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## The Alysiinae (Hym. Braconidae) parasites of the Agromyzidae (Diptera)

### IV. The parasites of *Hexomyza* ENDERLEIN, *Melanagromyza* HENDEL, *Ophiomyia* BRASCHNIKOV and *Napomyza* WESTWOOD<sup>2</sup>

With textfigures 148–170

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#### Introduction

Three parts of this paper have already appeared in this journal (GRIFFITHS, 1964, 1966a and 1966b). The present fourth part deals with the three remaining European genera of Agromyzinae, that is *Hexomyza* ENDERLEIN, *Melanagromyza* HENDEL and *Ophiomyia* BRASCHNIKOV, and with one further genus of Phyto-myzinae, *Napomyza* WESTWOOD. These genera contain very few species whose larvae form parenchymal leaf-mines (as in the majority of Agromyzidae). Most species of *Melanagromyza*, *Ophiomyia* and *Napomyza* feed in the stems of their host plant, either boring within the stem (in most *Melanagromyza* and *Napomyza*) or forming shallow mines beneath the epidermis (in many *Ophiomyia* species). However a few species of these genera have different biologies (for instance a few *Ophiomyia* and *Napomyza* species mine in the midrib or petiole of the leaf). The larvae of the other genus, *Hexomyza*, are all gall-causers.

The three genera of Agromyzinae are clearly monophyletic (being synapomorph in respect of their black halteres, reduction in the number of dorsocentral bristles and the form of the larval mandibles). *Napomyza* is without doubt phylogenetically disjunct from this group of genera (since the Agromyzinae are a monophyletic group), but it is convenient to consider its parasites at the same time because species of the *Chorebus senilis* group sensu lato and the *C. cybele* group are associated with both *Napomyza* and these genera of Agromyzinae.

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<sup>2</sup> Part I in Beitr. Ent., 14, 823–914; 1964. — Part II in Beitr. Ent., 16, 551–605; 1966. — Part III in Beitr. Ent., 16 775–951; 1966.

This similarity in parasite fauna appears to have arisen through the similarity in larval biology which has facilitated the transference of parasites from one group to the other.

All four host genera treated in this paper have recently been revised by SPENCER (1964, 1966a and 1966b). I have followed his nomenclature throughout. This involves some transference of species formerly included in *Melanagromyza* to *Ophiomyia*, as well as a new generic concept for which the name *Hexomyza* is available. As thus revised these three genera appear to represent monophyletic groups. My concept of *Napomyza* in this paper has been restricted (following NOWAKOWSKI and SPENCER) to those species monophyletic with the genotype *N. lateralis* FALLÉN. The parasites of the several leaf-mining species which were previously ascribed to this genus have already been treated in Part III (GRIFFITHS, 1966b).

Acknowledgements to most of those who have helped me with material for this paper have been given in previous parts. In addition to those already mentioned I would like to thank Drs. L. E. VAN'T SANT and Mr. J. G. C. BETHE of the Instituut voor Plantenziektenkundig Onderzoek at Wageningen, Holland, and Mr. J. LOUNSKY of the Station d'Entomologie at Gembloux, Belgium, whose help in obtaining parasite material from hosts of agricultural importance has been most valuable. My thanks are also due to Mr. J. C. DEEMING, who obtained the bred specimens of *Chorebus orbiculatae* sp. nov.

The abbreviations used in this paper have already been explained in the introduction to Part II (GRIFFITHS, 1966a).

### Previous Records

As in previous parts of this paper I have prepared a table below explaining the discrepancies between my list of host records and the list given in FULMEK (1962). The comments exclude changes in the generic nomenclature, which affect some of the host names and nearly all the parasite names. Comments on some of the rejected records are also included under the descriptions of the species concerned. Leaf-mining species formerly included in *Napomyza* are not mentioned in this list, but have been dealt with in Part III (GRIFFITHS, 1966b). FULMEK's list excludes previous records for *Hexomyza*, whose larvae are gall-causers, and *Melanagromyza*, whose larvae are stem-borers (the two species listed by FULMEK as *Melanagromyza*, as shown below, are now placed in *Ophiomyia*). Previous records for those genera are referred to under the descriptions of *Chorebus senilis* (NEES), *C. brevicornis* (THOMSON) and *C. gedanensis* (RATZEBURG), and also in the footnote to table 17.

#### *Dacnusa* HALIDAY

##### *Dacnusa pubescens* (CURTIS)

In addition to the records of this species from *Phytomyza* hosts given in Part III, I have received the following material bred from *Napomyza*.

##### Host 5 — *Napomyza carotae* SPENCER

1 ♂ from puparium in carrot (*Daucus carota sativus*), Nes, Friesland, Holland, em. 11. ix. 65, leg. BETHE (GCDG).

Table 16

Earlier Records of Alysiinae parasites of host species included in this paper in *Ophiomyia* and *Napomyza* (after FULMEK, 1962) with comments thereon.

Host	Parasite	Comments
<i>Melanagromyza beckeri</i> HENDEL	<i>Dacnusa leptogaster</i> HALIDAY <i>Rhizarcha areolaris</i> NEES	host was <i>Ophiomyia cunctata</i> HENDEL not accepted (see Part III)
<i>Melanagromyza simplex</i> H. LÖW	<i>Dacnusa bathyzona</i> MARSHALL <i>Dacnusa rondanii</i> GIARD	refers to <i>Chorebus rondanii</i> (GIARD) accepted
<i>Napomyza lateralis</i> FALLÉN	<i>Dacnusa didas</i> NIXON <i>Dacnusa flavipes</i> GOUREAU  <i>Dacnusa leptogaster</i> HALIDAY  <i>Dacnusa rufipes</i> NEES	host was <i>N. scrophulariae</i> SPENCER. not accepted (described from <i>Ceroðontha</i> ( <i>Dizygomyza</i> ) <i>iraeos</i> ROBINEAU DESVOIDY, see Appendix VIII) refers to <i>Chorebus glaber</i> (NIXON) bred from <i>N. cichorii</i> SPENCER SIMM's (1925) " <i>Phytomyza lateralis</i> FALLÉN" was the species now accepted as <i>P. nigra</i> MEIGEN. The parasite he called <i>rufipes</i> was probably the species described in Part III as <i>Chorebus aphantus</i> (MARSHALL). SIMM's figure is of a teneral specimen whose wing venation is not developed.
<i>Ophiomyia proboscidea</i> STROBL	<i>Rhizarcha areolaris</i> NEES  <i>Dacnusa tarsalis</i> THOMSON	The host was <i>Phytomyza nigra</i> MEIGEN (called <i>lateralis</i> by SIMM, 1925). not accepted (parasite of <i>Phytomyza autumnalis</i> GRIFFITHS and <i>P. farfarue</i> HENDEL)
<i>Tylomyza pinguis</i> FALLÉN	<i>Dacnusa leptogaster</i> HALIDAY	accepted

Host 6 — *Napomyza cichorii* SPENCER

1 ♀ from puparium in roots of chicory (*Cichorium intybus*), Isle of Walcheren, Holland, em. iii. 66, leg. BETHE (GCDG). 9 ex. from roots and leaves of chicory (*Cichorium intybus*), 1963/64 and 1964/65, from Zaventem, Belgium, leg. LOUNSKY (GCDG and Station d'Entomologie, Gembloux).

Host 7 — *Napomyza lateralis* FALLÉN

2 ex. from puparia in *Matricaria chamomilla*, Zaventem, Belgium, 1964/65, leg. LOUNSKY (GCDG).

The *Chorebus senilis* group sensu lato

The concept of the *Chorebus senilis* group sensu lato here proposed includes all species included by NIXON (1944) in his *Dacnusa leptogaster* group, *Dacnusa senilis* group s. str. and *Dacnusa gracilis* group, as well as *C. petiolatus* (NEES), which NIXON classified as a "species sola" of *Dacnusa*. I do not include in this group either *C. fallax* (NIXON) (referred to the *lateralis/ovalis* complex, see Part III) or the species included in NIXON's "cytherea subgroup" of his *senilis* group. The *senilis* group s.l., as here redefined, is perhaps part of a wider monophyletic group which also includes the *merella* and *cytherea* groups, and species formerly included in "*Gyrocampa*", "*Paragyrocampa*" and "*Chorebus*" in the restricted sense. My reasons for suggesting this concept have

been given in Part I (GRIFFITHS, 1964, p. 849–850). The *senilis* group is distinguished from the other members of this suggested group by one distinctive apomorph character — the sides of the pronotum, at least along and below the oblique suture, are covered with dense, opaque, usually matted pubescence. (In most other *Chorebus* spp. the pronotal pubescence is sparser, fine and inconspicuous: however a few species of the *ovalis/lateralis* complex associated with *Liriomyza* hosts, e.g. *C. misellus* (MARSHALL), have also, through convergence, evolved similar dense pronotal pubescence.) In addition the *senilis* group is apooec, i.e. characterised by an innovation in host association. That the association of this group with hosts of the *Melanagromyza*–*Ophiomyia*–*Hexomyza* group (these three genera being monophyletic) was the result of a transference from non-Agromyzinae hosts is apparent from the fact that the *Chorebus* parasites of leaf-mining species of Agromyzinae, included in the paraphyletic “genus” *Agromyza*, belong to the *lateralis/ovalis* complex, and are thus more closely related to the parasites of leaf-mining Phytomyzinae than to the *senilis* group. I have already discussed this interesting question of priorities in host association in Part I (GRIFFITHS, 1964, p. 869–874), where I concluded that the *senilis* group was probably derived from ancestors associated with *Cerodontha* subgenus *Dizygomyza*.

It seems to me that my concept of the *senilis* group s.l. is established beyond reasonable doubt as a monophyletic group within *Chorebus* by the synapomorphy and synapoeocy just mentioned. Other noteworthy morphological features for recognition of this group are as follows.

- (i) Metapleural pubescence very dense, forming a well-defined rosette around the rugose swelling (compare figs. 22–23 in Part I): prododeal pubescence also very dense (synapomorph with the majority of species included in *Chorebus*).
- (ii) Hind coxa with a well-defined tuft of matted pubescence near its base (? synapomorph with the *cytherea* group and those species formerly included in “*Gyrocampa*” and “*Chorebus*” in the restricted sense).
- (iii) Petiole at least 1.6 times as long as wide, often very elongate, parallel-sided or only slightly widened towards its apex (? synapomorph with the *merella* and *cytherea* groups).
- (iv) Pubescence immediately above the base of the mandibles somewhat dense, in some species forming distinct tufts: in some species the entire back of the head is densely pubescent. (The development of rather dense pubescence above the base of the mandibles probably represents an apomorph character, associated with the development of the adjacent pronotal pubescence, in the groundplan of the *senilis* group s.l.; but the difference in the pubescence of the head between species of the *senilis* group which are relatively plesiomorph in this respect, for instance *C. leptogaster* (HALIDAY) and *C. euryale* (NIXON), and species of the *merella* and *cytherea* groups is not very great.)
- (v) Wing with vein  $Cu_{1b}$  retained (fig. 154), though sometimes very short, forming a distinct angle with the transverse section of  $Cu_1$  (plesiomorph). (Only in *C. larides* (NIXON) is  $Cu_{1b}$  weak, as in the *lateralis/ovalis* complex.)
- (vi) Thorax elongate, at least 13 times as long as high.

NIXON (1943 and 1944) distinguished his “*leptogaster*-group” from his “*senilis*-group s. str.” primarily on the length and pubescence of the petiole. He states in his key to “*Dacnusa*” (NIXON, 1943, p. 164) that in the *leptogaster*-group the petiole is “very narrow, at least two and a half times as long as apically wide,

usually virtually bare . . .”, while in the *senilis*-group the petiole is “less narrow, at most twice as long as apically wide, thickly hairy except along the middle line . . .” Some exceptions to this distinction were however made. *C. larides* (NIXON) was included in the “*leptogaster*-group” in spite of its relatively short, pubescent petiole: and *C. glaber* (NIXON) was included in the “*senilis*-group s. str.” in spite of its bare petiole. Furthermore *C. brevicornis* (THOMSON), a species whose petiole does not agree well with either of the alternatives given in the key, was described under different synonyms in both groups. It seems to me therefore that NIXON’s group classification requires revision.

I have also included the *posticus* group (= the *gracilis* group of NIXON, 1944) in my *senilis* group s. l. The *posticus* group is established beyond doubt as a monophyletic group by the strongly apomorph female gaster. But it also possesses all the characters appropriate to the *senilis* group s. l. (see above). I am therefore fully satisfied that the *posticus* group is a subordinate group to be included within the *senilis* group s. l. The evolution of the apomorph female gaster of the *posticus* group was probably consequent upon the change in host association from an Agromyzid host to *Psila* (Psilidae). I have already discussed this question in Part I (GRIFFITHS, 1964, pp. 850 and 870).

I am also fully satisfied that *C. petiolatus* (NEES) belongs to the *senilis* group s. l. (see also GRIFFITHS, 1964, p. 850). NIXON (1943) appears to have overlooked the presence of hind coxal tufts in this species when constructing his key to “*Dacnusa*”. The life-history of *petiolatus* is unknown<sup>3</sup>, but it seems possible that its extremely large size is the result of transference from *Ophiomyia* to some non-Agromyzid host. The species appears synapomorph in respect of its extremely elongate petiole with species associated with the *Ophiomyia pulicaria* group.

Within my concept of the *senilis* group s. l. I think that four main subordinate groups may be recognised: (i) the *senilis* group sensu stricto, (ii) the *bathyzonus* group, (iii) the *posticus* group, and (iv) the *petiolatus* group. In addition there are seven species which I have not included in any subordinate group. The species included in these groups are shown in the key below.

The *senilis* group sensu stricto is apomorph in respect of its densely pubescent petiole: most species also have a stout, projecting ovipositor. The concept includes all species included in the *senilis* group s. str. by NIXON (1944) except *C. glaber* (NIXON), and also *C. larides* (NIXON), included by NIXON in his “*leptogaster*-group”. The inclusion of *C. brevicornis* (THOMSON) in this group is tentative, as its petiole is less pubescent than in the other species.

The *bathyzonus* group is characterised by the reduction of the precoxal suture to an almost smooth well-defined linear groove. The species of this group are as far as known restricted to stem-mining species of *Ophiomyia*. There is one other species associated with a stem-mining species of *Ophiomyia* which is

<sup>3</sup> GIARD (1904) concluded that the record of *petiolatus* as a parasite of *Platyparea poeciloptera* (SCHRANK) (Trypetidae) in stems of *Asparagus* was probably erroneous. See below under the description of *romani*.

probably monophyletic with the *bathyzonus* group as its precoxal suture is narrow, only weakly rugose-costate, approaching the condition found in that group: this is described below as *C. heringianus* sp. nov.

The *posticus* group, characterised by the strongly apomorph female gaster, has already been discussed above. There are three other species, *C. tamsi* (NIXON), *C. rondanii* (GIARD) and *C. orbiculatae* sp. nov. (not included in any group at present), which have mandibles similar to those of the *posticus* group (with tooth 1 strongly expanded, but teeth 3 and 4 relatively small). It seems probable that this feature represents synapomorphy, but this opinion is only tentative because similarity in the form of the mandibles is often the result of convergence. However if this suggested relationship is correct, it may be concluded that the change in host association which resulted in the formation of the *posticus* group was from *Ophiomyia* to *Psila* (not from *Melanagromyza* as I suggested in Part I).

In the *petiolatus* group I have included four species characterised by their extremely elongate petiole. Three of these species (*C. leptogaster* (HALIDAY), *C. femoratus* (TOBIAS) and *C. xiphidius* sp. nov.) are also synapomorph in respect of their wing venation, having a relatively short pterostigma and cell  $2R_1$ .

Of the three species not yet mentioned two, *C. gedanensis* (RATZEBURG) and *C. caelebs* (NIXON), are possibly synapomorph in respect of their strongly expanded cheeks. When more information on the parasites of *Hexomyza* is available their affinities may be clarified. The remaining species, *C. glaber* (NIXON), is unusual in being associated with a *Napomyza* host. Morphologically it is relatively plesiomorph, and I am unable to make any firm suggestions regarding its relationships at present (although it is very similar to *leptogaster*, there is no clear evidence of synapomorphy).

The key below will I hope help to identify European species of the *senilis* group s. l. I have not been able to see the types of TOBIAS' species, but I have included them in the key as best I can on the basis of their original descriptions (TOBIAS, 1962) and personal correspondance with their author. A few of the couplets in the key are based on NIXON's (1944) keys to his "*leptogaster*-group" and "*senilis*-group s. str.", but I have made extensive revision. Some references to relevant figures in the works of NIXON (1944) and TOBIAS (1962) have been included in the key.

#### Key to the *Chorebus senilis* group sensu lato

- 1 Petiole (compare fig. 170) with dense adpressed more or less matted pubescence covering all its surface except sometimes the central line (but somewhat sparser in *brevicornis*, fig. 169). Ovipositor (♀) stout and projecting beyond the apical tergite in the retracted position in most species (except *ares*, *brevicornis* and *larides*). Back of head pubescent, often very densely so, except in *euryale*. Precoxal suture rugose-costate. Gaster not laterally compressed . . . . *senilis* group sensu stricto . . . . 2
- Petiole largely bare (compare fig. 168) with pubescence mainly near its base (the species with the most extensively pubescent petioles included here are *fuscipennis* and *brevifemur*, see fig. 167: these will readily be distinguished from species of the

- senilis* group s. str. by their virtually smooth precoxal suture). Ovipositor (♀) not or hardly projecting beyond the apical tergite in the retracted position, except in *brevifemur*, *glaber*, *xiphidius* and the *posticus* group (in the latter the gaster is strongly laterally compressed) . . . . . 12
- 2 Gaster beyond petiole conspicuously yellow. Legs largely pale yellow with the base of the hind coxae and sometimes the apex of the hind femora infuscated. 31–32 antennal segments (♀). Ovipositor (♀) stout, but only shortly projecting beyond the apical tergite in the retracted position (its sheaths not longer than segment 1 of the hind tarsus) . . . . . *C. stenocerus* (THOMSON), **comb. nov.**  
 (= *Dacnusa praeclara* NIXON, 1944, **syn. nov.**)
- Gaster beyond petiole varying from yellow-brown or red-brown to black . . . . . 3
- 3 Legs with femora and tibiae entirely yellow, at most the coxae and tarsal segments 5 infuscated. Ovipositor (♀) strongly projecting . . . . . 4
- Legs darker, with at least the apex of the hind femora infuscated . . . . . 5
- 4 27–28 antennal segments (♀). (♂ unknown) . . . . . *C. pratensis* (TOBIAS), **comb. nov.**
- Antennal segments: ♂, 37; ♀, 31 . . . . . *C. pulchellus* sp. **nov.**  
 Host: an Agromyzid in *Hypochoeris radicata*
- 5 Ovipositor (♀) extremely long, projecting beyond the apical tergite by nearly the length of the petiole (NIXON, 1944, fig. 110). Back of head largely bare and shining (as in *leptogaster*). 29 antennal segments (♀). Hind coxae and greater part of the hind femora blackish . . . . . *C. euryle* (NIXON), **comb. nov.**
- Ovipositor (♀) shorter, in the retracted position not projecting beyond the apical tergite by more than two-thirds of the length of the petiole. Back of head more pubescent . . . . . 6
- 6 24–26 antennal segments (♀). Ovipositor (♀) not projecting beyond the apical tergite in the retracted position. Back of head pubescent, but not densely so. Mandibles not expanded, with teeth 3 and 4 relatively small. Basal flagellar segments very short. Hind legs largely infuscated . . . . . *C. larides* (NIXON) **comb. nov.**
- 30 or more antennal segments. Ovipositor (♀) projecting except in *brevicornis* and *ares* . . . . . 7
- 7 Mandibles small, with tooth 4 much reduced (fig. 161). Petiole with a band of pubescence on either side, but broadly bare along its centre line and near its apex (fig. 169). Basal flagellar segments unusually short (see the table of biometric data). Ovipositor (♀) not or only slightly projecting beyond the apical tergite in the retracted position . . . . . *C. brevicornis* (THOMSON)  
 Host: *Melanagromyza aeneoventris* FALLÉN
- Mandibles not so. Petiole more densely pubescent . . . . . 8
- 8 Mandibles narrow, not at all widened towards their apex, with all teeth sharply pointed (fig. 159 and NIXON, 1944, fig. 79). Pubescence of back of head not so dense as in *senilis* and *ares*, but tending to form tufts above the base of the mandibles . . . . . 9
- Mandibles (figs. 158 and 160) at least slightly widened towards their apex. Pubescence of back of head dense (extremely so in *senilis* and *ares*), but not forming distinct tufts near the base of the mandibles . . . . . 10

\* As NIXON (1944) suspected his *praeclara* is a synonym of *stenocera* THOMSON. As well as the male referred to in Appendix V (in Part I), there is a female of this species in the THOMSON collection without a locality label. Possibly this is from the type locality Ringsjön (since there is no specimen labelled as from that locality). At any rate it fits the description well. I am therefore designating this specimen as the lectotype of *stenocera*.

