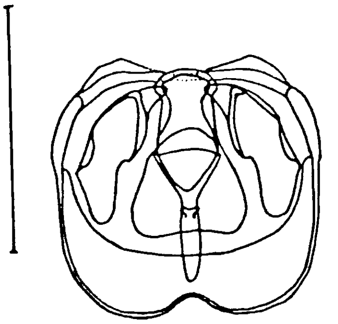
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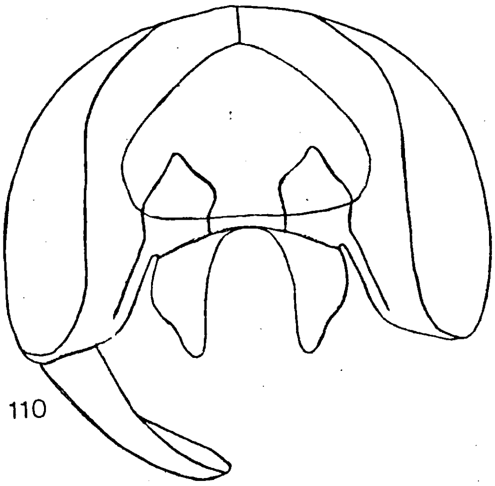
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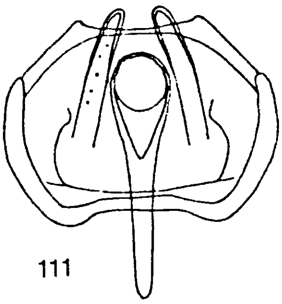
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113 *Conioscinella halophila* IX tergite Horning Ferry, Norfolk 22.v.1936 J.E.C.

114 *C. halophila* hypandrium Barton Mills, Suffolk 3.ix.1937 J.E.C.

115 *C. halophila* edita Barton Mills, Suffolk 3.ix.1937 J.E.C.

116 *C. sordidella* IX tergite Orford, Suffolk 19.vi.1907 J.E.C.

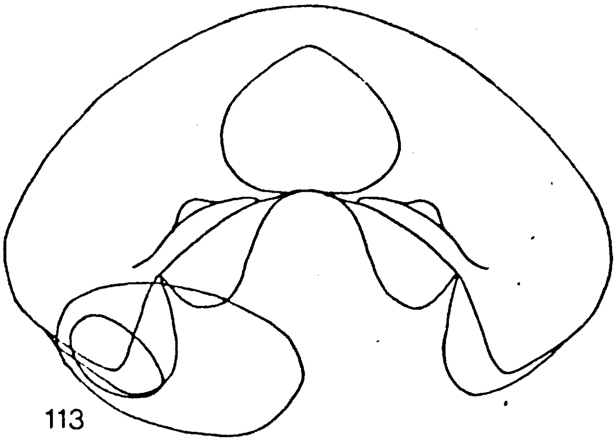
117 *C. sordidella* hypandrium Orford, Suffolk 19.vi.1907 J.E.C.

118 *C. sordidella* edita Orford, Suffolk 14.vi.1907 J.E.C.

119 *C. frontella* IX tergite Ardgay ? 28.vii.1936 J.E.C.

120 *C. frontella* hypandrium Ardgay ? 28.vii.1936 J.E.C.

121 *C. frontella* edita Ardgay ? 28.vii.1936 J.E.C.



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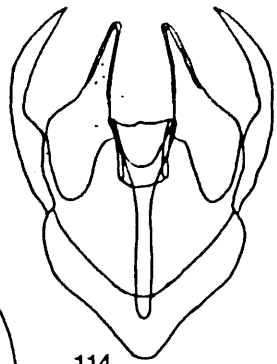

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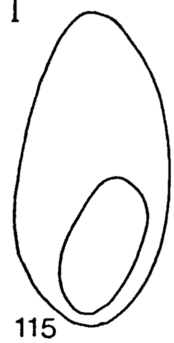

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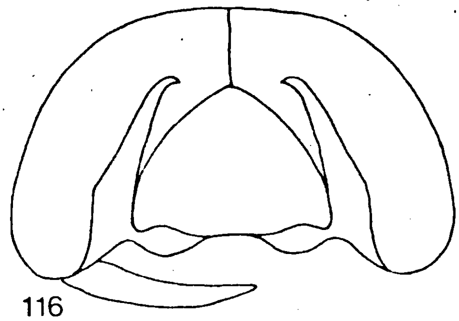

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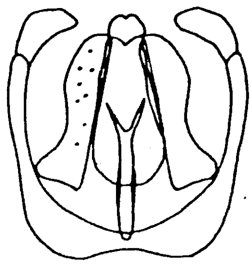

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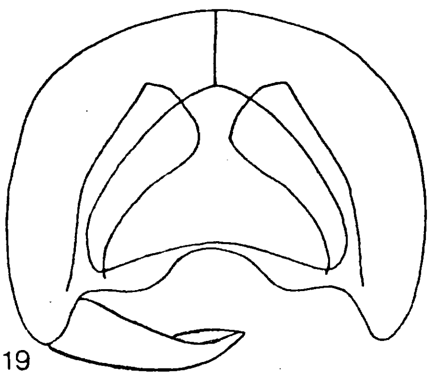

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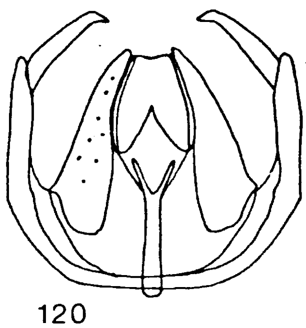

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122 *Tricimba cincta* IX tergite Wick Pond, Virginia Water, Surrey 23.viii.1971 J.W.I.

123 *T. cincta* hypandrium Wick Pond, Virginia Water, Surrey 25.viii.1971 J.W.I.

124 *T. cincta* edita Wick Pond, Virginia Water, Surrey 25.viii.1971 J.W.I.

125 *T. lineela* IX tergite Egham, Surrey 30.vi.1971 J.W.I.

126 *T. lineela* hypandrium Egham, Surrey 30.vi.1971 J.W.I.

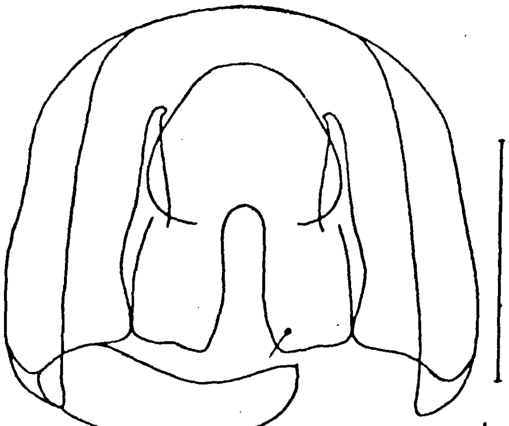
127 *T. lineela* edita Egham, Surrey 30.vi.1971 J.W.I.

128 *T. brachyptera* IX tergite Lakenheath, Suffolk 19.xii.1974 J.W.I.

129 *T. brachyptera* hypandrium Lakenheath, Suffolk 19.xii.1974 J.W.I.

130 *T. brachyptera* edita Lakenheath, Suffolk 19.xii.1974 J.W.I.

131 *T. brachyptera* wing Lakenheath, Suffolk 19.xii.1974 J.W.I.



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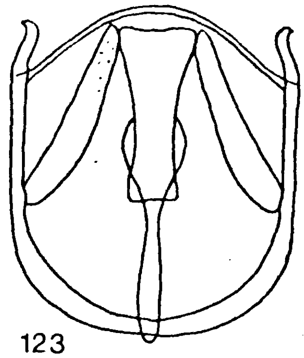

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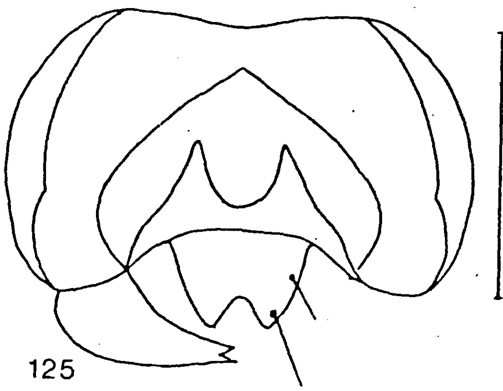

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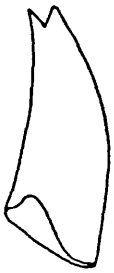

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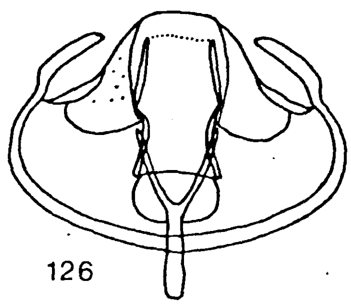

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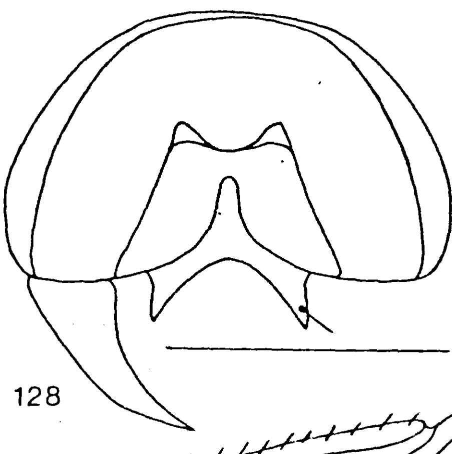

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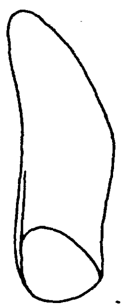

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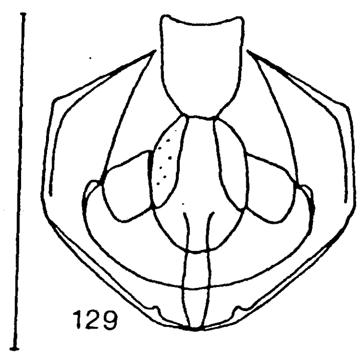

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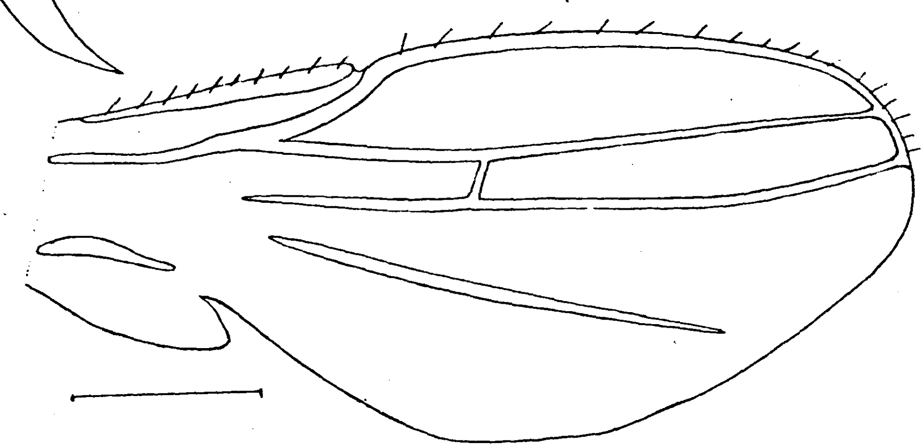

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132 *Dicraeus raptus* IX tergite Charlton Forest, Sussex 30.vii.1972 J.W.I.

133 *D. raptus* IX tergite lateral view from Nartshuk 1967

134 *D. raptus* hypandrium Charlton Forest, Sussex 30.vii.1972 J.W.I.

135 *D. ingratus* IX tergite Box Hill, Surrey 14.vi.1972 J.W.I.

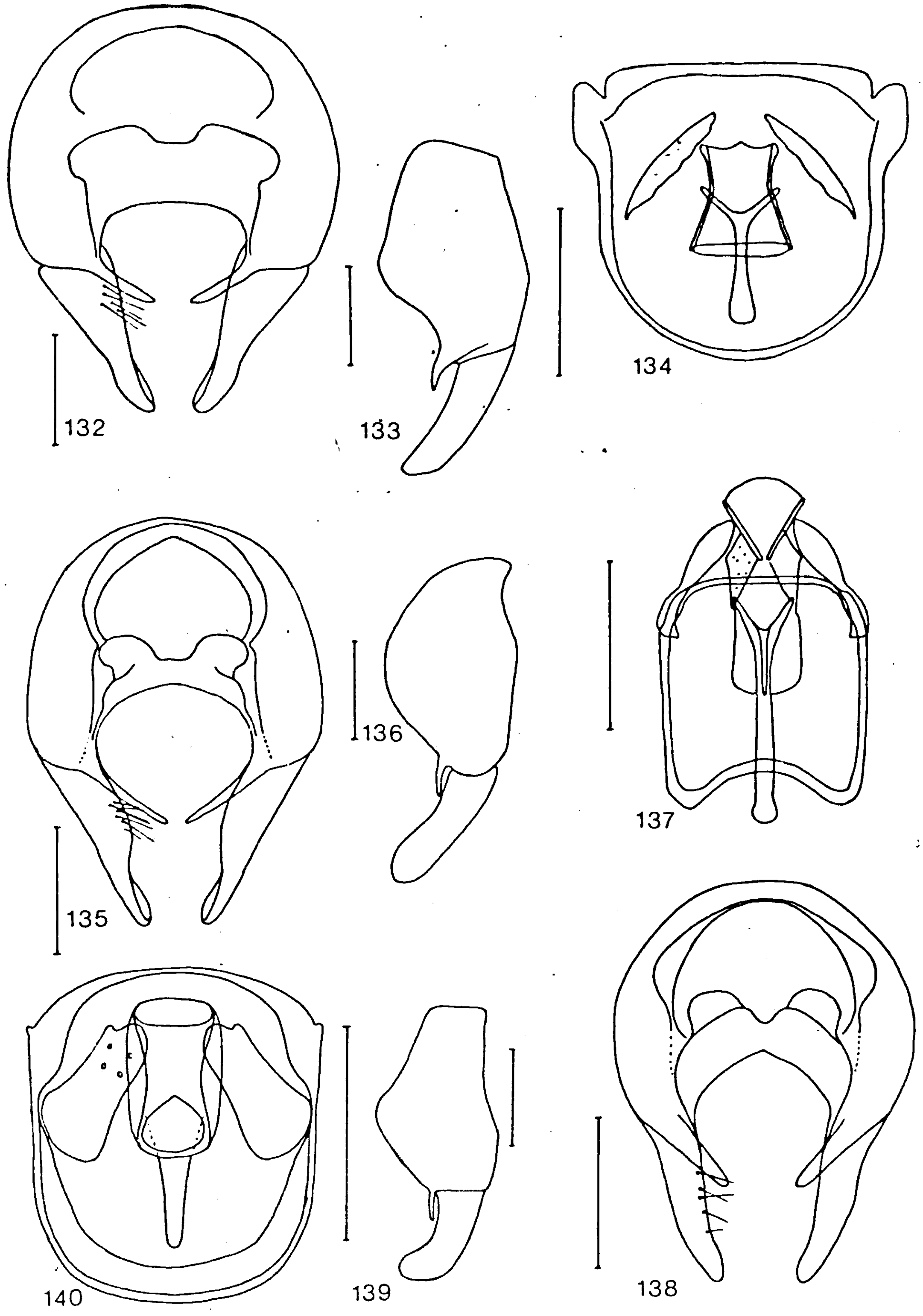
136 *D. ingratus* IX tergite lateral view from Nartshuk 1967.

137 *D. ingratus* hypandrium Box Hill, Surrey 14.vi.1972 J.W.I.

138 *D. tibialis* IX tergite ? Hereford 27.v.1912 J.H.W.

139 *D. tibialis* IX tergite lateral view from Nartshuk 1967

140 *D. tibialis* hypandrium ? Hereford 27. v.1912 J.H.W.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141 *Dicraeus* *styriacus* IX tergite Box Hill, Surrey
14.vi.1972 J.W.I.

142 *D. opacus* IX tergite lateral view from Collin
(1946) as *D. styriacus*

143 *D. styriacus* hypandrium Box Hill, Surrey
5.vi.1972 J.W.I.

144 *D. styriacus* edita Box Hill, Surrey
5.vi.1972 J.W.I.

145 *D. opacus* IX tergite Box Hill, Surrey
14.vi.1972 J.W.I.

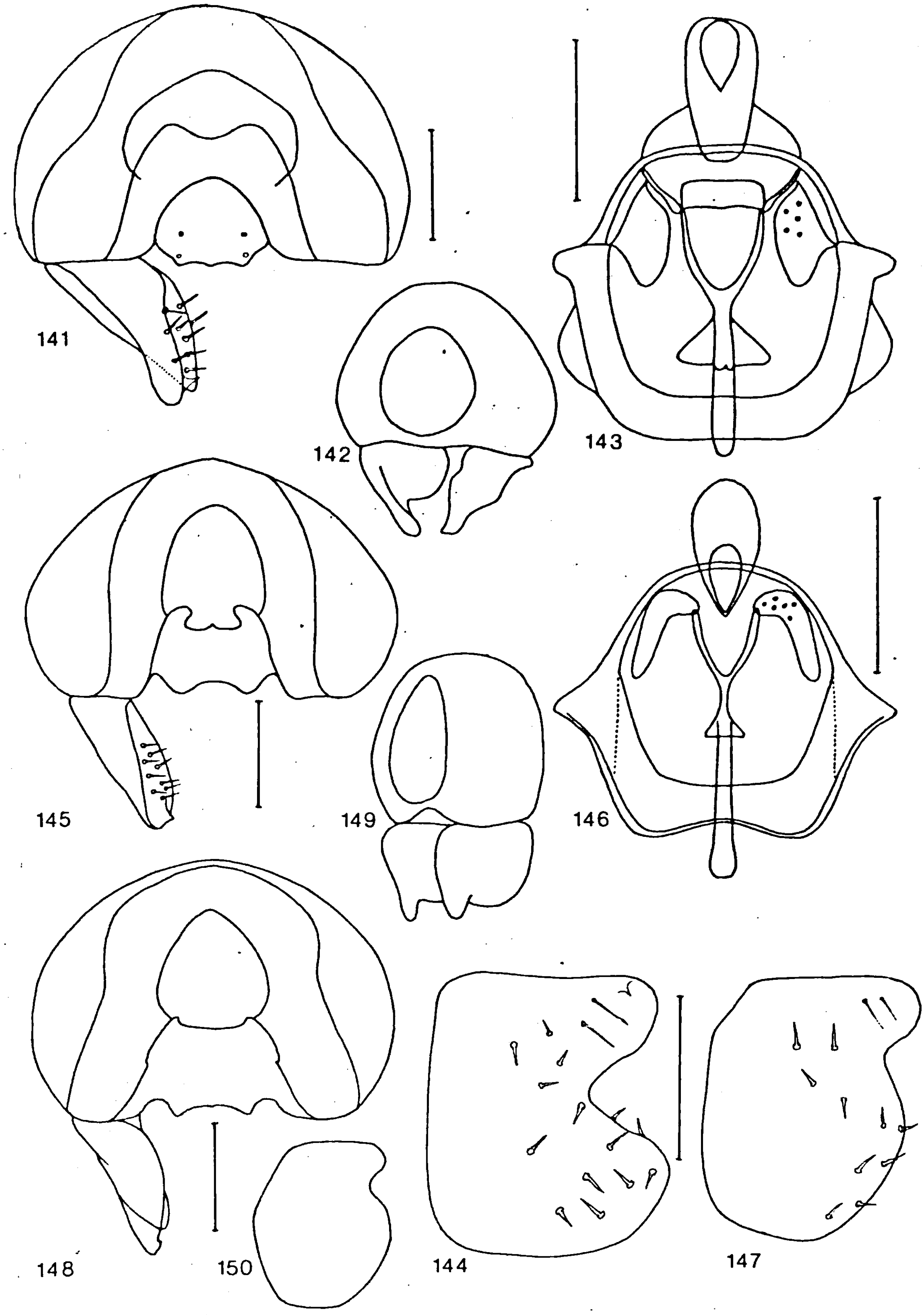
146 *D. opacus* hypandrium Box Hill, Surrey
14.vi.1972 J.W.I.

147 *D. opacus* edita Box Hill, Surrey
14.vi.1972 J.W.I.

148 *D. napaeus* IX tergite Cornbury Park, Oxon.
4.vii.1904 J.E.C.

149 *D. napaeus* IX tergite after Collin (1946)

150 *D. napaeus* edita Cornbury Park, Oxon.
4.vii.1904 J.E.C.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151 Dicraeus vagans IX tergite Box Hill, Surrey
14.vi.1972 J.W.I.

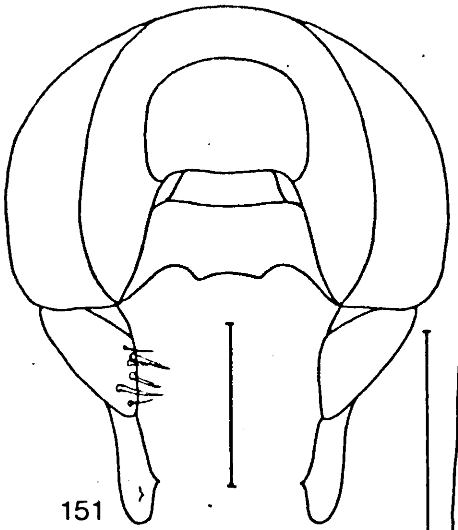
152 D. vagans hypandrium Box Hill, Surrey
14.vi.1972 J.W.I.

153 D. vagans edita Box Hill, Surrey
14.vi.1972 J.W.I.

154 D. fennicus IX tergite Arne, Dorset
15.vii.1972 J.W.I.

155 D. fennicus hypandrium Arne, Dorset
15.vii.1972 J.W.I.

156 D. scibilis IX tergite Orford, Suffolk
5.vii.1908 J.J.F.X.K.



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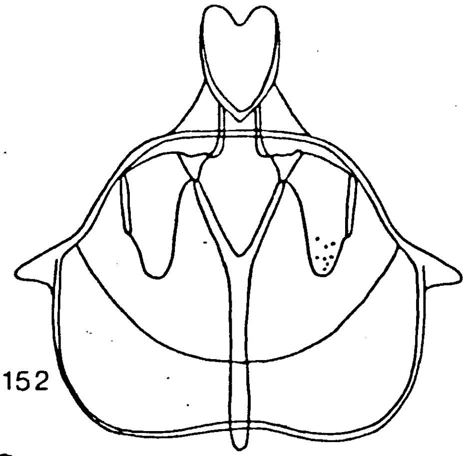

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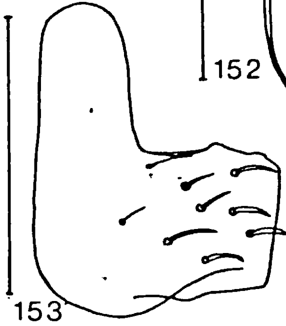

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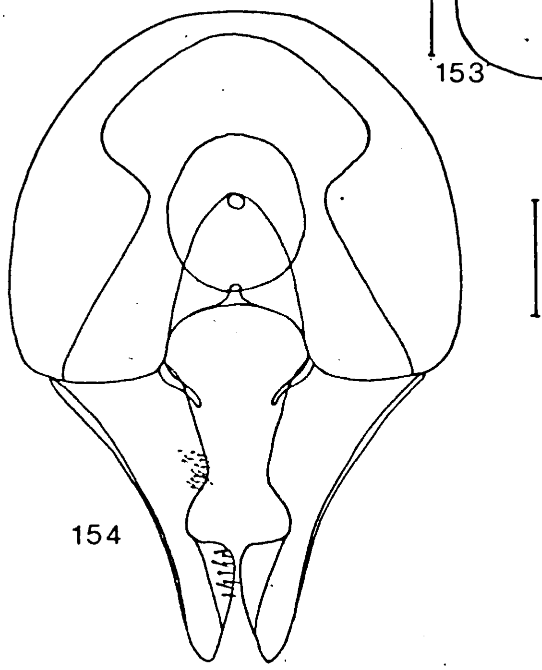

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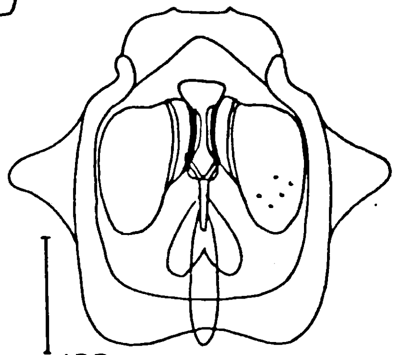

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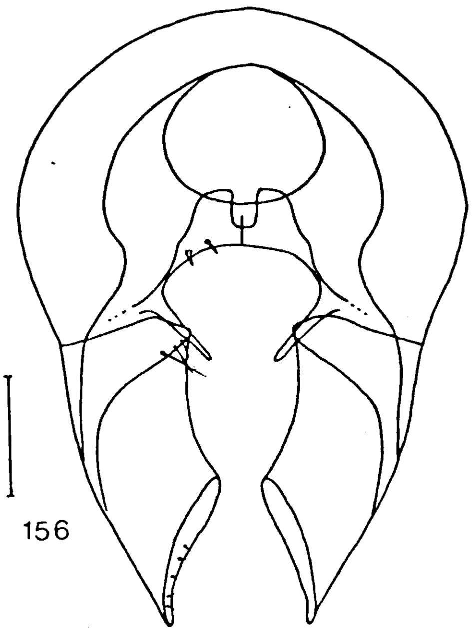

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157 *Tropidoscinis antennata* IX tergite Egham, Surrey
21.vi.1971 J.W.I.

158 *T. antennata* hypandrium Egham, Surrey
21.vi.1971 J.W.I.

159 *T. antennata* edita Egham, Surrey
21.vi.1971 J.W.I.

160 *T. albipalpis* IX tergite Egham, Surrey
22.vi.1971 J.W.I.

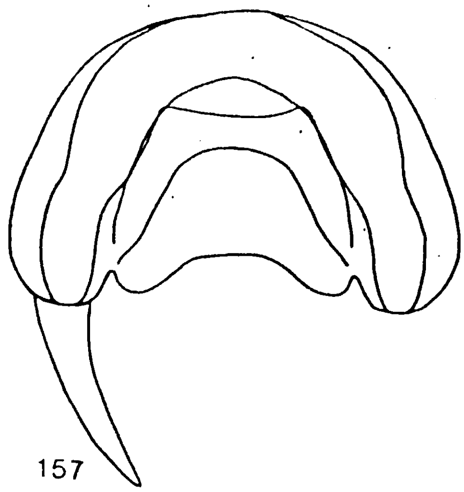
161 *T. albipalpis* hypandrium Egham, Surrey
22.vi.1971 J.W.I.

162 *T. albipalpis* edita Egham, Surrey
22.vi.1971 J.W.I.

163 *T. kertezi* IX tergite Egham, Surrey
23.vi.1971 J.W.I.

164 *T. kertezi* hypandrium Egham, Surrey
23.vi.1971 J.W.I.

165 *T. kertezi* edita Egham, Surrey
28.vi.1971 J.W.I.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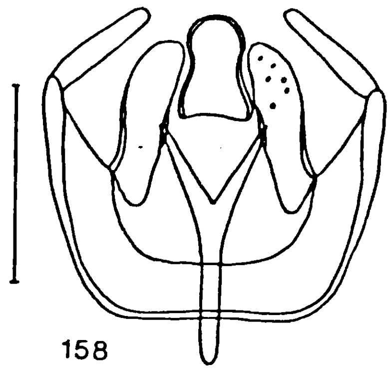
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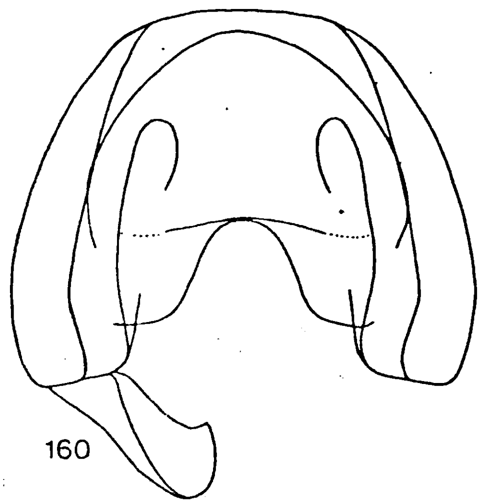
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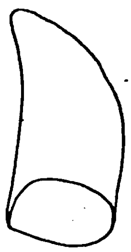
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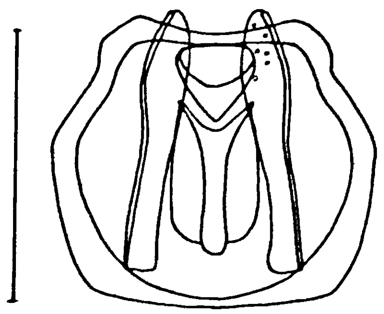
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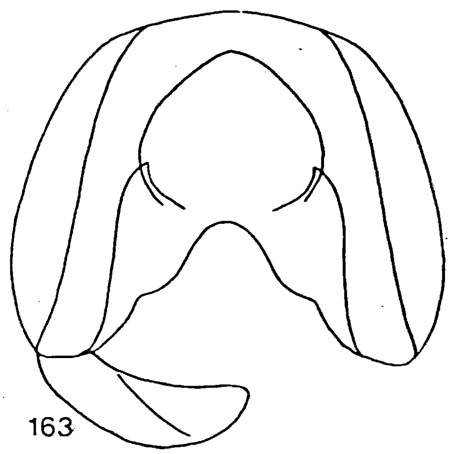
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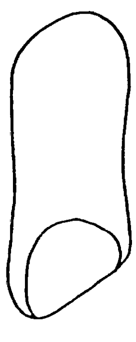
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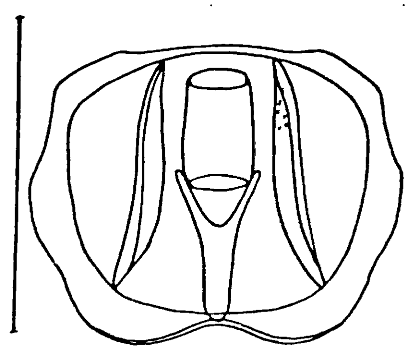
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166 *Tropidoscinis nigrifrons* IX tergite Flatford, Suffolk 16.vii.1951 L.P.

167 *T. nigrifrons* hypandrium Flatford, Suffolk 16.vii.1951 L.P.

168 *T. nigrifrons* edita Flatford, Suffolk 16.vii.1951 L.P.