- 9 38—42 antennal segments (♀) . . . . . *C. nomia* (NIXON), **comb. nov.**  
 — 34 antennal segments (♀)<sup>5</sup> . . . . . *C. maculatus* (NIXON), **comb. nov.**
- 10 Antennal segments: ♂, (36)—37—41; ♀, 35—36. Legs paler, with the hind femora infuscated only apically and the hind tibiae entirely yellow or yellow-brown. Mandibles large (fig. 160), distinctly widened towards their apex . . . . . *C. marsyas* (NIXON), **comb. nov.**<sup>6</sup>  
 — Antennal segments: ♂ (31)—33—36; ♀, (29)—31—34. Legs darker, with the hind femora entirely infuscated and often the apex of the hind tibiae infuscated. Mandibles (fig. 158) only slightly widened towards their apex . . . . . 11
- 11 Ovipositor (♀) projecting beyond the apical tergite in the retracted position by about two-thirds of the length of the petiole . . . . . *C. senilis* (NEES)
- Hosts: *Melanagromyza aeneoventris* FALLÉN, *Napomyza lateralis* FALLÉN, *N. scrophulariae* SPENCER and *N. cichorii* SPENCER
- Ovipositor (♀) much shorter, not or only slightly projecting beyond the apical tergite in the retracted position . . . . . *C. ares* (NIXON), **comb. nov.**<sup>7</sup>
- 12 Precoxal suture visible as an almost smooth linear groove . . . . . 13  
 — Precoxal suture distinctly rugose-costate, at least on its anterior half . . . . . 22
- 13 Mandibles narrow, with tooth 2 exceptionally long and pointed: tooth 3 weak or absent. Back of head bare or pubescent . . . . . see Part VI
- Certain species not referred to the *senilis* group s. l. (e. g. *C. uliginosus* ((HALIDAY) and *C. fordi* (NIXON)) resemble the *bathyzonus* group (through convergence) in having a long smooth precoxal suture and densely pubescent pronotum. These will be discussed in Part VI.
- Mandibles not as above: tooth 2 not exceptionally long and pointed: tooth 3 always distinct. Back of head densely pubescent in all species . . . . . *bathyzonus* group 14
- 14 Tooth 1 of mandibles enormously expanded, completely hiding the clypeus in lateral view of the head (NIXON, 1944, fig. 75). Legs bright yellow throughout. 36—37 antennal segments (♂). (♀ unknown). . . . . *C. sera* (NIXON), **comb. nov.**  
 — Tooth 1 of mandibles not or hardly expanded (compare fig. 162). Not more than 31 antennal segments . . . . . 15
- 15 Cheeks in lateral view angularly produced (NIXON, 1944, fig. 78), bearing a conspicuous tuft of white pubescence above the base of the mandibles. In the male the segments of at least the basal half of the flagellum are very shining and, at least on their dorsal surface, virtually bare. Petiole 3—3½ times as long as wide. Gaster beyond petiole reddish yellow. Legs largely reddish yellow. . . . . *C. bathyzonus* (MARSHALL)  
 Host: *Ophiomyia herakleivora* SPENCER

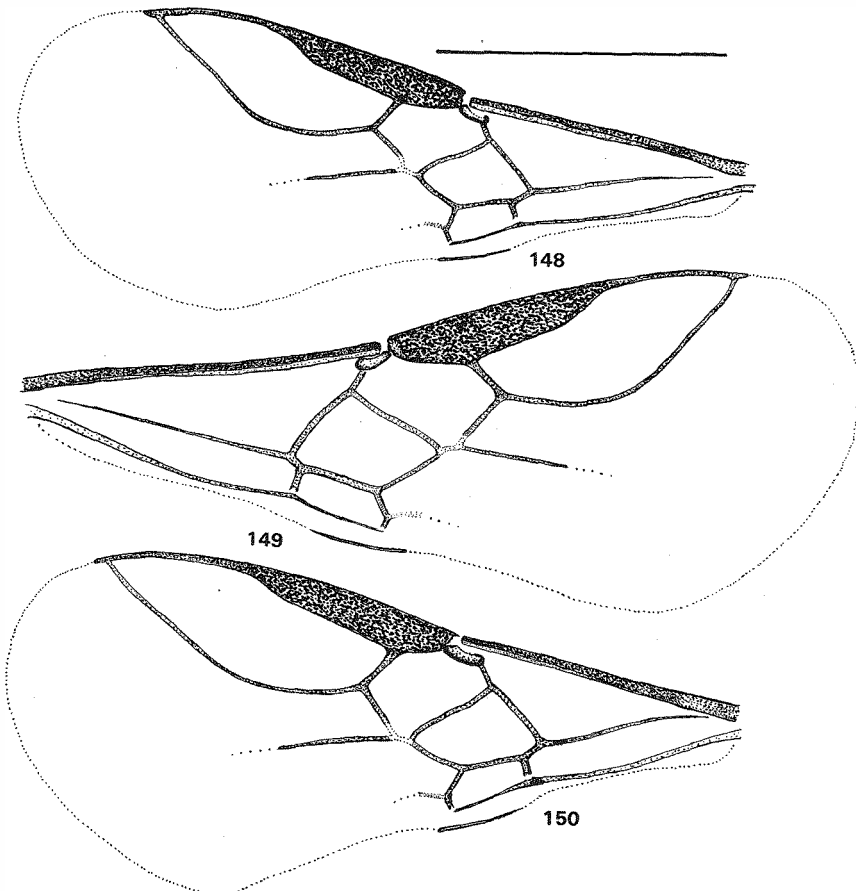
<sup>5</sup> It is difficult to judge to what extent the other differences between this species and *nomia* suggested by NIXON (1944) are reliable diagnostic criteria, since he only had a single specimen of *maculatus* before him. I have therefore thought it best to omit them from this key until further evidence is available.

<sup>6</sup> I have seen five specimens of *marsyas* in the HALIDAY collection. They appear to be HALIDAY's (1839) *Alysiu* (*Dacnusa*) *senilis* (NEES) Var. *β*, which he considered to represent *Dacnusa pulverosa* CURTIS. STELFOX was of this same opinion and labelled one of these specimens as *pulverosa*. I am considering *pulverosa* a nomen nudum, since the species was not described by CURTIS (the name was merely given in a check list). It hardly seems justifiable to consider the name available on account of HALIDAY's brief reference in synonymy.

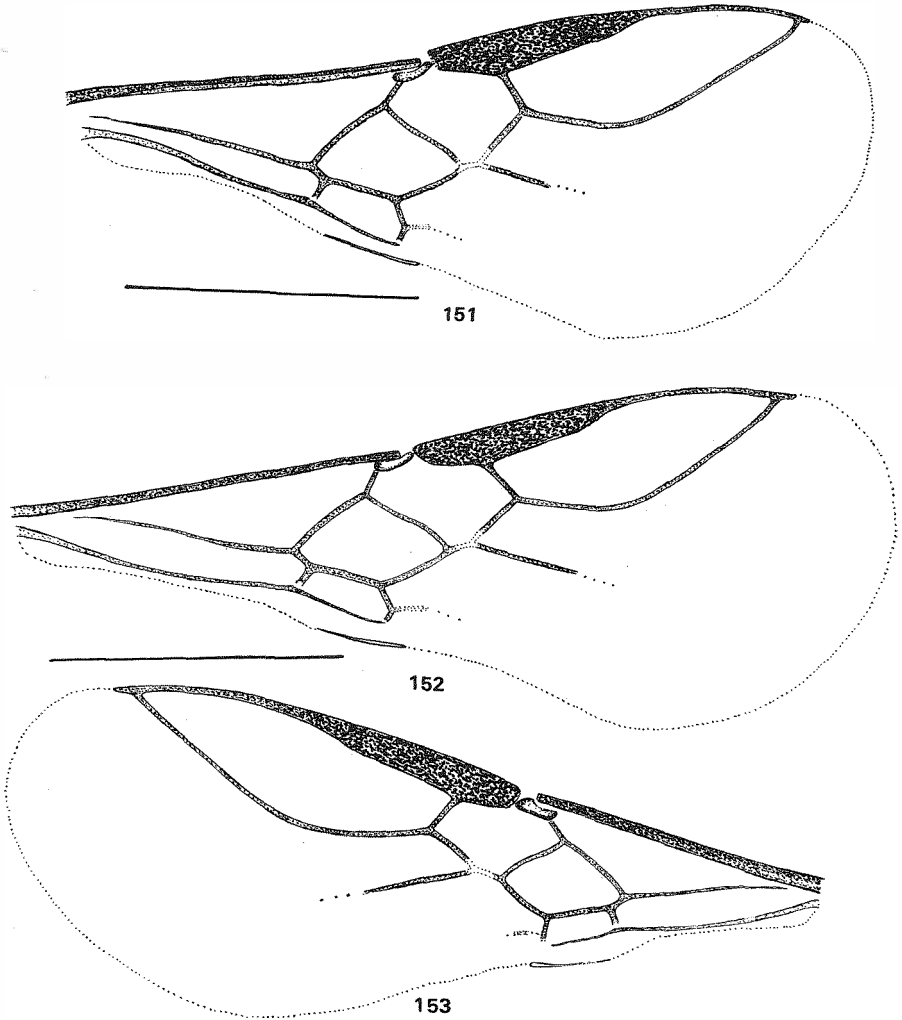
<sup>7</sup> The holotype of *Dacnusa* (*Dacnusa*) *stenocentra* THOMSON, 1895, from Arrie, Skåne, Sweden, is a very similar insect to *ares*. Its short ovipositor is extruded, but clearly would not project beyond the apical tergite if retracted. Probably this insect represents a different species from *ares* since its coloration is much paler (the basal antennal segments and legs are largely yellowish, and the gaster beyond petiole yellow-brown). Unfortunately the antennae are broken and most of the legs missing. I am not including the species in the key until further information is available.



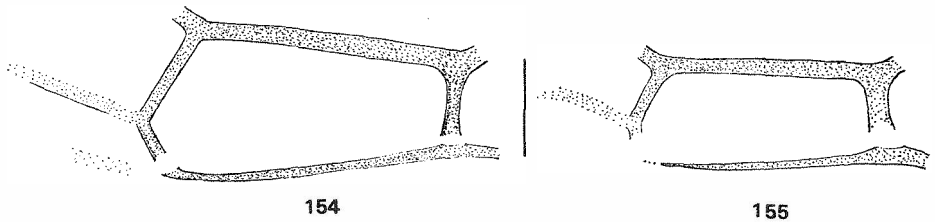
- Cheeks not or only weakly angulate; tuft of pubescence not so conspicuous. Basal flagellar segments pubescent in both sexes. Gaster beyond petiole usually darker . . . . . 16
  - 16 Petiole with some pubescence on either side of its central line, at least on its basal half (fig. 167). Antennal segments: ♂, (26)—28—29; ♀, (23)—25—28 . . . . . 17
  - Petiole largely bare, with some fine pubescence near its base but otherwise only a few scattered hairs on its dorsal surface (fig. 168 and NIXON, 1944, fig. 100) . . . . . 18
  - 17 Mandibles (fig. 162) hollowed and usually somewhat dilated posteriorly near their base below the tuft of pubescence (compare *cyparissa*). Ovipositor sheaths much shorter than the petiole . . . . . *C. fuscipennis* (NIXON)
- Hosts: *Ophiomyia heringi* STARÝ, *O. labiatarum* HERING and *O. sp.* on *Stachys palustris*
- Mandibles slightly concave posteriorly at their base, but not dilated. The dilated part of the ovipositor sheaths is as long as the petiole . . . . . *C. brevifemur* (TOBIAS), **comb. nov.**
  - 18 23—24 antennal segments (♀). Legs 1 and 2 largely brown, the hind legs more or less dark brown with the coxae almost black. Mesoscutum entirely covered with



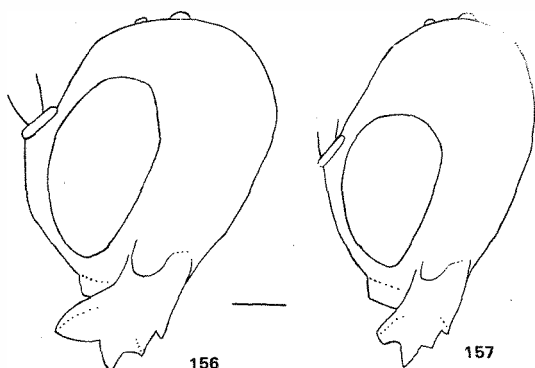
Figs. 148—150. Wings of *Chorebus* spp. ♀♀: 148, *C. leptogaster* (HALIDAY); 149, *C. glaber* (NIXON); 150, *C. fuscipennis* (NIXON), (Scale 1 mm.)



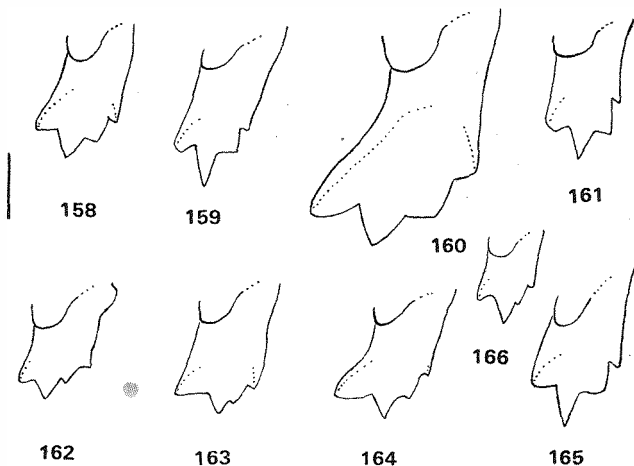
Figs. 151—153. Wings of *Chorebus* spp. ♀♀: 151, *C. brevicornis* (THOMSON); 152, *C. senilis* (NEES); 153, *C. didas* (NIXON). (Scale 1 mm.)



Figs. 154—155. Cell 2Cu of *Chorebus* spp.: 154, *C. brevicornis* (THOMSON); 155, *C. didas* (NIXON). (Scale 0.1 mm).



Figs. 156—157. Head and mandibles in lateral view of *Chorebus glaber* (NIXON) (to illustrate range of variation). (Scale 0.1 mm.)

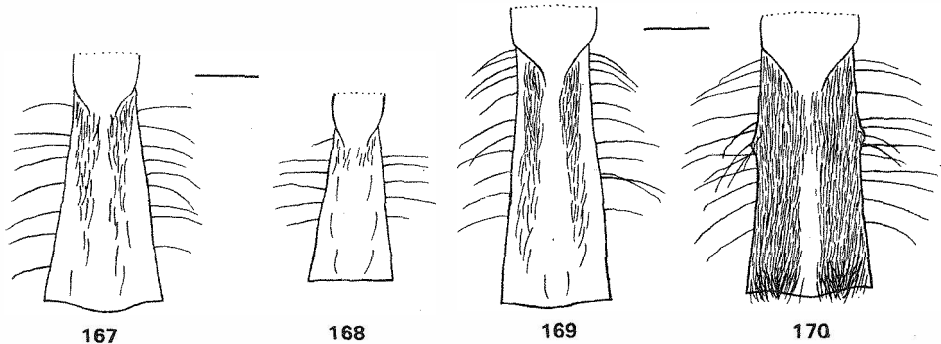


Figs. 158—166. Mandibles of *Chorebus* spp.: 158, *C. senilis* (NEES); 159, *C. nomia* (NIXON); 160, *C. marsyas* (NIXON); 161, *C. brevicornis* (THOMSON); 162, *C. fuscipennis* (NIXON); 163, *C. leptogaster* (GALIDAY); 164, *C. orbiculatae* sp. nov.; 165, *C. cybele* (NIXON); 166, *C. ibericus* sp. nov. (Scale 0.1 mm.)

extremely dense whitish pubescence which on the lateral lobes is largely directed laterally . . . . . *C. caesariatus* sp. nov.

Host: *Ophiomyia* sp. on *Medicago*

- Antennal segments: ♂, 29—31; ♀, 27—30 . . . . . 19
- 19 Mandibles hollowed and dilated posteriorly near their base below the tuft of pubescence (NIXON, 1944, fig. 74). Gaster beyond petiole deep yellow. Legs 1 and 2 yellow, the hind legs light brown . . . . . *C. cyparissa* (NIXON), **comb. nov.**
- Mandibles hollowed posteriorly near their base, but not or hardly dilated . . . . . 20
- 20 Lateral lobes of mesoscutum sculptured and densely pubescent. Legs light brown with the hind coxae infuscated . . . . . *C. herbigradus* (TOBIAS), **comb. nov.**
- Lateral lobes of mesoscutum at least partly bare . . . . . 21



Figs. 167—170. Petioles of *Chorebus* spp.: 167, *C. fuscipennis* (NIXON); 168, *C. caesariatus* sp. nov.; 169, *C. brevicornis* (THOMSON); 170, *C. senilis* (NEES). (Scale 0.1 mm.)