169 *Oscinella zurcheri* IX tergite Earlham, Norfolk 16.vi.1974 J.W.I.

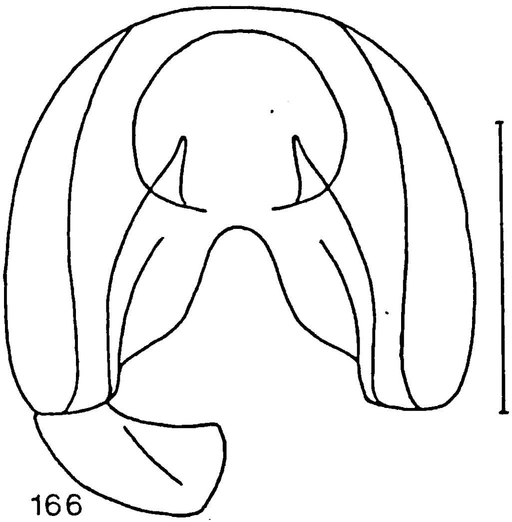
170 *O. zurcheri* hypandrium Earlham, Norfolk 16.vi.1974 J.W.I.

171 *O. zurcheri* edita Earlham, Norfolk 16.vi.1974 J.W.I.

172 *O. maura* IX tergite Chobham Common, Surrey 18.vi.1971 J.W.I.

173 *O. maura* hypandrium Chobham Common, Surrey 18.vi.1971 J.W.I.

174 *O. maura* edita Chobham Common, Surrey 18.vi.1971 J.W.I.



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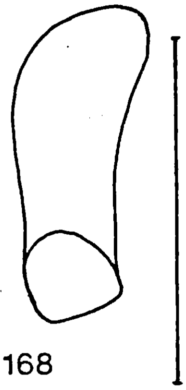

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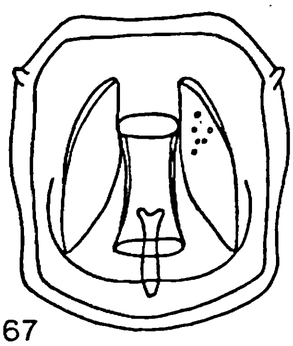

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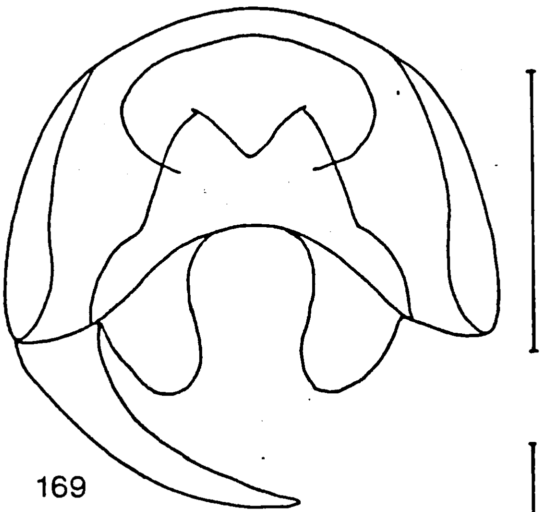

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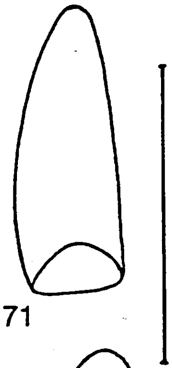

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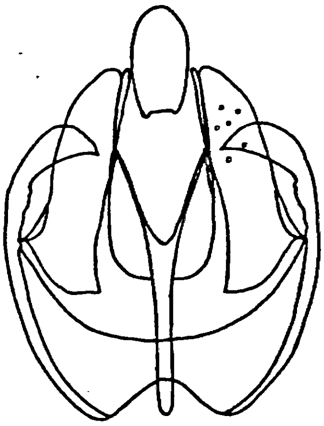

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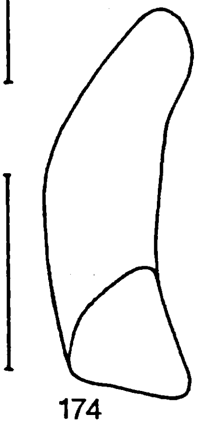

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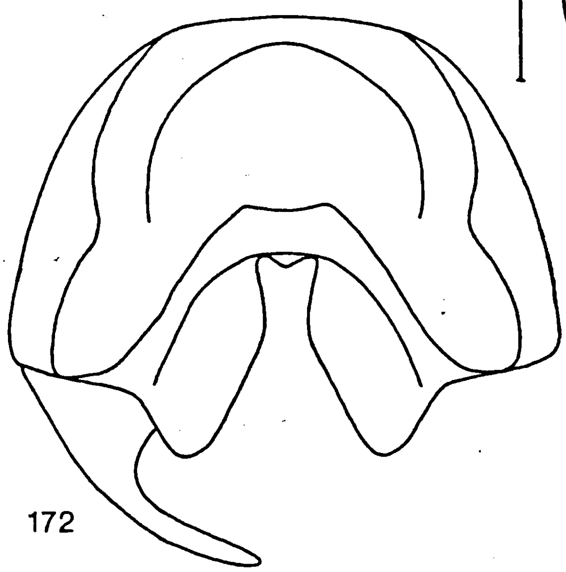

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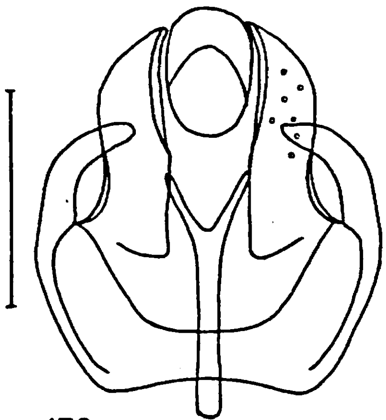

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175 Oscinella angustipennis IX tergite Earlham, Norfolk 7.vii.1974 J.W.I.

176 O. angustipennis hypandrium Earlham, Norfolk 7.vii.1974 J.W.I.

177 O. angustipennis edita Earlham, Norfolk 7.vii.1974 J.W.I.

178 O. trochanterata IX tergite Keswick, Norfolk 24.vi.1974 J.W.I.

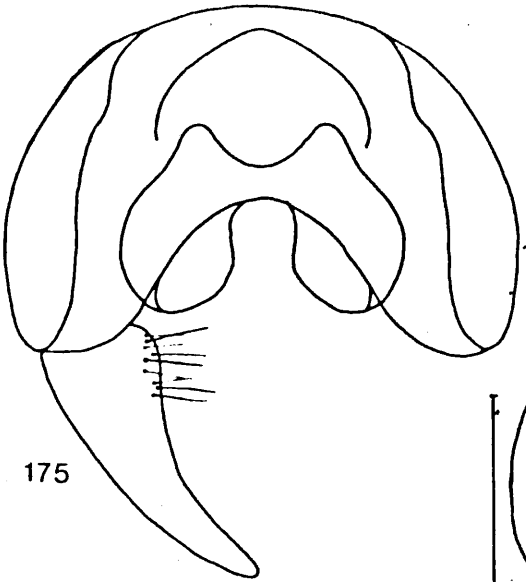
179 O. trochanterata hypandrium Keswick, Norfolk 15.vi.1974 J.W.I.

180 O. trochanterata edita Virginia Water, Surrey 6.ix.1971 J.W.I.

181 O. angularis IX tergite The Cut, Rhyl, Wales 30.viii.1968 B.H.C.

182 O. angularis hypandrium The Cut, Rhyl, Wales 30.viii.1968 B.H.C.

183 O. angularis edita The Cut, Rhyl, Wales 30.viii.1968 B.H.C.



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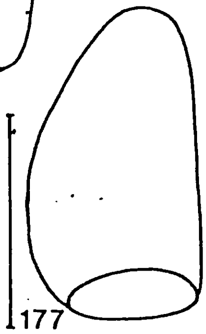

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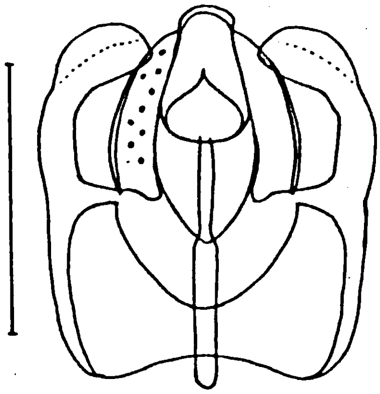

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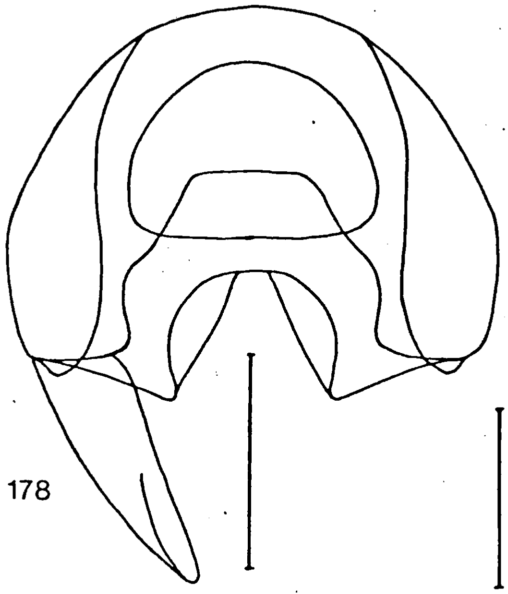

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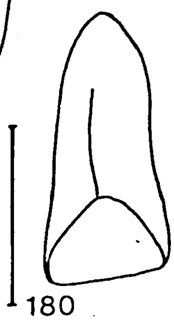

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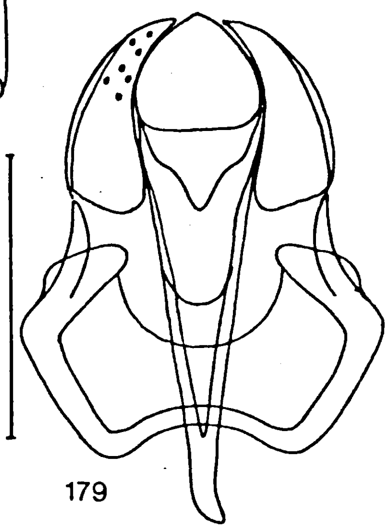

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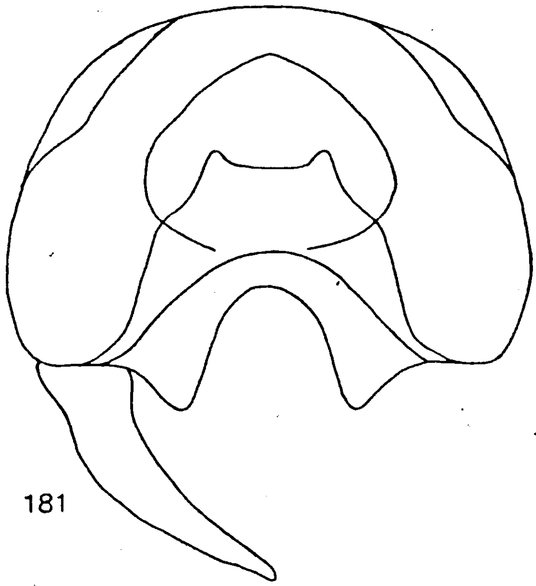

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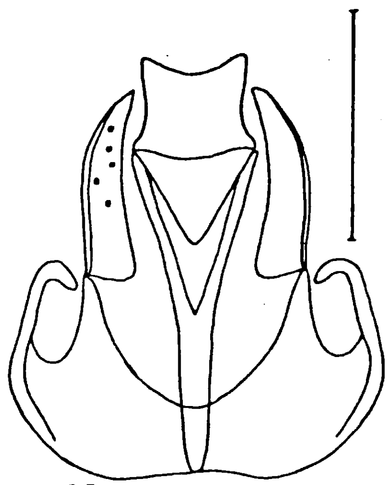

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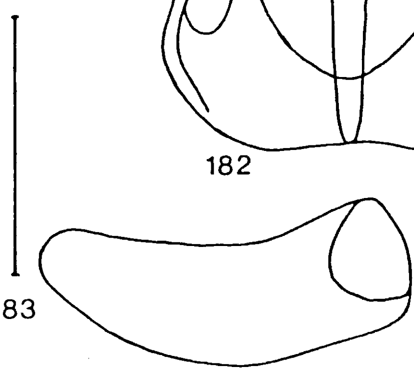

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184 *Oscinella posticata* IX tergite Earlham, Norfolk
15.vi.1974 J.W.I.

185 *O. posticata* hypandrium Earlham, Norfolk
15.vi.1974 J.W.I.

186 *O. posticata* edita Earlham, Norfolk
15.vi.1974 J.W.I.

187 *O. nitidissima* IX tergite Earlham, Norfolk
15.vi.1974 J.W.I.

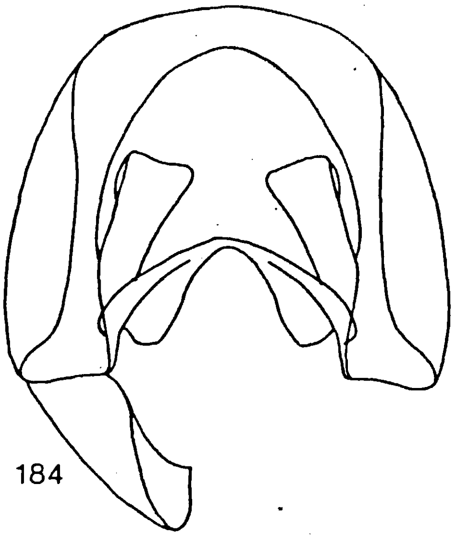
188 *O. nitidissima* hypandrium Egham, Surrey
17. v.1971 J.W.I.

189 *O. nitidissima* edita Egham, Surrey
17. v.1971 J.W.I.

190 *O. nitidissima* form *trigonella* IX tergite
Virginia Water, Surrey 5.x.1972 J.W.I.

191 *O. nitidissima* form *trigonella* hypandrium
Virginia Water, Surrey 5.x.1972 J.W.I.

192 *O. nitidissima* form *trigonella* edita
Keswick, Norfolk 24.vi.1974 J.W.I.



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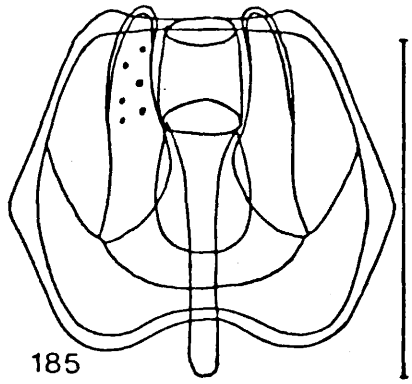

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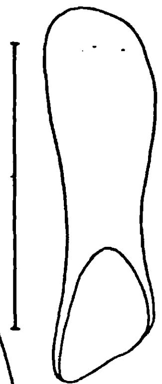

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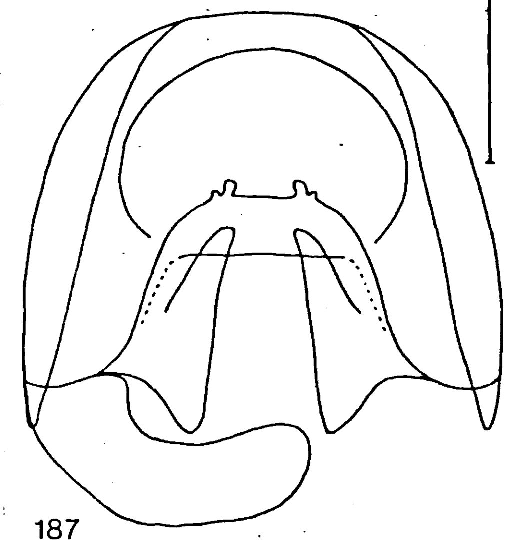

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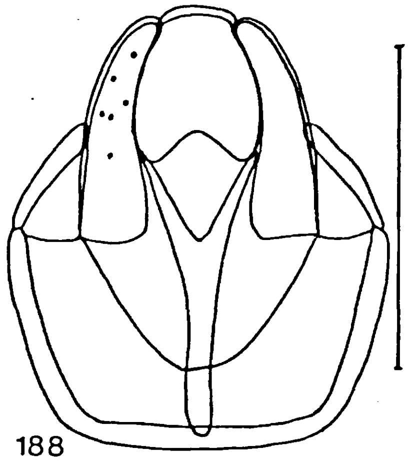

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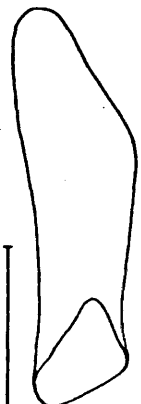

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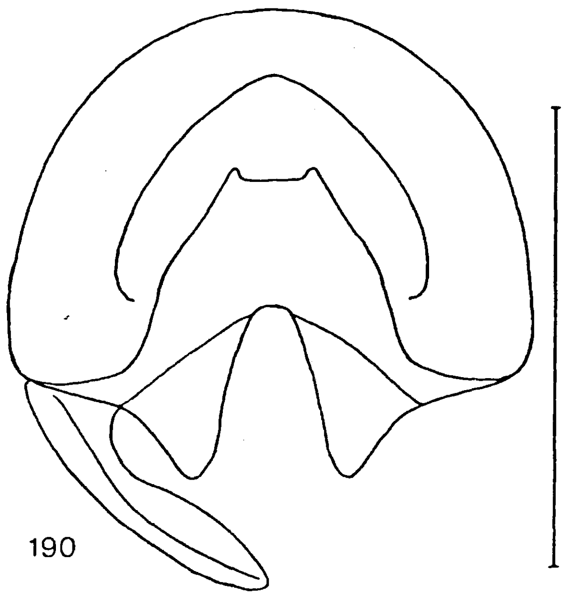

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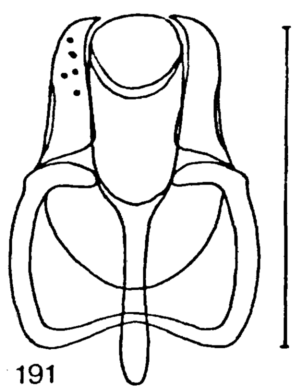

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193 <u>Oscinella</u> <u>cariciphila</u> IX tergite Totton, Hants.
27.vi.1952 C.R.V.

194 <u>O.</u> <u>cariciphila</u> hypandrium Totton, Hants.
27.vi.1952 C.R.V.

195 <u>O.</u> <u>grossa</u> IX tergite Cringleford, Norfolk
13.vi.1974 J.W.I.

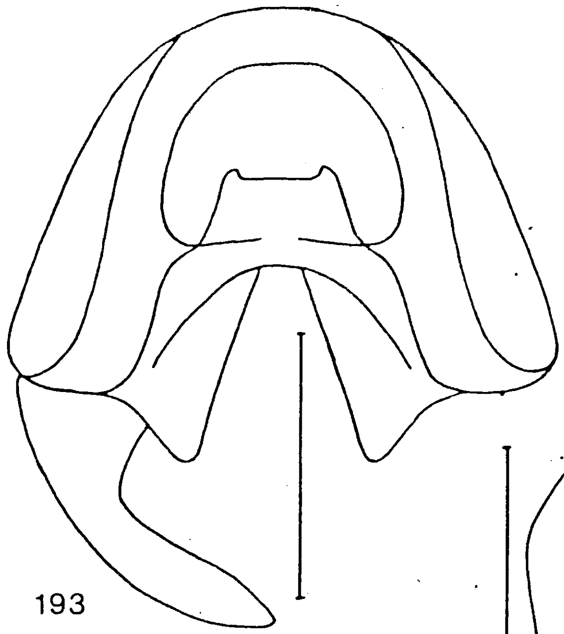
196 <u>O.</u> <u>grossa</u> hypandrium Cringleford, Norfolk
13.vi.1974 J.W.I.

197 <u>O.</u> <u>grossa</u> edita Cringleford, Norfolk
13.vi.1974 J.W.I.

198 <u>O.</u> <u>pusilla</u> IX tergite Arne, Dorset
2.viii.1971 A.J.P.

199 <u>O.</u> <u>pusilla</u> hypandrium Arne, Dorset
2.viii.1971 A.J.P.

200 <u>O.</u> <u>pusilla</u> edita Arne, Dorset 2.viii.1971 A.J.P.



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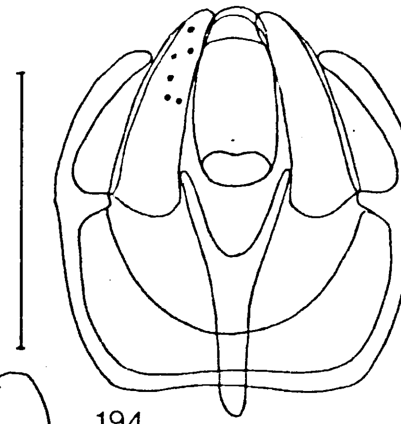

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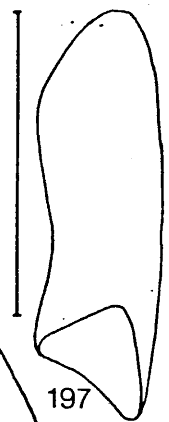

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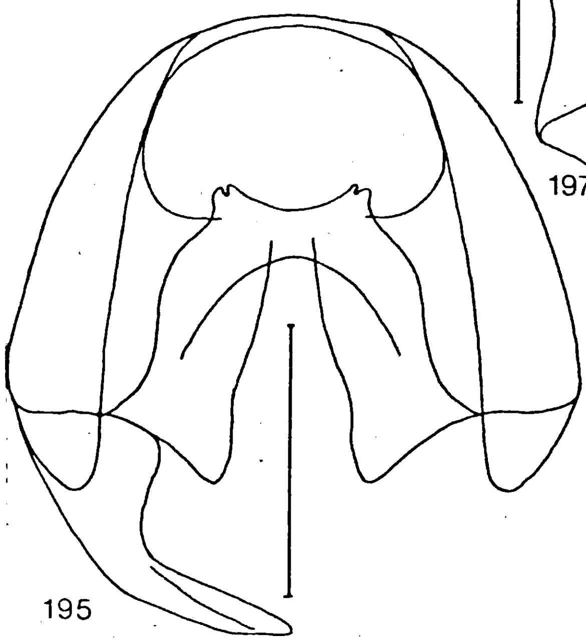

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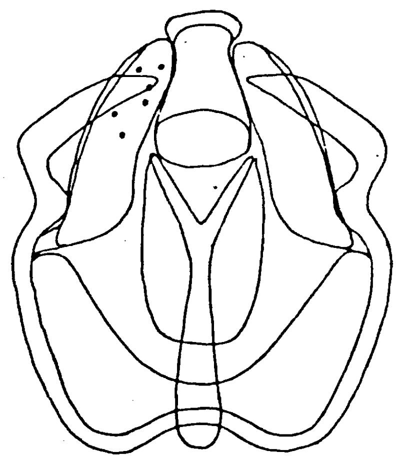

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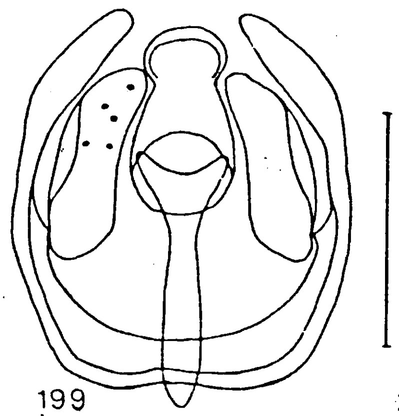

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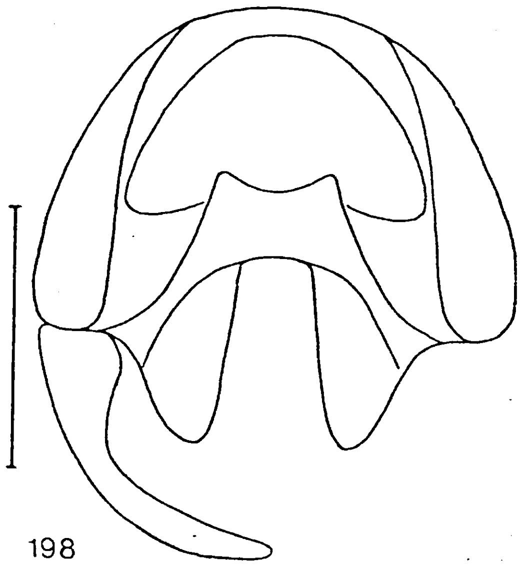

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201 <u>Oscinella pusilla</u> IX tergite Keswick, Norfolk 24.vi.1974 J.W.I.

202 <u>O. pusilla</u> hypandrium Keswick, Norfolk 24.vi.1974 J.W.I.

203 <u>O. pusilla</u> edita Keswick, Norfolk 24.vi.1974 J.W.I.

204 <u>O. nigerrima</u> IX tergite Egham, Surrey 20.iv.1971 J.W.I.

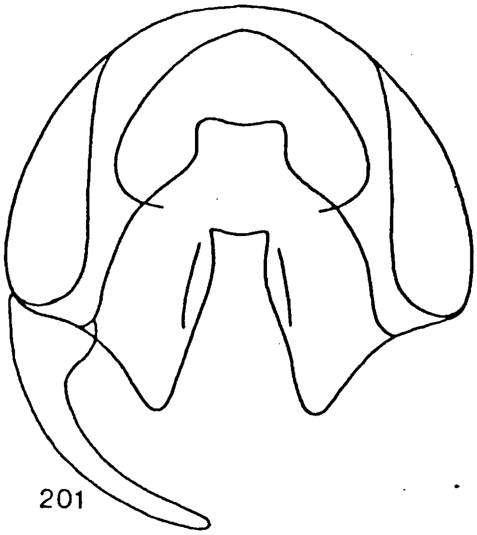
205 <u>O. nigerrima</u> hypandrium Egham, Surrey 20.iv.1971 J.W.I.

206 <u>O. nigerrima</u> edita Egham, Surrey 20.iv.1971 J.W.I.

207 <u>O. frit</u> IX tergite Egham, Surrey 30.vi.1971 J.W.I.

208 <u>O. frit</u> hypandrium Egham, Surrey 30.vi.1971 J.W.I.

209 <u>O. frit</u> edita Egham, Surrey 30.vi.1971 J.W.I.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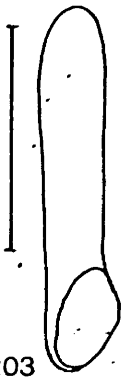
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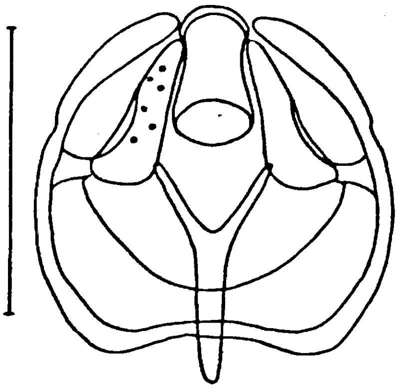
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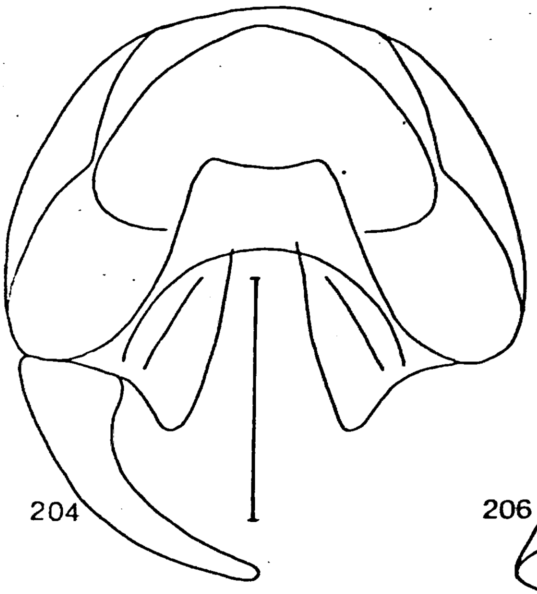
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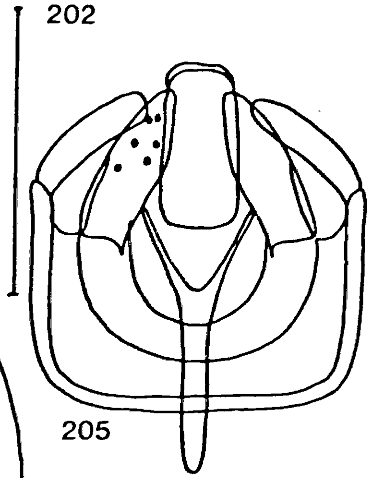
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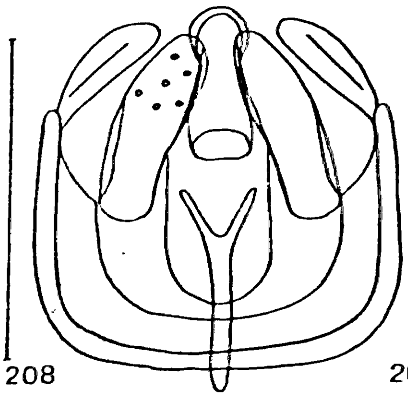
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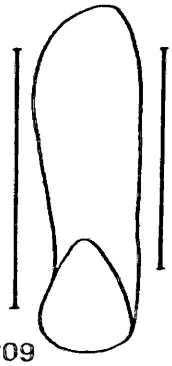
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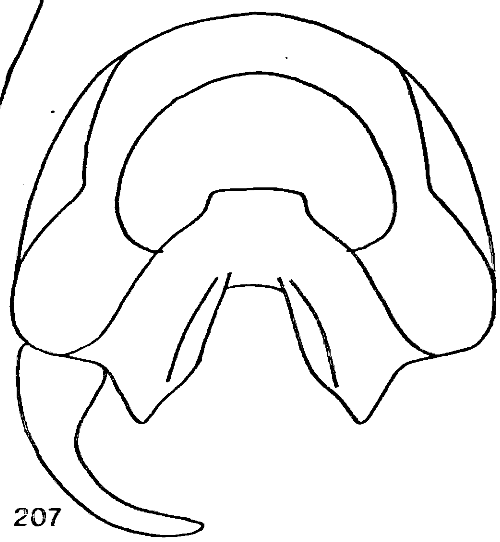
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210 *Lioscinella anthracina* IX tergite Barton Mills, Suffolk 29.v.1933 J.E.C.

211 *L. anthracina* hypandrium Barton Mills, Suffolk 29.v.1933 J.E.C.

212 *L. anthracina* edita Barton Mills, Suffolk 29.v.1933 J.E.C.

213 *L. atricornis* IX tergite Loch Garten, Inverness 25.vi.1938 J.E.C.

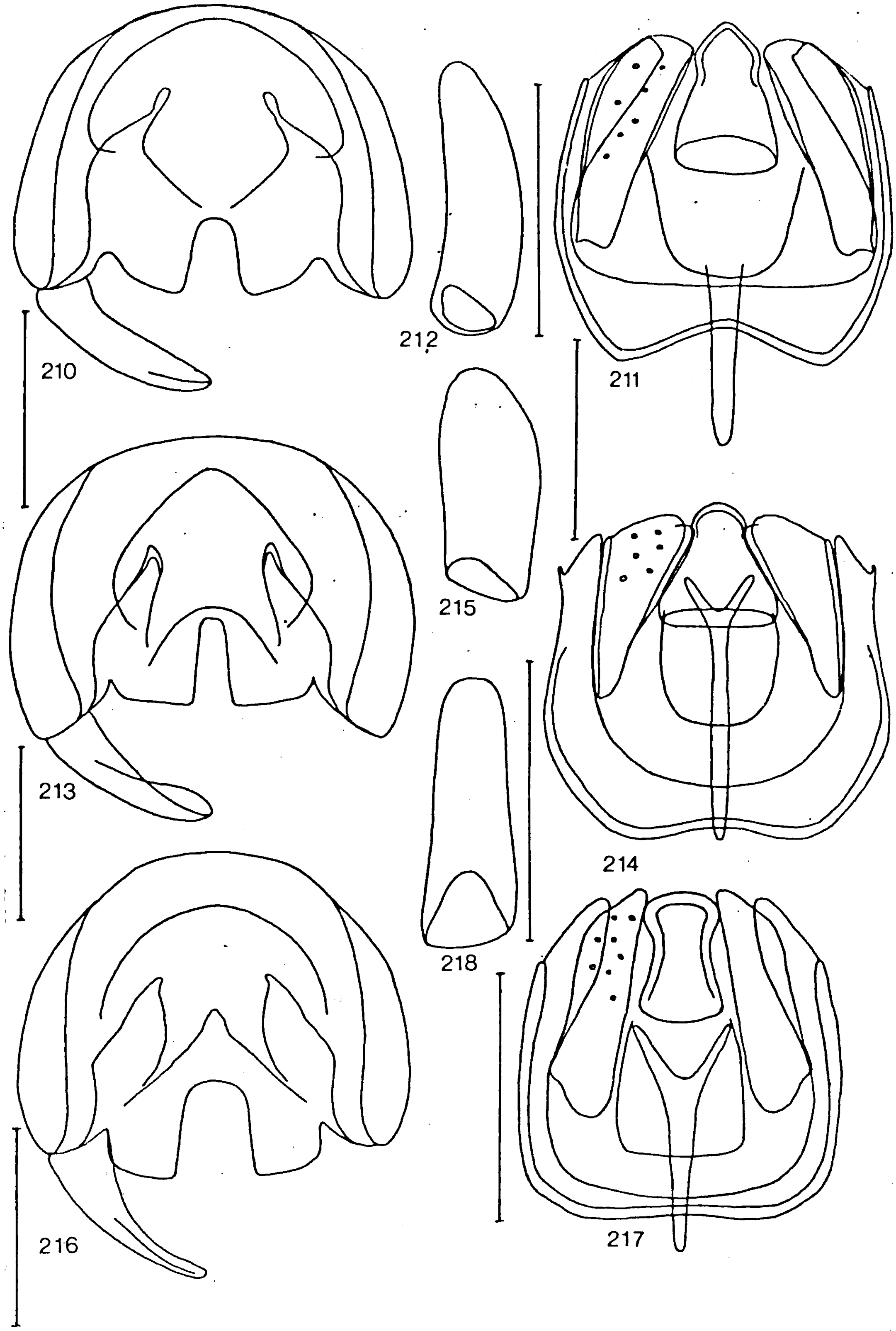
214 *L. atricornis* hypandrium Loch Garten, Inverness 25.vi.1938 J.E.C.

215 *L. atricornis* edita Loch Garten, Inverness 25.vi.1938 J.E.C.

216 *L. fasciola* IX tergite Egham, Surrey v.1971 J.W.I.

217 *L. fasciola* hypandrium Egham, Surrey v.1971 J.W.I.

218 *L. fasciola* edita Egham, Surrey v.1971 J.W.I.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219 *Lioscinella femoralis* IX tergite Egham, Surrey
2.vi.1972 J.W.I.

220 *L. femoralis* hypandrium Egham, Surrey
2.vi.1972 J.W.I.

221 *L. femoralis* edita Egham, Surrey
2.vi.1972 J.W.I.

222 *L. atricilla* IX tergite Aviemore, Inverness
31.v.1904 J.W.Y.

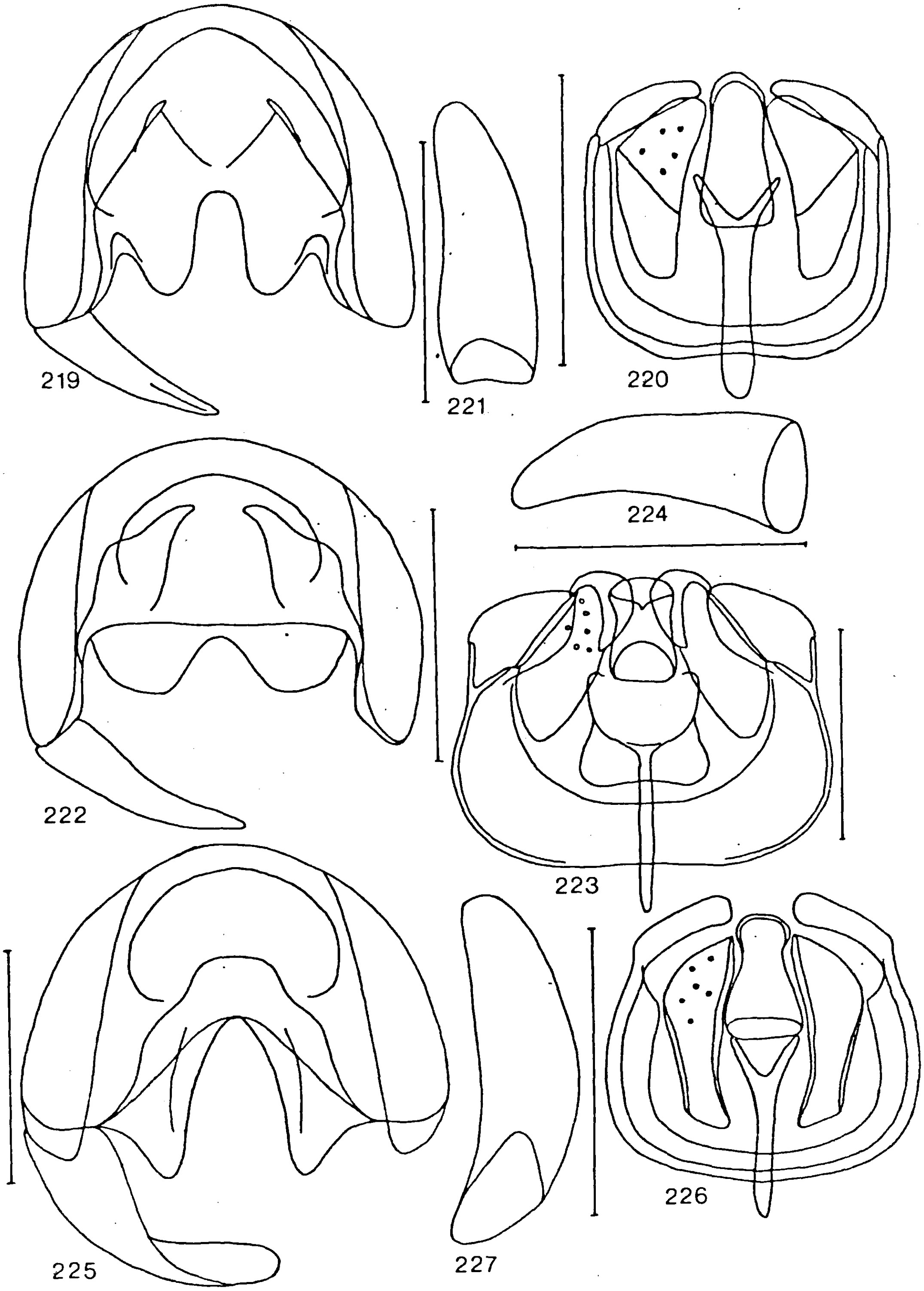
223 *L. atricilla* hypandrium Aviemore, Inverness
31.v.1904 J.W.Y.

224 *L. atricilla* edita Aviemore, Inverness
31.v.1904 J.W.Y.

225 *Melanochaeta capreola* IX tergite Seamere, Norfolk 26.v.1974 J.W.I.

226 *M. capreola* hypandrium Seamere, Norfolk
26.v.1974 J.W.I.

227 *M. capreola* edita Seamere, Norfolk
26.v.1974 J.W.I.



219 221 220

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225 227 226

228 Oscinisoma germanica IX tergite Obelisk Pond, Windsor Park, Berks. 31.v.1973 J.W.I.

229 O. germanica hypandrium Obelisk Pond, Windsor Park, Berks. 31.v.1973 J.W.I.

230 O. germanica edita Obelisk Pond, Windsor Park, Berks. 31.v.1973 J.W.I.

231 O. cognata IX tergite Egham, Surrey 29.iv.1971 J.W.I.

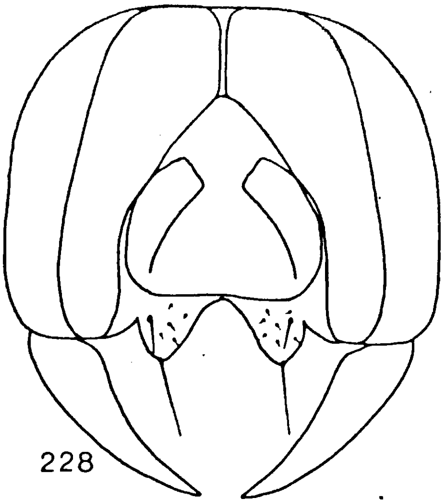
232 O. cognata hypandrium Egham, Surrey 29.iv.1971 J.W.I.

233 O. cognata edita Egham, Surrey 29.iv.1971 J.W.I.

234 O. gilvipes IX tergite Hardley Floods, Norfolk 29.x.1973 J.W.I.

235 O. gilvipes hypandrium Hardley Floods, Norfolk 29.x.1973 J.W.I.

236 O. gilvipes edita Hardley Floods, Norfolk 29.x.1973 J.W.I.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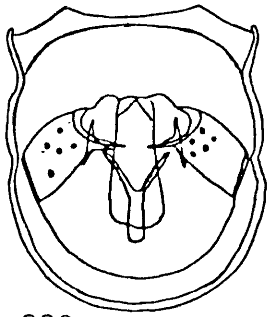
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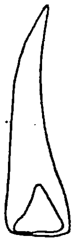
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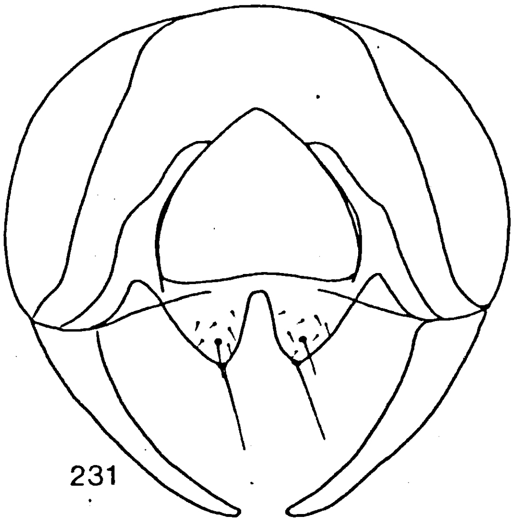
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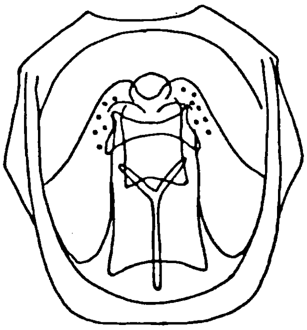
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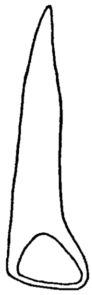
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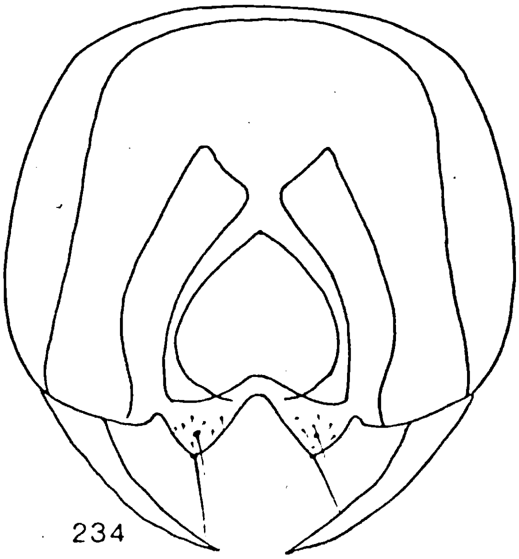
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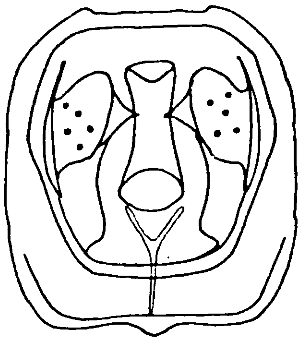
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236

237 Eribolus slesvicensis hypandrium Walton on Naze, Essex 20.vii.1912 J.E.C.

238 E. slesvicensis edita Walton on Naze, Essex 20.vii.1912 J.E.C.

239 E. nanus IX tergite Cliffords Castle, Herefordshire 13.viii.1902 J.W.Y.

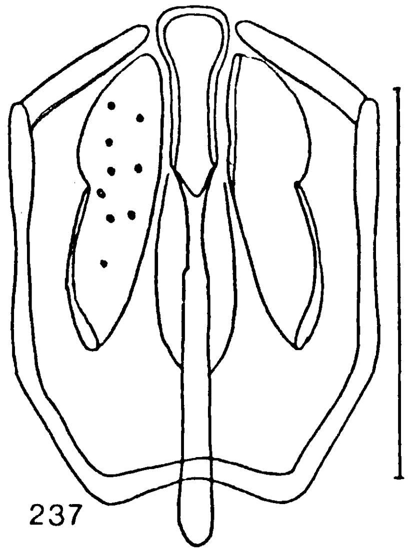
240 E. nanus hypandrium Cliffords Castle, Herefordshire 13.viii.1902 J.W.Y.

241 E. nanus edita Cliffords Castle, Herefordshire 13.viii.1902 J.W.Y.

242 E. hungaricus IX tergite Mudeford, Hampshire 13.vi.1947 J.E.C.

243 E. hungaricus hypandrium Mudeford, Hampshire 13.vi.1947 J.E.C.

244 E. hungaricus edita Orford, Suffolk 26.vi.1908 J.J.F.X.K.



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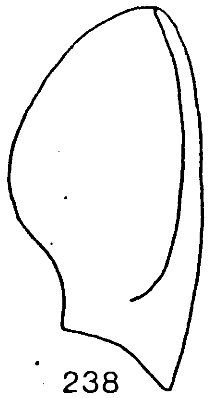

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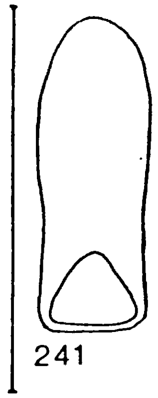

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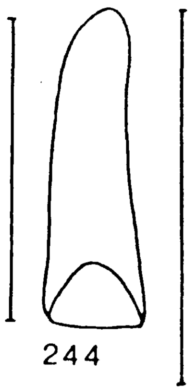

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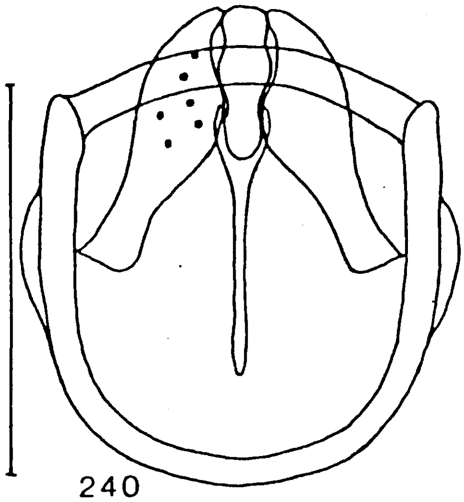

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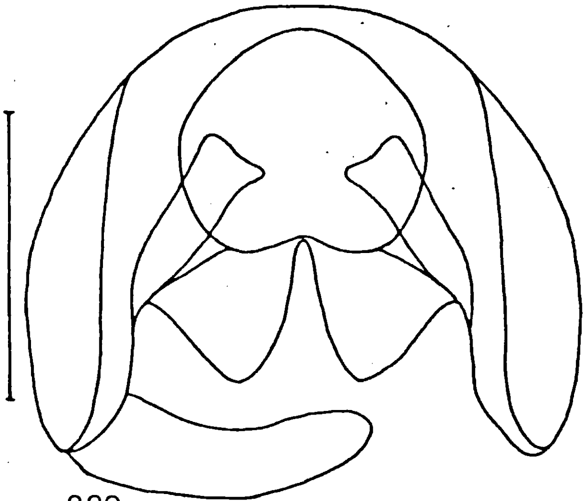

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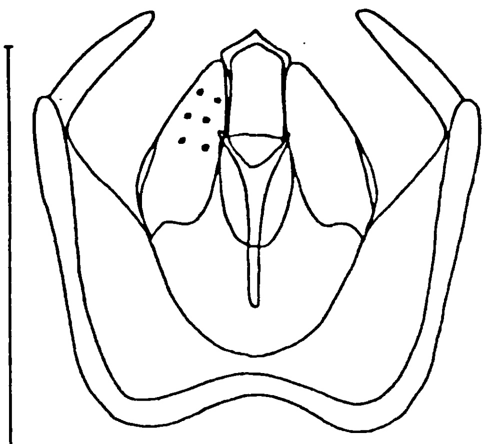

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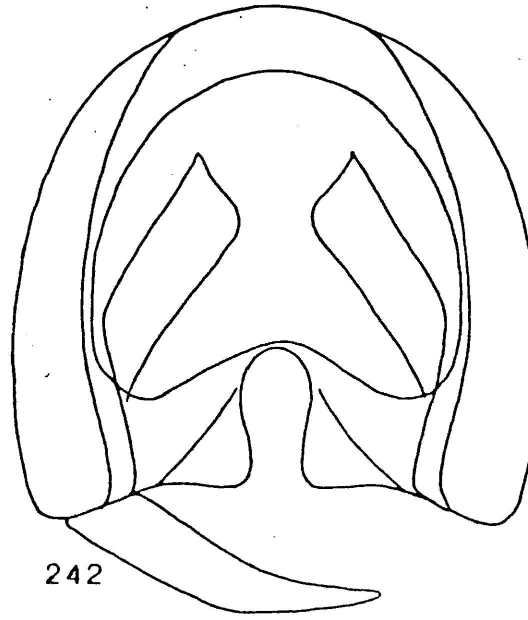


242

245 *Eribolus gracilior* IX tergite Newmarket, Suffolk
12.vi.1943 J.E.C.

246 *E. gracilior* hypandrium Newmarket, Suffolk
23.v.1943 J.E.C.

247 *E. gracilior* edita Newmarket, Suffolk
23.v.1943 J.E.C.

248 *Elachiptera pubescens* IX tergite Arne, Dorset
2.viii.1971 A.J.P.

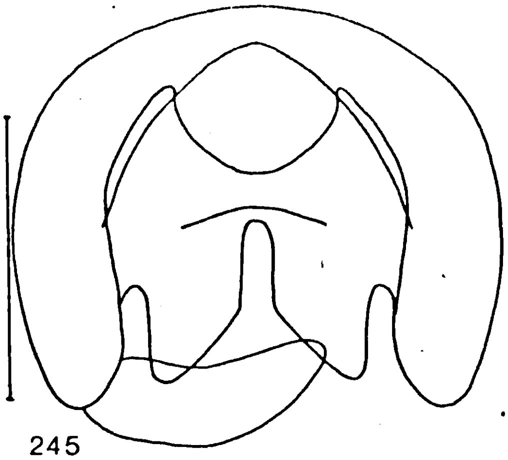
249 *E. pubescens* hypandrium Arne, Dorset
2.viii.1971 A.J.P.

250 *E. pubescens* edita Arne, Dorset
2.viii.1971 A.J.P.

251 *E. brevipennis* IX tergite Hengisbury Head,
Hants. 16.v.1972 J.W.I.

252 *E. brevipennis* hypandrium Hengistbury Head,
Hants. 16.v. 1972 J.W.I.

253 *E. brevipennis* edita Hengistbury Head, Hants.
16.v.1972 J.W.I.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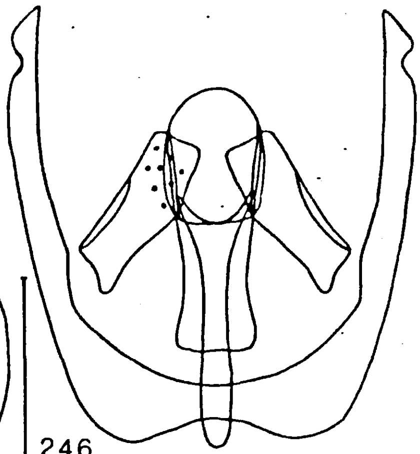
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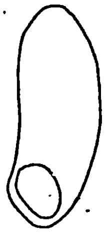
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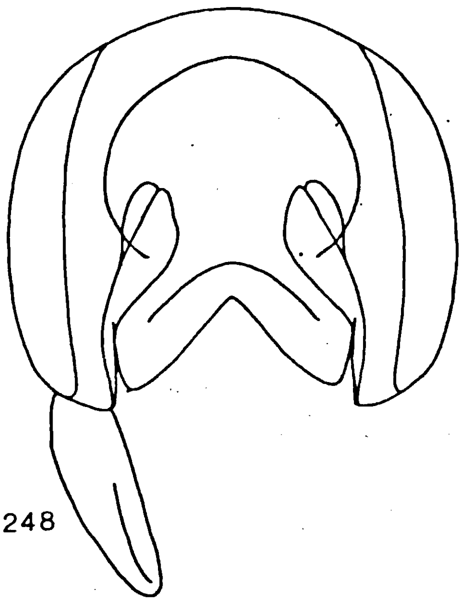
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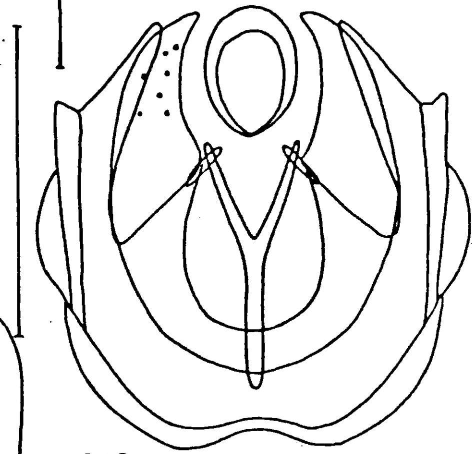
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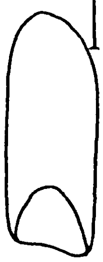
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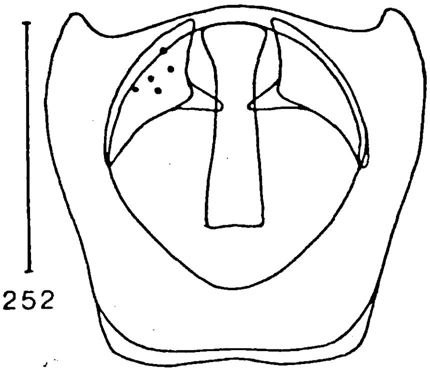
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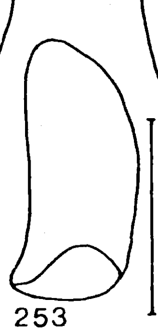
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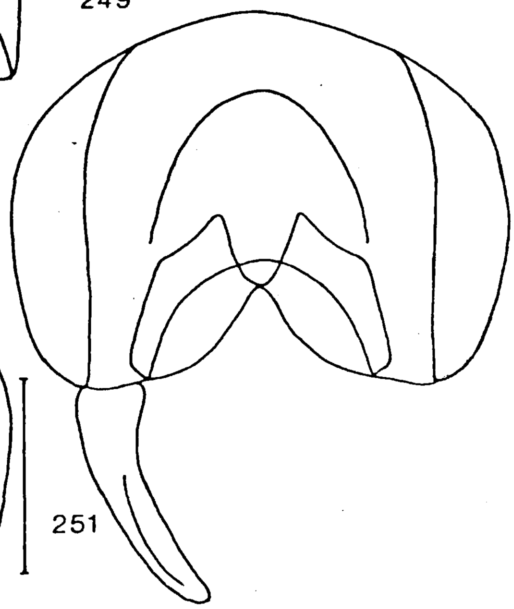
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254 Elachiptera bimaculata IX tergite Limasol, Cyprus ii.1934 G.M.

255 E. uniseta IX tergite Black Park, Bucks. vi.1933 E.B.B.

256 E. uniseta hypandrium Black Park, Bucks. vi.1933 E.B.B.

257 E. uniseta edita Frensham Little Pond, Surrey 16.iv.1973 J.W.I.

258 E. megaspis IX tergite Virginia Water, Surrey 23.viii.1971 J.W.I.

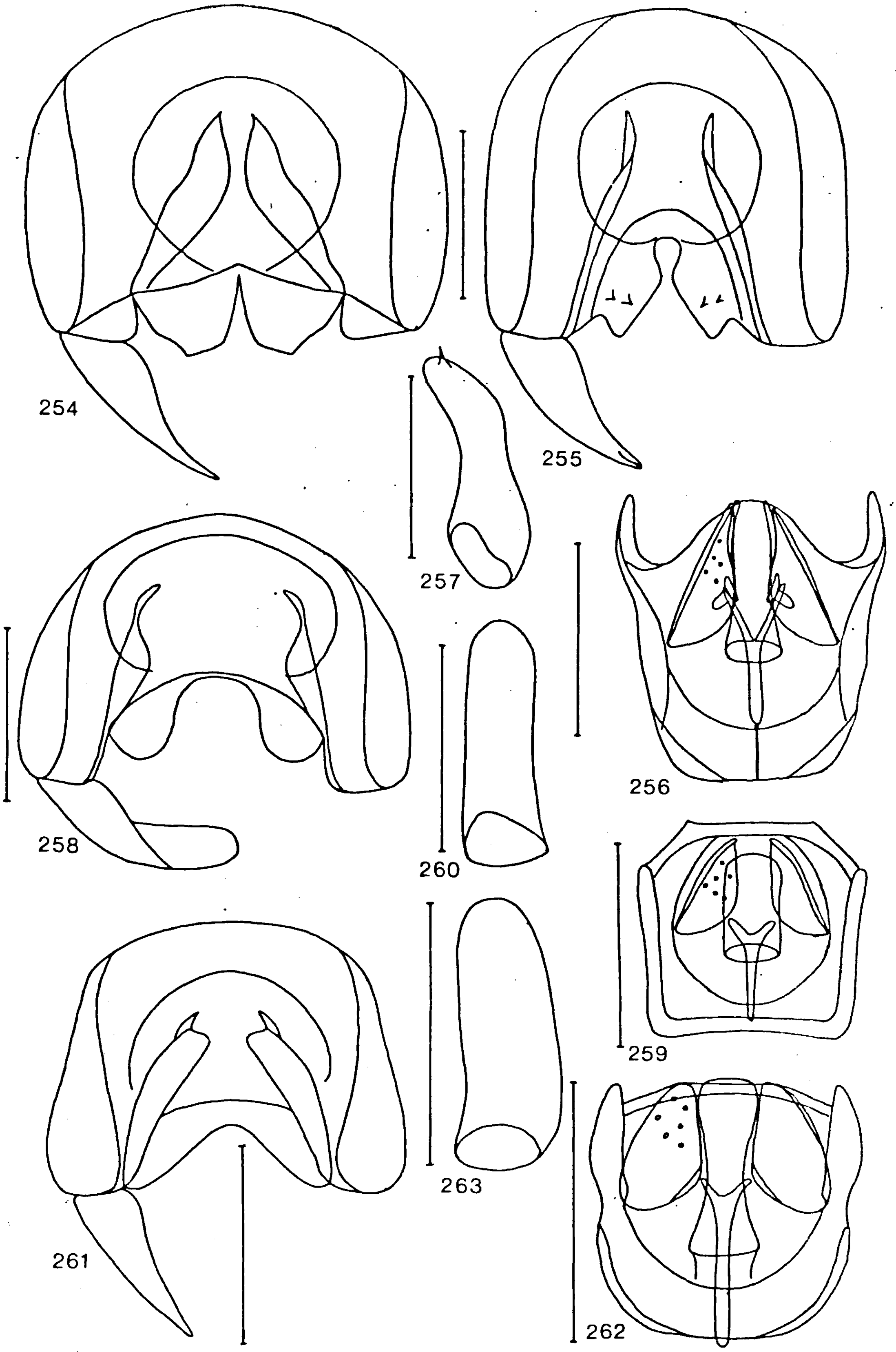
259 E. megaspis hypandrium Virginia Water, Surrey 23.viii.1971 J.W.I.

260 E. megaspis edita Virginia Water, Surrey 23.viii.1971 J.W.I.

261 E. scrobiculata IX tergite Frensham Little Pond, Surrey 16.iv.1973 J.W.I.

262 E. scrobiculata hypandrium Frensham Little Pond, Surrey 16.iv.1973 J.W.I.

263 E. scrobiculata edita Frensham Little Pond, Surrey 16.iv.1973 J.W.I.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264 *Elachiptera rufifrons* IX tergite Oare, Kent
3.viii.1937 J.E.C.

265 *E. rufifrons* hypandrium Oare, Kent
3.viii.1937 J.E.C.

266 *E. cornuta* IX tergite Frensham Little Pond,
Surrey 12.iii.1971 J.W.I.