- 21 Gaster with tergite 3 yellowish, the following tergites yellow-brown. Legs largely yellow, with at least the hind tarsi and apex of the hind tibiae darkened . . . . . *C. nerissa* (NIXON), **comb. nov.**
- Gaster beyond petiole more or less brown. Legs 1 and 2 ochreous yellow: hind legs uniformly brown except for the yellowish trochanter and trochantellus . . . . . *C. lychnidis* sp. nov.
- Host: *Ophiomyia* sp. on *Lychnis*
- 22 Petiole extraordinarily elongate, 3—3½ times as long as wide. Back of head more or less bare centrally, pubescent only at its sides (near the mandibles) . . . . . *petiolatus* group . . . . . 23
- Petiole not so elongate, less than three times as long as wide . . . . . 26
- 23 Very large species, about 5 mm. long. Antennal segments: ♂, 45—51; ♀, 43—45. Tooth 1 of mandible much expanded. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position . . . . . *C. petiolatus* (NEES), **comb. nov.**
- Smaller species (up to 2.8 mm. long). Not more than 33 antennal segments. Tooth 1 of mandibles hardly expanded (fig. 163). Wing with pterostigma and cell 2R<sub>1</sub> relatively short (fig. 148 and TOBIAS, 1962, fig. 48) . . . . . 24
- 24 Coxae yellow. Gaster beyond petiole conspicuously yellow or yellow-brown. Ovipositor (♀) projecting beyond the apical tergite in the retracted position . . . . . *C. xiphidius* sp. nov.
- Host: *Ophiomyia* sp. on *Picris*
- Coxae black. Gaster beyond petiole varying from reddish yellow to black . . . . . 25
- 25 Cheeks somewhat projecting, with distinct tufts of pubescence above the base of the mandibles. Hind femora strongly thickened (TOBIAS, 1962, fig. 49). (♀ unknown) . . . . . *C. femoratus* (TOBIAS), **comb. nov.**
- Cheeks not projecting, with only fine inconspicuous pubescence near the base of the mandibles. Hind femora not so strongly thickened. Ovipositor (♀) not or only slightly projecting beyond the apical tergite in the retracted position . . . . . *C. leptogaster* (HALIDAY)
- Hosts: *Ophiomyia cunctata* HENDEL, *O. pulicaria* MEIGEN and *O. pinguis* FALLÉN
- 26 Gaster laterally compressed towards its apex in the female; ovipositor slender and upcurved, projecting beyond the apex of the gaster (NIXON, 1943, figs. 63 and 64; and TOBIAS, 1962, figs. 54 and 55). Tooth 1 of mandible very much expanded

- (NIXON, 1944, fig. 145). Back of head more or less bare centrally, pubescent only at its sides (near the mandibles). . . . . *C. posticus* group<sup>8</sup>
- Gaster not laterally compressed in the female; ovipositor not distinctly projecting beyond the apical tergite in the retracted position except in *glaber*. Tooth 1 of mandibles strongly expanded only in *tamsi*, *orbiculatae*, *rondanii* and sometimes in *glaber* . . . . . 27
  - 27 Cheeks strongly expanded posteriorly above the base of the mandibles (NIXON, 1944, figs. 81 and 82); but the mandibles are relatively small (tooth 1 not expanded) . . . . . 28
  - Head more transverse, or, if with somewhat expanded cheeks (*rondanii*), the mandibles are also large, with tooth 1 distinctly expanded . . . . . 29
  - 28 Gaster beyond petiole yellow. Legs 1 and 2 yellow; hind legs contrastingly dark, with brown femora, tibiae and tarsi. Back of head with only sparse long pubescence . . . . . *C. caelebs* (NIXON), **comb. nov.**
  - Gaster beyond petiole red-brown or brown. Legs largely reddish yellow or yellow-brown, the hind pair being only slightly darker than legs 1 and 2. Back of head fairly densely pubescent . . . . . *C. gedanensis* (RATZEBURG)
  - Host: *Hexomyza schineri* GIRAUD
  - 29 Mesoscutum largely bare (with some fine pubescence on its anterior face and a few hairs along the former course of the notaulices: central lobe either bare or with a little fine scattered pubescence). Mandibles small, with tooth 1 only slightly expanded. Precoxal suture narrow, only weakly rugose-costate. Legs ochreous yellow or yellow-brown with the hind coxae slightly darker, brown or dark brown . . . . . *C. heringianus* sp. nov.
  - Host: *Ophiomyia thalictraulis* HERING
  - Mesoscutum with at least its anterior face and central lobe fairly densely pubescent. Mandibles usually with tooth 1 strongly expanded (compare fig. 164) (but variable in *glaber*, figs. 156 and 157) . . . . . 30
  - 30 Legs entirely reddish yellow, except that the hind femora are slightly darkened at their apex. Gaster beyond petiole yellow. Basal flagellar segments markedly yellowish beneath. (♀ unknown). . . . . *C. tamsi* (NIXON), **comb. nov.**
  - At least the hind legs extensively infuscated . . . . . 31
  - 31 Gaster beyond petiole bright yellow. Legs 1 and 2 deep yellow, but the hind legs contrastingly darker, with the femora, tibiae and tarsi uniformly dark brown. Petiole slightly widened towards its apex. . . . . *C. rondanii* (GIARD)
  - Host: *Ophiomyia simplex* LOEW
  - Gaster beyond petiole darker. Legs 1 and 2 yellow-brown or brown. Petiole parallel-sided . . . . . 32
  - 32 Back of head virtually bare centrally (although densely pubescent at its sides, near the mandibles). Hind tibiae largely yellow-brown or red-brown, usually becoming

<sup>8</sup> Note on the *posticus* group. The available names for species of this group are *Alysia* (*Dacnusa*) *postica* HALIDAY, 1839, *Dacnusa egregia* MARSHALL, 1891, *Dacnusa* (*Dacnusa*) *dentifera* THOMSON, 1895, *Dacnusa compressiventris* TENGLE, 1935, *Dacnusa sselene* NIXON, 1937, *Dacnusa dentata* TOBIAS, 1962, and *Dacnusa cultrata* TOBIAS, 1962. The earliest and best-known name, *Alysia gracilis* NEES, 1834, is a primary homonym of *Alysia gracilis* CURTIS, 1826, and must presumably be discarded unless reference is made to the International Commission on Zoological Nomenclature. The application of these names and their synonymy requires reappraisal. I suspect that the concept of *gracilis* in NIXON (1944) is composite, since the range of variation recorded in colour and the number of antennal segments is very wide. One species (usually called *gracilis* in the literature) is well known as a parasite of *Psila rosae* FABRICIUS (Psilidae). It is possible that *C. tamsi* (NIXON), whose female is unknown, also belongs to the *posticus* group; but I have provisionally keyed it in couplet 30 below.

I have not been able on the limited information available to give a satisfactory definition of males of the *posticus* group in this couplet.

black only near their apex. Ovipositor (♀) stout, distinctly projecting beyond the apical tergite in the retracted position . . . . . *C. glaber* (NIXON)

Host: *Napomyza cichorii* SPENCER

— Back of head distinctly pubescent centrally, as well as at its sides. Hind legs uniformly dark brown or black. Ovipositor (♀) hardly projecting beyond the apical tergite in the retracted position . . . . . *C. orbiculatae* sp. nov.

Host: *Ophiomyia orbiculata* HENDEL

In the descriptions which follow the following common characters may be assumed, unless otherwise stated.

Clypeus dark, like the face. Face almost smooth, covered with dense, fine pubescence which is directed upwards over its centre but downwards along the eye-margins. Mandibles 4-toothed. Thorax elongate (at least 1.3 times as long as high). Precoxal suture long, reaching the hind margin of the mesepisternum. Sides of pronotum, at least along and below the oblique suture, and subalar callus covered with dense, opaque pubescence. Metapleural pubescence very dense, forming a well-defined rosette around the rugose swelling (compare figs. 22–23 in Part I); propodeum covered with similar dense pubescence. Tergite 3 without basal pubescence.

Wing (figs. 148–152 and 154) with vein  $Cu_{1b}$  retained (though sometimes very short), forming a distinct angle with the transverse section of  $Cu_1$ .

***Chorebus senilis* (NEES), comb. nov.**

*Bassus senilis* NEES, 1814

*Alysia senilis* (NEES), NEES, 1834

*Alysia (Dacnusa) senilis* (NEES), HALIDAY, 1839 (in part)

*Dacnusa senilis* (NEES), MARSHALL, 1891, 1895 and 1897 (in part), NIXON, 1937 and 1944

*Dacnusa (Dacnusa) tomentosa* THOMSON, 1895

*Dacnusa nemesis* MORLEY, 1924

Colour. Palpi varying from yellow to dark brown. Labrum deep yellow. Antennae entirely dark or becoming obscurely brown towards their base. Legs largely yellow-brown or brown, with the coxae, especially the hind coxae, darker, usually virtually black: hind femora dark brown or black, at least near their apex: hind tibiae often distinctly infuscated towards their apex. Gaster beyond petiole dark, sometimes with tergite 3 reddish.

Morphology. Back of head clothed with very dense adpressed pubescence, but no distinct tufts are formed above the base of the mandibles. Mandible (fig. 158) slightly expanded towards its apex, with all four teeth strongly developed. Antennal segments: ♂, 33–36; ♀, 31–34 (bred material only). Palpi long.

Mesoscutum conspicuously punctate on about its anterior half, with extremely dense fine pubescence covering most of its surface (although sometimes this tends to become sparse on the posterior half of the lateral lobes): notaulices not extending longitudinally (only their lateral extensions distinct). Sides of pronotum also entirely covered with extremely dense fine pubescence, beneath which its surface can be seen to be strongly punctate. Subalar callus and the

anterior edge of the mesepisternum with similar dense pubescence: precoxal suture rugose-costate anteriorly. Pubescence of metapleuron, propodeum and the base of the hind coxa extremely dense. Petiole 1.9—2.2 times as long as wide, more or less parallel sided, with its entire surface covered by extremely dense fine pubescence (fig. 170): this shows some tendency to become denser towards the apical corners (although no distinct tufts are formed). Ovipositor (♀) usually very stout, projecting beyond the apical tergite in the retracted position by about two-thirds of the length of the petiole (but only by about one-third of the length of the petiole in the small female bred from *Napomyza cichorii* SPENCER).

Wing (fig. 152) with vein *R*<sub>2</sub> weakly sinuate: *Im-cu* rejected from cell *R*<sub>2</sub>.

#### Breeding records

Host 1 — *Melanagromyza aeneoventris* FALLÉN (= *cirsii* RONDANI)

1 ♂ from puparium 15. ix. 61 in stem of *Cirsium palustre*, Llanrhidian, Gower, Wales, em. 6. iv. 62 (GCDG). 1 ♀ from puparium 23. ix. 61 in stem of *Cirsium vulgare*, Betchworth, Surrey, England, em. 15. x. 61 (GCDG). 1 ♀ from stem of *Cirsium palustre*, Oxford, England, em. 30. iv. 23, leg WATERS (BM). 5 ex. from puparia in stems of *Cirsium vulgare* (= *Carduus lanceolatus*), Farnham Royal and Cippenham, Bucks., England, em 20. i and 4—13. v. 38 (BM). 1 ♂ from puparium in stem of *Cirsium vulgare*, Reading, Berks., England, em. 4. v. 38 (BM).

Host 2 — *Napomyza lateralis* FALLÉN

1 ♀ from puparium in *Matricaria chamomilla*, Zaventem, Belgium, 1964/65, leg. LOUNSKY (Station d'Entomologie, Gembloux).

Host 3 — *Napomyza cichorii* SPENCER

1 ♀ from puparium in leaves (chicons) of *Cichorium intybus*, Zaventem, Belgium, em. 13. v. 66, leg LOUNSKY (GCDG).

Host 4 — *Napomyza scrophulariae* SPENCER

2 ♀♀ from puparia 19. ix. 64 in stems of *Scrophularia nodosa* on dunes at Newcastle, Co. Down, Ireland, em. 7—8. v. 65 (GCDG): a dead male was found on the same occasion inside a hollow stem of this plant, clearly emerged from this same host.

ALLEN (1956) also recorded this species (det. M. W. R. DE V. GRAHAM) from puparia of a *Napomyza* species found in stems of *Anthriscus sylvestris* at Sunninghill, Berks., England.

There are a number of species similar to *senilis* whose life-history has not yet been established (see the key above). Important characters for distinguishing *senilis* from these are the number of antennal segments (contrast *marsyas*), the form of the mandibles (contrast *nomia*, *maculatus* and *marsyas*) and the projecting ovipositor (contrast *ares*).

I have reexamined the female (not male as stated in Appendix V in Part I) of THOMSON'S (1895) *tomentosa* from the type locality (Pålsjö, Sweden), and am satisfied that it represents this species, although the infuscation of its hind femora and tibiae is not very marked. (It is clear from the shape of the mandibles that it does not represent *C. marsyas* (NIXON)).

#### *Chorebus pulchellus* sp. nov.

Colour. Palpi yellow. Labrum and centre of mandibles orange-yellow. Clypeus red-brown or black. Basal antennal segments yellow-brown (clearly so at least

as far as the fourth flagellar segment), this colour merging gradually into the darker colour of the more apical flagellar segments. Legs deep yellow, with only tarsal segments 5 and sometimes the base of the hind coxa infuscated. Gaster beyond petiole brown or red-brown.

**Morphology.** Back of head evenly clothed with fairly dense adpressed pubescence, but no distinct tufts are formed above the base of the mandibles: the pubescence here, although very dense, is dark and not very conspicuous. Mandibles only slightly expanded towards their apex (similar to those of *senilis*, fig. 158 — not long and pointed as in *nomia* and *maculatus*). Antennal segments: ♂, 37; ♀, 31.

Mesoscutum strongly punctate on about its anterior half, with dense whitish adpressed pubescence covering all its surface except part of the posterior half of the lateral lobes: longitudinal extensions of notaulices absent or weak. Sides of pronotum punctate, entirely covered by dense pubescence similar to that of the mesoscutum. Precoxal suture narrow, but distinctly rugose-costate anteriorly. Pubescence of metapleuron, propodeum and base of the hind coxa whitish and extremely dense. Petiole 1.8—2.0 times as long as wide, slightly widened towards its apex, entirely covered (except for the narrow central keel) with short, very dense pubescence which shows a tendency to become denser towards the apical corners (as in *senilis*, fig. 170). Ovipositor (♀) stout, projecting beyond the apical tergite in the retracted position by about half the length of the petiole.

Wing with vein  $R_s$  sinuate: *Im-cu* rejected from cell  $R_s$ .

Holotype ♀, 2 ♂♂ paratypes from puparia 10. vi. 36 in *Hypochoeris radicata*, Ribnitz/Körkwitz, Mecklenburg, Germany, em. 23. vi. 36, leg. BUHR (GCDG).

Dr. BUHR thought that the host was probably *Phytomyza cecidonomia* HERING, but the puparia were not retained. Since no species of the *senilis* group has been confirmed from any *Phytomyza* host, I suspect that BUHR's suggestion may not be correct. The question cannot be settled until additional bred material is obtained.

This species is a typical member of the *senilis* group sensu stricto, but is unusual in having entirely yellow legs. TOBIAS (1962) has described a yellow-legged species of this group as *Dacnusa pratensis*. But he states that his two females have 27 and 28 antennal segments. The description appears appropriate to the species before me in most respects, but the range of antennal segments (27—37) assumed if it is considered that only one species is involved, is wider than has been established for any species of the *senilis* group. I have therefore concluded that the material before me probably represents a distinct species.

#### *Chorebus brevicornis* (THOMSON)

*Dacnusa* (*Dacnusa*) *brevicornis* THOMSON, 1895

*Dacnusa chrysippe* NIXON, 1944

*Dacnusa ea* NIXON, 1944

*Chorebus brevicornis* (THOMSON), GRIFFITHS, 1964



**Colour.** Palpi and labrum brown or yellow-brown. Antennae usually entirely dark (at most reddish at their base). Centre of mandibles red-brown. Legs 1 and 2 yellow-brown or reddish; hind legs contrastingly dark, varying from red-brown to virtually black. Gaster entirely dark.

**Morphology.** Back of head evenly clothed with dense adpressed pubescence, but no distinct tufts are formed above the base of the mandibles. Mandibles (fig. 161) small, not expanded, with tooth 4 much reduced. Antennal segments: ♂, (32)—33—36; ♀, 30—33: basal flagellar segments unusually short (see the table of biometric data).

Mesoscutum punctate anteriorly, with its entire surface covered with short dense pubescence which on the lateral lobes is partly directed laterally: notaulices with only their lateral extensions distinct, at most extending longitudinally as feeble smooth impressions. Precoxal suture narrow, weakly rugose-costate anteriorly. Petiole (fig. 169) 2.4—2.6 times as long as wide, more or less parallel-sided, with a band of pubescence on either side but broadly bare and strongly shining along its centre-line and near its apex. Ovipositor (♀) stout but short, not or only slightly projecting beyond the apical tergite in the retracted position.

Wing with cell  $2R_1$  rather elongate: vein  $R_s$  hardly sinuate: position of *1m-cu* variable, sometimes distinctly rejected from cell  $R_s$  (as fig. 151), but often only narrowly rejected or almost interstitial.

#### Breeding records

Host — *Melanagromyza aeneoventris* FALLÉN (= *cirsii* RONDANI)

1 ♀ from puparium in stem of *Cirsium palustre*, Woodwalton Fen, Hunts., England, em. 3. iv. 61 (GCDG). 1 ♀ from puparium in stem of *Cirsium* sp., Scratch Wood, London, em. 11. v. 55, leg. SPENCER (GCDG). 2 ♀♀ (including the holotype of *Dacnusa ea* NIXON) from stems of *Cirsium vulgare* (= *Carduus lanceolatus*), Reading, Berks., England, em. 15. vi. 38 (BM). 3 ♂♂ from puparia 18. ix. 65 in stems of *Cirsium arvense*, Wöllnitz, Jena, Thuringia, Germany, em. 2. xi. 65, 9 and 11. iii. 66, leg. BUHR no. 2661 (GCDG). 1 ♂ from puparium in stem of *Cirsium arvense*, Mühlhausen, Thuringia, Germany, em. spring '65, leg. BUHR no. 2322 (GCDG). 1 ♀, Neckarrems, Württemberg, Germany, em. 30. v. 55, leg. GROSCHKE (STGT). 1 ♂, Stuttgart-Hofen, Germany, em. 30. v. 55, leg. GROSCHKE (STGT). 3 ♀♀, Feuerbach Tal, Stuttgart, em. 1. vi. 55, leg. GROSCHKE (STGT).

This species will be readily distinguished from other species of the *senilis* group sensu stricto (including *C. senilis* (NEES) which is associated with the same host) by the pubescence of its petiole (fig. 169), the form of its mandibles (fig. 161), its short basal flagellar segments and short ovipositor. The synonymy of NIXON's (1944) two names was proposed in Part I of this paper (GRIFFITHS, 1964).

***Chorebus rondanii* (GIARD), comb. nov.**

*Dacnusa Rondanii* GIARD, 1904

*Dacnusa galba* NIXON, 1944, **syn. nov.**

**Colour.** Palpi and labrum yellow. Basal antennal segments yellowish or reddish as far as about the third flagellar segment. Centre of mandibles yellow-

brown. Legs 1 and 2 deep yellow: hind legs contrastingly darker, with the femora, tibiae and tarsi uniformly dark brown, but the coxae, trochanter and trochantellus paler, more or less yellow-brown. Gaster beyond petiole bright yellow, in strong contrast with the shining black petiole.

Morphology. Pubescence of head as described for *leptogaster*. Mandibles (compare fig. 164) with tooth 1 strongly expanded, but teeth 3 and 4 relatively small. Antennal segments: ♂, 30 (holotype of *Dacnusa galba* NIXON); ♀, 25, 26 (bred specimens). Palpi fairly long.

Mesoscutum with shallow sculpture on its anterior face extending onto the anterior part of the central lobe, with fairly dense pubescence covering its anterior face and central lobe, but the lateral lobes largely bare: notaulices distinct, reaching the posterior fovea as shallow V-shaped impressions. Precoxal suture narrow but conspicuously rugose-costate anteriorly. Dorsal face of propodeum partly with only sparse pubescence, so that its shining rugose surface is clearly visible: but its posterior face is very densely pubescent (as normally in the *senilis* group). Petiole 2.0—2.2 times as long as wide, slightly widened towards its apex, with a little pubescence on each side near its base but otherwise almost bare. Ovipositor (♀) directed upwards in the retracted position, slightly projecting beyond the apical tergite. Hind femur unusually short and thick.

Wing with cell  $2R_1$  fairly elongate: vein  $R_s$  weakly sinuate: *Im-cu* well rejected from cell  $R_s$ .

#### Breeding records

Host — *Ophiomyia simplex* LOEW

BARNES and WALTON (1934) recorded this species (as *Dacnusa bathyzona* MARSHALL) from the above host in stems of cultivated *Asparagus officinalis* at Harpenden, Herts., and Evesham, Worcs., England. Further breeding data for Harpenden material with some observations on the habits of the insect are given by BARNES (1937). The above description is based on my examination of 11 of BARNES' specimens from Harpenden (retained in my personal collection). These appear to represent the same species as NIXON's *Dacnusa galba*.

GIARD's (1904) description of *rondanii* (from Argenteuil, France) is as follows.

"Ce parasite ressemble beaucoup, comme forme, comme couleur et comme ornementation, à *Dacnusa petiolata* NEES, dont il est, en quelque sorte, une réduction. Sa taille est en effet à peu près moitié moindre. *D. petiolata* mesure 5 mill. Notre espèce est longue de 3 mill. environ; les antennes ont aussi 3 mill.; les ailes antérieures 2.5 mill. En outre, les nervures cubitale et postérieure, au lieu d'être interrompues, se prolongent jusqu'au bord de l'aile.

Il me paraît très possible que ce *Dacnusa*, que j'appellerai *Dacnusa Rondanii*, soit celui qui a été indiqué par RONDANI sous le nom de *D. petiolata*, comme parasite de *Platyparea poeciloptera*.

Mais, comme les *Dacnusa* sont généralement parasites des *Agromyza*, je ne puis affirmer que notre espèce ne soit pas plutôt parasite d'*A. simplex* dont le présence dans les Asperges aurait échappé à RONDANI. De nouvelles recherches sont nécessaires pour lever toute espèce de doute à cet égard."

As a description this is entirely inadequate, but appears nevertheless to make the name *rondanii* available under the current rules of nomenclature. I have

not been able to obtain any information on whether GIARD's material still exists. In the circumstances I have assumed on the evidence of host association that GIARD's species was the same as the species obtained by BARNES. Should it later be discovered that more than one species of the *senilis* group is associated with *O. simplex* LOEW, then this assumption could be challenged. But on present information it seems to me reasonable that this assumption should be made, since BARNES' extensive breedings suggest that, at least in England, there is only one species of *Chorebus* associated with this host.

This species should be readily recognised by its extensive yellow coloration (but with contrastingly dark hind legs), and the form of the mandibles.

***Chorebus orbiculatae* sp. nov.**

Colour. Palpi and labrum deep yellow or yellow-brown. Antennae entirely dark. Centre of mandibles red-brown. Legs 1 and 2 more or less uniformly yellow-brown or brown: hind legs with the coxae, femora, tibiae and tarsi uniformly dark brown or almost black, but the trochanter and trochantellus contrastingly yellow-brown. Gaster beyond petiole red-brown, becoming darker towards its apex.

Morphology. Back of head distinctly pubescent centrally, as well as at its sides: a distinct opaque whitish tuft of pubescence is formed on the posterior edge of the head near the base of the mandibles. Mandibles (fig. 164) with tooth 1 strongly expanded, but teeth 3 and 4 relatively small. Antennal segments: ♂, 32; ♀, 27 (2 ex.). Palpi fairly long.

Mesoscutum roughened anteriorly, with dense pubescence covering all or most of its surface (at most the posterior half of the lateral lobes partly bare): notaulices weak, hardly extending longitudinally on the dorsal surface of the mesoscutum. Precoxal suture narrow, weakly rugose-costate anteriorly. Petiole about 2.6 times as long as wide, parallel-sided or very slightly widened towards its apex, largely bare and shining, with some fine pubescence near its base but otherwise only about 4–5 pairs of scattered hairs on its dorsal surface. Ovipositor (♀) similar to that of *leptogaster*, directed upwards in the retracted position, only slightly projecting beyond the apical tergite.

Wing with vein  $R_s$  weakly sinuate: *Im-cu* rejected from cell  $R_s$ .

Breeding records

Host — *Ophiomyia orbiculata* HENDEL

Holotype ♀ and paratype ♀ from puparia 13. vii. 62 in roots and stems of cultivated *Pisum sativum*, Potters Bar, Herts., England, leg. DEEMING (GCDG). 1 ♀ paratype from puparium ix. 63, same plant and locality, em. 14. v. 64 (GCDG).

In addition I have received a male, also designated a paratype, caught on 20. vii. 50 at Portrane, Co. Dublin, Ireland (in Mr. A. W. STELFOX's collection).

This species may be recognised by its very dark coloration, expanded mandibles (fig. 164) and the presence of pubescence on the central part of the back of the head. The male may be confused with that of *C. glaber* (NIXON) if the last character is not properly appreciated (the females are readily separable by the length of the ovipositor).

***Chorebus heringianus* sp. nov.**

Colour. Palpi ochreous yellow. Labrum orange. Antennae dark, with the scape and annellus and sometimes the first flagellar segment yellow-brown or red-brown. Centre of mandibles red or red-brown. Legs ochreous yellow or yellow-brown with the hind coxae and sometimes the tarsi slightly darker, brown or dark brown. Gaster beyond petiole dark brown.

Morphology. Back of head bare except at its sides (near the mandibles). Mandibles small, with tooth 1 only slightly expanded. Antennal segments: ♂, 28 (2 ex.), 30; ♀, 27 (2 ex.). Palpi fairly long.

Mesoscutum largely smooth, bare and shining, often flattened centrally, with some fine pubescence on its anterior face (mainly towards its sides) and a few hairs along the former course of the notaulices (the dense tufts on the hind margin of the mesoscutum are however retained as in other members of the *senilis* group): in two specimens there is also a little pubescence on the central lobe, but in the other three specimens these are virtually bare: notaulices distinct anteriorly only, although in two of the specimens some indication of V-shaped impressions can be seen as far as the posterior fovea. Sides of pronotum with densely matted pubescence along and below the oblique suture (as in other members of the *senilis* group), but largely bare and shining above the suture. Precoxal suture narrow, weakly rugose-costate at least anteriorly. Petiole 2.1–2.6 times as long as wide, more or less parallel-sided, strongly shining and almost bare, with at most a few fine hairs at its base and along its sides. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing with cell  $2R_1$  elongate; vein  $R_2$  almost evenly curved, not at all sinuate; *Im-cu* rejected from cell  $R_2$ .

Host — *Ophiomyia thalictraulis* HERING

Holotype ♀, 2 ♂♂ paratypes from puparia in stems of *Thalictrum minus*, Ochsenburg, Kyffhäuser, Thuringia, Germany, em. 8–16. ii. 63, HERING no. 1914, leg. BUHR (GCDG). 1 ♂ paratype from puparium in stem of *Thalictrum minus*, Jenzig, Jena, Thuringia, em. 15. vii. 63, HERING no. 1967, leg. BUHR (GCDG). 1 ♀ paratype from puparium 17. ix. 65 in stem of *Thalictrum minus*, Lobeda, Jena, Thuringia, em. 24. iii. 66, leg. BUHR no. 2664 (GCDG).

I have much pleasure in naming this species in honour of Professor Dr. E. M. HERING, who has contributed so much to our knowledge of leaf-mining insects.

This species has a very narrow precoxal suture, approaching the condition found in the *bathyzonus* group, but this is weakly rugose-costate at least anteriorly. It differs from all other species of the *senilis* group in having a largely bare mesoscutum (in strong contrast with the sides of the pronotum and the propodeum, which are densely pubescent as normally in this group).

***Chorebus caesariatus* sp. nov.**

Colour. Palpi and labrum yellow-brown. Antennae entirely dark. Centre of mandibles red or red-brown. Legs 1 and 2 largely brown, the hind legs somewhat darker, more or less dark brown, with the coxae almost black (sometimes the

hind femora and tibiae are also virtually black). Gaster beyond petiole yellow-brown, either unicolorous or with the apical tergites becoming darker.

**Morphology.** Back of head covered with dense whitish pubescence, which is fairly evenly distributed and does not form well-defined tufts near the base of the mandibles: the vertex and temples however bear only the normal two or three rows of pubescence. Mandibles not expanded, with all four teeth clearly defined. Antennal segments: ♀, 23 (3 ex.), 24 (5 ex.).

Mesoscutum slightly flattened centrally, roughened anteriorly, entirely covered with extremely dense whitish pubescence which on the lateral lobes is largely directed laterally: notaulices reaching the posterior fovea (although much obscured by the pubescence). Precoxal suture visible as a smooth well-defined linear groove. Pubescence of metapleuron, propodeum and hind coxa extremely dense and whitish. Petiole (fig. 168) 2.3—2.5 times as long as wide, very narrow at its base and distinctly widened towards its apex, strongly shining and largely bare, with some fine pubescence near its base but otherwise only 3—5 pairs of long hairs on its dorsal surface. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing with vein  $R_s$  weakly sinuate: *Im-cu* clearly rejected from cell  $R_s$ .

Host — *Ophiomyia* sp. ? *curvipalpis* ZETTERSTEDT

Holotype ♀, 7 ♀♀ paratypes from puparia 18. viii. 63 in stems of *Medicago sativa*, Lido di Venezia, Italy, em. 23. viii—15. ix. 63 (GCDG).

This small species will readily be distinguished from other members of the *bathyzonus* group by its lower number of antennal segments and extremely dense mesoscutal pubescence.

***Chorebus fuscipennis* (NIXON), comb. nov.**

*Dacnusa fuscipennis* NIXON, 1937 and 1944

**Colour.** Palpi and labrum yellow or ochreous yellow. Antennae more or less entirely dark, rarely becoming brownish towards their base. Centre of mandibles red-brown. Legs 1 and 2 largely ochreous yellow or yellow-brown: hind legs more or less uniformly brown except that the trochanter and trochantellus are often somewhat paler. Gaster beyond petiole uniformly coloured, varying from deep yellow to dark brown.

**Morphology.** Back of head clothed with fairly dense pubescence which becomes denser towards the base of the mandibles, where it forms whitish or grey tufts which are distinct in lateral view. Mandibles (fig. 162) hardly expanded towards their apex, but with a characteristic hollowed dilation posteriorly near their base below the tuft of pubescence (as also in *C. cyparissa* (NIXON)). Antennal segments: ♂, (26)—28—29; ♀, (23)—25—28. Palpi fairly long.

Mesoscutum usually not conspicuously flattened centrally (though this is so in a few specimens), usually slightly punctate anteriorly, completely covered with dense pubescence, which sometimes tends to be directed laterally on the lateral lobes: notaulices almost absent. Precoxal suture visible as a smooth

well-defined linear groove. Petiole (fig. 167) 2.3–2.5 times as long as wide, usually slightly widened towards its apex, rather densely pubescent on its basal half but becoming largely bare towards its apex. Ovipositor (♀) not or hardly projecting beyond the apical tergite in the retracted position.

Wing (fig. 150) with cell  $2R_1$  rather elongate:  $R_5$  hardly sinuate: *1m-cu* rejected from cell  $R_5$ .

#### Breeding records

##### Host 1 — *Ophiomyia heringi* STARÝ

2 ex. from puparia 15. viii. 35 in stems of *Lapsana communis*, Dargun, Warsaw, Mecklenburg, Germany, em. 20. viii. 35, leg. BUHR (GCDG). 1 ex. from puparium 25. viii. 35, same plant and locality, em. 23. ii. 36, leg. BUHR (GCDG). 2 ex. from puparia 31. viii. 35 in stems of *Lapsana communis*, Laage, Mecklenburg, em. 30. ix. 35 and 26. ii. 36, leg. BUHR (GCDG). 5 ex. from puparia 25 and 31. viii. 35 in stems of *Lapsana communis*, Teterow, Mecklenburg, em. 27. ii — 18. iii. 36, leg. BUHR (GCDG). 5 ex. from puparia 3. ix. 35 in stems of *Lapsana communis*, Penzlin, Mecklenburg, em. 12–20. iii. 36, leg. BUHR (GCDG). 2 ex. from puparia 15. ix. 35 in stems of *Lapsana communis*, Serrahn, Mecklenburg, em. 19–20. ii. 36, leg. BUHR (GCDG). 11 ex. from puparia 15. ix. 35 in stems of *Mycelis muralis*, Serrahn, Mecklenburg, em. 19. ii — 1. iii. 36, leg. BUHR (GCDG). 4 ex. from puparia 15. ix. 35 in stems of *Mycelis muralis*, Krakow, Mecklenburg, em. 15–22. ii. 36, leg. BUHR (GCDG). 1 ♂ from stem of *Lapsana communis*, Mühlhausen, Thuringia, Germany, em. 25. i. 65, leg. BUHR, HERING no. 2233 (GCDG). 2 ♀♀ from puparia in stems of *Campanula persicifolia*, Hedlandet, Södermanland, Sweden, em. 15 and 28. vii. 43, leg. LUNDQVIST (LUND).

##### Host 2 — *Ophiomyia labiatarum* HERING

1 ♂ from puparium 16. viii. 35 in stem of *Stachys silvatica*, Dargun, Warsaw, Mecklenburg, Germany, em. 20. viii. 35, leg. BUHR (GCDG).

##### Host 3 — *Ophiomyia* sp.

1 ♂ 2 ♀♀ from puparia 28. ix. 60 in stems of *Stachys palustris*, Woodwalton Fen, Hunts., England, em. 6–23. iv. 61 (GCDG).

Host 3 was recorded in GRIFFITHS (1963a) and SPENCER (1964) as *Ophiomyia labiatarum* HERING, but I think it probable that it represents a different species, since the hind spiracles of the puparia have 9–11 bulbs in contrast with about 7 in the true *labiatarum*. No bred flies have yet been obtained. The series of *fuscipennis* bred from this host are darker coloured than NIXON's holotype and the other material before me (on which the above description has been based), having the legs, mandibles, labrum and palpi entirely dark brown or black. It is possible that they represent a different species, but I do not wish to offer a firm opinion on the basis of a single series.

NIXON (1944) has emphasised that this species has infumated wings: however this character is subject to individual variation and it does not seem to me very reliable for purposes of identification. An important character for identifying this species is that its petiole (fig. 167) is more densely pubescent than in other species of the *bathyzonus* group except *C. brevifemur* (TOBIAS). Also the mandibles have a hollowed dilation near their base (fig. 162), as in *C. cyparissa* (NIXON).

***Chorebus lychnidis* sp. nov.**

Colour. Palpi dull yellow or yellow-brown. Labrum orange-yellow. Antennae dark except for the yellow-brown scape and annellus. Centre of mandibles red-brown. Legs 1 and 2 ochreous yellow: hind legs uniformly brown except for the yellowish trochanter and trochantellus. Gaster beyond petiole largely brown (but tergite 3 yellow-brown in the male).

Morphology. Back of head clothed with short, fairly dense pubescence (but not so densely pubescent as for instance in *fuscipennis* and *caesariatus*): in lateral view a small whitish tuft of pubescence can be seen on the posterior edge of the head near the base of the mandibles. Cheeks not conspicuously angled (contrast *bathyzonus*). Mandibles hardly expanded towards their apex, with tooth 2 relatively large and pointed, rather conspicuously hollowed posteriorly near their base below the tuft of pubescence. Antennal segments: ♂, 30; ♀, 28: male flagellum normally pubescent (contrast *bathyzonus*). Palpi long.

Mesoscutum not distinctly flattened centrally, with punctate sculpture on its anterior face and the anterior part of its central lobe, with its anterior face and central lobe densely pubescent but the lateral lobes largely bare: notaulices distinct, V-shaped, reaching the posterior fovea. Precoxal suture visible as a smooth well-defined linear groove. Petiole very narrow and elongate, over 3 times as wide as long, parallel-sided, with a little pubescence near its base but otherwise only 3–4 pairs of hairs on its dorsal surface. Ovipositor (♀) hardly projecting beyond the apical tergite in the retracted position.

Wing with vein  $R_s$  weakly sinuate: *Im-cu* clearly rejected from cell  $R_s$ .

Host — *Ophiomyia* sp. ? *melandricaulis* HERING

Holotype ♂, paratype ♀ from puparia 9. vii. 61 in stems of *Lychnis flos-cuculi*, Woodwalton Fen, Hunts., England, em. 2. viii. 61 (GCDG).

These specimens were referred to in GRIFFITHS (1963a) as "*Dacnusa* sp. (*leptogaster* group)". They are very similar to *C. nerissa* (NIXON), but are darker coloured. I think they probably represent a different species, but this conclusion should be reappraised when more material is available.

***Chorebus bathyzonus* (MARSHALL), comb. nov.**

*Dacnusa bathyzona* MARSHALL, 1891, NIXON, 1937 and 1944

Colour. Palpi and labrum yellow. Antennae almost entirely dark (with only the annellus and the ventral surface of the scape yellow-brown) in the male, but with their basal segments (as far as the first or second flagellar segment) yellowish in the female. Centre of mandibles red-brown. Legs largely deep yellow, but with the fifth tarsal segments of legs 1 and 2, the entire hind tarsi and the apex of the hind tibiae infuscated (and sometimes also the hind femora and the rest of the hind tibiae red-brown). Gaster beyond petiole largely bright reddish yellow.

Morphology. Back of head densely clothed with adpressed pubescence: in lateral view the cheeks appear angularly produced and bear a conspicuous tuft

of matted white pubescence above the base of the mandibles. Mandibles hardly expanded, with all four teeth clearly defined, hollowed posteriorly near their base below the tuft of pubescence. Antennal segments: ♂, 28–32; ♀, 26–31: in the male the segments of at least the basal third of the flagellum are very shining and, at least on their dorsal surface, virtually bare. Palpi long.

Mesoscutum often somewhat flattened centrally, with its anterior face and central lobe punctate and very densely pubescent, but the lateral lobes contrastingly smooth, shining and largely bare: notaulices distinct, V-shaped, reaching the posterior fovea. Precoxal suture visible as a smooth well-defined linear groove. Petiole very narrow and elongate, 3–3½ times as long as wide, parallel-sided, virtually bare except for a little pubescence near its base. Ovipositor (♀) not or hardly projecting beyond the apical tergite in the retracted position.

Wing with vein  $R_s$  weakly sinuate: *Im-cu* clearly rejected from cell  $R_s$ .

#### Breeding records

Host — *Ophiomyia heracleivora* SPENCER

1 ♂ from puparium 17. xi. 56 on *Heracleum sphondylium*, Bookham Common, Surrey, England, em. vi. 57, leg. SPENCER (BM). 6 ex. from puparia on *Heracleum sphondylium*, Sunninghill, Berks., England, leg. ALLEN (det. M.W.R. DE V. GRAHAM, recorded by ALLEN, 1956).

This species is easily distinguished from other members of the *bathyzonus* group by its brightly coloured gaster, the conspicuous tuft of matted white pubescence visible in lateral view on the rather angularly produced cheeks, and the sexual dimorphism of its antennal pubescence.

Records of "*Dacnusa bathyzona*" as a parasite of *Ophiomyia simplex* LOEW refer to *C. rondanii* (GIARD) (see under the description of that species above). I have no doubt that the record in TAVARES (1905) also refers to a different species (see the footnote to table 17).