267 *E. cornuta* hypandrium Egham, Surrey
29.iv.1971 J.W.I.

268 *E. cornuta* edita Frensham Little Pond, Surrey
12.iii.1971 J.W.I.

269 *E. diastema* IX tergite Wraysbury, Bucks.
11.iii.1973 J.W.I.

270 *E. diastema* hypandrium Wraysbury, Bucks.
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271 *E. diastema* edita Wraysbury, Bucks.
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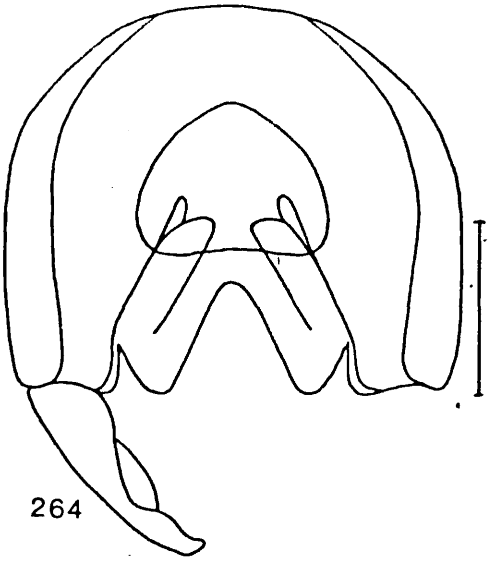

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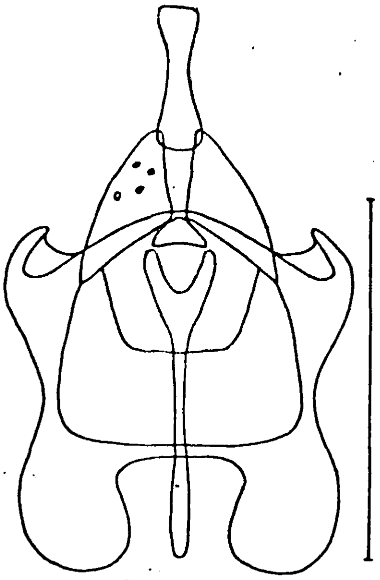

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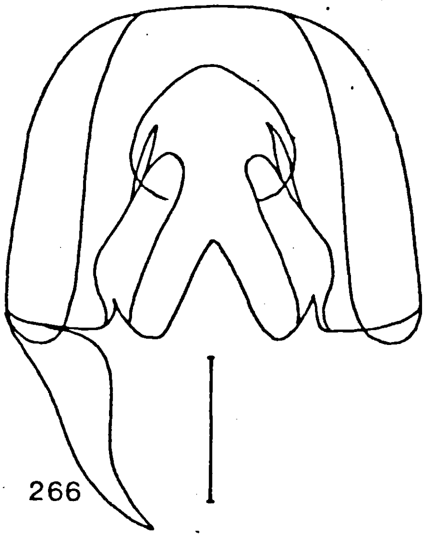

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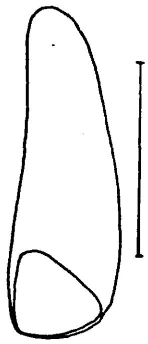

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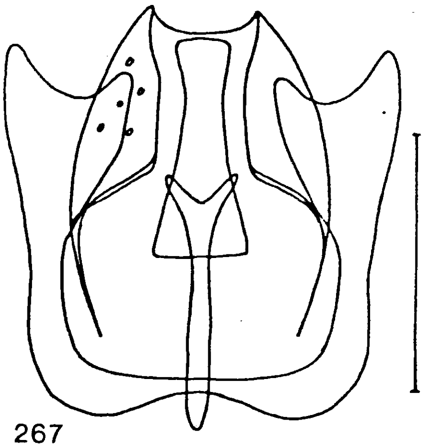

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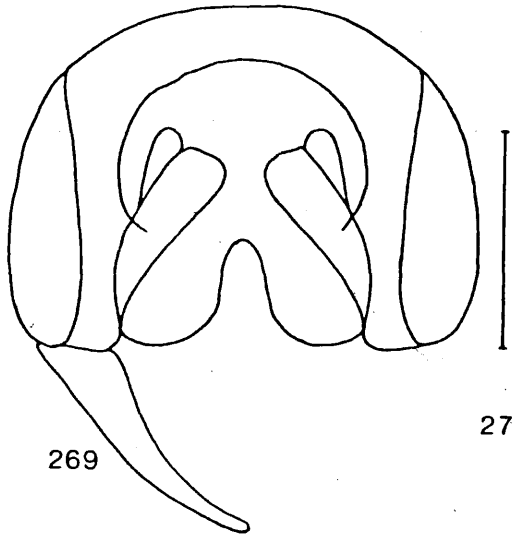

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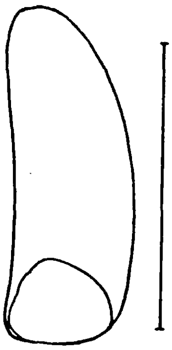

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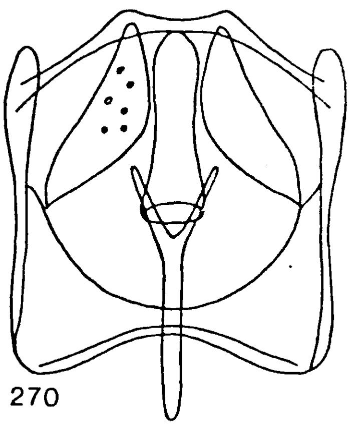

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272 *Elachiptera tuberculifera* IX tergite Chobham Common, Surrey 23.iv.1971 J.W.I.

273 *E. tuberculifera* hypandrium Chobham Common, Surrey 23.iv.1971 J.W.I.

274 *E. tuberculifera* edita Chobham Common, Surrey 23.iv.1971 J.W.I.

275 *Gaurax niger* IX tergite Bradfield, Berks. vi.1933 E.B.B.

276 *G. niger* hypandrium Bradfield, Berks. vi.1933 E.B.B.

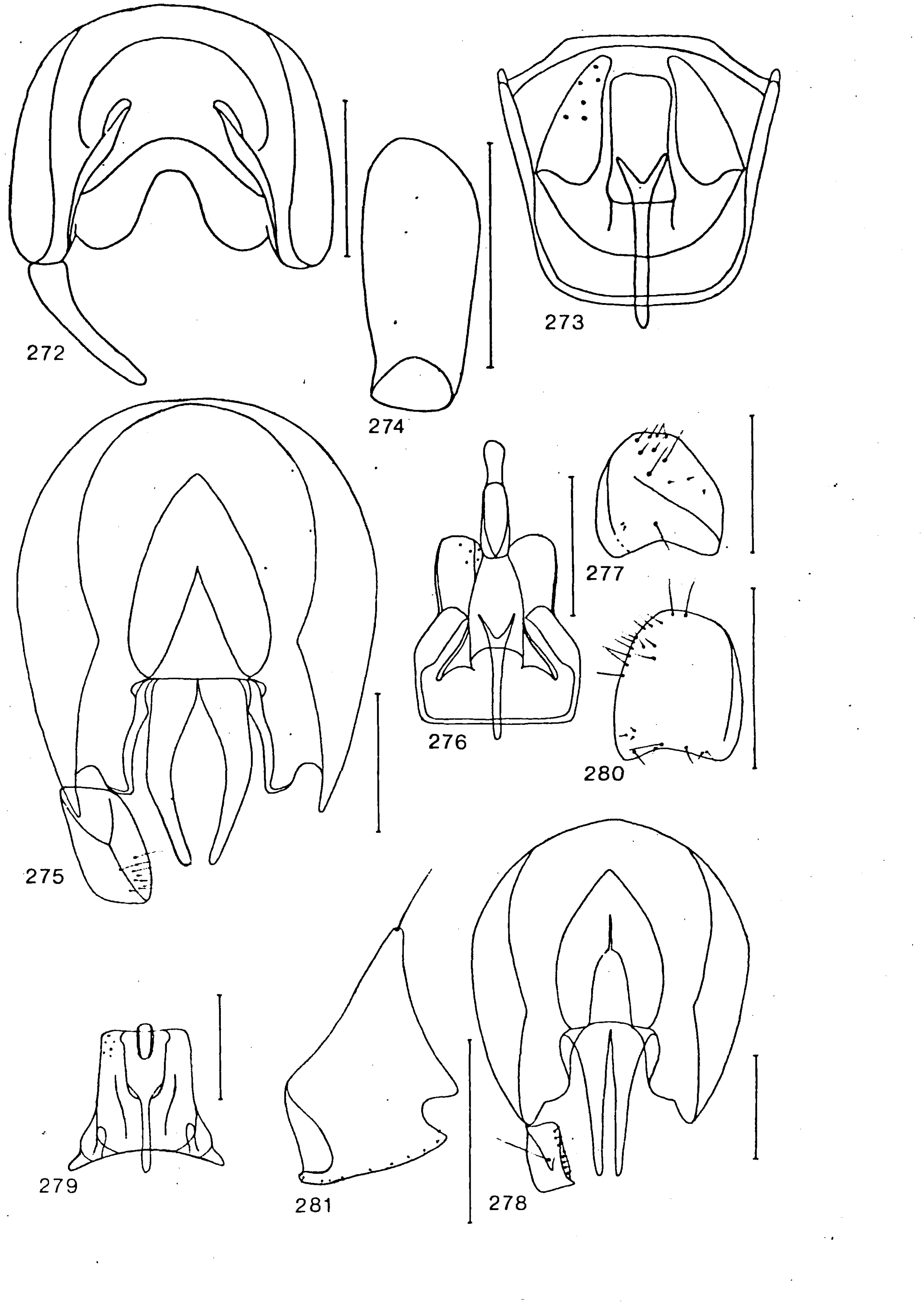
277 *G. niger* edita Bradfield, Berks. vi.1933 E.B.B.

278 *G. dubius* IX tergite Roundsea Woods, Lancs. 28.v.1963 K.P-S.

279 *G. dubius* hypandrium Tub-y-Maes, Caerns. 8.iv.1964 K.P-S.

280 *G. dubius* edita Tub-y-Maes, Caerns. 8.iv.1964 K.P-S.

281 *G. fascipes* edita Mordiford, Hereford 20.vii.1909 J.H.W.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282 <u>Camarota</u> <u>curvipennis</u> IX tergite Chapman's Pool, Dorset 15.vii.1972 J.W.I.

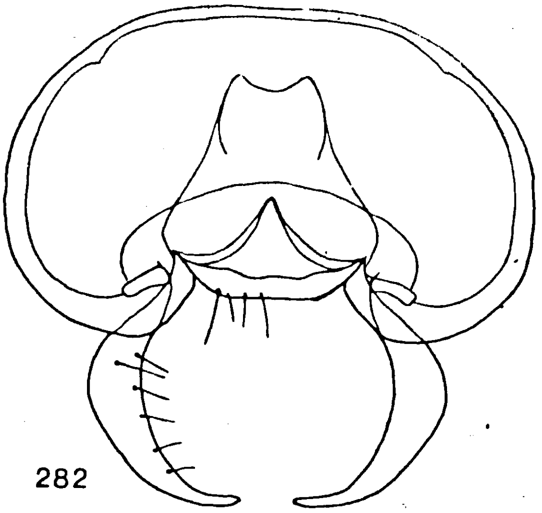
283 <u>C</u>. <u>curvipennis</u> hypandrium Chapman's Pool, Dorset 15.vii.1972 J.W.I.

284 <u>Platycephala</u> <u>planifrons</u> IX tergite King's Lynn, Norfolk vi.1908 E.A.A.

285 <u>P</u>. <u>planifrons</u> hypandrium King's Lynn, Norfolk vi.1908 E.A.A.

286 <u>P</u>. <u>umbraculata</u> IX tergite Reg. Keilce, Poland 9.vii.1972 J.H.

287 <u>P</u>. <u>umbraculata</u> hypandrium Reg. Keilce, Poland 9.vii.1972 J.H.



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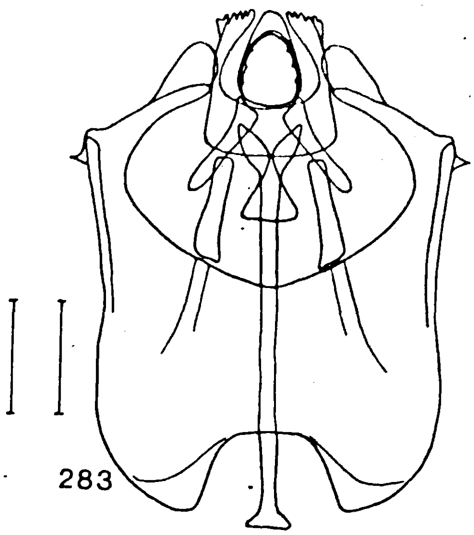

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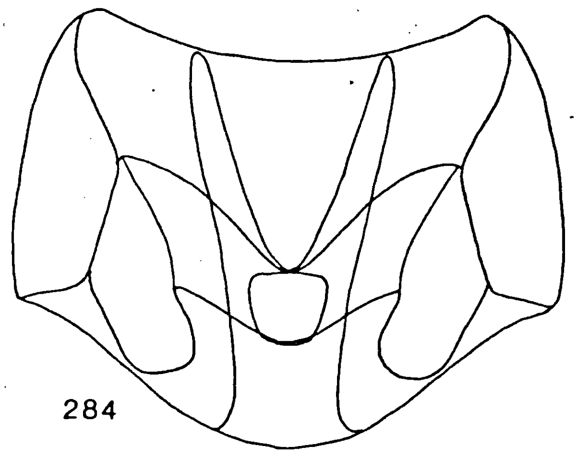

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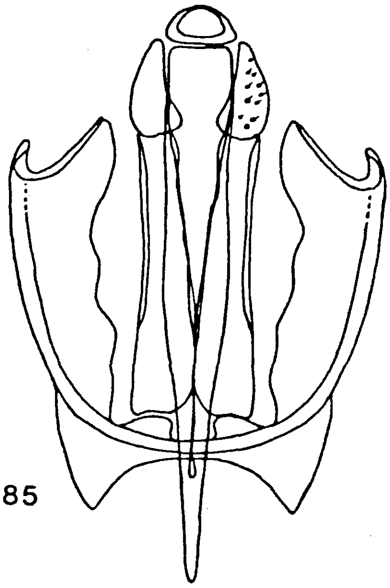

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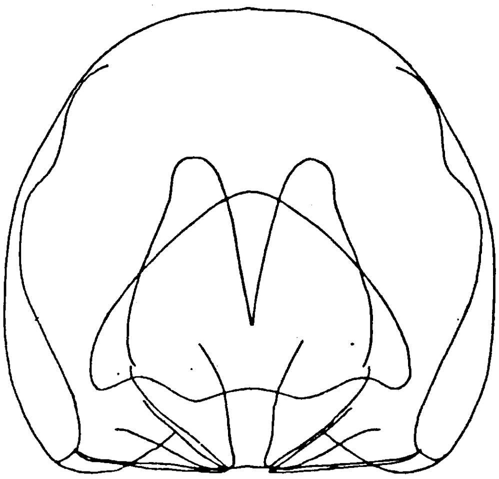

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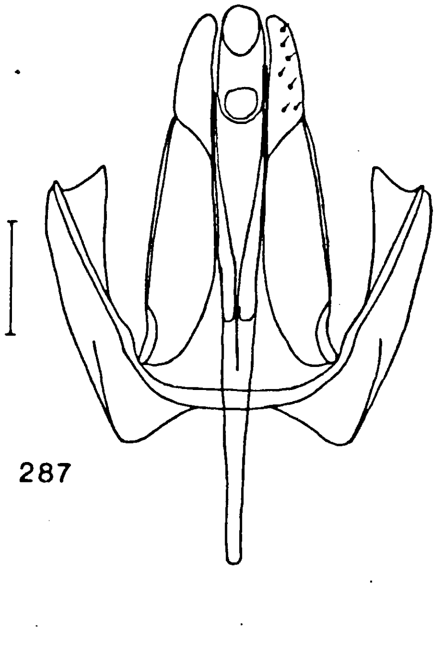

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288 *Meromyza pratorum* postgonite Findhorn, Elgin
1.viii.1899 J.W.Y.

289 *M. sorocula* postgonite Cherwell meadows, Oxford
23.vii.1941 E.T.

290 *M. coronoseta* postgonite Flatford, Suffolk
15.vii.1951 L.P.

291 *M. curvinervis* postgonite Lakenheath Warren, Suffolk 18.vii.1965 L.P.

292 *M. laeta* postgonite Zuel, Italy 1-3.viii.1969 V.F.E.

293 *M. femorata* postgonite Swanscombe, Kent
26.vi.1964 L.P.

294 *M. saltatrix* postgonite Scout Park,
21.vii.1946 C.N.C.

295 *M. variegata* postgonite Ashford, Kent
24.vi.1945 L.P.

296 *M. nigriventris* postgonite Ruislip, Middlesex
8.ix.1956 L.P.

297 *M. palposa* postgonite Flatford, Suffolk
19.vii.1951 L.P.

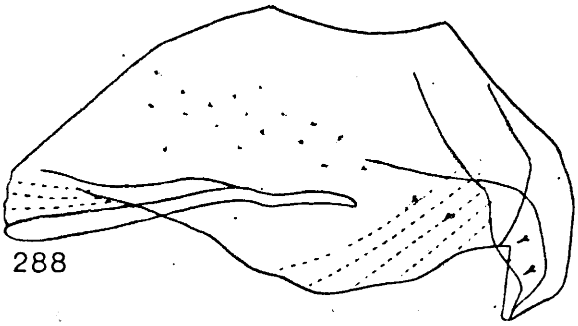
298 *M.* species 2 postgonite Lakenheath, Suffolk
27.viii.1965 L.P.

299 *M. triangulina* postgonite Cors Godh, Anglesey
5.vii.1976 J.W.I.

300 *M. pluriseta* postgonite All Hallows, Kent
20.viii.1950 L.P.

301 *M. bohemica* postgonite Riddlesdown, Surrey
13.vii.1964 L.P.

302 *M.* species 1 postgonite Benfleet, Essex
19.vii.1936 L.P.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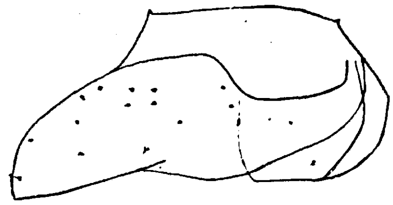
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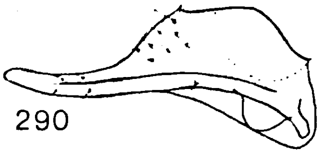
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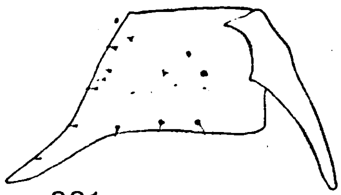
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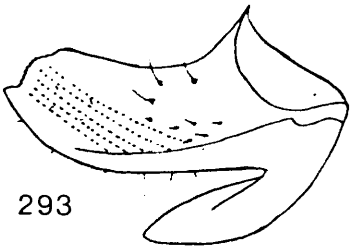
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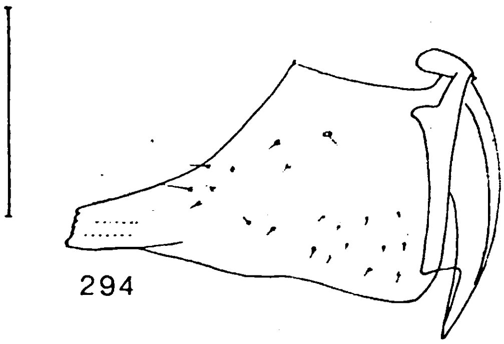
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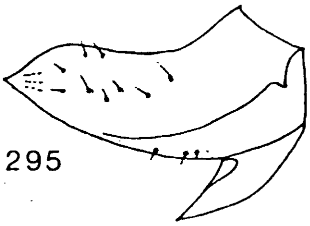
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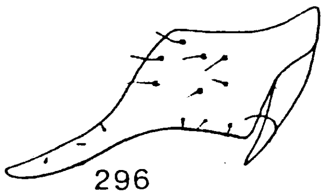
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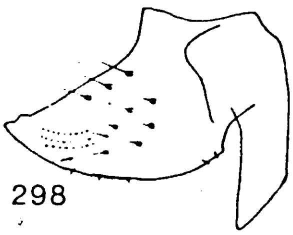
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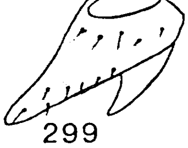
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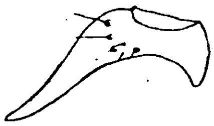
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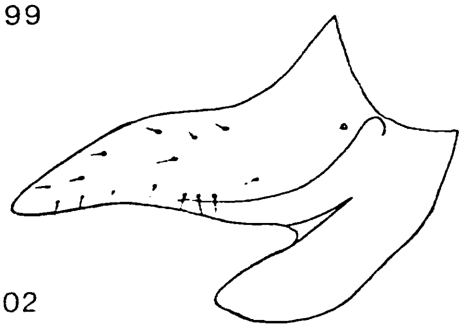
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303 _Meromyza pratorum_ aedeagus lateral view Findhorn, Elgin 1.viii.1899 J.W.Y.

304 _M. pratorum_ aedeagus ventral view Llanbedr, Brecknock 2.vii.1903 J.W.Y.

305 _M. sorocula_ aedeagus lateral view Cherwell Meadows, Oxford 23.vii.1941 E.T.

306 _M. sorocula_ aedeagus ventral view Lewes, Sussex 5.viii.1869 G.H.V.

307 _M. coronoseta_ aedeagus lateral view Flatford, Suffolk 15.vii.1951 L.P.

308 _M. curvinervis_ aedeagus lateral view Lakenheath Warren, Suffolk 18.vii.1965 L.P.

309 _M. femorata_ aedeagus lateral view Swanscombe, Kent 26.vi.1964 L.P.

310 _M. femorata_ aedeagus ventral view Riddlesdown, Surrey 13.vii.1964 L.P.

311 _M. saltatrix_ aedeagus lateral view Scout Park, 21.vii.1946 C.N.C.

312 _M. saltatrix_ aedeagus ventral view Morfa Dyffryn, Merion. 12.vii.1976 A.G.I.

313 _M. laeta_ aedeagus lateral view Zuel, Italy 1-3.viii.1969 V.F.E.

314 _M. variegata_ aedeagus lateral view Beddington, Surrey 21.vii.1951 L.P.

315 _M. variegata_ aedeagus ventral view Ashford, Kent 24.vi.1945 L.P.

316 _M. nigriventris_ aedeagus lateral view Box Hill, Surrey 24.vi.1971 J.W.I.

317 _M. nigriventris_ aedeagus ventral view Cripplegate, London 30.v.1953 L.P.

318 _M. pluriseta_ aedeagus lateral view All Hallows, Kent 20.viii.1950 L.P.

319 _M. pluriseta_ aedeagus ventral view Flatford, Suffolk 15.vii.1951 L.P.

320 _M. palposa_ aedeagus lateral view Flatford, Suffolk 19.vii.1951 L.P.

321 _M. palposa_ aedeagus ventral view Mitcham, Surrey 7.vii.1947 L.P.

322 _M. triangulina_ aedeagus lateral view Cors Godh, Anglesey 5.vii.1976 J.W.I.

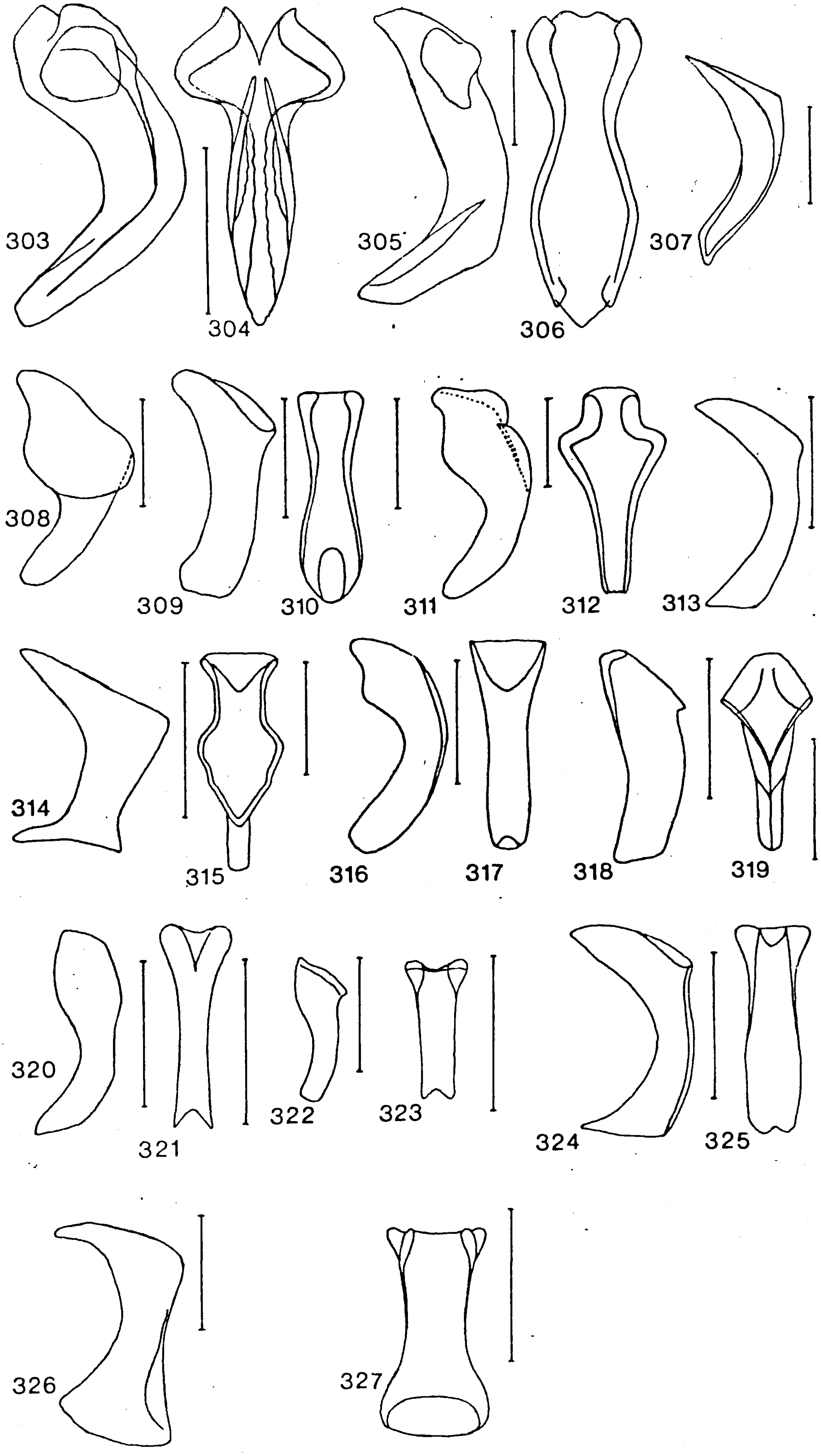
323 _M. triangulina_ aedeagus ventral view Limpsfield, Surrey 21.vii.1946 L.P.

324 _M. bohemica_ aedeagus lateral view Riddlesdown, Surrey 13.vii.1964 L.P.

325 _M. bohemica_ aedeagus ventral view Mitcham, Surrey 7.vii.1947 L.P.

326 _M._ species 1 aedeagus lateral view Benfleet, Essex 19.vii.1936 L.P.

327 _M._ species 2 aedeagus ventral view Lakenheath, Suffolk 27.vii.1965 L.P.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328 <u>Meromyza</u> <u>pratorum</u> IX tergite lateral view Findhorn, Elgin 1.viii.1899 J.W.Y.

329 <u>M</u>. <u>pratorum</u> IX tergite apical view Hayle, Cornwall 23.viii.1947 L.P.

330 <u>M</u>. <u>sorocula</u> IX tergite lateral view Cherwell Meadows, Oxon. 23.vii.1941 E.T.

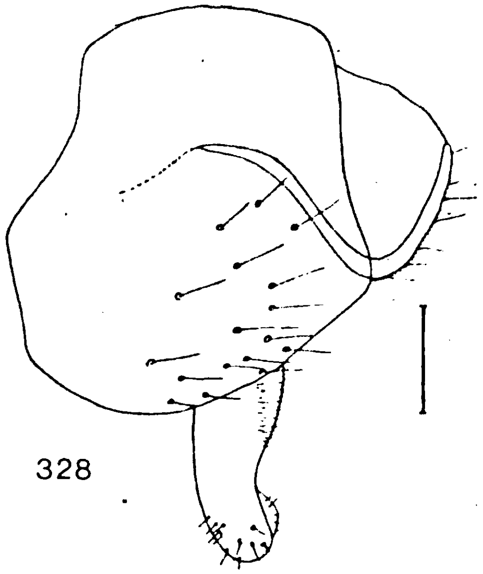
331 <u>M</u>. <u>coronoseta</u> IX tergite lateral view Flatford, Suffolk 15.vii.1951 L.P.

332 <u>M</u>. <u>femorata</u> IX tergite lateral view Swanscombe, Kent 26.vi.1964 L.P.

333 <u>M</u>. <u>femorata</u> IX tergite apical view Riddlesdown, Surrey 13.vii.1964 L.P.

334 <u>M</u>. <u>saltatrix</u> IX tergite lateral view Morfa Dyffryn, Merion. 12.vii.1976 A.G.I.

335 <u>M</u>. <u>saltatrix</u> IX tergite apical view Scout Park, 21.vii.1946 C.N.C.