#### *Chorebus leptogaster* (HALIDAY), **comb. nov.**

*Alysia* (*Dacnusa*) *leptogaster* HALIDAY, 1839

*Dacnusa leptogaster* (HALIDAY), MARSHALL, 1891, 1895 and 1897, NIXON, 1937 and 1944

*Dacnusa naenia* MORLEY, 1924

*Dacnusa dinae* BURGHELE, 1960, **syn. nov.**

Colour. Palpi yellow-brown, testaceous or brown. Labrum black. Antennae entirely black. Centre of mandibles red-black. Legs 1 and 2 varying from yellow-brown or testaceous to dark brown with the coxae and sometimes the tarsi virtually black: hind legs largely black or dark brown (the coxae always black), but usually with the trochantellus and the base of the tibiae red-brown. Gaster beyond petiole uniformly coloured, varying from reddish yellow to almost black.

Morphology. Back of head largely bare, with pubescence only at its sides (near the mandibles): in lateral view some fairly dense pubescence can be seen above the base of the mandibles (where the surface beneath is distinctly sculptur-



ed), but no distinct tufts are formed. Mandibles (fig. 163) with tooth 1 only slightly expanded. Antennal segments: ♂, (29)—30—33; ♀, (25)—26—30 (bred material only). Palpi long.

Sides of pronotum densely pubescent along and below the oblique suture, but with a shining, bare or only sparsely pubescent area above this. Mesoscutum with its anterior face and the anterior part of the central lobe roughened, with dense pubescence covering its anterior face and central lobe but the lateral lobes largely bare: notaulices usually indicated anteriorly only (but occasionally complete, reaching the posterior fovea). Precoxal suture distinctly rugose-costate anteriorly. Petiole extraordinarily long and narrow (3—3½ times as long as wide), parallel-sided, strongly shining and largely bare, with only a few fine hairs at its base and along its sides. Ovipositor (♀) directed upwards in the retracted position, not or only slightly projecting beyond the apical tergite.

Wing (fig. 148) with the pterostigma rather short and almost parallel-sided: cell  $2R_1$  rather short: vein  $R_s$  only weakly sinuate: *Im-cu* well rejected from cell  $R_s$ .

#### Breeding records

##### Host 1 — *Ophiomyia pulicaria* MEIGEN

4 ex from puparia 5. v. 63 on *Taraxacum* sp. in my garden at Barnet, London, em. 4 to 26. vi. 63 (GCDG). 1 ♂ from puparium 14. vii. 65 on *Taraxacum officinale*, Rieseninger, Mühlhausen, Thuringia, Germany, em 2. viii. 65, leg BUHR no. 2483 (GCDG). 3 ♂♂ from puparia 14. v. 65 on *Taraxacum officinale*, Stadtwald, Mühlhausen, Thuringia, em. 2—7. vi. 65, leg BUHR no. 2363 (GCDG). 2 ♀♀ from puparia 13. v. 66, same plant and locality, em. 4 and 9. vi. 66, leg. BUHR no. 2724 (GCDG). 1 ♂ from puparium 1. vi. 66, same plant and locality, em. 15. vi. 66, leg. BUHR no. 2809 (GCDG). 1 ♀ from puparium 20. v. 66 on *Taraxacum officinale*, Ochsenburg, Süd-Kyffhäuser, Thuringia, em. 5. vi. 66, leg. BUHR no. 2751 (GCDG). 1 ♀, Stuttgart-O'türkheim, Germany, em. 8. viii. 55, leg. GROSCHKE (STGT).

##### Host 2 — *Ophiomyia cunctata* HENDEL

1 ♀ from puparium 14. vii. 65 on *Sonchus oleraceus*, Rieseninger, Mühlhausen, Thuringia, Germany, em. 28. vii. 65, leg BUHR no. 2465a (GCDG). 1 ex. from puparium 11. vii. 53 on *Sonchus asper*, Hampstead, London, em 2. viii. 53, leg SPENCER (BM) (host formerly recorded as *O. beckeri* HENDEL in GRIFFITHS, 1956).

##### Host 3 — *Ophiomyia pinguis* FALLÉN

About 30 ex. from puparia in cultivated chicory (*Cichorium intybus*), Zaventem, Belgium, 1964—1966, leg. LOUNSKY (GCDG and Station d'Entomologie, Gembloux).

Other breeding records from undetermined species of the *Ophiomyia pulicaria* group (probably *pulicaria* MEIGEN or *cunctata* HENDEL).

1 ♀ from puparium 14. ix. 61 on *Taraxacum* sp., Oxwich, Gower, Wales, em. 4. x. 61 (GCDG). 1 ♀ from *Urospermum capense*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 25. vii. 36, leg. BUHR (GCDG). ♂♀ from puparia 18. viii. 65 on *Taraxacum officinale*, Stadtwald, Mühlhausen, Thuringia, Germany, em. 28. viii and 17. ix. 65, leg. BUHR no. 2605 (GCDG). 1 ♀ from puparium 3. viii. 65 on *Lapsana communis*, same locality, em. 22. viii. 65, leg. BUHR no. 2566 (GCDG). 1 ♂ from puparium 18. v. 66 on *Picris hieracioides*, same locality, em. 7—8. vi. 66, leg. BUHR no. 2738 (GCDG). ♂♀ from puparia 20. vii. 65 on *Sonchus oleraceus*, Katzentreppen, Mühlhausen, Thuringia, em. 2—5. viii. 65, leg. BUHR no. 2502 (GCDG).

The synonymy of *Dacnusa naenia* MORLEY was stated in Appendix VII in Part II. Although I have not seen BURGHELE's (1960) material of "*Dacnusa dinae*", her description seems to me to agree fully with *leptogaster* and I have therefore proposed the synonymy of her name.

The record of a host of this species as "*Phytomyza continua* HENDEL" given in NIXON (1944) was doubtless the result of confusion with *Ophiomyia pinguis* FALLÉN. There are no puparia with the series in question (Geneva, Switzerland, 1934, leg. DESHUSSES), which is in the British Museum.

This species is similar to *C. femoratus* (TOBIAS) and *C. xiphidius* sp. nov. in respect of its extremely long petiole and the wing venation. The differences between these species are given in the key above.

***Chorebus xiphidius* sp. nov.**

Similar to *C. leptogaster* (HALIDAY), with which it may be compared as follows. Colour. Palpi and labrum clear yellow. Centre of mandibles red-brown. Legs largely deep yellow or ochreous yellow, with the tarsi (especially the hind tarsi) and the apex of the hind tibiae infuscated, and the dorsal surface of the hind femora infuscated at least on their apical half (the coxae however are all yellow or ochreous yellow, not at all infuscated). Gaster beyond petiole conspicuously yellow or yellow-brown.

Morphology. Antennal segments: ♂, 32–33; ♀, 29–31. Palpi extremely long (see the table of biometric data).

Mesoscutal pubescence extending onto about the anterior half of the lateral lobes. Ovipositor (♀) much longer, directed more or less horizontally and strongly projecting beyond the apical tergite in the retracted position, its sheaths about as long as the first segment of the hind tarsus.

Host — *Ophiomyia* sp. (*pulicaria* group)

1 ♀ paratype from puparium 2. v. 66 in leaf of *Picris hieracioides*, Stadtwald, Mühlhausen, Thuringia, Germany, em. 15. v. 66, leg. BUHR no. 2716 (GCDG). Holotype ♀; 2 ♂♂ 1 ♀ paratypes from puparia 13. v. 66, same plant and locality, em. 7–16. vi. 66, leg. BUHR no. 2726 (GCDG). 1 ♂ 4 ♀♀ paratypes from puparia 18. v. 66, same plant and locality, em. 7–23. vi. 66, leg. BUHR nos. 2735 and 2738 (GCDG).

This species is clearly monophyletic with *C. leptogaster* (HALIDAY) and *C. femoratus* (TOBIAS), being synapomorph in respect of the extremely elongate petiole and wing venation (fig. 148). The form of the petiole in conjunction with pale coloration and a projecting ovipositor in the female will enable the species to be easily recognised.

The host is an apparently undescribed species of the *Ophiomyia pulicaria* group whose puparia differ from those of the known species in having smaller spiracles (with only 6–7 bulbs on the hind spiracles).

***Chorebus glaber* (NIXON), comb. nov.**

*Dacnusa leptogaster* (HALIDAY) sensu VAN DEN BRUEL, 1933 (nec *Alysia* (*Dacnusa*) *leptogaster* HALIDAY, 1839)

*Dacnusa glabra* NIXON, 1944

Colour. Palpi dark brown or black. Labrum black. Antennae entirely dark (except sometimes the annellus). Centre of mandibles red or red-brown. Legs with all coxae, trochanters and usually the trochantelli black: femora and tibiae of legs 1 and 2 largely yellow-brown or brown, at most with the dorsal surface of the femora infuscated; hind legs with black femora, but the tibiae are largely yellow-brown or red-brown, usually becoming black only near their apex: all tarsi infuscated. Gaster entirely black.

Morphology. Back of head bare centrally, but densely pubescent at its sides (near the mandibles): in lateral view the pubescence on the posterior edge of the head above the base of the mandibles appears to form tufts, but these are sometimes grey and rather inconspicuous. Mandibles very variable in size, sometimes large with tooth 1 strongly expanded (fig. 156), but often much smaller, not expanded (fig. 157). Antennal segments: ♂, (29)—30—32—(33); ♀, 25—29.

Sides of pronotum entirely covered with dense pubescence. Mesoscutum largely smooth, with only its anterior face punctate, with pubescence covering its anterior face and central lobe but the lateral lobes largely bare: notaulices weak, not extending longitudinally on the dorsal surface of the mesoscutum. Precoxal suture rugose-costate anteriorly. Petiole 2.0—2.6 times as long as wide, almost or completely parallel-sided, strongly shining, with its dorsal surface largely bare (except for some fine pubescence near its base and sometimes a few hairs along its sides). Ovipositor (♀) stout, shortly projecting beyond the apical tergite in the retracted position (by up to a half of the length of the petiole).

Wing (fig. 149) with cell  $2R_1$  relatively short; pterostigma broad, distinctly tapering towards its apex; vein  $R_s$  only weakly sinuate;  $Im-cu$  widely rejected from cell  $R_s$ .

#### Breeding records

Host — *Napomyza cichorii* SPENCER

This species is the most numerous parasite of this host, which is a serious pest of cultivated chicory (*Cichorium intybus*) in Belgium and Holland. About 3,000 specimens have been bred by Mr. J. LOUNSKY of the Station d'Entomologie at Gembloux from material collected at Zaventem, Belgium (1963—1966). I have also received material from Holland (Isle of Walcheren and Isle of Overflakke, spring 1966) sent by Drs. VAN 'T SANT (leg. BETHE) of the Instituut voor Plantenziektenkundig Onderzoek at Wageningen. A sample of the above material is retained in my personal collection.

VAN DEN BRUEL's (1933) figure of "*Dacnusa leptogaster* HAL." clearly refers to this species, but it is likely that he also had the true *Chorebus leptogaster* (HALIDAY) before him, since this is a parasite of *Ophiomyia pinguis* FALLÉN which was included in some of his breeding samples. The species has also been referred to as "*Dacnusa gracilis* NEES" in VAN 'T SANT, VIJZELMAN and BETHE (1961).

There are many other references to parasites of this host in the considerable literature concerning the control of chicory flies. It seems reasonable to assume that all such references to "*Dacnusa*" parasites of *Napomyza* on chicory refer wholly or for the most part to the present species. But it must be borne in mind when interpreting the results of experiments in which both *Napomyza* and *Ophiomyia pinguis* FALLÉN were present, that workers in this field have hitherto failed to distinguish *glaber* from the true *leptogaster*, which is a parasite of the *Ophiomyia*.

There is an unusually wide range of variation in the size of the head and mandibles in this species (compare nos. 19—20 with nos. 21—22 in the table of biometric data and fig. 156 with fig. 157). Specimens with a large head and mandibles were bred by Mr. LOUNSKY mainly from puparia in the roots of chicory, while the majority of specimens bred from puparia in leaves had a relatively smaller head and mandibles. However this correlation is only partial and many intermediate specimens occur.

There is a specimen of *glaber* in the HALIDAY collection labelled “*navicularis*” (possibly doubtfully as the record was not published) by HALIDAY, but the species does not fit NEES’ (1834) description of *Alysia navicularis*, which is stated to have a pubescent petiole. NIXON’S (1944) holotype is a specimen with strongly expanded mandibles.

This species is well characterised in the female by its projecting ovipositor. The male might easily be confused with *C. leptogaster* (HALIDAY), but has a shorter petiole and the sides of the pronotum entirely covered with dense pubescence. Another dark-legged species which might be confused with *glaber* is described in this paper as *C. orbiculatae* sp. nov. (the differences are given in the key above).

***Chorebus gedanensis* (RATZEBURG), comb. nov.**

*Alysia Gedanensis* RATZEBURG, 1852

*Dacnusa Gedanensis* (RATZEBURG), MARSHALL, 1891

*Dacnusa anguligena* NIXON, 1937 and 1944, **syn. nov.**

Colour. Palpi and labrum yellow-brown. Antennae entirely dark or becoming brownish towards their base. Centre of mandibles red-brown. Legs largely reddish yellow or yellow-brown, the hind pair being slightly darker than legs 1 and 2: coxae more or less brown. Gaster beyond petiole red-brown or brown, becoming darker towards its apex.

Morphology. Back of head clothed with fairly dense pubescence: in lateral view the cheeks are produced backwards above the mandibles to form an angulate projection, which is rather densely pubescent. Mandibles not expanded, hollowed posteriorly near their base. Antennal segments: ♂, 31—33; ♀, 30—33.

Mesoscutum hardly sculptured, with fine pubescence covering much of its surface but absent from a large part of the lateral lobes: notaulices well-developed anteriorly, reaching the posterior fovea as smooth (sometimes very weak) impressions. Precoxal suture rugose-costate anteriorly. Sculpture of metapleuron and propodeum very coarse. Petiole about 2.2 times as long as wide, parallel-sided, with its dorsal surface almost bare and strongly shining. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

\*Wing with cell  $2R_1$  rather elongate: vein  $R_s$  weakly sinuate: pterostigma rather broad: *1m-cu* well rejected from cell  $R_s$ .

## Breeding records

Host — *Hexomyza schineri* GIRAUD

3♂♂ 2♀♀ from galls on *Populus tremula*, Hoddesdon, Herts., England, em. v—vi, leg. EAGLES and NIBLETT (BM) (the type series of *Dacnusa anguligena* NIXON). RATZBURG (1852) refers to 2 ex. bred by BRISCHKE from galls on *Populus tremula*, em. 2 and 17. vi. 1849 (locality not stated but clearly Gdansk (Danzig) from the specific name), and further material bred by REISSIG (? locality), also from galls on *Populus tremula*.

RATZBURG (1852) gives the host of this species as *Saperda populnea* (L.) (Coleoptera) or possibly “gleichzeitig mit ihm lebenden Dipteren”. Galls of *Hexomyza* on Salicaceae can easily be confused on external appearance with coleopterous galls and clearly this is the explanation of the record. RATZBURG's specimens have been destroyed, but I think there can be no reasonable doubt from his description that the species before him was the same as NIXON's *Dacnusa anguligena*. For instance his reference to the number of antennal segments, the extensive pubescence and the shape of the petiole all strongly support this interpretation. GIRAUD (1861), in his original description of the host fly bred from galls on *Populus alba* on the banks of the Danube (presumably near Vienna), states that he obtained a parasite “*Dacnusa agromyzae* m. n. sp.”, but this is a nomen nudum since no description is given and does not preoccupy the use of the name *Dacnusa agromyzae* GAHAN for an American species.

Little difficulty will arise in identifying bred material of this species on account of the characteristic life-history. The shape of the head is perhaps its most distinctive morphological feature (see NIXON, 1944, fig. 81).

The *Chorebus cybele* group

The concept of the *cybele* group, first proposed by NIXON (1943 and 1944) for the two monophyletic species *cybele* and *didas*, is here extended to include three further species. I consider the species included in this group synapomorph in respect of the reduction of tooth 4 of the mandibles, their elongate form, and possibly also the upcurved ovipositor. They differ from the other group treated in this paper, the *senilis* group, in possessing at most fine inconspicuous pubescence on the sides of the pronotum (a plesiomorph character), in lacking a distinct rosette of metapleural pubescence (plesiomorph) (compare fig. 21), and in having vein  $Cu_{1b}$  weak or absent (fig. 155), so that cell  $2Cu$  is more or less open at its lower distal corner (apomorph).

The inclusion in this group of *C. cyclops* (NIXON)<sup>9</sup>, a species of unknown life-history, is provisional. Its metapleural and propodeal pubescence are similar to those of the other species, and its mandibles may be derived from the type found in other species (through reduction of tooth 3 as well as tooth 4, as has also occurred in *C. ibericus* sp. nov.). However *cyclops* has an almost bare mesoscutum and a subcubical head. On the basis mainly of the last two characters NIXON (1943 and 1946) associated it with *C. diremtus* (NEES), a parasite of *Cerodontha* s. s., as the *diremta* group of “*Dacnusa*”. That species however appears referable to

<sup>9</sup> See also the table of biometric data.

the *ovalis/lateralis* complex, as it has a well-defined metapleural rosette. I think therefore that the undoubted similarity of these two species in the shape of the head represents convergence.

The species which I include in the *cybele* group may be distinguished by the following key.

**Key to the *Chorebus cybele* group**

- 1 Thorax characteristically long and narrow, 2.3–2.4 times as long as wide. 28–42 antennal segments. Mandibles as fig. 165. Petiole densely pubescent. Ovipositor (♀) projecting beyond the apical tergite in the retracted position . . . . . 2
- Thorax roughly 1.9–2.1 times as long as wide. 18–30 antennal segments. Legs largely dark. Petiole only sparsely pubescent. Ovipositor (♀) not or only slightly projecting beyond the apical tergite in the retracted position . . . . . 3
- 2 Antennal segments: ♂, (34)–35–40–(42); ♀, (32)–33–37–(38). Ovipositor rather long, projecting beyond the apical tergite in the retracted position usually by a third to a half of the length of the petiole. Legs usually largely yellow . . . . . *C. cybele* (NIXON)
- Hosts: *Melanagromyza lappae* LOEW, *M. eupatorii* SPENCER, *M. symphyti* GRIFFITHS and *M. sp.* on *Chaerophyllum aureum*
- Antennal segments: ♂, 33–35; ♀, 28–31. Ovipositor shorter. Legs dark, especially the hind pair . . . . . *C. didas* (NIXON)
- Host: *Napomyza scrophulariae* SPENCER
- 3 Mesoscutal pubescence almost confined to the former course of the notaulices. Head subcubical (about 1.3 times as wide as long). Antennal segments: ♂, 27–30; ♀, (22)–23–25. Mandibles with tooth 2 long and pointed but teeth 3 and 4 reduced. Petiole elongate, about twice as long as wide. . . . . *C. cyclops* (NIXON), **comb. nov.**
- Mesoscutum with at least its central lobe densely pubescent. Head more transverse (1.6–1.8 times as wide as long) . . . . . 4
- 4 Petiole broad, 1.3–1.6 times as long as wide. Antennal segments: ♂, (26)–27–29; ♀, 23–26. Mandibles with tooth 3 usually well developed (compare fig. 165). . . . . *C. parvungulus* (THOMSON) (= *acco* NIXON)
- Host: *Napomyza lateralis* FALLÉN and *N. cichorii* SPENCER
- Petiole more elongate, about 1.7 times as long as wide. 18 antennal segments (2♀♀). Mandibles with both teeth 3 and 4 small and indistinct (fig. 166). ***C. ibericus sp. nov.***
- Host: *Ophiomyia beckeri* HENDEL

In the descriptions which follow the following common characters may be assumed.