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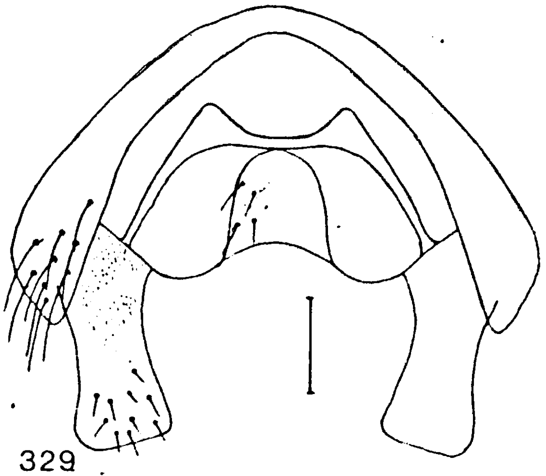

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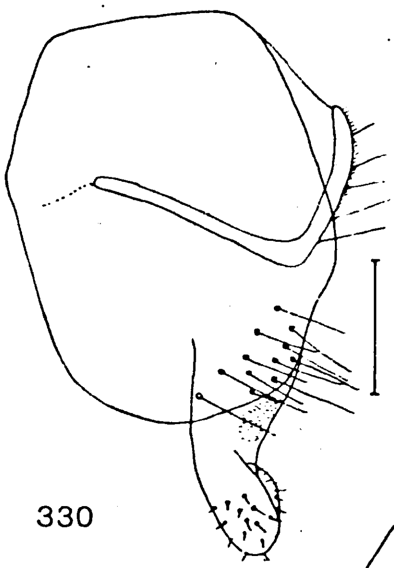

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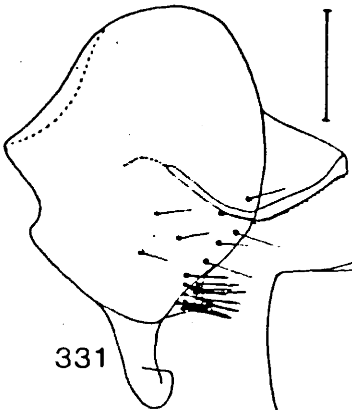

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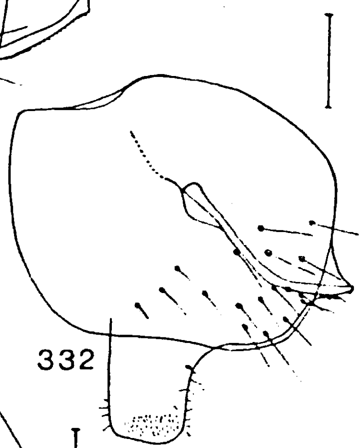

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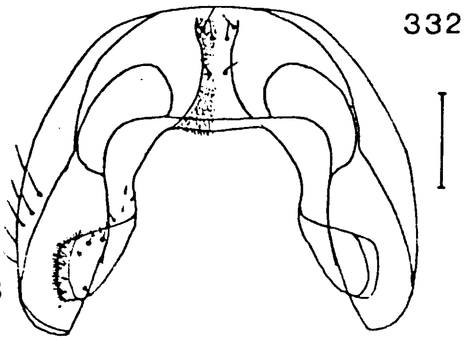

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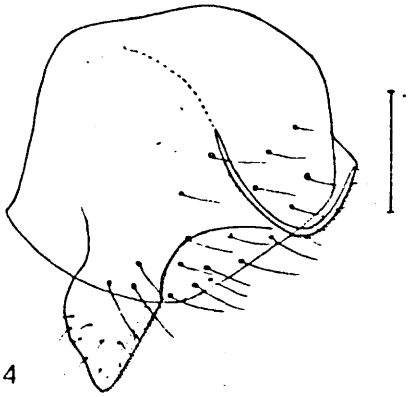

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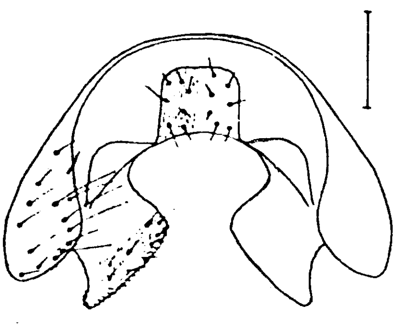

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336 *Meromyza curvinervis* IX tergite lateral view
Lakenheath Warren, Suffolk 18.vii.1965 L.P.

337 *M. variegata* IX tergite lateral view Ashford,
Kent 24.vi.1946 L.P.

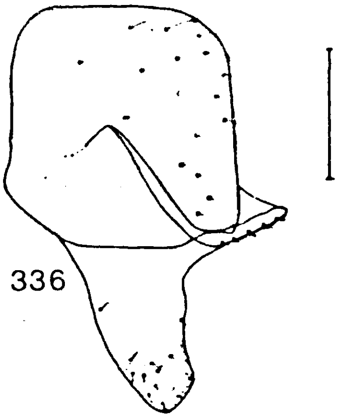
338 *M. nigriventris* IX tergite lateral view Lower
Halston, Kent 29.vii.1950 L.P.

339 *M. variegata* IX tergite apical view Beddington,
Surrey 21.vii.1951 L.P.

340 *M. nigriventris* IX tergite apical view Box Hill,
Surrey 24.vi.1971 J.W.I.

341 *M. pluriseta* IX tergite lateral view All Hallows,
Kent 20.viii.1950 L.P.

342 *M. pluriseta* IX tergite apical view Flatford,
Suffolk 19.vii.1951 L.P.



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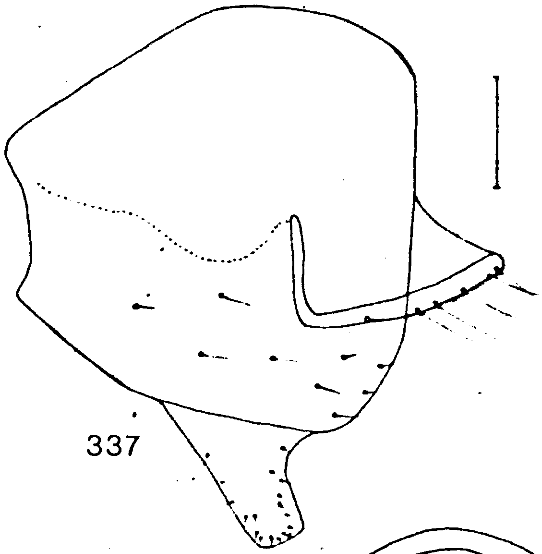

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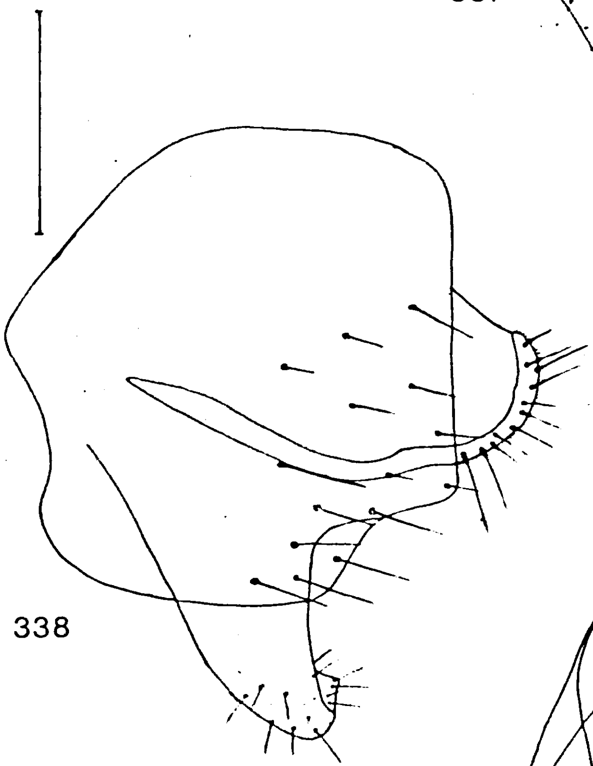

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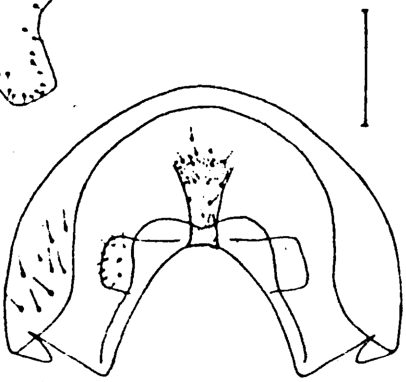

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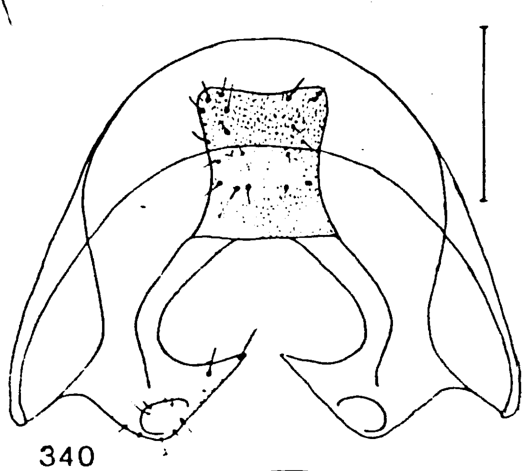

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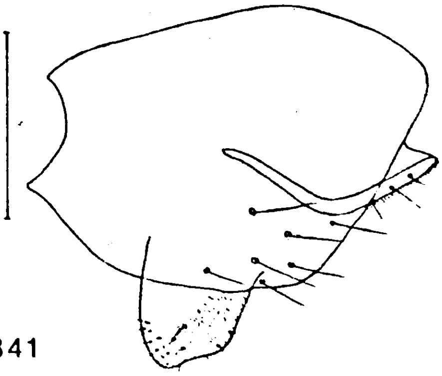

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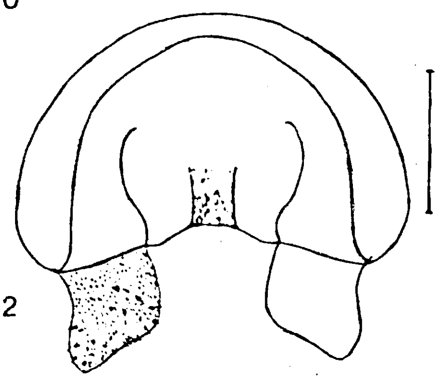

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343 Meromyza palposa IX tergite lateral view Flatford, Suffolk 19.vii.1951 L.P.

344 M. palposa IX tergite apical view Flatford, Suffolk 19.vii.1951 L.P.

345 M. triangulina IX tergite lateral view Cors Godh, Anglesey 5.vii.1976 J.W.I.

346 M. triangulina IX tergite apical view Limpsfield, Surrey 21.vii.1946 L.P.

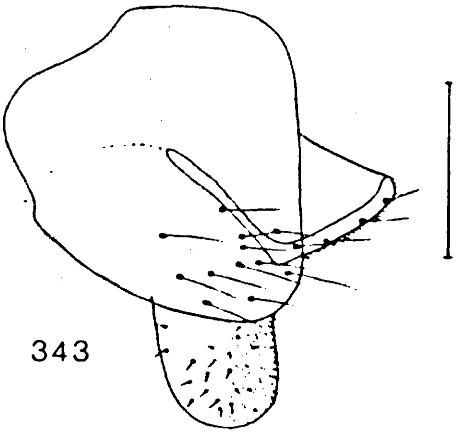
347 M. bohemica IX tergite lateral view Riddlesdown, Surrey 13.vii.1964 L.P.

348 M. bohemica IX tergite apical view Mitcham, Surrey 7.vii.1947 L.P.

349 M. sp. 1 IX tergite lateral view Benfleet, Essex 19.vii.1936 L.P.

350 M. sp. 2 IX tergite apical view Lakenheath, Suffolk 27.vii.1965 L.P.

351 M. sp. 2 IX tergite lateral view Lakenheath, Suffolk 27.vii.1965 L.P.



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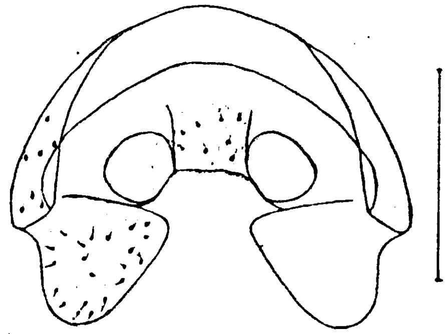

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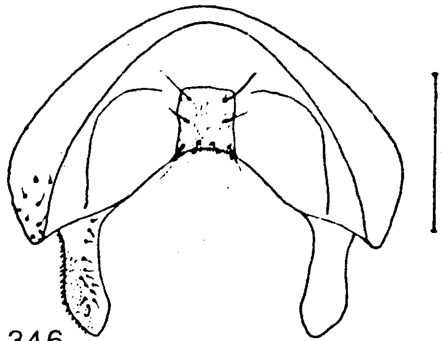

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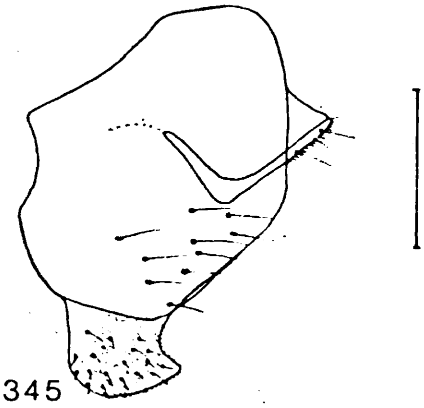

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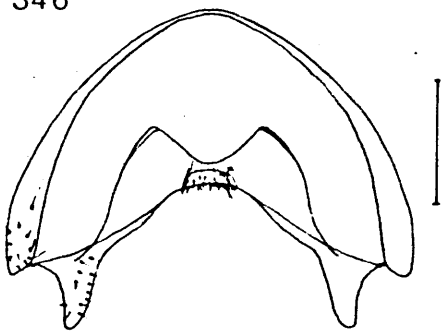

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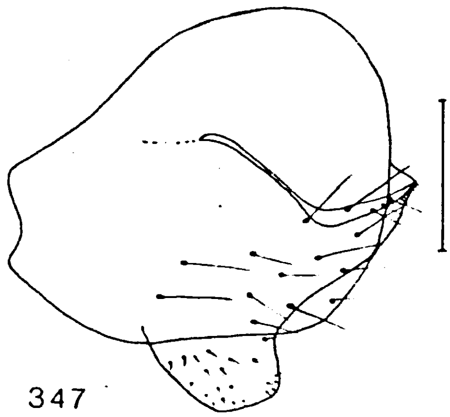

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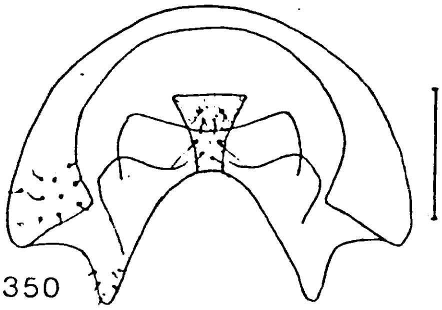

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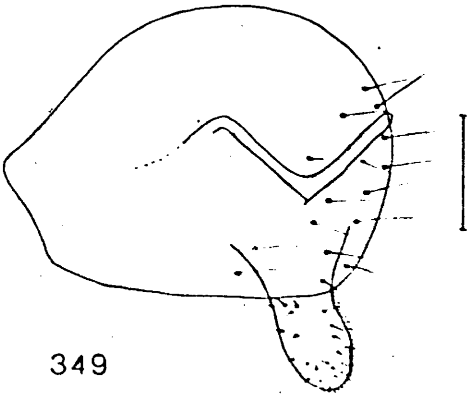

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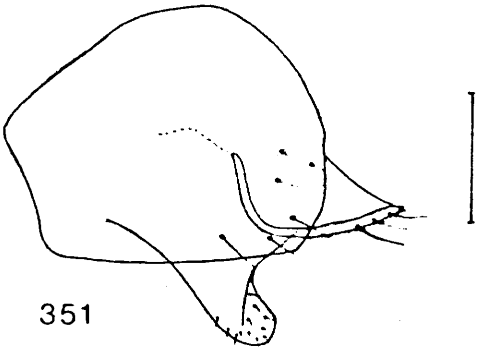


351

352 Eurina lurida IX tergite Beaulieu, Hants.
20.v.1904 J.E.C.

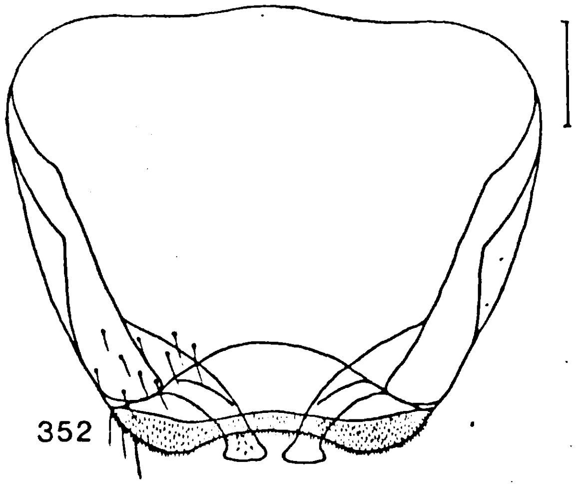
353 E. lurida hypandrium Beaulieu, Hants.
20.v.1904 J.E.C.

354 Cryptonevra tarsata IX tergite Barton Mills,
Suffolk 19.vi.1936 J.E.C.

355 Cryptonevra tarsata hypandrium Barton Mills,
Suffolk 19.vi.1936 J.E.C.

356 Cryptonevra glabra IX tergite Chapman's Pool,
Dorset 15.vii.1972 J.W.I.

357 Cryptonevra glabra hypandrium Chapman's Pool,
Dorset 15.vii.1972 J.W.I.



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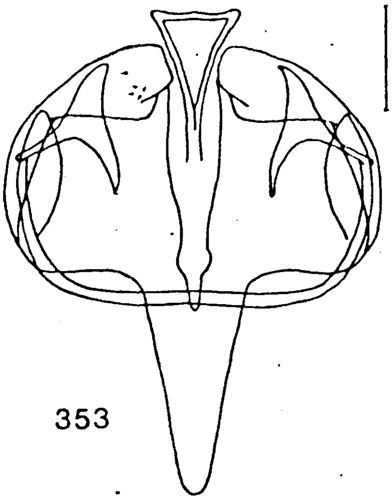

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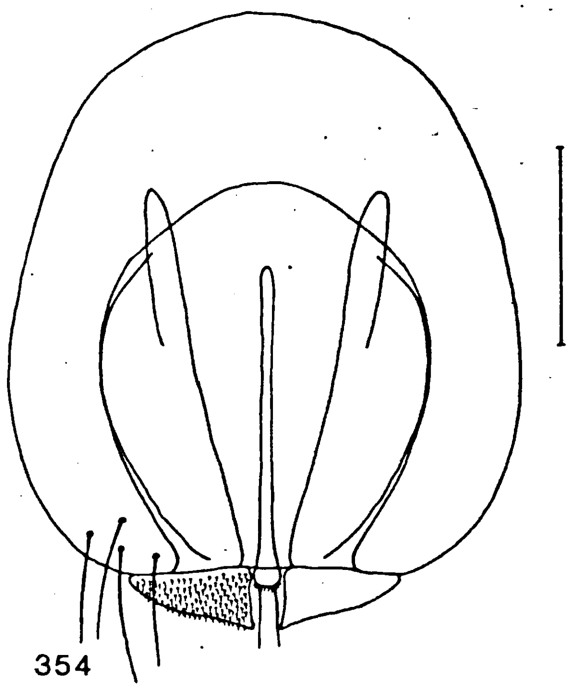

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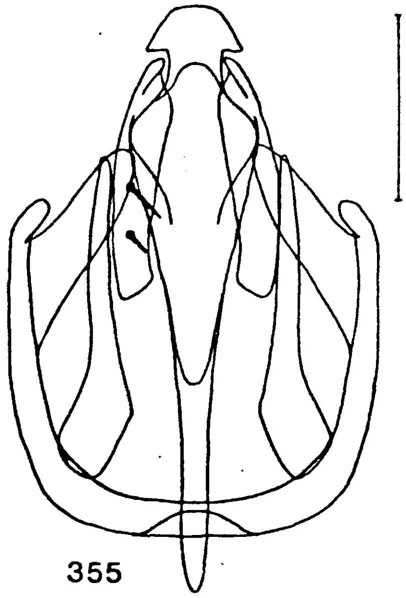

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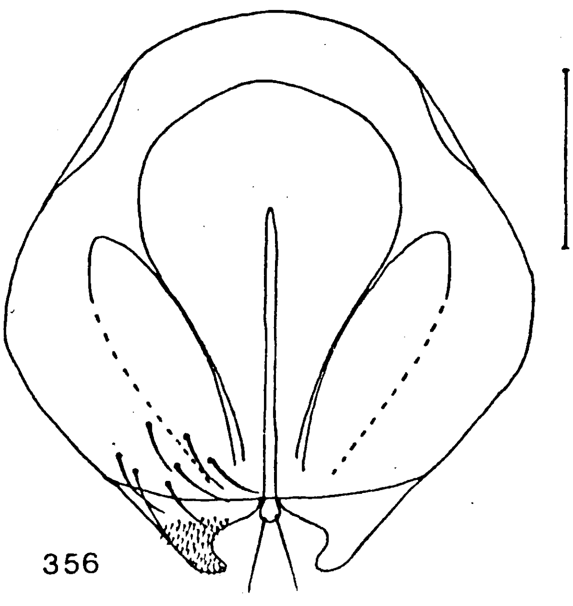

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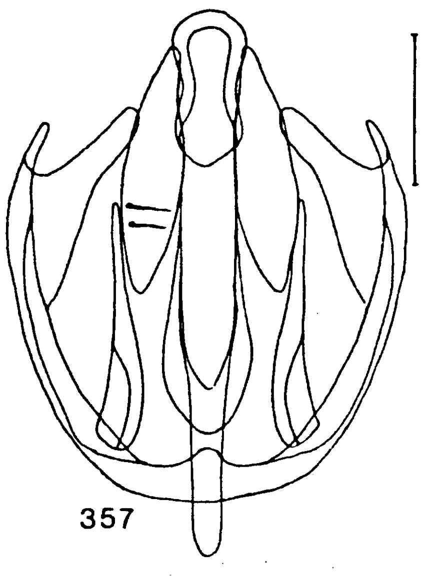


357

358 *Cryptonevra diadema* IX tergite Upton Broad, Norfolk 21.vii.1976 J.W.I.

359 *C. diadema* hypandrium Upton Broad, Norfolk 21.vii.1976 J.W.I.

360 *C. diadema* aedeagus ventral view Upton Broad, Norfolk 21.vii.1976 J.W.I.

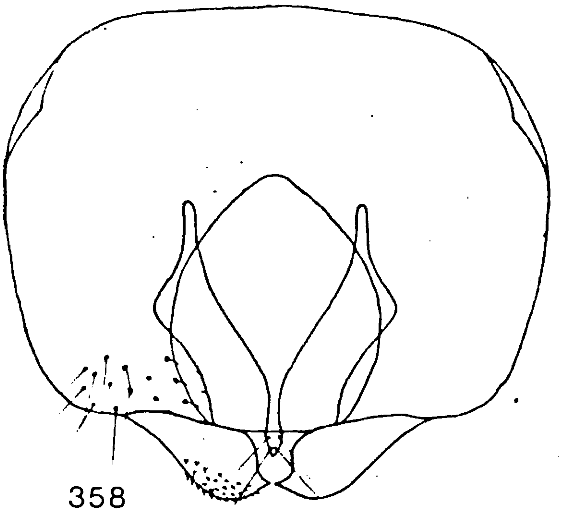
361 *C. diadema* aedeagus lateral view Wicken, Cambs. 7.vi.1912 J.E.C.

362 *C. consimilis* aedeagus ventral view Wicken, Cambs. vi.1932 J.E.C.

363 *C. consimilis* aedeagus lateral view Wicken, Cambs. vi.1932 J.E.C.

364 *C. consimilis* IX tergite Wicken, Cambs. vi.1932 J.E.C.

365 *C. consimilis* hypandrium Wicken, Cambs. vi.1932 J.E.C.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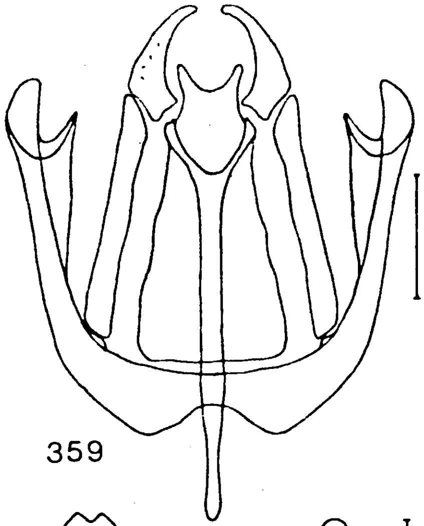
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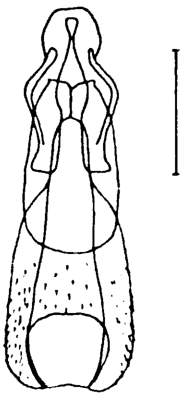
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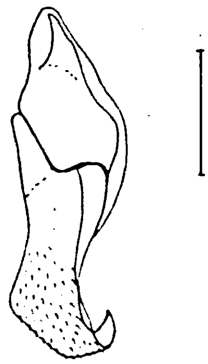
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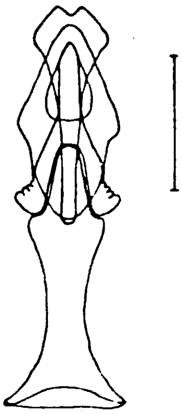
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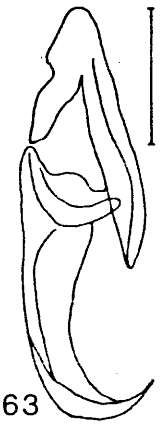
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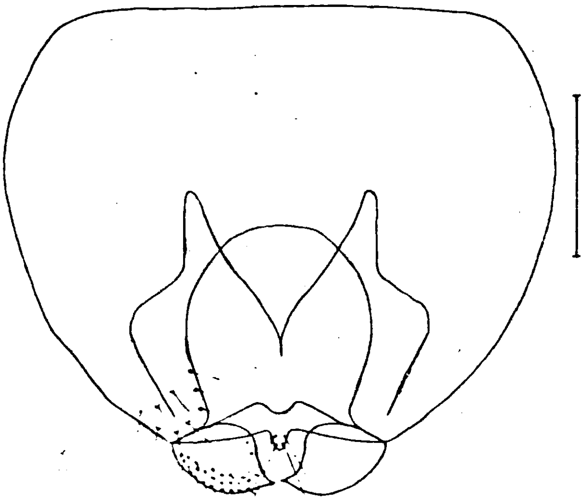
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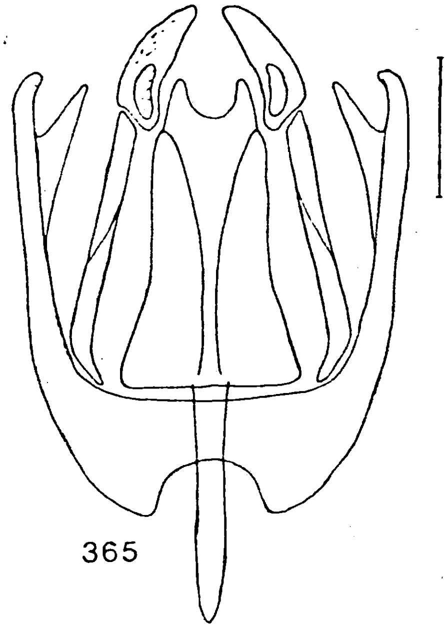
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366 Cryptonevra flavitarsis IX tergite Wheatfen, Norfolk ii.1977 J.W.I.

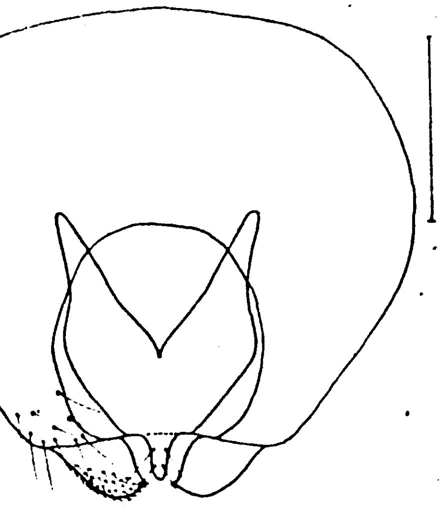
367 C. flavitarsis hypandrium Wheatfen, Norfolk ii.1977 J.W.I.

368 C. nigritarsis hypandrium Keyhaven, Hants. 17.vi.1951 C.N.C.

369 C. nigritarsis IX tergite Keyhaven, Hants. 17.vi.1951 C.N.C.

370 Diplotoxa messoria IX tergite Egham, Surrey 25.iv.1973 J.W.I.

371 Diplotoxa messoria hypandrium Egham, Surrey 25.iv.1973 J.W.I.



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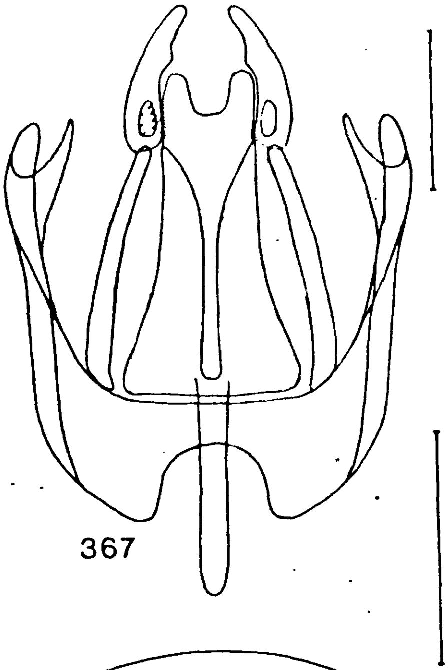

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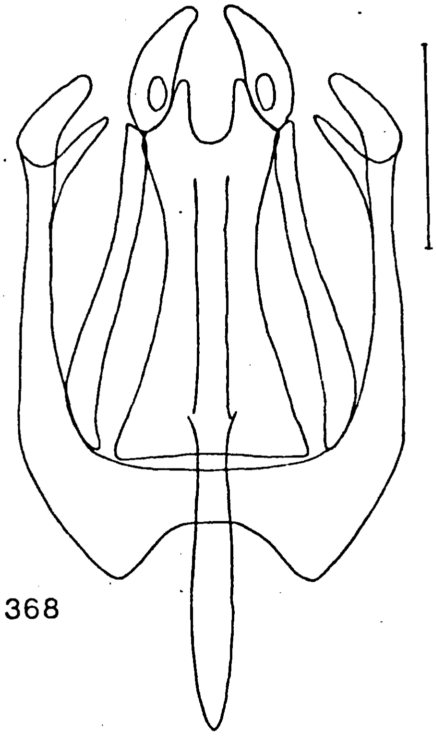

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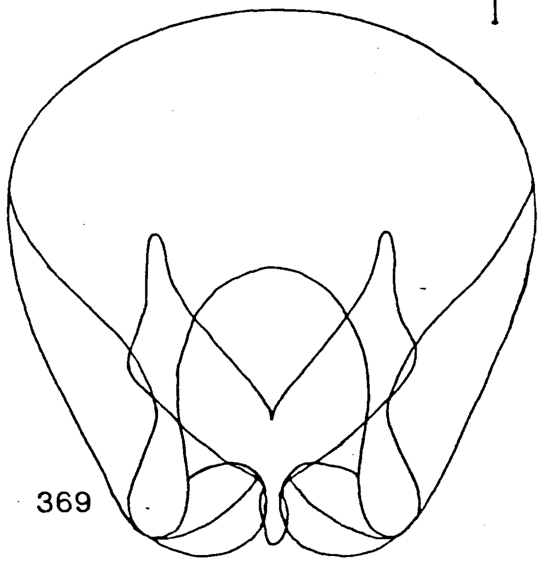

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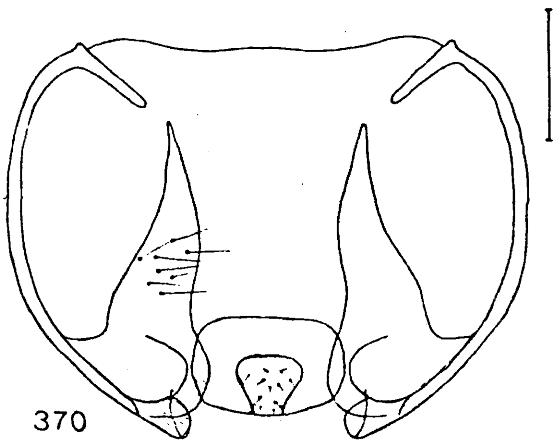

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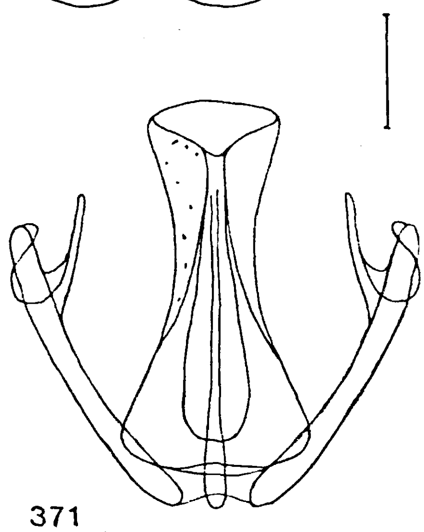


371

372 *Lasiosina* *cinctipes* IX tergite Egham, Surrey
2.vi.1972 J.W.I.

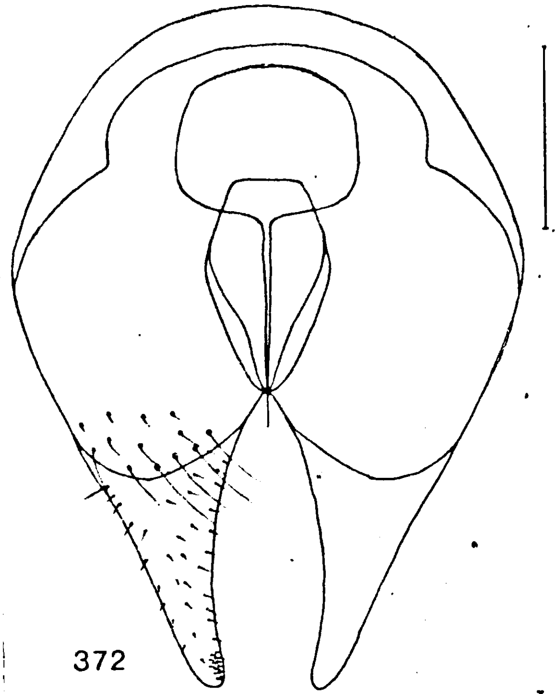
373 *L.* *cinctipes* hypandrium Egham, Surrey
2.vi.1972 J.W.I.

374 *L.* *ruficeps* IX tergite Loch Assynt, Sutherland
30.vi.1911 J.W.Y.

375 *L.* *ruficeps* hypandrium Loch Assynt, Sutherland
30.vi.1911 J.W.Y.

376 *L.* *approximatonervis* female ovipositor lateral view Studland, Dorset
7.ix.1910 J.W.Y.

377 *L.* *heleocharis* female ovipositor lateral view
Aviemore, Inverness 25.vi.1939 J.E.C.



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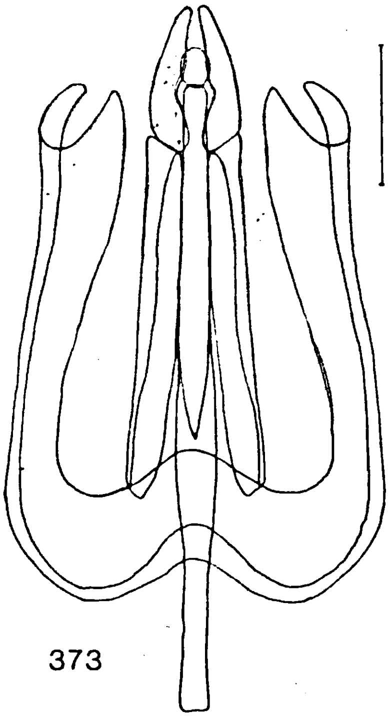

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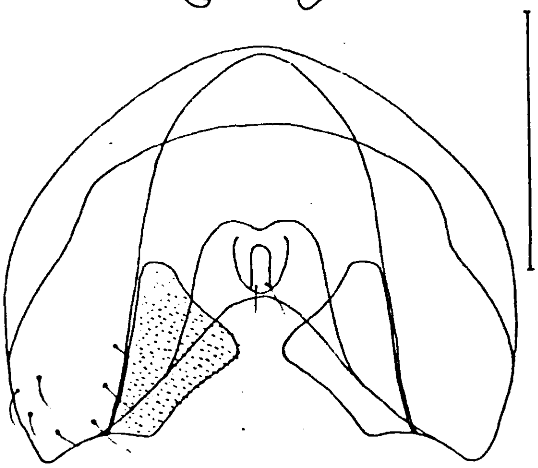

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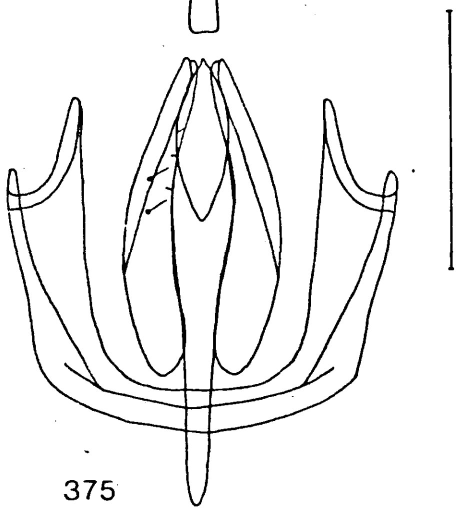

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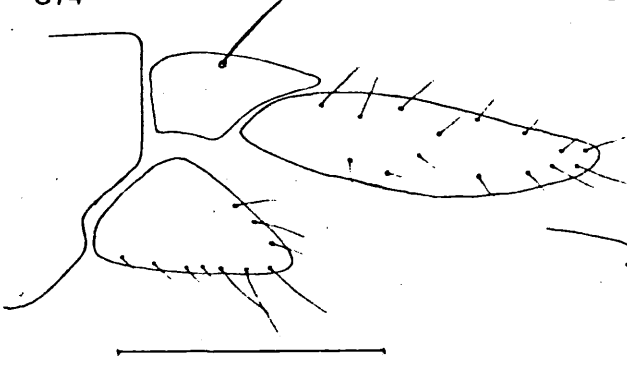

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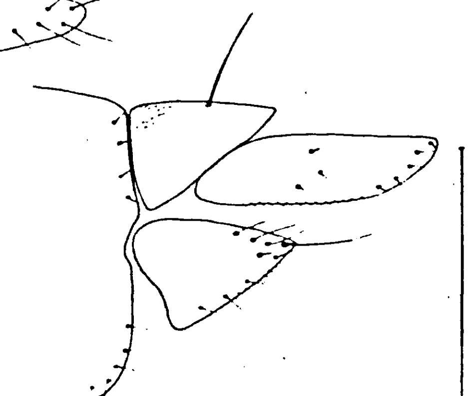


377

378 Lasiosina approximatonervis IX tergite Fowlmere, Norfolk 8.vi.1939 J.E.C.

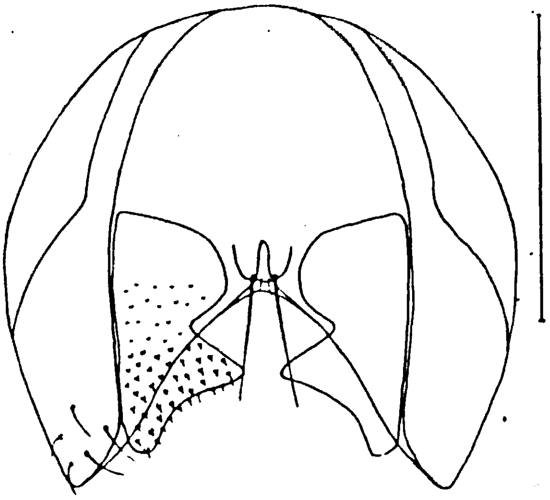
379 L. approximatonervis hypandrium Fowlmere, Norfolk 8.vi.1939 J.E.C.

380 L. heleocharis IX tergite Culbin Sands, Nairn 6.v.1935 J.E.C.

381 L. heleocharis hypandrium Fowlmere, Norfolk 8.vi.1939 J.E.C.

382 Eutropha fulvifrons IX tergite Morfa Harlech, Merion. 13.vii.1976 P.J.C.

383 E. fulvifrons hypandrium Morfa Harlech, Merion. 13.vii.1976 P.J.C.



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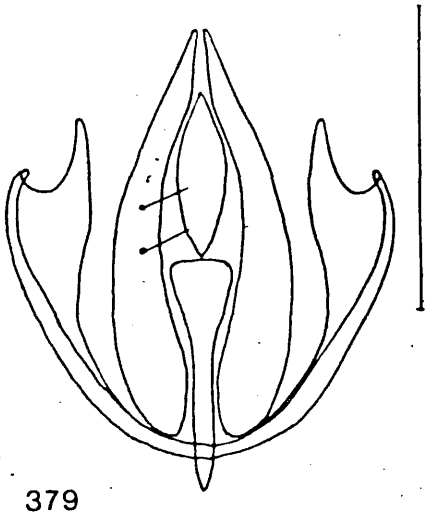

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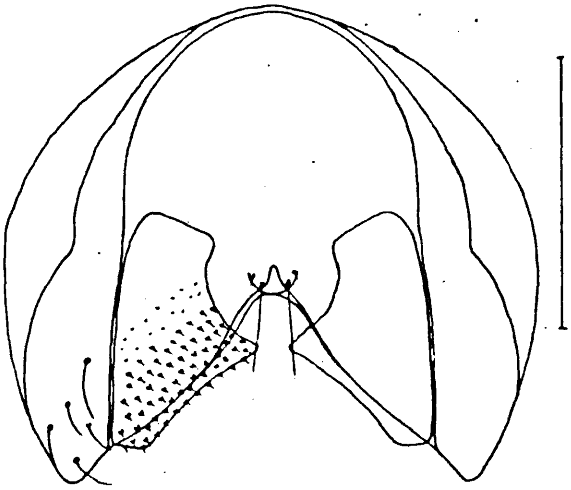

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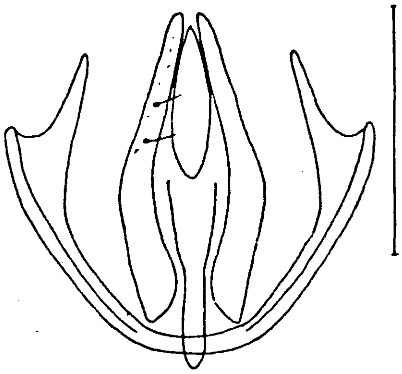

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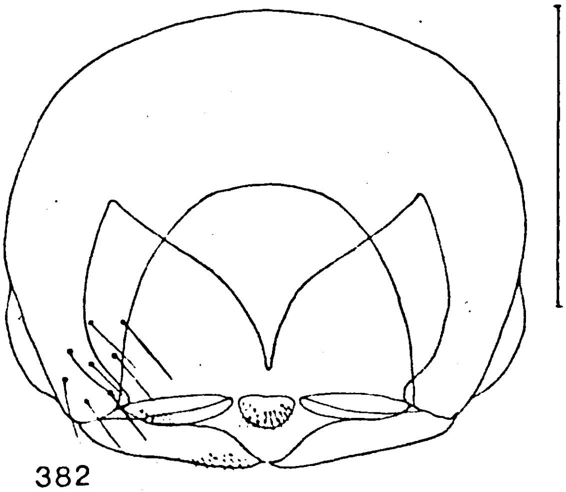

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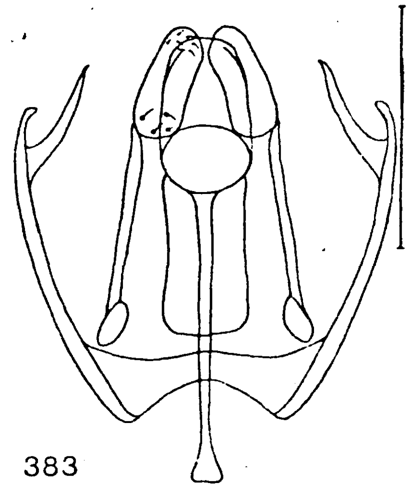


383

384 *Cetema cereris* IX tergite Cripplegate, London
11.vii.1953 L.P.

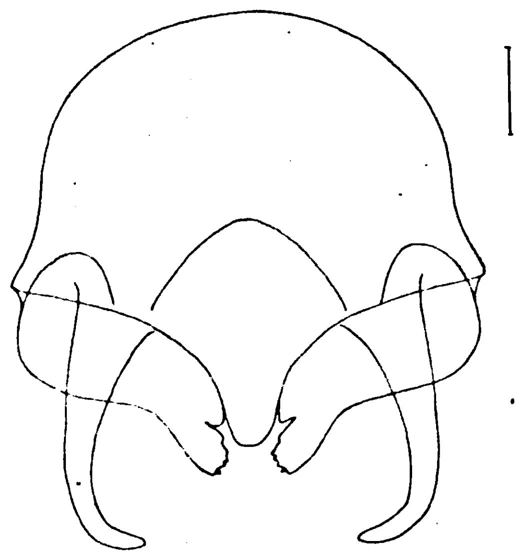
385 *C. cereris* hypandrium Cripplegate, London
11.vii.1953 L.P.

386 *C. myopina* IX tergite Aviemore, Inverness
6.vii.1933 J.E.C.

387 *C. myopina* hypandrium Aviemore, Inverness
6.vii.1933 J.E.C.

388 *C. paramyopina* IX tergite Musselburgh, Midlothian
5.vii.1906 A.E.J.C.

389 *C. paramyopina* hypandrium Musselburgh, Midlothian
5.vii.1906 A.E.J.C.



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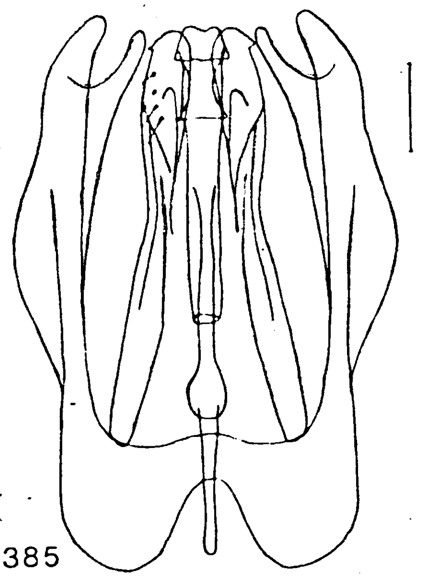

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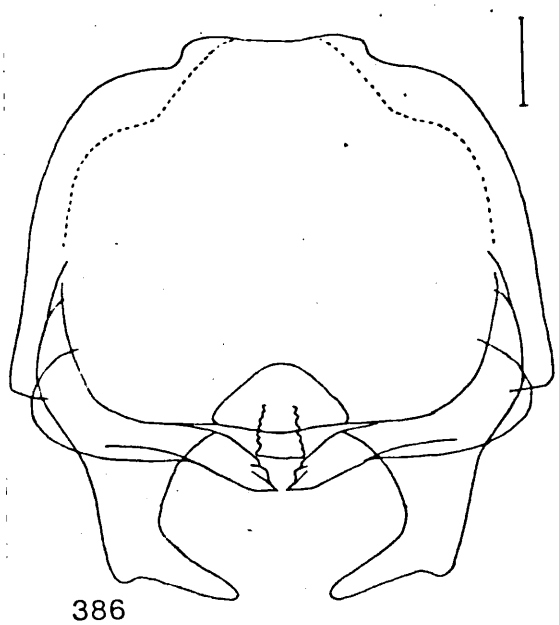

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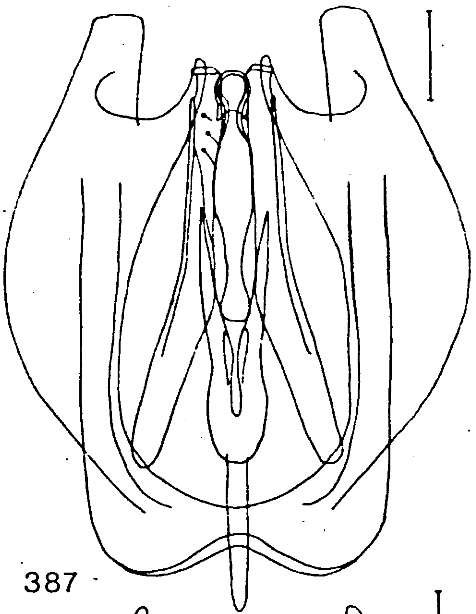

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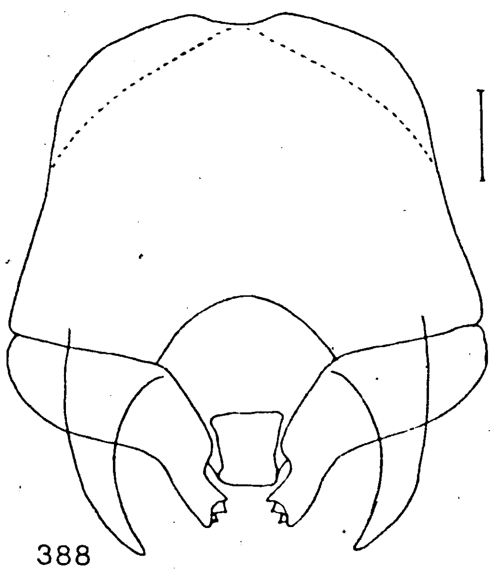

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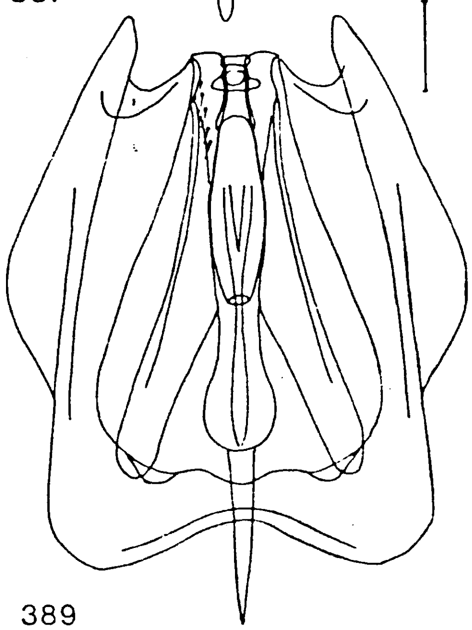


389

390 Cetema neglecta IX tergite Marlow, Bucks.
18.vii.1971 J.W.I.

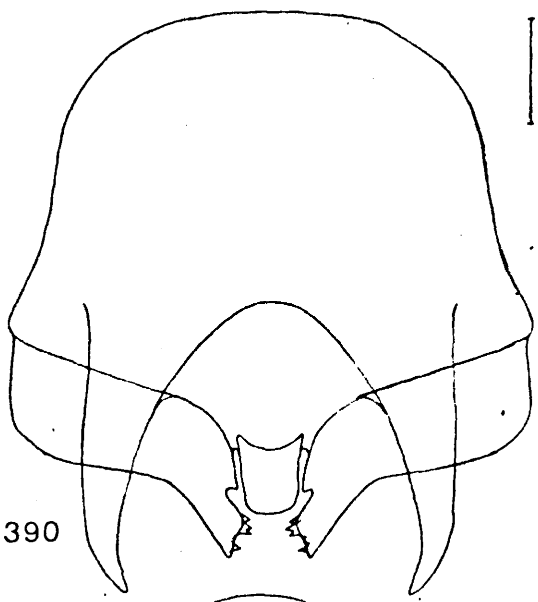
391 C. neglecta hypandrium Marlow, Bucks
18.vii.1971 J.W.I.

392 C. elongata IX tergite Egham, Surrey
3.vi.1971 J.W.I.

393 C. elongata hypandrium Egham, Surrey
3.vi.1971 J.W.I.

394 C. sp. 1 IX tergite Egham, Surrey
25.vi.1973 J.W.I.

395 C. sp. 1 hypandrium Egham, Surrey
25.vi.1973 J.W.I.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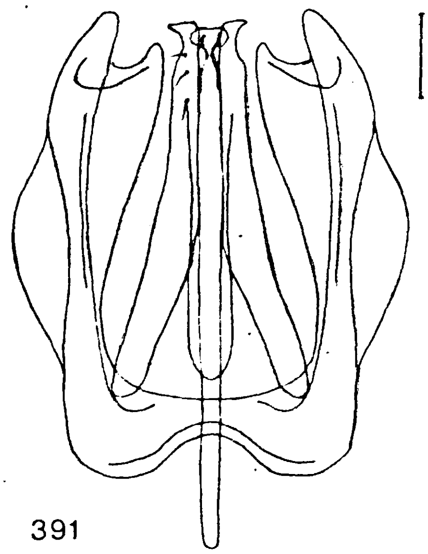
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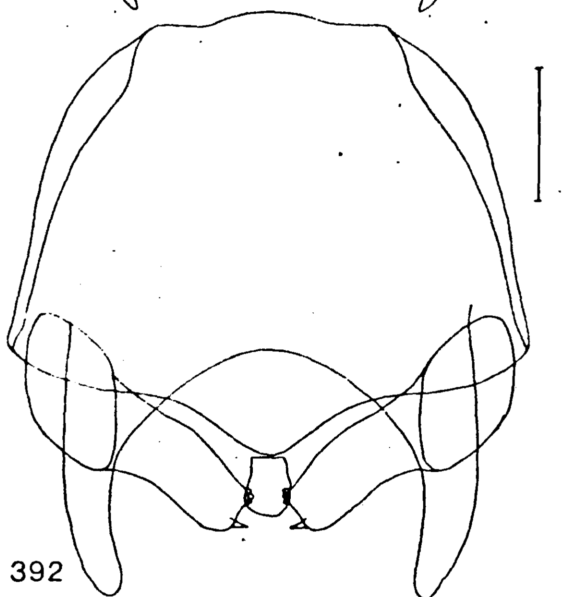
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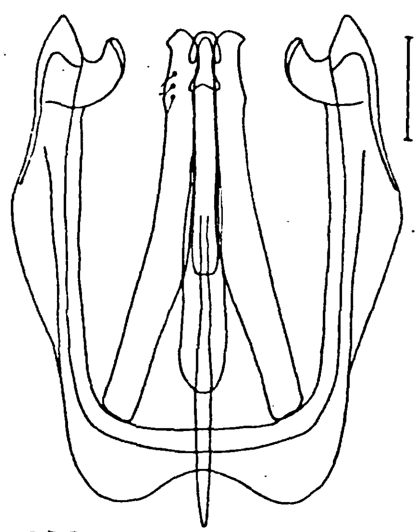
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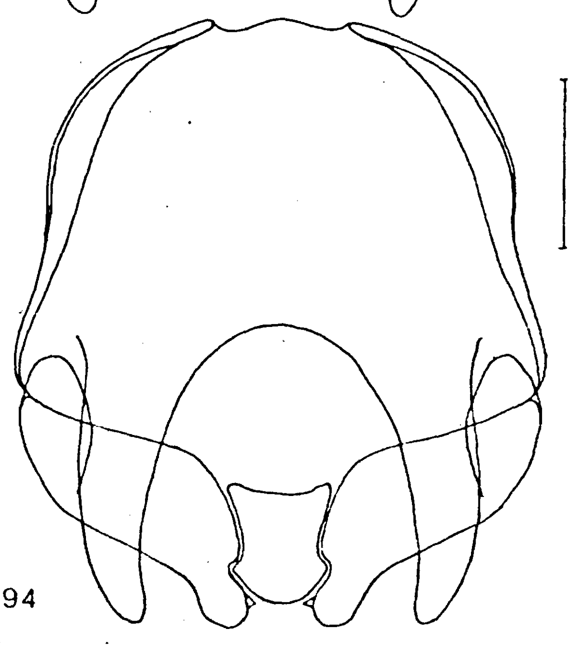
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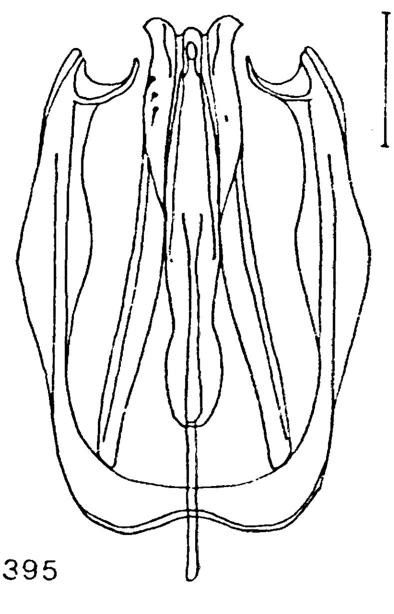

395

396 *Melanum laterale* IX tergite lateral view Mudeford, Hants. 13.vi.1947 J.E.C.

397 *M. laterale* IX tergite apical view Newborough, Anglesey 10.vii.1976 A.G.I.

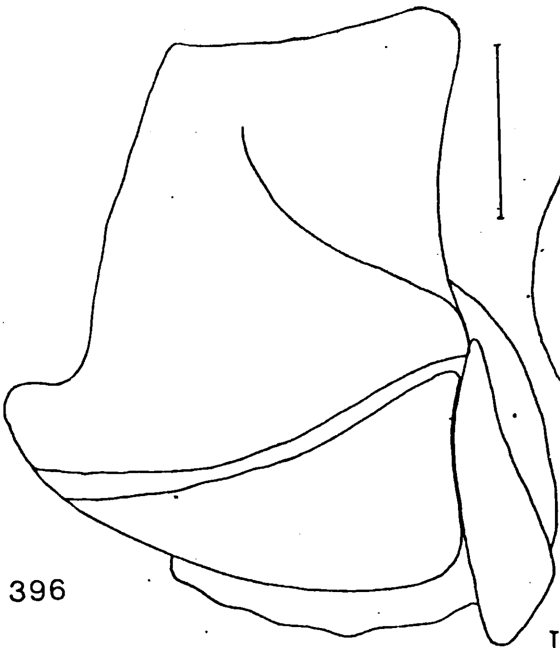
398 *M. laterale* hypandrium Newborough, Anglesey 10.vii.1976 A.G.I.

399 *M. fumipenne* IX tergite Nethy Bridge, Inverness 19.vii.1905 J.W.Y.

400 *M. fumipenne* hypandrium Nethy Bridge, Inverness 19.vii.1905 J.W.Y.

401 *Epichlorops puncticollis* IX tergite Wooddittton Wood, Cambs. 18.vii.1928 J.E.C.

402 *E. puncticollis* hypandrium Brockenhurst, Hants. 6.vii.1907 J.J.F.X.K.