Clypeus dark, like the face. Sides of pronotum shining, with only fine inconspicuous pubescence mainly below the oblique suture. Propodeal pubescence dense, usually rather short. Petiole more or less parallel-sided. Hind coxa not unusually densely pubescent, without any distinct tufts. Hind tarsus about as long as the hind tibia.

Wing (compare fig. 153) with cell  $2R_1$  somewhat narrow and vein  $R_s$  not or only weakly sinuate: vein  $2r$  branching rather remote from the base of the pterostigma: *Im-cu* clearly rejected from cell  $R_s$ : cell  $2Cu$  (fig. 155) more or less open at its lower distal corner ( $Cu_{1b}$  weak or absent).

***Chorebus cybele* (NIXON), comb. nov.***Dacnusa cybele* NIXON, 1937 and 1944

Colour. Palpi yellow or reddish yellow. Labrum orange or yellow-brown. Centre of mandibles red-brown. Antennae with the scape and pedicel red-brown, the flagellum usually entirely dark, but sometimes with its basal segments more or less red-brown. Legs largely golden yellow or reddish yellow with the hind tarsi and usually the base of the hind coxae and apex of the hind tibiae infuscated: occasionally the hind femora and tibiae are more or less brown.<sup>10</sup> Gaster usually largely dark except for the yellow-brown or reddish base of tergite 3: occasionally this paler colour is more extensive.

Morphology. Antennal segments: ♂, (34)—35—40—(42); ♀, (32)—33—37—(38). Mandibles 4-toothed, not expanded, with tooth 4 reduced, obviously smaller than the large tooth 3 (fig. 165). Face shining, with only shallow punctate sculpture, covered with fairly dense fine pubescence which is directed downwards along the eye-margins but mostly inwards towards its centre, becoming sparse or absent along the centre-line. Palpi long.

Thorax extremely narrow and elongate (2.3—2.4 times as long as wide). Mesoscutum shining, with its anterior face and central lobe weakly punctate, with dense pubescence covering its anterior face, central lobe and about the anterior half of the lateral lobes, but the posterior half of the lateral lobes is often bare: posterior fovea long and deep, extending almost from the middle of the mesoscutum: notaulices with only their lateral extensions distinctly rugose, either extending to the posterior fovea as narrow V-shaped more or less smooth grooves or virtually absent from the dorsal surface of the mesoscutum. Mesepisternum with a long, fairly narrow, but distinctly rugose precoxal suture extending almost from the epicnemial suture to its posterior margin. Metapleural pubescence (fig. 21) not forming a distinct rosette. Petiole 1.7—1.9 times as long as wide, with fairly dense pubescence covering almost its entire surface (but occasionally tending to be absent from the centre-line posteriorly), often slightly denser at the apical corners, but no tufts are formed. Tergite 3 with few or no basal hairs. Ovipositor (♀) long and upcurved, conspicuously projecting beyond the apical tergite (by a third to a half of the length of the petiole) in the retracted position.

Large species (wing length up to 4 mm.).

## Breeding records

Host 1 — *Melanagromyza lappae* LOEW

2 ex. from puparia in stems of *Arctium* sp., Scratch Wood, London, em. 10. v. 56, leg. SPENCER (GCDG). 8 ex. from puparia in stems of *Arctium lappa*, Mühlhausen, Thuringia, Germany, em. 14. iv (1♀) and 7. v. 55, leg. BUHR, HERING nos. 867 and 870 (GCDG).

<sup>10</sup> One of the two males bred from the *Melanagromyza* sp. in stems of *Chaerophyllum aureum* at Mühlhausen is remarkable in having dark palpi, the hind legs completely infuscated and the middle legs largely so. This insect must clearly be considered a variant, as the other male bred with it is normally coloured. (There is no question of confusion with *didas*, because that species has fewer antennal segments.)

1 ♂ 7 ♀♀ (including the holotype ♀) from puparia in stems of *Arctium* sp., Bagley Wood, Berks., England, em. 24. v—3. vi. 32, leg. HAMM (HD and BM). 3 ex. from puparia in stems of *Arctium vulgare*, North Mimms, Herts., England, em. 12—19. v. 62 (GCDG).

Host 2 — *Melanagromyza eupatorii* SPENCER

1 ♀ from puparium 22. i. 61 in stem of *Eupatorium cannabinum*, Woodwalton Fen, Hunts., England, em. 12. iii. 61 (GCDG). 1 ♂ from puparium 18. iii. 23 in stem of *Eupatorium cannabinum*, Cothill, Berks., England, em. 3. v. 23, leg. WATERS (HD). 1 ♀ from puparium ix. 58 in stem of *Eupatorium cannabinum*, Chippenham Fen, Cambs., England, em. spring 59, leg. SPENCER (GCDG). 1 ♀ from puparium in stem of *Eupatorium cannabinum*, Heidelberg, Germany, em. 5. v. 56, leg. SPENCER (GCDG).

Host 3 — *Melanagromyza* sp.

1 ♀ from puparium 18. ix. 64 in stem of *Chaerophyllum aureum*, Jena-Wöllnitz, Thuringia, Germany, em. 10. iii. 65, leg. BUHR (GCDG). 2 ♂♂ from puparia in stems of *Chaerophyllum aureum*, Mühlhausen, Thuringia, em. spring 66, leg. BUHR (GCDG).

Host 4 — *Melanagromyza symphyti* GRIFFITHS

48 ex. from larvae and puparia 17. ix. 61 in stems and leaf-stalks of *Symphytum officinale*, Woodwalton Fen, Hunts., England, em. 26. iv—25. vi. 62 (32 ex.) and 4—21. v. 63 (16 ex.) (GCDG).

The records for Woodwalton Fen were previously published in GRIFFITHS (1963a and 1936b). It is noteworthy that some specimens from the series bred from *M. symphyti* GRIFFITHS at that locality did not emerge until they had passed two winters in the host puparia. Host 3 is probably an undescribed species.

This species will be readily distinguished from the other species of this group treated in this paper by its large size, longer ovipositor and usually yellow legs.

***Chorebus didas* (NIXON), comb. nov.**

*Dacnusa didas* NIXON, 1944

Similar to *cybele*, with which it may be compared as follows.

Colour darker. Palpi yellow-brown to almost black. Labrum brown. Antennae more or less entirely dark. Legs 1 and 2 largely brown or light brown: hind legs darker, varying from almost completely black to brown with only the coxae more or less black. Gaster entirely dark.

Morphology. Antennal segments: ♂, 33—35; ♀, 28—31. Centre of mesepisternum bearing a band of fine hairs. Petiole more elongate, 2.1—2.3 times as long as wide. Ovipositor (♀) shorter than in most specimens of *cybele*, not so strongly upcurved.

Smaller species (wing length not exceeding 3 mm.).

Breeding records

Host — *Napomyza scrophulariae* SPENCER

4 ♂♂ from puparia in *Digitalis* sp., Hampstead, London, em. 10—23. iii. 66, leg. SPENCER (GCDG). Numerous specimens from seed capsules of *Digitalis* sp., Slough (Bucks.), Abinger (Surrey) and Wallington (Surrey), England 1951 (see WOODROFFE and SOUTHGATE, 1952). 1 ♀ from puparium 27. ix. 64 in stem of *Mentha spicata* (garden mint), East Barnet, London, em. 7. v. 65 (GCDG).



In addition I have received one female labelled as bred from a puparium 25. iii. 56 of *Melanagromyza nibletti* SPENCER in stem of *Silaum silaus*, Bookham, Surrey, England, em. 20. iv. 56, leg. SPENCER (GCDG). I regard this record as requiring confirmation, since it is in conflict with the other information on the host association of this species and the host puparium was not preserved.

This species may be distinguished from the other dark-legged species which I have included in the *cybele* group by its extremely long and narrow thorax (as in *cybele*), distinctly projecting ovipositor and elongate densely pubescent petiole.

***Chorebus parvungulus* (THOMSON), comb. nov.**

*Dacnusa* (*Dacnusa*) *parvungula* THOMSON, 1895

*Dacnusa acco* NIXON, 1943 and 1946, **syn. nov.**

Colour. Palpi infuscated, more or less dark brown. Labrum brown or blackish. Centre of mandibles brown or red-brown. Antennae more or less entirely dark. Legs very dark, with at least the coxae and tarsi dark brown or virtually black; but usually the femora and tibiae of legs 1 and 2 and the hind tibiae are somewhat paler, more or less brown. Gaster with tergite 3 reddish or more or less entirely dark.

Morphology. Antennal segments: ♂, (26)—27—29; ♀, 23—26. Face virtually smooth. Mandibles (compare fig. 165) with tooth 1 slightly expanded and tooth 3 relatively large (only tooth 4 markedly reduced).

Thorax not so narrow as in *cybele* and *didas* (about 2.0—2.1 times as long as wide). Mesoscutum largely smooth and shining with its anterior face densely pubescent and rather long pubescence covering its central lobe and extending onto the anterior part of the lateral lobes, although these are largely bare: notaulices hardly extending longitudinally on the dorsal surface of the mesoscutum. Precoxal suture well developed anteriorly but often not extending to the hind margin of the mesepisternum: centre of mesepisternum bearing a band of fine pubescence. Metapleural pubescence similar to that of *cybele* and *didas* (compare fig. 21). Petiole 1.3—1.6 times as long as wide, strongly shining with short inconspicuous pubescence at its sides but bare centrally: the base of tergite 3 also bears some fine pubescence. Ovipositor (♀) short and stout, slightly upcurved, hardly projecting beyond the apical tergite in the retracted position.

**Breeding records**

**Host 1 — *Napomyza lateralis* FALLÉN**

2 ♀♀ from puparia 19. viii. 35 in flowerheads of *Matricaria maritima inodora*, Schorrentin, Mecklenburg, Germany, em. 30. viii. 35, leg. BUHR no. 69 (GCDG). 1 ♂ from puparium in *Matricaria chamomilla*, Lüsewitz, Mecklenburg, em. 20. ix. 53, leg. BUHR no. 590 (BM). 2 ♀♀ from flowerheads of *Chrysanthemum leucanthemum*, 1953, Rothamsted Experimental Station, Herts., England (BM). 12 ex. from puparia in *Matricaria chamomilla*, Zaventem, Belgium, 1964/65, leg. LOUNSKY (GCDG and Station d'Entomologie, Gembloux).

**Host 2 — *Napomyza cichorii* SPENCER**

1 ♀ from puparium 25. iii. 66 in *Cichorium intybus*, Isle of Overflakee, Holland, em. 19. iv. 66, leg. BETHE (GCDG).

This species may be readily distinguished from the other dark-legged species of the *cybele* group by the form and pubescence of its petiole.

NIXON (1946) considered that *C. thusa* (NIXON) (a parasite of *Phytomyza rufipes* MEIGEN, see Part III) was "very closely related" to this species (his *acco*). But *thusa* has a large mandible, very different from that of the species which I include in the *cybele* group. Its similarity to *parvungulus* in respect of its coloration, number of antennal segments and reduction of the notaulices does not seem to me firm evidence of synapomorphy, as agreement in these characters is clearly often the result of convergence in the Dacnusiini. But although I do not consider that *thusa* can be the sister-species of *parvungulus*, it is possible that there is a close relationship between the *cybele* group and *thusa* (which also lacks a metapleural rosette). The question may be clarified when further information on the parasites of other stem-boring species of *Phytomyza* and *Napomyza* is available.

THOMSON'S (1895) original description refers to both sexes from Örtöfta, near Lund, Sweden. Two specimens from this locality, one of each sex, were sent to me for examination. The description is clearly based on the female, which is hereby designated lectotype. The male is a faded example of a species of the *senilis* group *sensu stricto*.

***Chorebus ibericus* sp. nov.**

Similar to *parvungulus*, with which it may be compared as follows.

Morphology. 18 antennal segments (2 ♀♀). Facial pubescence rather coarse. Mandibles small, with tooth 2 relatively large and pointed but teeth 3 and 4 small and indistinct (fig. 166). Mesoscutal pubescence more extensive, only part of the posterior half of the lateral lobes bare. Petiole more elongate, about 1.7 times as long as wide. Ovipositor (♀) distinctly upcurved, shortly projecting beyond the apical tergite in the retracted position.

Size very small (wing length about 1.9 mm.).

Host — *Ophiomyia beckeri* HENDEL

Holotype ♀, paratype ♀ from puparia 24. iv. 55 on an unidentified species of Compositae, Algeciras, Spain, em. v. 55, leg. SPENCER (GCDG).

This species should be readily distinguished from *parvungulus* by its fewer antennal segments and more elongate petiole. Its somewhat modified mandibles (fig. 166) might cause doubt about its belonging to the *cybele* group, and it is important for purposes of identification that the pubescence of its metapleuron and petiole should be carefully checked. Its mandibles are similar to those of *C. cyclops* (NIXON), but that species has much less mesoscutal pubescence, a subcubical head and more numerous antennal segments.

**Keys to the Dacnusiini Parasites of particular Host Genera**

Keys are here given to the Dacnusiini parasites of *Melanagromyza*, *Ophiomyia* and *Napomyza*. No key to the parasites of *Hexomyza* can be given, since only a single species, *Chorebus gedanensis* (RATZBURG), was available to me for study.

1. *Melanagromyza* spp.

- 1 Sides of pronotum shining, with only fine inconspicuous pubescence mainly below the oblique suture. Metapleural pubescence not forming a distinct rosette (fig. 21). Back of head largely bare. Mandibles (fig. 165) with tooth 4 reduced, obviously smaller than the large tooth 3. Ovipositor (♀) long and upcurved, projecting beyond the apical tergite in the retracted position by a third to a half of the length of the petiole. Antennal segments: ♂, (34)—35—40—(42); ♀, (32)—33—37—(38). Legs usually largely yellow . . . . . *Chorebus cybele* (NIXON)

Hosts: *M. lappae* LOEW, *M. eupatorii* SPENCER, *M. symphyti* GRIFFITHS and *M. sp.* on *Chaerophyllum aureum*

- Sides of pronotum with dense matted pubescence. Metapleural pubescence very dense, forming a well-defined rosette around the rugose swelling (compare figs. 22 and 23). Back of head densely pubescent. At least the hind legs extensively infuscated . . . . . 2
- 2 Mandibles small with tooth 4 much reduced (fig. 161). Petiole with a band of pubescence on either side, but broadly bare along its centre line and near its apex (fig. 169). Basal flagellar segments unusually short (see the table of biometric data). Ovipositor (♀) not or only slightly projecting beyond the apical tergite in the retracted position . . . . . *Chorebus brevicornis* (THOMSON)

Host: *M. aeneoventris* FALLÉN

- Mandibles with all four teeth well developed (fig. 158). Petiole with its entire surface very densely pubescent (fig. 170). Ovipositor (♀) stout, projecting beyond the apical tergite in the retracted position by about two-thirds of the length of the petiole. . . . . *Chorebus senilis* (NEES)

Hosts: *M. aeneoventris* FALLÉN (and also *Napomyza* spp.)

2. *Ophiomyia* spp.

- 1 Metapleural pubescence not forming a distinct rosette. Sides of pronotum with only fine inconspicuous pubescence mainly below the oblique suture. 18 antennal segments (♀). Mandibles (fig. 166) with teeth 3 and 4 small and indistinct. Legs largely dark . . . . . *Chorebus ibericus* sp. nov.

Host: *O. beckeri* HENDEL

- Metapleural pubescence very dense, forming a well-defined rosette around the rugose swelling (compare figs. 22—23). Sides of pronotum densely pubescent, at least along and below the oblique suture. Mandibles not so . . . . . 2
- 2 Tooth 1 of mandibles strongly expanded but teeth 3 and 4 relatively small (fig. 164). Precoxal suture rugose, at least anteriorly . . . . . 3
- Tooth 1 of mandibles not strongly expanded (figs. 162 and 163) . . . . . 4
- 3 Gaster beyond petiole bright yellow. Legs 1 and 2 deep yellow, but the hind legs contrastingly darker, with the femora, tibiae and tarsi uniformly dark brown. Petiole 2.0—2.2 times as long as wide, slightly widened towards its apex. Back of head almost bare centrally . . . . . *Chorebus rondanii* (GIARD)

Host: *O. simplex* LOEW

- Gaster dark. Legs 1 and 2 yellow-brown or brown. Petiole parallel-sided, about 2.6 times as long as wide. Back of head distinctly pubescent centrally . . . . . *Chorebus orbiculatae* sp. nov.

Host: *O. orbiculata* HENDEL

- 4 Pterostigma and cell  $2R_1$  relatively short (fig. 148). Petiole extraordinarily long and narrow,  $3-3\frac{1}{2}$  times as long as wide. Back of head virtually bare centrally, pubescent only at its sides (near the mandibles). Precoxal suture rugose-costate anteriorly. Lateral lobes of mesoscutum bare . . . . . 5
- Pterostigma and cell  $2R_1$  more elongate (fig. 150) . . . . . 6
- 5 Coxae yellow. Gaster beyond petiole conspicuously yellow or yellow-brown. Ovipositor (♀) strongly projecting beyond the apical tergite in the retracted position . . . . . ***Chorebus xiphidius* sp. nov.**
- Host: *O. sp.* on *Picris*
- Coxae black. Gaster beyond petiole varying from reddish yellow to black. Ovipositor (♀) not or only slightly projecting beyond the apical tergite in the retracted position . . . . . ***Chorebus leptogaster* (HALIDAY)**
- Hosts: *O. cunctata* HENDEL, *O. pulicaria* MEIGEN and *O. pinguis* FALLÉN
- 6 Mesoscutum largely bare (with some fine pubescence on its anterior face and a few hairs along the former course of the notaulices: central lobe either bare or with a little fine scattered pubescence). Back of head bare centrally, pubescent only at its sides (near the mandibles). Precoxal suture narrow, but weakly rugose-costate anteriorly . . . . . ***Chorebus heringianus* sp. nov.**
- Host: *O. thalictricaulis* HERING
- Mesoscutum with its anterior face and central lobe densely pubescent. Back of head densely pubescent. Precoxal suture visible as an almost smooth well-defined linear groove . . . . . 7
- 7 23—24 antennal segments (♀). Mesoscutum entirely covered with extremely dense whitish pubescence which on the lateral lobes is largely directed laterally. Petiole largely bare (fig. 168) . . . . . ***Chorebus caesariatus* sp. nov.**
- Host: *O. sp.* on *Medicago*
- Antennal segments more numerous . . . . . 8
- 8 Cheeks in lateral view angularly produced (NIXON, 1944, fig. 78), bearing a conspicuous tuft of white pubescence above the base of the mandibles. In the male the segments of at least the basal third of the flagellum are very shining and, at least on their dorsal surface, virtually bare. Gaster beyond petiole reddish yellow. Legs largely reddish yellow. . . . . ***Chorebus bathyzonus* (MARSHALL)**
- Host: *O. heracleivora* SPENCER
- Cheeks not thus produced; tuft of pubescence not so conspicuous. Flagellum entirely pubescent in both sexes . . . . . 9
- 9 Mandibles (fig. 162) hollowed and somewhat dilated posteriorly near their base. Lateral lobes of mesoscutum pubescent. Petiole somewhat densely pubescent on about its basal half (fig. 167) . . . . . ***Chorebus fuscipennis* (NIXON)**
- Hosts: *O. heringi* STARÝ, *O. labiatarum* HERING and *O. sp.* on *Stachys palustris*
- Mandibles hollowed posteriorly near their base, but not or hardly dilated. Lateral lobes of mesoscutum largely bare. Petiole largely bare. (Legs 1 and 2 ochreous yellow: hind legs uniformly brown except for the yellowish trochanter and trochantellus — contrast *C. nerissa* (NIXON)) . . . . . ***Chorebus lychnidis* sp. nov.**
- Host: *O. sp.* on *Lychnis*

3. *Napomyza* spp.