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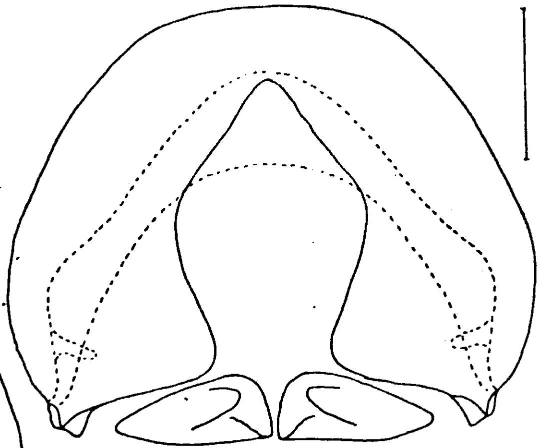

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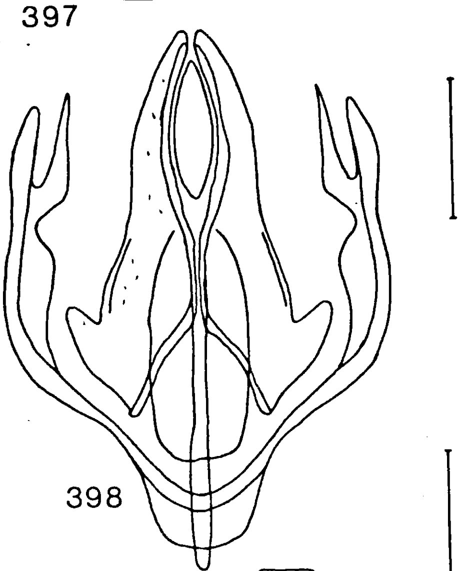

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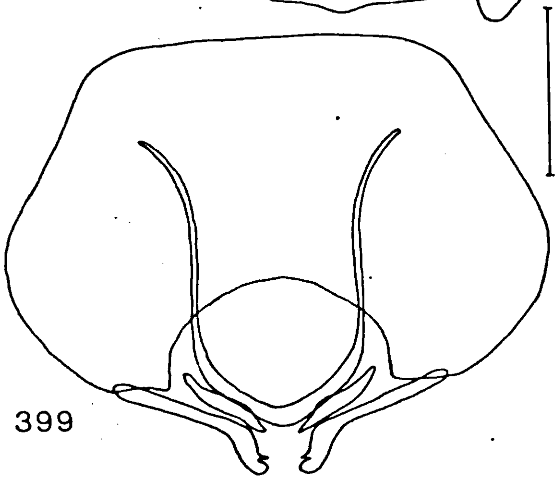

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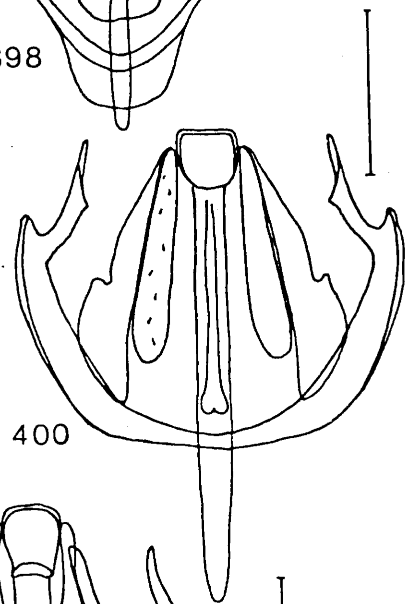

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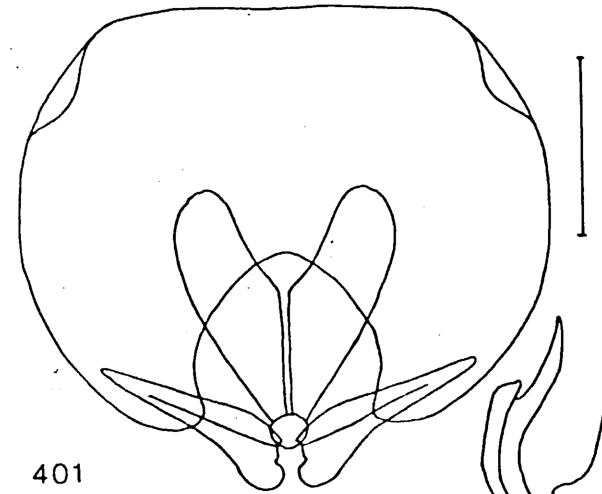

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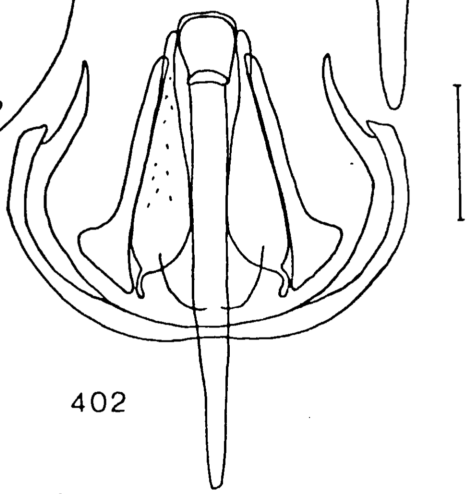


402

403 <u>Chlorops</u> (<u>Anthracophaga</u>) <u>strigula</u> IX tergite
Woodditton Wood, Cambs. 11.v.1936 J.E.C.

404 <u>Chlorops</u> (<u>Anthracophaga</u>) <u>strigula</u> hypandrium
Woodditton Wood, Cambs. 11.v.1936 J.E.C.

405 <u>Chlorops</u> (<u>Anthracophaga</u>) <u>frontosa</u> hypandrium
Stanford Water, Norfolk 14.v.1974 J.W.I.

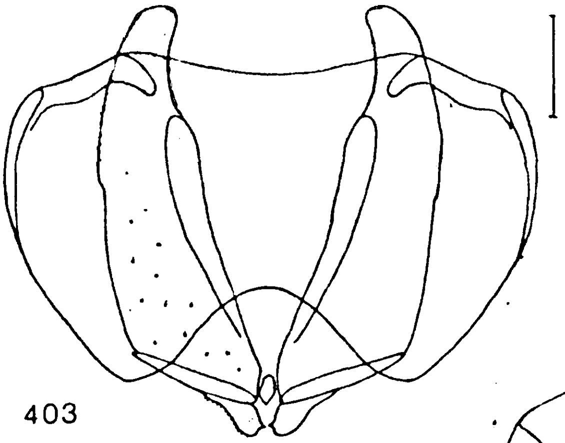
406 <u>Chlorops</u> (<u>Anthracophaga</u>) <u>frontosa</u> IX tergite
Stanford Water, Norfolk 14.v.1974 J.W.I.

407 <u>Chlorops</u> <u>adjuncta</u> IX tergite Bunwell, Cambs.
1.v.1937 J.E.C.

408 <u>C</u>. <u>adjuncta</u> hypandrium Bunwell, Cambs.
1.v.1937 J.E.C.

409 <u>C</u>. sp. 1 hypandrium Silwood, Berks. v.1951 I.W.B.N.

410 <u>C</u>. sp. 1 IX tergite Silwood, Berks. v.1951 I.W.B.N.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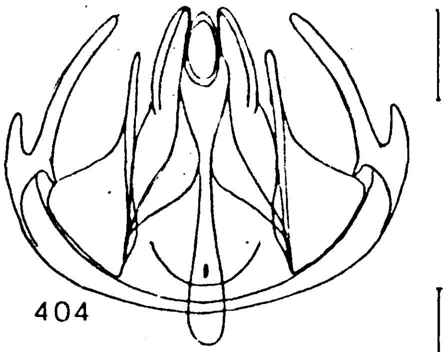
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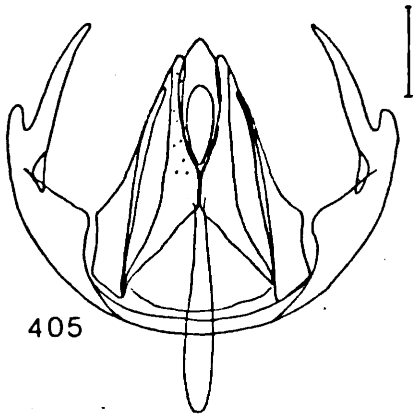
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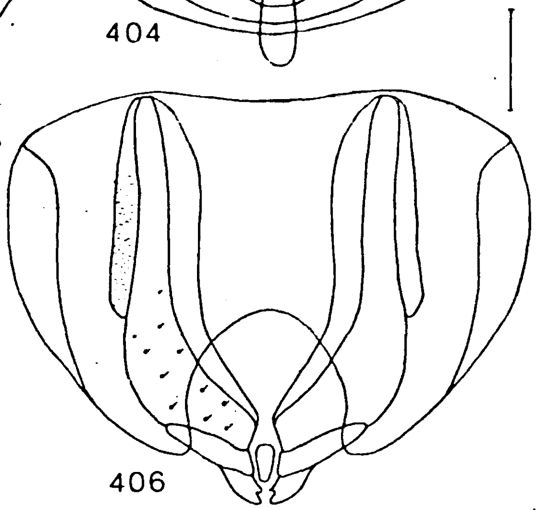
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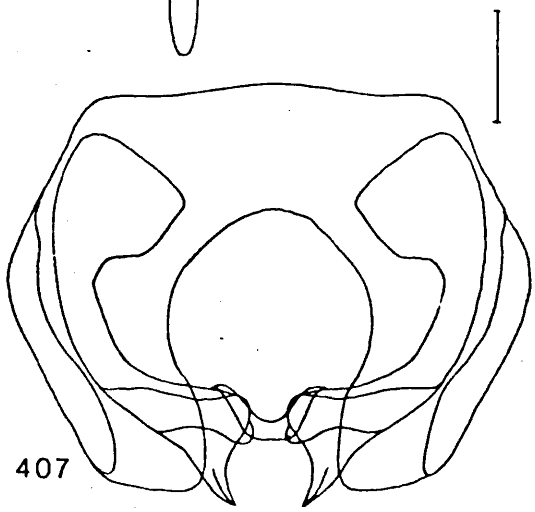
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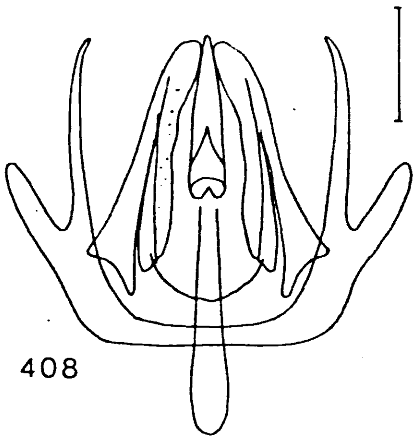
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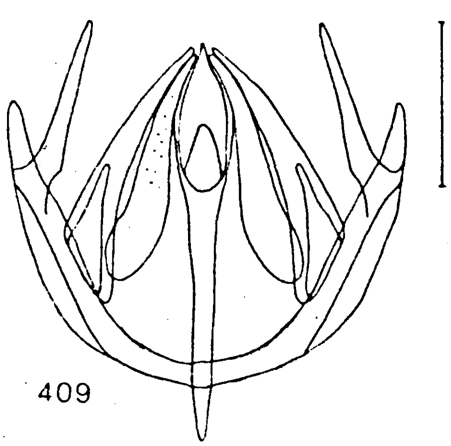
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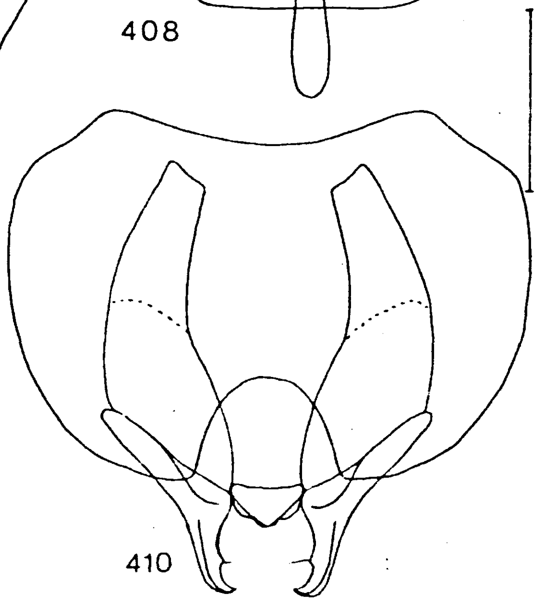

410

411 *Chlorops varsoviensis* IX tergite Cors Geirch, Caerns. 7.vii.1976 J.W.I.

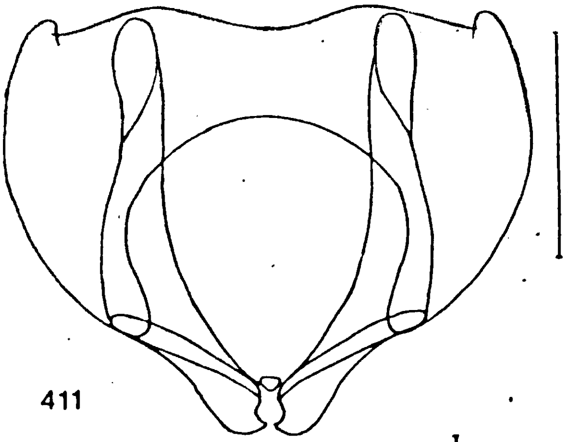
412 *C. varsoviensis* hypandrium Cors Geirch, Caerns. 7.vii.1976 J.W.I.

413 *C. varsoviensis* hypandrium Nethy Bridge, Inverness 6.vii.1905 J.W.Y.

414 *C. varsoviensis* IX tergite Nethy Bridge, Inverness 6.vii.1905 J.W.Y.

415 *C. troglodytes* IX tergite Runnymede, Surrey 19.vi.1963 P.J.C.

416 *C. troglodytes* hypandrium Runnymede, Surrey 19.vi.1963 P.J.C.



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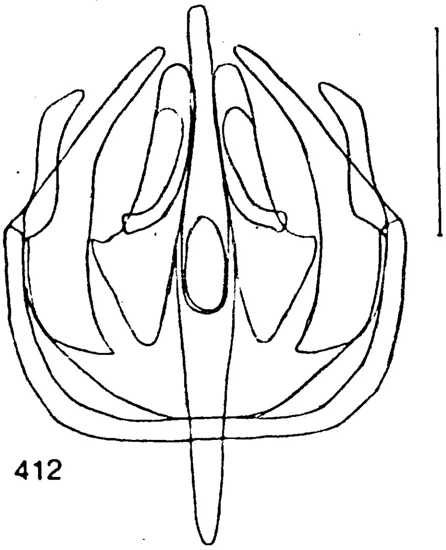

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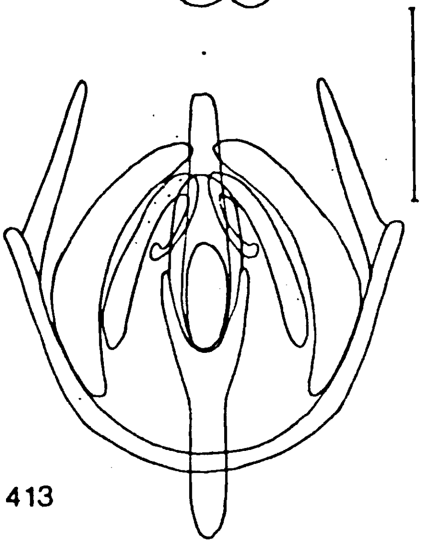

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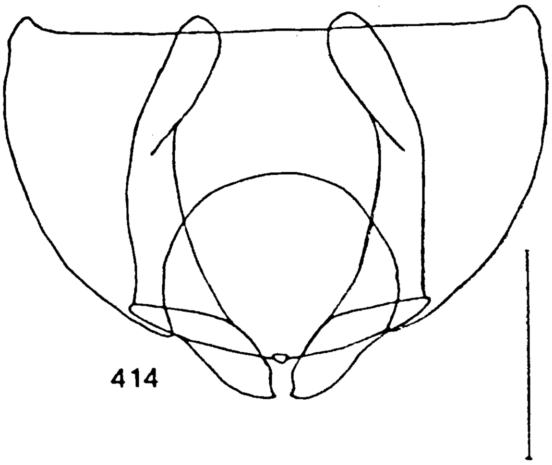

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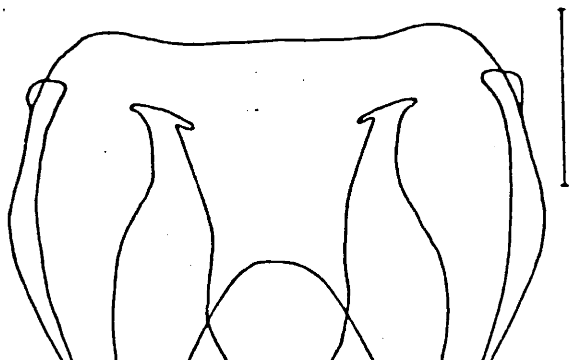

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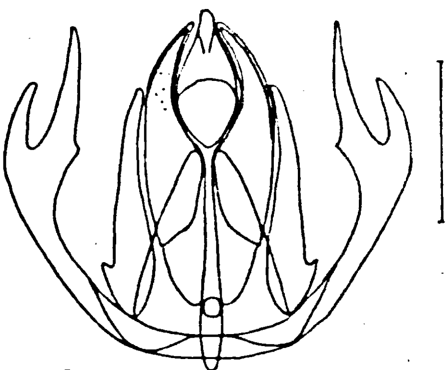


416

417 *Chlorops serena* IX tergite Egham, Surrey
22.ix.1972 J.W.I.

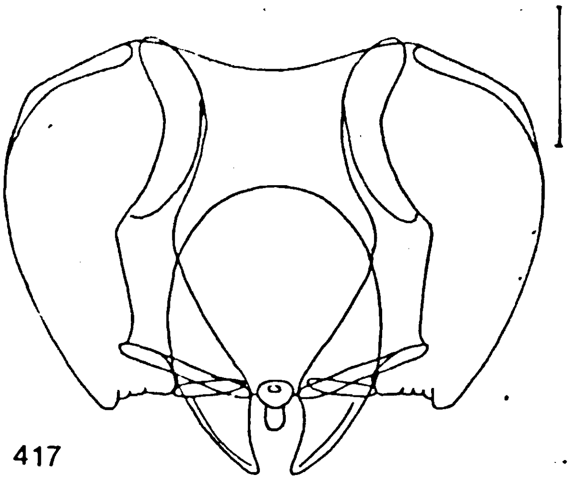
418 *C. serena* hypandrium Egham, Surrey
30.v.1971 J.W.I.

419 *C. brevimana* IX tergite Wheatfen, Norfolk
5.ix.1973 J.W.I.

420 *C. brevimana* hypandrium Virginia Water, Surrey
6.ix.1971 J.W.I.

421 *C. pumilionis* IX tergite Foul Anchor, Lincs
6.ix.1973 J.W.I.

422 *C. pumilionis* hypandrium Egham, Surrey
15.ix.1970 J.W.I.



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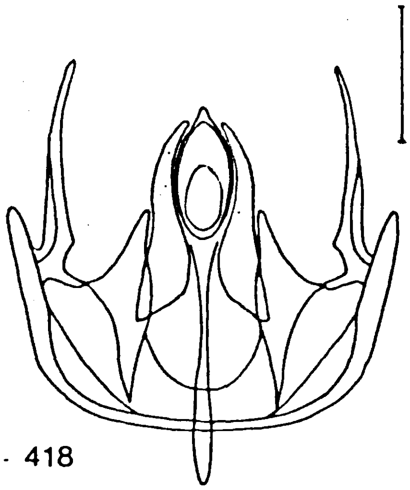

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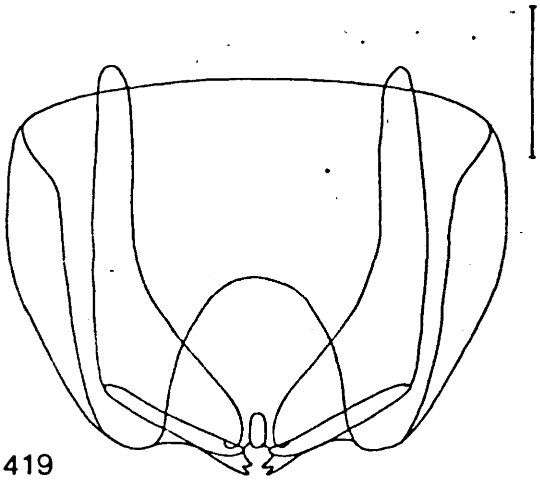

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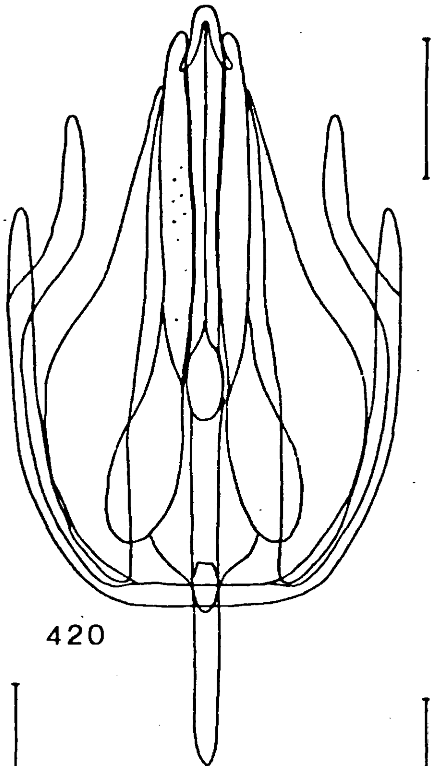

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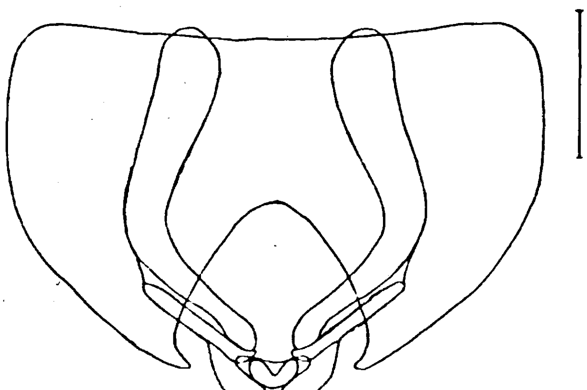

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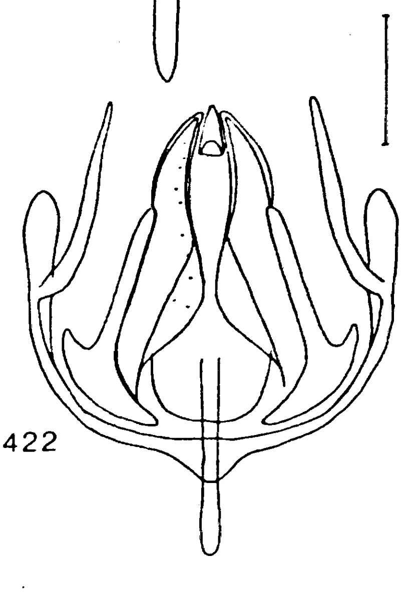


422

423 *Chlorops hypostigma* IX tergite Egham, Surrey
2.vi.1972 J.W.I.

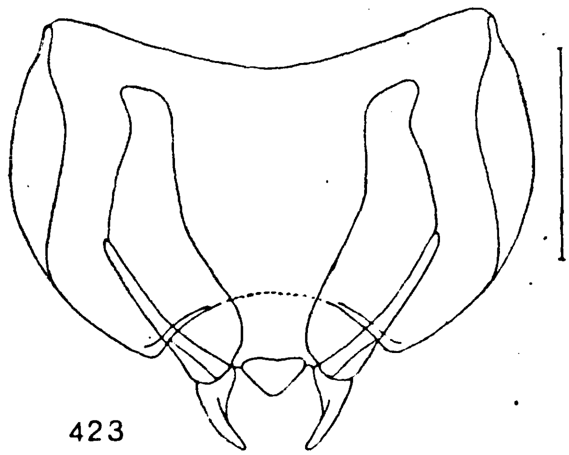
424 *C. hypostigma* hypandrium Egham, Surrey
2.vi.1972 J.W.I.

425 *C. meigeni* IX tergite Glenflesk, Co. Kerry
29.vi.1969 P.J.C.

426 *C. meigeni* hypandrium Glenflesk, Co. Kerry
29.vi.1969 P.J.C.

427 *C. speciosa* IX tergite Upware, Kent
18.vii.1875 G.H.V.

428 *C. speciosa* hypandrium Upware, Kent
18.vii.1875 G.H.V.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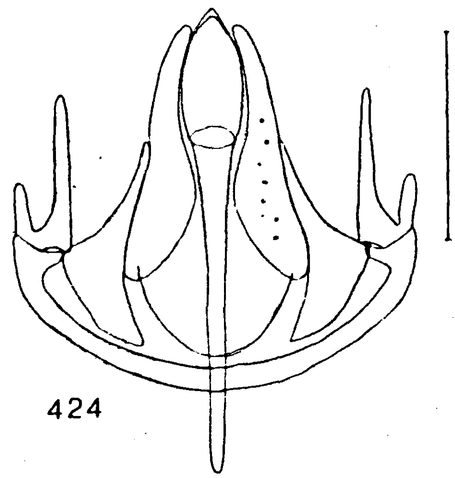
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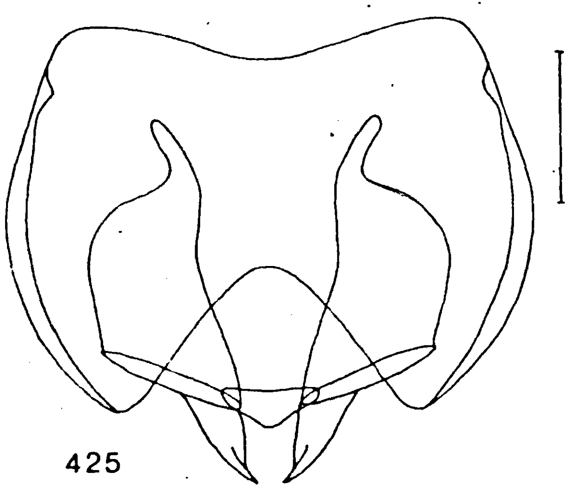
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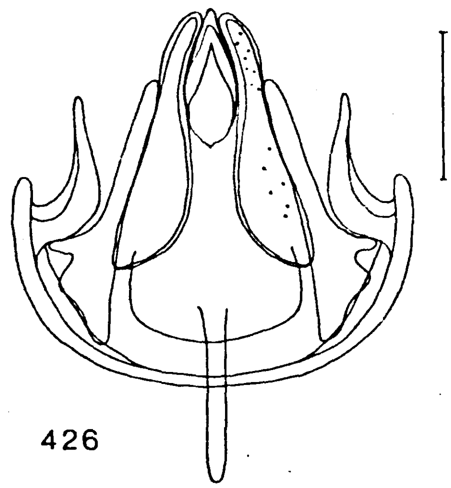
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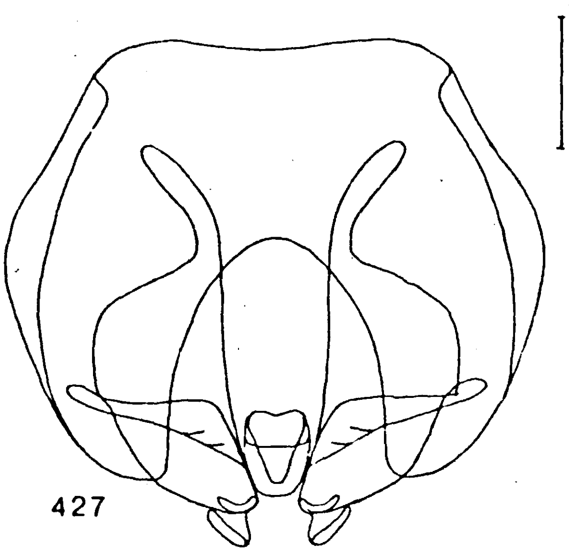
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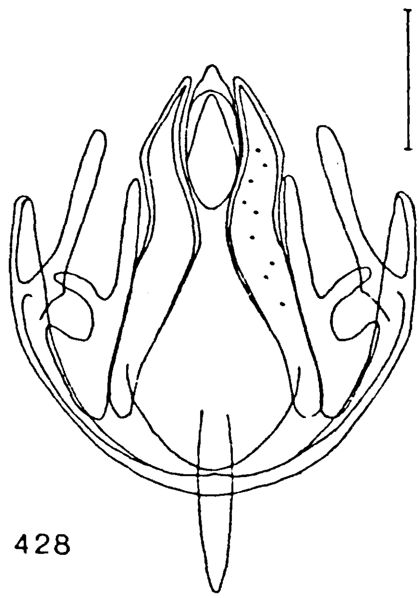

428

429 *Chlorops planifrons* IX tergite Frensham, Surrey
23.vi.1973 J.W.I.

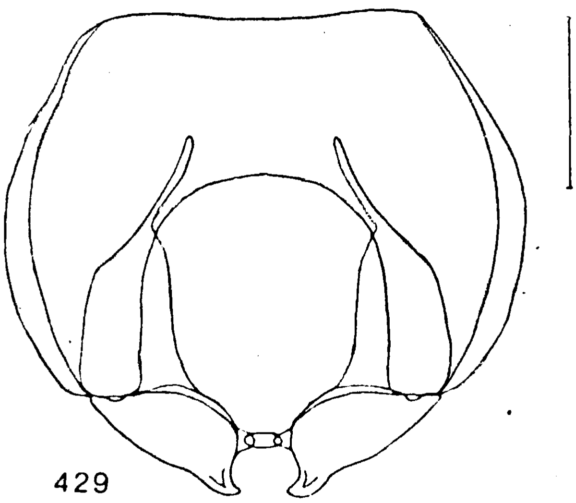
430 *C. planifrons* hypandrium Frensham, Surrey
23.vi.1973 J.W.I.

431 *C. triangularis* IX tergite Lyndhurst, Hants.
18.vi.1895 G.H.V.

432 *C. triangularis* hypandrium Lyndhurst, Hants.
18.vi.1895 G.H.V.

433 *C. interrupta* IX tergite Wytham, Berks.
x.1915 ? (Liverpool Mus.)

434 *C. interrupta* hypandrium Wytham, Berks.
x.1915 ? (Liverpool Mus.)



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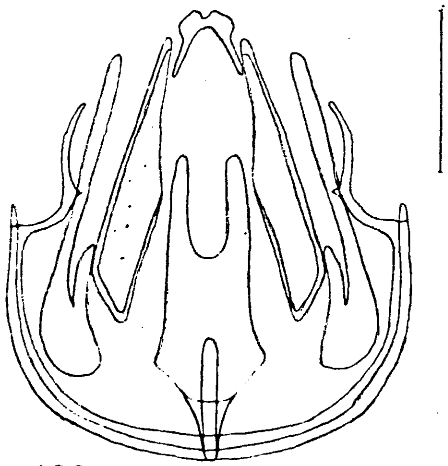

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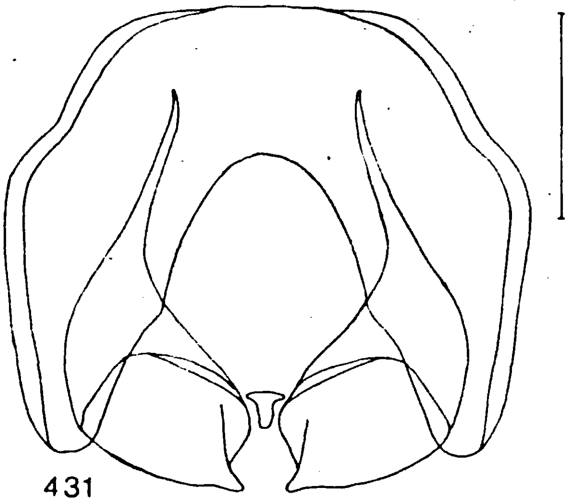

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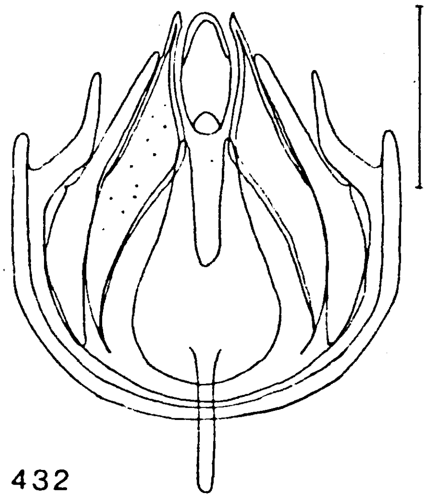

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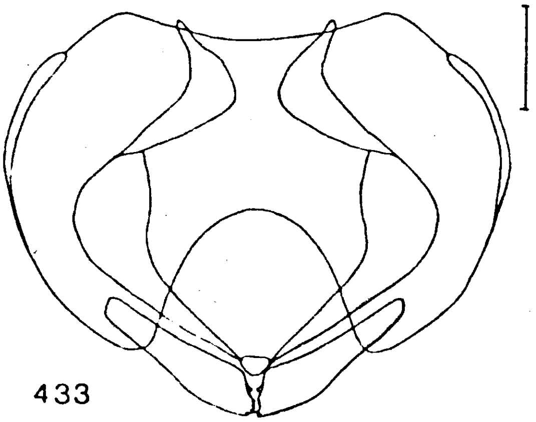

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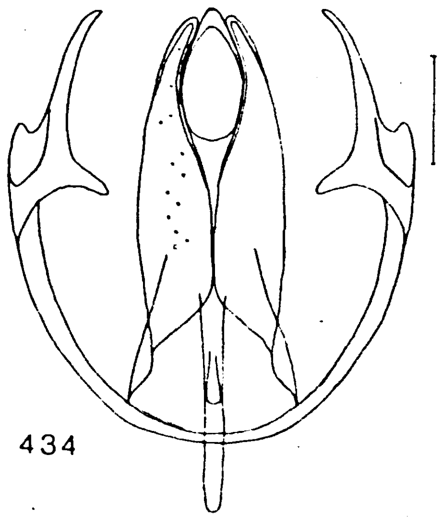


434

435 _Chlorops_ _gracilis_ IX tergite Shabbingdon, Bucks.
7.vii.1934 ? (Liverpool Mus.)

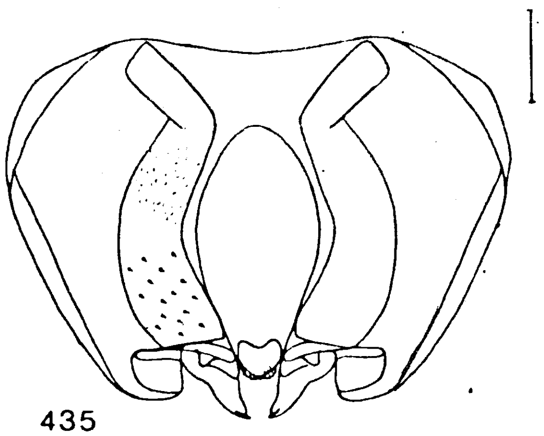
436 _C_. _gracilis_ hypandrium Shabbingdon, Bucks.
7.vii.1934 ? (Liverpool Mus.)

437 _C_. _citrinella_ IX tergite Brockenhurst, Hants.
12.vii.1907 J.J.F.X.K.

438 _C_. _citrinella_ hypandrium Brockenhurst, Hants.
12.vii.1907 J.J.F.X.K.

439 _C_. _rufina_ IX tergite Devereux, Hereford.
16.viii.1902 J.H.W.

440 _C_. _rufina_ hypandrium Devereux, Hereford.
16.viii.1902 J.H.W.



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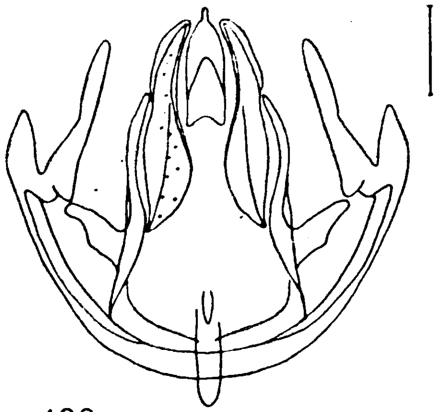

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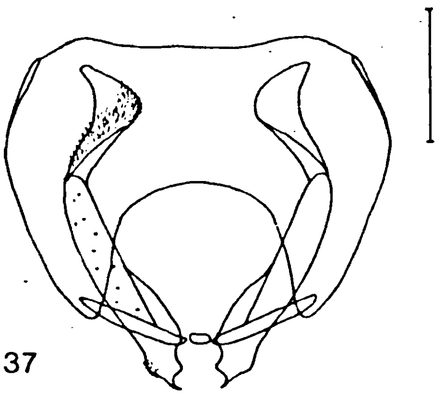

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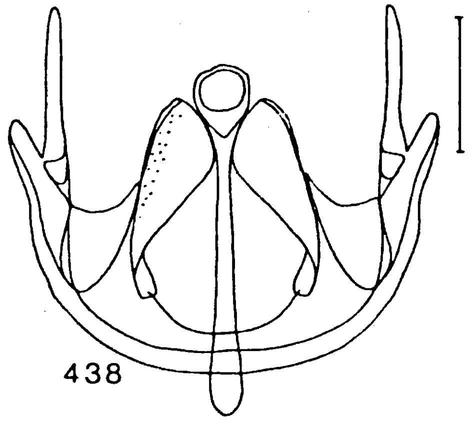

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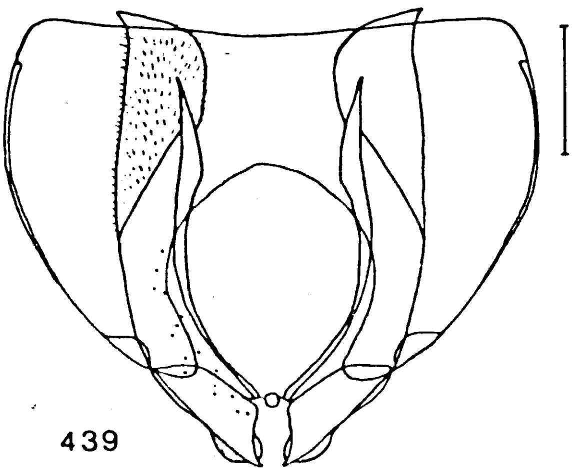

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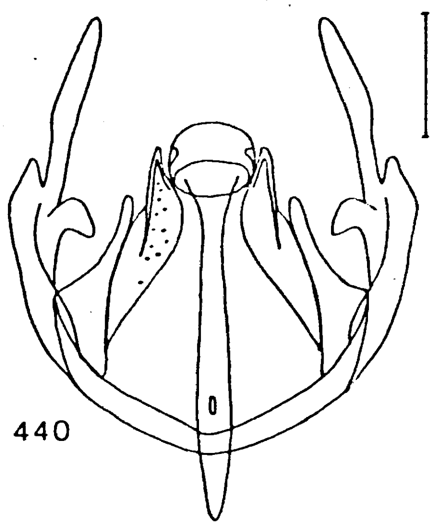


440

441 *Chlorops scalaris* IX tergite Wells, Norfolk
5.vii.1969 K.C.D.

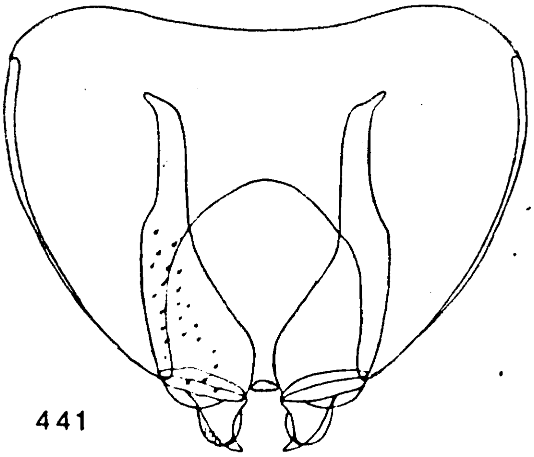
442 *C. scalaris* hypandrium Wolvercote, Oxon.
8.vi.1911 ? (Liverpool Mus.)

443 *C. centromaculata* IX tergite Stoke Common, Bucks.
9.ix.1967 P.J.C.

444 *C. centromaculata* hypandrium Wangford Warren,
Suffolk 8.ix.1973 P.J.C.

445 *C. calceata* IX tergite Stiffkey, Norfolk
8.vii.1974 J.W.I.

446 *C. calceata* hypandrium Stiffkey, Norfolk
8.vii.1974 J.W.I.



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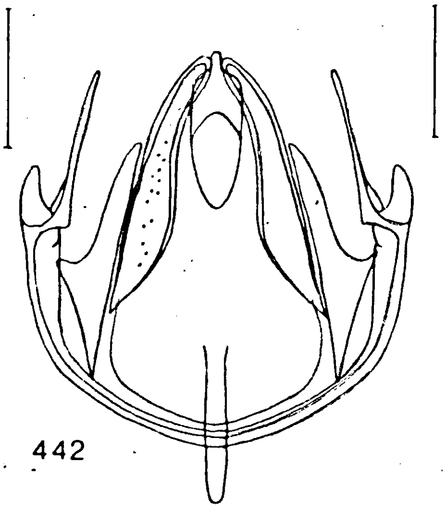

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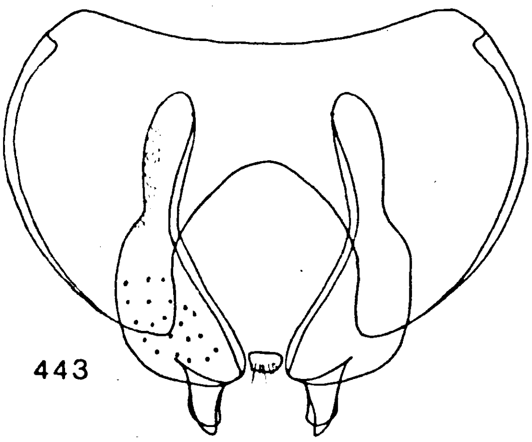

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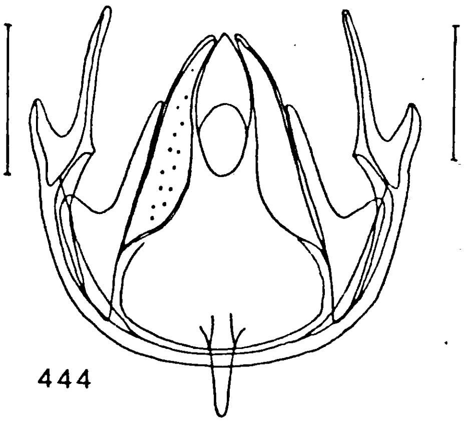

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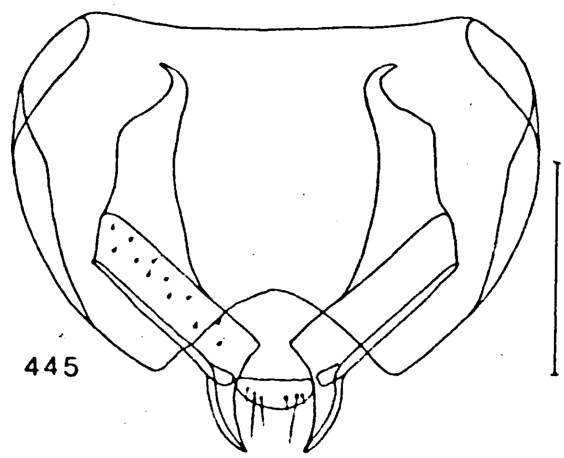

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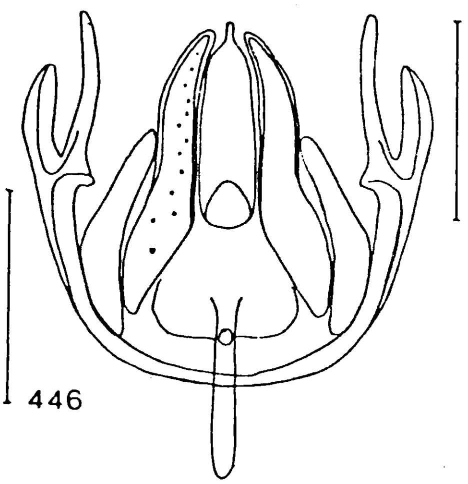


446

447 _Chlorops_ _obscurella_ hypandrium Swanscombe, Kent
26.vi.1964 L.P.

448 _C._ _obscurella_ IX tergite Swanscombe, Kent
26.vi.1964 L.P.

449 _Thaumatomyia_ (_Chloropisca_) _glabra_ IX tergite
Chobham Common, Surrey 18.vi.1971 J.W.I.

450 _T._ (_C._) _glabra_ hypandrium Chobham Common, Surrey
18.vi.1971 J.W.I.

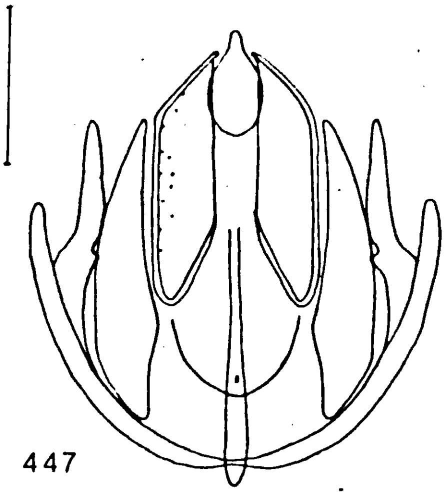
451 _Thaumatomyia_ _trifasciata_ edita Mytchett, Surrey
24.viii.1975 P.J.C.

452 _Thaumatomyia_ (_Chloropisca_) _glabra_ edita
Egham, Surrey 22.vi.1971 J.W.I.

453 _Thaumatomyia_ _rufa_ edita Mytchett, Surrey
28.vi.1971 J.W.I.

454 _T._ _notata_ edita Egham, Surrey 24.vi.1971 J.W.I.

455 _T._ _hallandica_ edita Chobham Common, Surrey
18.vi.1971 J.W.I.



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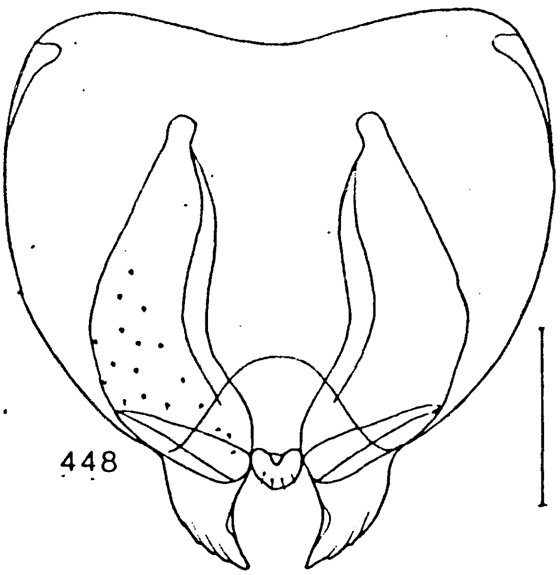

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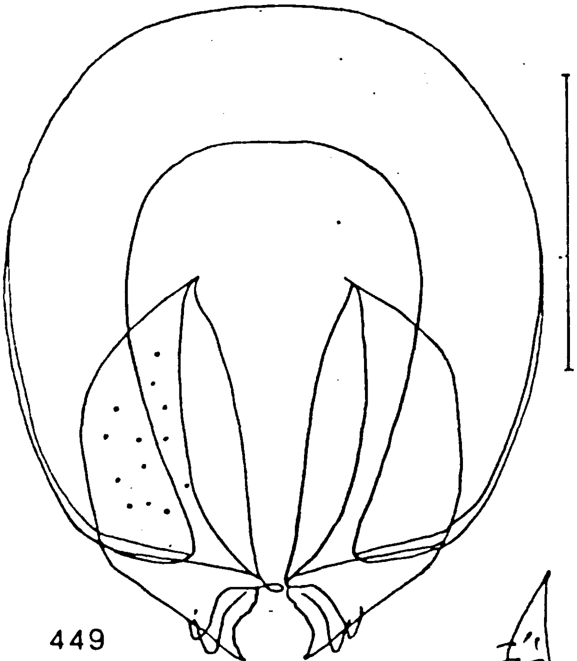

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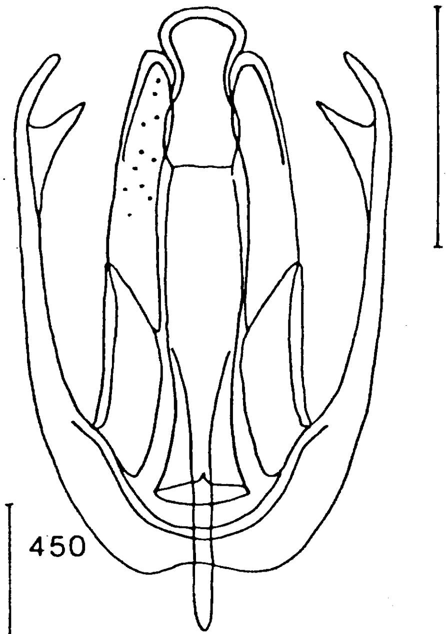

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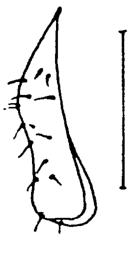

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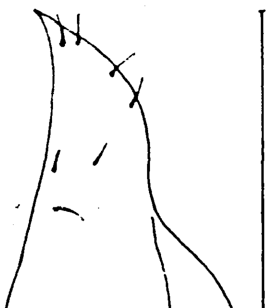

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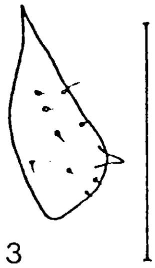

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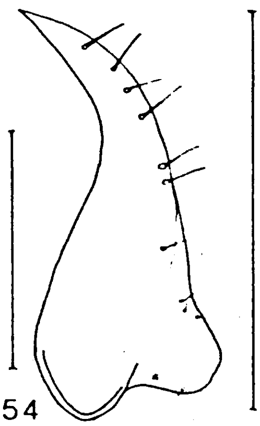

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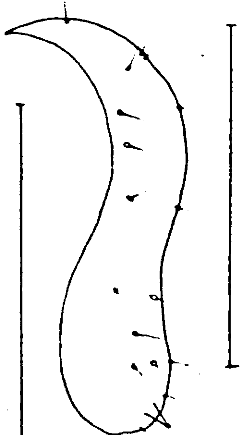


455

456 <u>Thaumatomyia</u> <u>notata</u> IX tergite Egham, Surrey
3.v.1970 J.W.I.

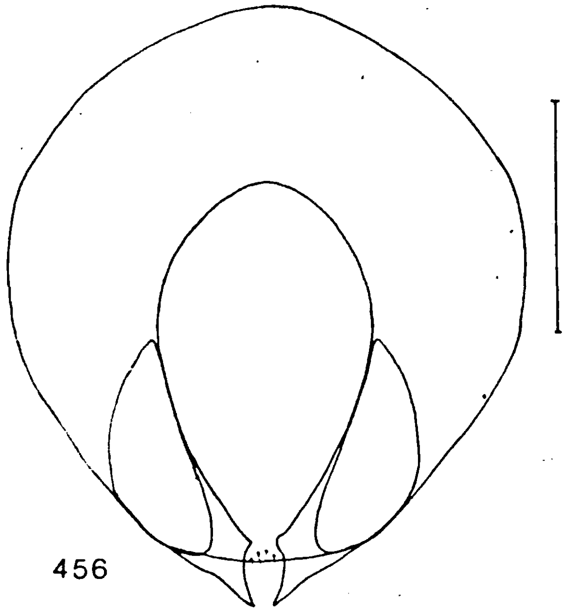
457 <u>T</u>. <u>notata</u> hypandrium Egham, Surrey
3.v.1970 J.W.I.

458 <u>T</u>. <u>hallandica</u> IX tergite Chobham Common,
Surrey 18.vi.1971 J.W.I.

459 <u>T</u>. <u>hallandica</u> hypandrium Chobham Common,
Surrey 18.vi.1971 J.W.I.

460 <u>T</u>. <u>trifasciata</u> IX tergite Mytchett, Surrey
24.viii.1975 P.J.C.

461 <u>T</u>. <u>trifasciata</u> hypandrium Mytchett, Surrey
24.viii.1975 P.J.C.



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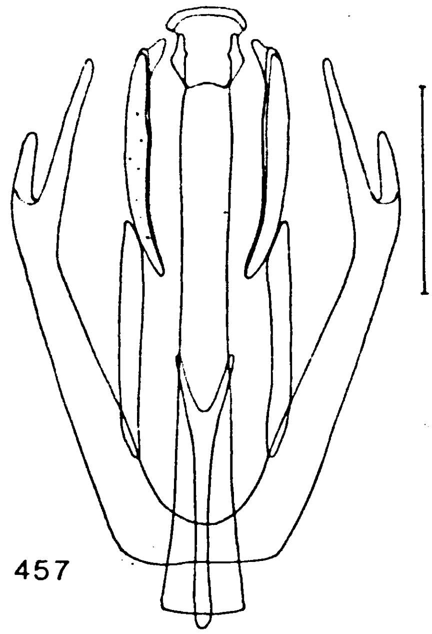

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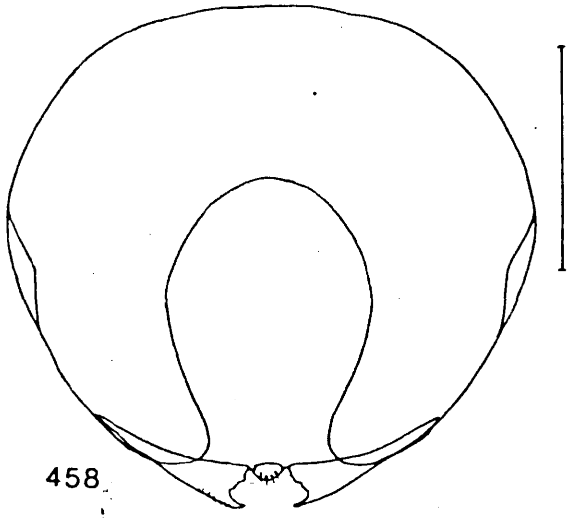
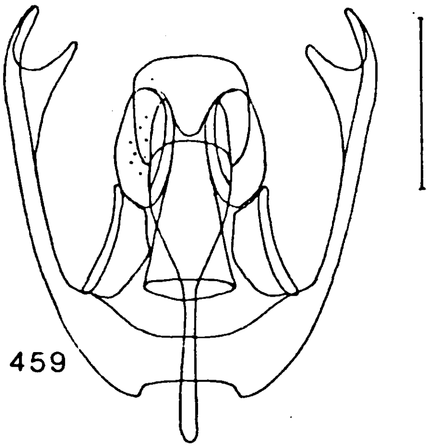
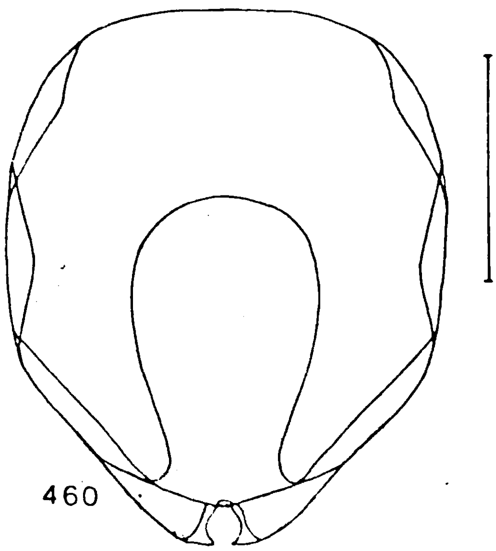


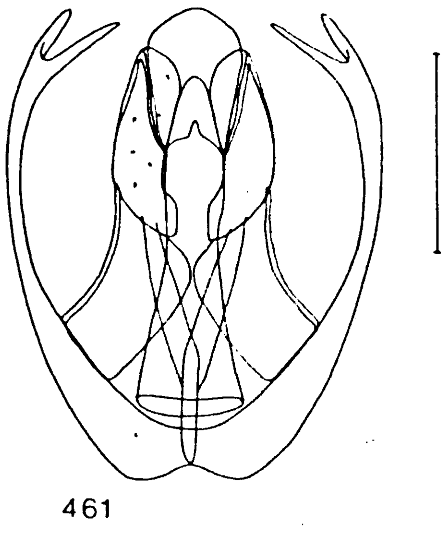
458



459



460



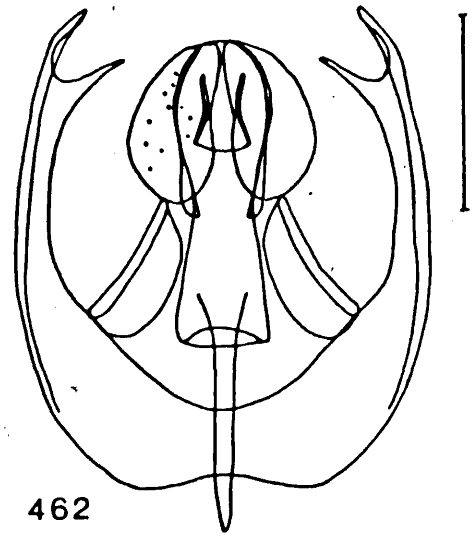
461

462 *Thaumatomyia rufa* hypandrium Egham, Surrey

28.vi.1971 J.W.I.

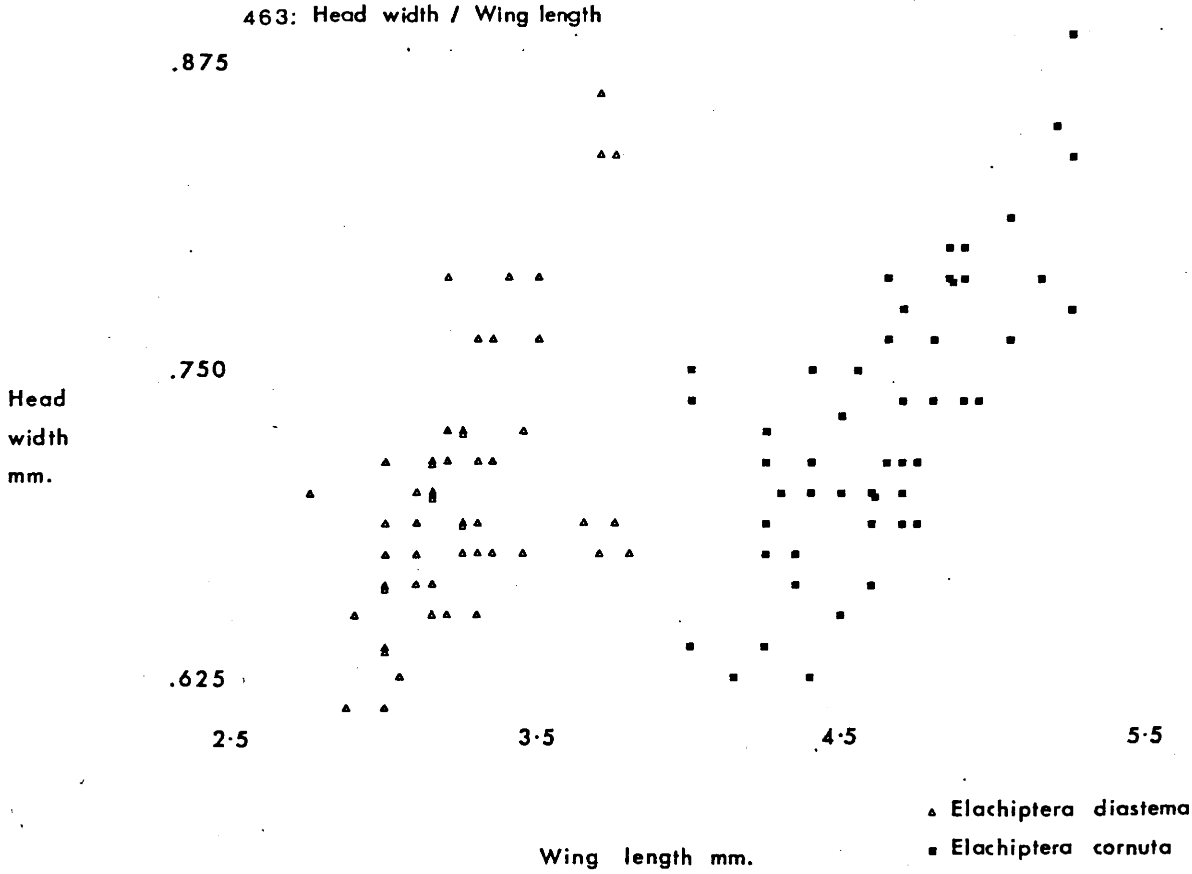
463 Scatter diagram of head width : wing length

of *Elachiptera diastema* and *E. cornuta*.



462

463: Head width / Wing length



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SUMMARY

This thesis examines the taxonomy of the British Chloropidae. A total of 166 species has been found to occur in Britain. The male genitalia of nearly all the species have been described and illustrated. Identification keys to Chloropinae except *Meromyza* and most Oscinellinae are provided. In an attempt to stabilise the nomenclature, type material of 81 species and forms discussed in this thesis has been examined.

The following species are added to the British list: *Calamoncosis aspistylina* Duda, *Trachysiphonella carinfacies* Nartshuk, *Oscinisoma gilvipes* Loew, *Crassivenula brachyptera* Thalhammer, *Meromyza bohemica* Fedoseeva, *M. coronoseta* Hubicka, *M. curvinervis* Zetterstedt, *M. palposa* Fedoseeva, *M. pluriseta* Péterfi, *M. sorocula* Fedoseeva, *M. triangulina* Fedoseeva, *Cryptonevra nigritarsis* Duda, *Lasiosina heleocharis* Nartshuk, *Melanum fumipenne* Loew?, *Chlorops adjuncta* Becker, *C. centromaculata* Duda, *C. varsoviensis* Becker.

Undescribed species were found in the following genera: *Conioscinella* (1 species), *Meromyza* (2 species), *Cryptonevra* (1 species), *Cetema* (1 species), *Chlorops* (1 species). Two undescribed species of Chloropinae were not identified to generic level.

Following an examination of the type material, nomenclatorial changes are required in the following species: *glyceriae* Nartshuk (=*nitida* Mg.); *vallaris* Collin (=*styriacus* Strobl); *styriacus* Strobl misident., = *opacus* Beck.; *hortensis* Collin (= *pusilla* Mg.); *coei* Nartshuk (= *capreola* Hal.); *femorata* Macq.

(= variegata Mg., not auctt.). Tropidoscinis zurcheri was considered to be better placed in Oscinella.

The femoral comb, a secondary sexual character, is described and found to occur in Oscinellinae but not Chloropinae. The British Oscinellinae are divided into 6 groups of genera and the British Chloropinae are divided into 9 groups of genera. The interrelationships of these genus groups are discussed but it was not possible to divide the subfamilies into categories between the subfamily and genus group level. The division of the family into Oscinellinae and Chloropinae is confirmed and the evidence in this thesis does not indicate that the Chloropidae are misplaced in the superfamily Tephritoidea.

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