- 1 Metapleural pubescence long and dense, directed mainly downwards towards the hind coxa. Petiole subtriangular with dense pubescence similar to that of the meta-

pleuron and propodeum. Precoxal suture absent. Pterostigma very elongate (fig. 128 in Part III), blackened in the male. Mandible as fig. 140 (in Part III). Legs largely yellow (but with the base of the hind coxae infuscated) . . . . . *Dacnusa pubescens* (CURTIS)

Hosts: *N. carotae* SPENCER, *N. cichorii* SPENCER, *N. lateralis* FALLÉN and certain *Phytomyza* spp. (see Part III)

- Petiole more or less parallel-sided. Rugose precoxal suture present. Pterostigma shorter, not blackened in the male. Mandibles 4-toothed, but differently shaped. Legs darker, with at least the hind coxae and femora infuscated. . . . . 2
- 2 Metapleural pubescence not forming a distinct rosette (compare fig. 21). Sides of pronotum with only fine inconspicuous pubescence mainly below the oblique suture . . . . . 3
- Metapleural pubescence very dense, forming a well-defined rosette around the rugose swelling (compare figs. 22—23). Sides of pronotum very densely pubescent. Ovipositor (♀) distinctly projecting beyond the apical tergite in the retracted position. 4
- 3 Thorax very long and narrow, 2.3—2.4 times as long as wide. Petiole elongate, 2.1 to 2.3 times as long as wide, fairly densely pubescent. Antennal segments: ♂, 33 to 35; ♀, 28—31. Ovipositor (♀) projecting beyond the apical tergite in the retracted position . . . . . *Chorebus didas* (NIXON)

Host: *N. scrophulariae* SPENCER

- Thorax roughly 2.0—2.1 times as long as wide. Petiole broad, 1.3—1.6 times as long as wide, with short inconspicuous pubescence at its sides but bare centrally. Antennal segments: ♂, (26)—27—29; ♀, 23—26. Ovipositor (♀) hardly projecting beyond the apical tergite in the retracted position. . . . . *Chorebus parvungulus* (THOMSON)

Hosts: *N. lateralis* FALLÉN and *N. cichorii* SPENCER

- 4 Petiole with its entire surface very densely pubescent (fig. 170). Back of head entirely covered with very dense pubescence . . . . . *Chorebus senilis* (NEES)

Hosts: *N. lateralis* FALLÉN, *N. cichorii* SPENCER and *N. scrophulariae* SPENCER (and also *Melanagromyza aeneoventris* FALLÉN)

- Petiole largely bare. Back of head bare centrally, pubescent only at its sides (near the mandibles) . . . . . *Chorebus glaber* (NIXON)

Host: *Napomyza cichorii* SPENCER

### Key to the Dacusini Parasites of Chicory Flies

Since experimental work on the Agromyzid pests of chicory (*Cichorium intybus*) is often undertaken using mixed infestations of flies of different genera, it appears useful to include in this paper a key to all parasites which have been obtained from chicory flies. The material I have seen has been obtained from two species, *Napomyza cichorii* SPENCER and *Ophiomyia pinguis* FALLÉN.

- 1 Pterostigma very elongate (fig. 128 in Part III), blackened in the male. Precoxal suture absent. Metapleuron evenly covered with long, dense pubescence (which does not form a rosette). Petiole subtriangular with dense pubescence similar to that of the propodeum and metapleuron. Legs largely yellow (but with the base of the hind coxae infuscated) . . . . . *Dacnusa pubescens* (CURTIS)  
Occasionally on *Napomyza cichorii* SPENCER (also on other *Napomyza* spp. and certain *Phytomyza* spp.)
- Pterostigma shorter, not blackened in the male. Rugose precoxal suture present. Petiole more or less parallel-sided. Legs darker, with at least the hind coxae and femora infuscated . . . . . 2

- 2 Petiole with its entire surface very densely pubescent (fig. 170). Back of head entirely covered with dense pubescence. Sides of pronotum entirely covered with dense pubescence. Ovipositor (♀) projecting beyond the apical tergite. Mandible as fig. 158. Metapleural pubescence forming a rosette (compare figs. 22—23) . . . . .  
 . . . . . *Chorebus senilis* (NEES)  
 Once on *Napomyza cichorii* SPENCER (also bred from other *Napomyza* spp. and *Melanagromyza aeneoventris* FALLÉN)
- Petiole at least partly bare and shining, at most with fine pubescence near its base and along its sides. Back of head bare centrally . . . . . 3
- 3 Metapleural pubescence rather evenly distributed, not forming a distinct rosette. Sides of pronotum with only fine, inconspicuous pubescence mainly below the the oblique suture. Petiole broad, 1.3—1.6 times as long as wide. Ovipositor (♀) hardly projecting beyond the apical tergite in the retracted position . . . . .  
 . . . . . *Chorebus parvungulus* (THOMSON)  
 Once on *Napomyza cichorii* SPENCER (normally on *N. lateralis* FALLÉN)
- Metapleural pubescence forming a well-defined rosette (compare figs. 22—23). Sides of pronotum with conspicuous dense matted pubescence at least along and below the oblique suture. Petiole over twice as long as wide . . . . . 4
- 4 Petiole 2.0—2.6 times as long as wide. Sides of pronotum entirely covered with dense pubescence. Ovipositor (♀) long, distinctly projecting beyond the apical tergite in the retracted position (by up to a half of the length of the petiole). Pubescence on back of head near the base of the mandibles very dense. . . . *Chorebus glaber* (NIXON)  
 The most common parasite of *Napomyza cichorii* SPENCER (known only from this host)
- Petiole extremely long and narrow (3.0—3.5 times as long as wide). Sides of pronotum densely pubescent along and below the oblique suture, but with a shining, bare or only sparsely pubescent area above this. Ovipositor (♀) shorter, normally directed upwards when retracted, not or only slightly projecting beyond the apical tergite. Pubescence on back of head near the base of the mandibles sparser . . . . .  
 . . . . . *Chorebus leptogaster* (HALIDAY)  
 Common on *Ophiomyia pinguis* FALLÉN (and also on *O. cunctata* HENDEL and *O. pulicaria* MEIGEN)

**Host Association**

Table 17 below lists the known associations of Dacnusiini with the host genera treated in this paper.

The majority of the *Chorebus* spp. treated in this paper exhibit, as far as known, monophagy of the first or second degree. This conforms with the pattern of host association shown by the *Chorebus* parasites of the other genera of Agromyzidae treated in parts II and III of this paper. One species, *C. senilis* (NEES), exhibits disjunctive monophagy. The host association of other members of the *senilis* group suggests that the original association of this species was with *Melanagromyza* and that its association also with *Napomyza* spp. is secondary.

The host range of *Dacnusa pubescens* (CURTIS), associated with a number of *Phytomyza* species as well as *Napomyza*, is disjunctive and appears determined partly by the location of the host larvae — the known hosts are all stem-borers or feed in the midrib of the leaf with the exception of *Phytomyza atricornis* MEIGEN, which however does not seem to be a normal host.

Table 17  
List of Records of Dacnusi Parasites of *Hexomyza*, *Melanagromyza*, *Ophiomyia*  
and *Napomyza*

Hosts	<i>Dacnusa</i>	<i>Chorebus senilis</i> group s. l.	<i>Chorebus cybele</i> group
<b>I. <i>Hexomyza</i></b>			
<i>schineri</i>		<i>gedanensis</i>	
<i>kiefferi</i>		sp. <sup>11</sup>	
<b>II. <i>Melanagromyza</i></b>			
<i>aeneoventris</i>		<i>senilis, brevicornis</i>	
<i>lappae</i>			<i>cybele</i>
<i>eupatorii</i>			<i>cybele</i>
<i>symphyti</i>			<i>cybele</i>
sp. ( <i>Chaerophyllum aureum</i> )			<i>cybele</i>
<b>III. <i>Ophiomyia</i></b>			
<i>orbiculata</i>		<i>orbiculatae</i>	
<i>simplex</i>		<i>rondanii</i>	
<i>beckeri</i>			<i>ibericus</i>
sp. ( <i>Picris</i> )		<i>xiphidius</i>	
<i>cunctata</i>		<i>leptogaster</i>	
<i>pulicaria</i>		<i>leptogaster</i>	
<i>pinguis</i>		<i>leptogaster</i>	
<i>thalictricaulis</i>		<i>heringianus</i>	
<i>heringi</i>		<i>fuscipennis</i>	
<i>labiatarum</i>		<i>fuscipennis</i>	
sp. ( <i>Stachys palustris</i> )		<i>fuscipennis</i>	
sp. ( <i>Medicago</i> )		<i>caesariatus</i>	
sp. ( <i>Lychnis</i> )		<i>lychnidis</i>	
<i>heracleivora</i>		<i>bathyzonus</i>	
<b>IV. <i>Napomyza</i></b>			
<i>lateralis</i>	<i>pubescens</i>	<i>senilis</i>	<i>parvungulus</i>
<i>scrophulariae</i>		<i>senilis</i>	<i>didas</i>
<i>carotae</i>	<i>pubescens</i>		
<i>cichorii</i>	<i>pubescens</i>	<i>glaber, senilis</i>	<i>parvungulus</i>

<sup>11</sup> TAVARES (1905) records "*Dacnusa bathyzona* MARSHALL" as a parasite of his "*Agromyza kiefferi*", bred from galls on *Cytisus*. The host is doubtless a species of *Hexomyza*, probably a prior name for *H. sarothamni* HENDEL. Unfortunately I have not been able to obtain any material bred from this host. The identification of the parasite as *bathyzona* carries no authority, as the Dacnusi were very poorly known in 1905.

### Summary

1. This paper, the fourth of a series, deals with the Dacnusi (Alysiinae) parasites of *Hexomyza* ENDERLEIN, *Melanagromyza* HENDEL, *Ophiomyia* BRASCHNIKOV (Agromyzinae) and *Napomyza* WESTWOOD (Phytomyzinae). Except for a single species of *Dacnusa* the parasites all belong to two disjunct groups of the genus *Chorebus*, the *C. senilis* group s.l. and the *C. cybele* group, which are both redefined. —
2. Revised keys are given to the European species of the two *Chorebus* groups treated. Keys are also given to the parasites of three of the host genera, and to the parasites of those flies associated with chicory (*Cichorium intybus*). —
3. Except for the single *Dacnusa* species (which also attacks certain *Phytomyza* spp.), all parasites treated in this paper exhibit a high degree of host specificity. A complete host/parasite list for Europe has been prepared, including revision of previous records. —
4. Seven new species are described, six in the *Chorebus senilis* group s.l. and one in the *Chorebus cybele* group.

## Zusammenfassung

1. Dieser Artikel, der vierte einer Reihe, behandelt die Dacnusi-(Alysiinae)-Parasiten von *Hexomyza* ENDERLEIN, *Melanagromyza* HENDEL, *Ophiomyia* BRASCHNIKOV (Agromyzinae) und *Napomyza* WESTWOOD (Phytomyzinae). Außer einer einzigen Art von *Dacnusa* gehören diese Parasiten alle zu zwei getrennten Gruppen der Gattung *Chorebus*, der *C. senilis* Gruppe s.l. und der *C. cybele* Gruppe, die beide neu bestimmt werden. —
2. Es werden revidierte Bestimmungstabellen der europäischen Arten der beiden behandelten *Chorebus*-Gruppen mitgeteilt. Ferner werden Bestimmungstabellen angegeben für die Parasiten von drei der Wirtsgattungen und für die Parasiten der mit der Zichorie (*Cichorium intybus*) verbundenen Fliegen. —
3. Außer der einzigen *Dacnusa*-Art (die auch gewisse *Phytomyza*-Arten befällt) weisen alle in dieser Arbeit behandelten Parasiten einen hohen Grad von Wirtsspezifität auf. Es wurde eine vollständige Liste von Wirten und Parasiten für Europa aufgestellt, die die Revision früherer Berichte einschließt. —
4. Sieben neue Arten werden beschrieben, sechs in der *Chorebus senilis* Gruppe s.l. und eine in der *Chorebus cybele* Gruppe.

## Резюме

- Эта статья, четвертая по очереди, занимается с паразитами Dacnusi (Alysiinae) родов *Hexomyza* ENDERLEIN, *Melanagromyza* HENDEL, *Ophiomyia* BRASCHNIKOV (Agromyzinae) и *Napomyza* WESTWOOD (Phytomyzinae). Кроме одного вида *Dacnusa* все паразиты принадлежат двум отдельным группам рода *Chorebus*, группе *C. senilis* s.l. и группе *C. cybele*, которые оба определяются по новому. —
2. Даются ревидированные определительные таблицы европейских видов обоих групп *Chorebus*. Далее приводятся определительные таблицы для паразитов трёх родов хозяинов и для паразитов тех мух, которые связаны с *Cichorium intybus*. —
3. Кроме одного вида *Dacnusa* (которая паразитирует и некоторые виды *Phytomyza*) выявляют все здесь обработанные паразиты высокую специфику к хозяевам. Составляется полный список всех хозяинов и паразитов для Европы, который включает ревизию ранних данных. —
4. Семь новых видов описываются, шесть из группы *Chorebus senilis* s.l. и один из группы *Chorebus cybele*.

## References

- ALLEN, P., Observations on the biology of some Agromyzidae (Diptera). Proc. R. ent. Soc. London (Ser. A), **31**, 117—131; 1956.
- BARNES, H. F., The Asparagus Miner (*Melanagromyza simplex* H. LOEW) (Agromyzidae; Diptera). Ann. appl. Biol., **24**, 574—588; 1937.
- BARNES, H. F. & WALTON, C. L., The Asparagus Miner, *Melanagromyza simplex* LOEW (Diptera: Agromyzidae). Ent. mon. Mag., **70**, 183—185; 1934.
- BRUEL, W. E. VAN DEN, Contribution à l'étude des mouches de la chicorée-witloof *Napomyza lateralis* FALL. et *Ophiomyia pinguis* FALL. (Agromyzides). Bull. Inst. agr. et Stat. Recherches Gembloux, **2**, 17—44; 1933.
- BURGEHELE, A. D., Neue Beiträge zur Kenntnis der Dacnusi (Hymenoptera, Braconidae). Ent. Tidskr., **81**, 131—139; 1960.
- CURTIS, J., British Entomology. London, **3**, 99—194; 1826.
- FULMEK, L., Parasiten der Blattminierer Europas. 's-Gravenhage, 203 pp.; 1962.
- GIARD, A., Sur l'*Agromyza simplex* H. LOEW parasite de l'Asperge (Dipt.). Bull. Soc. ent. France, **87**, 179—181; 1904.
- GIRAUD, J., Fragments entomologiques. Verh. zool.-bot. Ges. Wien, **11**, 447—494; 1861.
- GRIFFITHS, G. C. D., Host Records of Dacnusi (Hym., Braconidae) from leaf-mining Diptera. Ent. mon. Mag., **92**, 25—30; 1956.



- GRIFFITHS, G. C. D., The Agromyzidae (Diptera) of Woodwalton Fen. Ent. mon. Mag., **98**, 125–155; 1963 a.
- , The Agromyzidae (Diptera) of Woodwalton Fen: Supplement. Ent. mon. Mag., **98**, 155–158; 1963 b.
- , The Alysinae (Hym., Braconidae) parasites of the Agromyzidae (Diptera). I. General questions of taxonomy, biology and evolution. Beitr. Ent., **14**, 823–914; 1964. — II. The parasites of *Agromyza* FALLÉN. Beitr. Ent., **16**, 551–605; 1966 a. — III. The parasites of *Paraphytomyza* ENDERLEIN, *Phytagromyza* HENDEL and *Phytomyza* FALLÉN. Beitr. Ent., **16**, 775–951; 1966 b.
- HALIDAY, A. H., Hymenoptera Britannica. Fasc. 2: *Alysia*. London, 28 pp.; 1839.
- MARSHALL, T. A., Les Braconides. In: ANDRÉ, E., Species des Hyménoptères d'Europe et d'Algérie. Gray, **5**, 635 pp.; (1891–1896) 1891.
- , A Monograph of British Braconidae. Trans. ent. Soc. London, Part VI, 1895, p. 363 to 398; 1895. — Part VII, 1897, p. 1–31; 1897.
- MORLEY, C., Notes on Braconidae: XIII. — Dacnuses. Entomologist, **57**, 193–198, 250–255; 1924.
- NEES AB ESENBECK, C. G., Ichneumonides adsciti in genera et familias divisi. Ges. naturforsch. Freunde Berlin, Mag. f. d. neuesten Entdeckungen i. d. gesammten Naturkunde, **6**, 183–221; 1814.
- , Hymenopterorum Ichneumonibus affinium monographiae, genera Europaea et species illustrantes. 1. Pars II: Monographia Ichneumonidum Alysioideorum, p. 195–298. Stuttgart & Tübingen, 1834.
- NIXON, G. E. J., The British Species of *Dacnusa* (Hym., Fam. Braconidae). Trans. Soc. brit. Ent., **4**, 1–88; 1937.
- , A Revision of the European Dacnusiini (Hym., Braconidae, Dacnusiinae). Ent. mon. Mag., **79**, 20–34; 159–168; 1943. **80**, 88–108, 140–151; 1944. **82**, 279–300; 1946.
- RATZBURG, J. T. C., Die Ichneumoniden der Forstinsekten in entomologischer und forstlicher Beziehung. Ein Anhang zur Abbildung und Beschreibung der Forstinsekten. Berlin, **3**, XIX & 272 pp.; 1852.
- SANT, L. E. VAN 'T, VIJZELMAN, H. E. & BETHE, J. G. C., Enkele Gegevens over de Witlofmineervlieg (*Napomyza lateralis* FALL.) en haar Bestrijdingsmogelijkheden. Mededeling No. 268 van het Instituut voor Plantenziektenkundig Onderzoek te Wageningen and Mededeling no. 22 van het Proefstation voor de groenteteelt in de Volle grond te Alkmaar, 36 pp.; 1961.
- SIMM, K., *Phytomyza lateralis* FALLÉN. Ein Beitrag zur Kenntnis der Morphologie und Biologie. Bull. int. Acad. pol. Sci. Lett., sér. B, 1924, 735–752; 1925.
- SPENCER, K. A., A revision of the Palaearctic species of the genus *Ophiomyia* BRASCHNIKOV (Diptera: Agromyzidae). Beitr. Ent., **14**, 773–822; 1964.
- , A revision of European species of the genera *Melanagromyza* HENDEL and *Hexomyza* ENDERLEIN, with a supplement on the genus *Ophiomyia* BRASCHNIKOV (Diptera: Agromyzidae). Beitr. Ent., **16**, 3–60; 1966 a.
- , A clarification of the genus *Napomyza* WESTWOOD (Diptera, Agromyzidae). Proc. R. ent. Soc. London. (Ser. B), **35**, 29–40; 1966 b.
- TAVARES, J. S., Synopse das Zoocécidas Portuguezas. Broteria, **4**, 1–136; 1905.
- TELENGA, N. A., Übersicht der aus U.S.S.R. bekannten Arten der Unterfamilie Dacnusiinae (Braconidae, Hymenoptera). Vereinsschr. Ges. Luxemburger Naturfreunde, **12** (1934), p. 107–125; 1935.
- THOMSON, C. G., LII. Bidrag till Braconidernas kändedom. Opusc. ent., fasc. **20**, p. 2141 to 2339; 1895.
- TOBIAS, V. I., Contribution to the fauna of the subfamily Alysinae (Hymenoptera, Braconidae, Alysinae) of the Leningrad Region. Trudy Zool. Inst., **31**, 81–137; 1962.
- WOODROFFE, G. E. & SOUTHGATE, B. J., *Dacnusa didas* NIXON (Hym., Braconidae) and *Syntomopus thoracicus* WALK. (Hym., Pteromalidae) bred from *Napomyza lateralis* (FALL.) (Dipt., Agromyzidae). Ent. mon. Mag., **88**, 46; 1952.

Tables of Biometric Data

Table 16  
Biometric Data

		Absolute Measurements (1 = 0.01 mm.)																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
		Head			Eye-width (lateral)	Distance between Eyes	Clypeus Width	Mandibles Width	Antennal Segments			Maxillary Palpus Segments				Thorax			Hind Leg			Hind Tarsal Segments				
Width	Length	Height	3	4					5	3	4	5	6	Length	Width	Height	Femur	Tibia	Tarsus	1	2	3	4	5		
1	♂	72	43	56	22	37	23	16	19	15	13	13	16	11	12	111	51	69	67	106	108	44	22	16	10	13
2	♀	67	11	56	18	34	25	13	20	15	14	12	17	12	13	111	52	71	74	109	115	48	24	17	11	15
3	♀	65	37	50	21	34	22	13	20	17	14	11	17	11	11	102	46	61	65	100	102	41	22	15	10	14
4	♂	80	37	48	19	34	22	11	21	16	14	11	16	9	9	95	44	67	58	89	—	41	21	14	—	—
5	♀	76	41	61	21	37	23	12	13	13	12	11	15	11	11	122	54	80	69	102	96	40	21	14	10	14
6	♂	65	41	61	17	35	—	11	15	12	12	9	13	9	9	113	—	71	67	93	89	37	17	13	9	12
7	♀	65	41	51	19	34	21	15	11	11	10	7	10	7	7	98	52	58	56	83	74	32	15	9	7	11
8	♂	71	46	52	19	34	22	14	13	12	12	8	12	9	9	104	54	58	58	87	—	35	17	11	—	—
9	♀	66	35	50	15	34	22	17	12	12	11	—	—	—	—	87	48	61	56	83	76	30	15	11	8	10
10	♀	65	39	49	21	33	—	16	13	12	12	8	12	9	9	89	48	63	57	87	80	34	17	11	8	11
11	♀	62	33	51	19	31	21	13	12	12	11	8	11	9	9	100	60	63	56	84	76	30	17	11	7	11
12	♂	58	31	43	15	27	—	11	13	11	11	—	13	8	7	91	49	52	48	74	73	29	15	10	7	10
13	♀	50	31	43	19	25	21	10	12	12	12	7	10	7	7	80	46	43	44	69	68	26	15	10	7	10
14	♀	44	26	39	15	21	17	9	11	10	11	6	9	7	7	67	38	41	41	61	62	25	13	9	6	9
15	♂	50	26	41	13	25	18	10	12	12	11	7	12	9	9	74	40	47	44	69	67	27	13	9	7	9
16	♂	59	40	48	17	32	23	12	16	13	12	10	13	10	11	89	47	58	50	78	84	35	17	12	8	10
17	♀	44	27	41	13	22	17	9	12	11	11	—	11	7	8	78	41	44	41	68	65	26	12	9	7	10
18	♂	49	30	41	17	24	17	9	13	12	12	6	12	7	8	81	43	44	44	69	67	28	13	9	7	9
19	♂	72	35	58	23	37	22	11	13	12	11	9	15	9	9	118	63	72	69	98	80	28	17	11	9	12
20	♀	67	37	54	16	34	22	19	14	13	11	8	10	7	9	89	44	58	56	83	91	34	21	14	9	13
21	♂	79	43	60	15	38	26	21	19	16	13	11	13	11	11	113	55	78	67	104	112	43	25	19	11	16
22	♀	69	36	56	19	38	22	13	16	13	12	10	13	9	10	108	53	73	64	96	102	39	23	16	11	14
23	♂	71	38	61	21	39	26	14	17	15	14	9	14	9	9	111	59	76	65	98	103	39	22	17	11	14
24	♀	63	35	51	17	32	21	16	12	12	11	7	12	8	9	85	48	65	59	85	83	32	17	12	9	12
25	♂	67	35	52	14	35	22	14	17	13	12	9	13	9	11	96	56	74	58	81	81	31	17	11	9	12
26	♂	54	30	44	13	29	19	12	15	12	12	12	14	9	11	78	43	56	50	73	80	32	17	12	8	11
27	♀	58	32	48	17	30	21	12	15	12	12	12	13	9	12	83	46	56	56	81	85	34	19	12	9	11

- Nos. 1—2. *Chorebus senilis* (NEES): 1, ex *Melanagromyza aeneoventris* FALLÉN, Gower, Wales; 2, ex *Napomyza scrophulariae* SPENCER, Ireland.
- Nos. 3—4. *Chorebus pulchellus* sp. nov. (3 the holotype).
- Nos. 5—6. *Chorebus brevicornis* (THOMSON) ex *Melanagromyza aeneoventris* FALLÉN: 5, Woodwalton, Hunts., England; 6, Jena, Germany.
- Nos. 7—8. *Chorebus rondanii* (GIARD) ex *Ophiomyia simplex* LOEW, England.
- Nos. 9—10. *Chorebus orbiculatae* sp. nov. ex *Ophiomyia orbiculata* HENDEL, Potters Bar, England (10 the holotype).
- Nos. 11—12. *Chorebus fuscipennis* (NIXON) ex *Ophiomyia heringi* STARÝ, Germany: 11, Dargun; 12, Mühlhausen.
- Nos. 13—14. *Chorebus caesariatus* sp. nov. (14 the holotype).

								Ratios																		
26	27	28	29	30	31	32		A	B	C		D	E			F	G	H	I	J					K	L
Hind Coxa		Wing Length		Gaster Length		Petiole		Total Body Length	Length/Width of Head	Length/Height of Head	Width of Head/Distance between Eyes/Width of Clypeus	Width of Length Mandibles of Head	Antennal Segments			Height/Length of Thorax	Thorax/Head Width/Width	Wing/Body Length	Hind Tibia/Tarsus	Hind Tarsal Segments					Lengths of Petiole/Gaster	Width/Length of Petiole
Width	Length	Width	Length	Width	Length	3	4						5	1	2					3	4	5				
19	32	300	152	22	49	305	1.7	1.3	2.0 : 1 : 0.6		2.7	1.3 : 1 : 0.9			1.6	1.4	1.0	1.0	2.0 : 1 : 0.7:0.5:0.6					3.1	2.2	
19	32	300	145	26	48	300	1.6	1.4	2.0 : 1 : 0.7		3.1	1.3 : 1 : 0.9			1.6	1.3	1.0	1.1	2.0 : 1 : 0.7:0.5:0.6					3.0	1.9	
17	28	276	135	22	44	276	1.8	1.3	1.9 : 1 : 0.7		2.9	1.2 : 1 : 0.8			1.7	1.4	1.0	1.0	1.9 : 1 : 0.7:0.5:0.6					3.0	2.0	
17	28	248	130	24	44	276	1.8	1.3	1.8 : 1 : 0.7		3.3	1.4 : 1 : 0.9			1.4	1.3	1.1	—	2.0 : 1 : 0.7: —					2.9	1.8	
—	—	305	155	21	54	329	1.9	1.5	2.0 : 1 : 0.6		3.3	1.0 : 1 : 0.9			1.5	1.4	1.1	0.9	1.9 : 1 : 0.7:0.5:0.7					2.9	2.6	
18	28	286	145	21	48	286	1.6	1.5	1.8 : 1 : —		3.7	1.2 : 1 : 1.0			1.6	—	1.0	1.0	2.1 : 1 : 0.7:0.5:0.7					3.0	2.4	
17	24	248	124	21	41	257	1.6	1.2	1.9 : 1 : 0.6		2.8	1.0 : 1 : 0.9			1.7	1.3	1.0	0.9	2.1 : 1 : 0.6:0.5:0.7					3.0	2.0	
19	24	257	124	18	40	252	1.5	1.1	2.1 : 1 : 0.7		3.3	1.1 : 1 : 1.0			1.8	1.3	1.0	—	2.1 : 1 : 0.7: —					3.1	2.2	
17	26	228	95	17	43	224	1.9	1.4	2.0 : 1 : 0.7		2.1	1.1 : 1 : 0.9			1.4	1.4	1.0	0.9	2.0 : 1 : 0.7:0.5:0.7					2.2	2.6	
16	22	233	93	17	43	233	1.7	1.3	2.0 : 1 : —		2.4	1.1 : 1 : 0.9			1.4	1.3	1.0	0.9	2.0 : 1 : 0.7:0.5:0.7					2.1	2.6	
17	25	248	95	19	46	233	1.9	1.5	2.1 : 1 : 0.7		2.5	1.1 : 1 : 0.9			1.6	1.0	0.9	0.9	1.8 : 1 : 0.7:0.5:0.7					2.0	2.5	
14	21	228	115	17	39	238	1.9	1.4	2.2 : 1 : —		2.7	1.2 : 1 : 1.0			1.7	1.2	1.0	1.0	1.9 : 1 : 0.7:0.5:0.7					2.9	2.3	
14	21	200	85	14	35	195	1.6	1.4	2.0 : 1 : 0.8		3.0	1.0 : 1 : 1.0			1.9	1.1	1.0	1.0	1.8 : 1 : 0.7:0.5:0.7					2.5	2.5	
13	18	176	76	13	30	173	1.7	1.5	2.1 : 1 : 0.8		2.8	1.1 : 1 : 1.1			1.6	1.2	1.0	1.0	1.9 : 1 : 0.7:0.5:0.7					2.6	2.3	
14	20	219	108	11	35	205	1.9	1.6	2.0 : 1 : 0.7		2.6	1.0 : 1 : 0.9			1.6	1.3	0.9	1.0	2.1 : 1 : 0.7:0.6:0.7					3.1	3.1	
16	23	238	120	13	41	248	1.5	1.2	1.9 : 1 : 0.7		3.4	1.2 : 1 : 0.9			1.5	1.3	1.0	1.1	2.1 : 1 : 0.7:0.5:0.8					3.0	3.1	
13	19	214	100	13	34	224	1.6	1.5	2.1 : 1 : 0.8		3.2	1.1 : 1 : 1.0			1.8	1.1	1.0	1.0	2.2 : 1 : 0.7:0.6:0.8					3.0	2.6	
15	21	209	93	15	32	205	1.7	1.4	2.1 : 1 : 0.7		3.2	1.1 : 1 : 1.0			1.8	1.2	1.0	1.0	2.1 : 1 : 0.7:0.6:0.7					2.9	2.1	
19	28	286	132	22	48	286	2.1	1.6	2.0 : 1 : 0.6		3.2	1.1 : 1 : 0.9			1.6	1.1	1.0	0.8	1.7 : 1 : 0.7:0.6:0.7					2.7	2.2	
17	25	233	126	19	41	262	1.8	1.5	2.0 : 1 : 0.6		2.0	1.1 : 1 : 0.9			1.5	1.5	1.1	1.1	1.7 : 1 : 0.7:0.4:0.6					3.1	2.2	
19	27	286	167	25	50	338	1.8	1.4	2.1 : 1 : 0.7		2.1	1.2 : 1 : 0.8			1.5	1.4	1.2	1.1	1.7 : 1 : 0.7:0.4:0.6					3.3	2.0	
17	27	276	135	19	48	286	1.9	1.5	1.8 : 1 : 0.6		2.8	1.2 : 1 : 0.9			1.5	1.3	1.0	1.1	1.7 : 1 : 0.7:0.5:0.6					2.8	2.6	
19	27	271	157	21	48	295	1.9	1.6	1.8 : 1 : 0.7		2.7	1.1 : 1 : 0.9			1.5	1.2	1.1	1.0	1.7 : 1 : 0.7:0.5:0.6					3.3	2.4	
15	22	238	103	14	44	228	1.8	1.5	2.0 : 1 : 0.7		2.2	1.1 : 1 : 0.9			1.3	1.3	1.0	1.0	1.9 : 1 : 0.7:0.6:0.7					2.3	3.2	
15	24	248	124	16	48	267	1.9	1.5	1.9 : 1 : 0.6		2.5	1.3 : 1 : 0.9			1.3	1.2	1.1	1.0	1.8 : 1 : 0.7:0.6:0.7					2.6	3.0	
12	21	205	104	12	37	214	1.8	1.5	1.9 : 1 : 0.6		2.5	1.2 : 1 : 1.0			1.4	1.3	1.0	1.1	1.9 : 1 : 0.8:0.5:0.6					2.8	3.2	
13	21	233	132	12	41	248	1.8	1.5	2.0 : 1 : 0.7		2.7	1.2 : 1 : 1.0			1.5	1.3	1.1	1.1	1.8 : 1 : 0.7:0.5:0.6					3.2	3.3	

- No. 15. *Chorebus lychnidis* sp. nov. holotype.  
 No. 16. *Chorebus bathyzonus* (MARSHALL) ex *Ophiomyia heracleivora* SPENCER, England.  
 Nos. 17–18. *Chorebus heringianus* sp. nov., Kyffhäuser, Germany (17 the holotype).  
 No. 19. *Chorebus gedanensis* (RATZBURG), Högër district, Sweden (BM).  
 Nos. 20–23. *Chorebus glaber* (NIXON) ex *Napomyza cichorii* SPENCER: 20, Walcheren, Holland; 21, Zaventem, Belgium; 22, Holland (? locality); 23, Isle of Overflakke, Holland.  
 Nos. 24–25. *Chorebus leptogaster* (HALIDAY) ex *Ophiomyia pulicaria* MEIGEN: 24, Barnet, England; 25, Mühlhausen Germany.  
 Nos. 26–27. *Chorebus ziphidius* sp. nov. (27 the holotype).

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Table 17  
Biometric data

		Absolute Measurements (1 = 0.01 mm.)																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
		Head			Eye-width (lateral)	Distance between Eyes	Clypeus Width	Mandibles Width	Antennal Segments			Maxillary Palpus Segments				Thorax			Hind Leg			Hind Tarsal Segments				
		Width	Length	Height					3	4	5	3	4	5	6	Length	Width	Height	Femur	Tibia	Tarsus	1	2	3	4	5
1	♂	78	47	65	22	39	28	15	22	17	15	12	19	13	13	132	58	87	87	132	126	52	27	21	13	16
2	♀	72	43	61	22	35	23	13	18	16	15	12	16	11	11	117	50	74	76	109	109	46	22	17	11	13
3	♀	58	35	47	15	30	21	12	16	13	13	10	14	10	12	95	40	58	58	93	91	37	19	15	9	12
4	♀	59	39	47	19	29	19	9	15	13	12	10	13	9	9	93	40	56	58	95	93	39	20	14	9	11
5	♀	64	36	54	16	34	21	13	15	13	12	7	10	6	6	96	46	63	59	85	89	37	20	14	8	11
6	♀	52	32	46	17	26	19	10	14	11	11	7	10	6	7	80	39	50	51	75	78	29	18	13	9	10
7	♀	46	27	38	14	25	17	8	11	12	11	5	7	4	5	62	34	44	39	62	63	23	13	9	7	10
8	♀	44	34	41	14	21	17	11	13	12	11	7	9	6	7	71	34	52	48	72	74	31	16	11	7	10

Right part of table 17

												Ratios												
26	27	28	29	30	31	32	A	B	C		D	E			F	G	H	I	J				K	L
Hind Coxa		Wing Length	Gaster Length	Petiole		Total Body Length	Length/Width of Head	Length/Height of Head	Width of Head/Distance between Eyes/Width of Clypeus	Width of Length Mandibles/of Head	Antennal Segments			Height/Length of Thorax	Thorax/Head Width/Width	Wing/Body Length/Length	Hind Tibia/Tarsus	Hind Tarsal Segments				Lengths of Petiole/Gaster	Width/Length of Petiole	
Width	Length			Width	Length						3	4	5					2	3	4	5			
21	39	376	170	30	52	362	1.7	1.4	2.0 : 1 : 0.7		3.2	1.3 : 1 : 0.9			1.5	1.4	1.0	1.0	1.9 : 1 : 0.8 : 0.5 : 0.6				3.3	1.8
21	34	329	152	26	48	300	1.7	1.4	2.1 : 1 : 0.7		3.3	1.2 : 1 : 0.9			1.6	1.4	0.9	1.0	2.1 : 1 : 0.8 : 0.5 : 0.6				3.2	1.9
14	29	286	126	16	36	262	1.7	1.4	1.9 : 1 : 0.7		2.9	1.2 : 1 : 1.0			1.6	1.5	0.9	1.0	2.0 : 1 : 0.8 : 0.5 : 0.7				3.5	2.3
15	28	276	130	17	35	257	1.5	1.2	2.0 : 1 : 0.6		4.2	1.1 : 1 : 0.9			1.7	1.5	0.9	1.0	2.0 : 1 : 0.7 : 0.4 : 0.6				3.7	2.1
16	27	—	132	25	36	262	1.8	1.5	1.9 : 1 : 0.6		2.8	1.1 : 1 : 0.9			1.5	1.4	—	1.0	1.9 : 1 : 0.7 : 0.4 : 0.6				3.6	1.4
14	22	224	104	22	32	209	1.6	1.4	2.0 : 1 : 0.7		3.2	1.2 : 1 : 1.0			1.6	1.3	0.9	1.0	1.6 : 1 : 0.7 : 0.5 : 0.6				3.3	1.4
9	17	186	78	15	25	162	1.7	1.4	1.8 : 1 : 0.7		3.3	0.9 : 1 : 0.9			1.4	1.4	0.9	1.0	1.8 : 1 : 0.7 : 0.6 : 0.8				3.1	1.7
15	22	209	98	16	32	213	1.3	1.2	2.1 : 1 : 0.8		3.1	1.1 : 1 : 0.9			1.4	1.3	1.0	1.0	1.9 : 1 : 0.7 : 0.5 : 0.6				3.1	2.0

Nos. 1—2. *Chorebus cybele* (NIXON): 1, ex *Melanagromyza lappae* LOEW, Herts., England; 2, ex *M. eupatorii* SPENCER, Woodwalton, England.

Nos. 3—4. *Chorebus didas* (NIXON): 3, ex *Napomyza serophulariae* SPENCER, Barnet, London; 4, Bookham, Surrey.

Nos. 5—6. *Chorebus parvungulus* (THOMSON): 5, ex *Napomyza lateralis* FALLÉN, Germany; 6, Sweden (holotype).

No. 7. *Chorebus ibericus* sp. nov. holotype.

No. 8. *Chorebus cyclops* (NIXON), Ashtead, Surrey, England (BM).

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