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

V. The parasites of *Liriomyza* MIK and certain small genera of Phytomyzinae[1]

With textfigures 171–185

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Introduction

Four parts of this paper have already appeared in this journal (GRIFFITHS, 1964, 1966a, 1966b and 1967). The present fifth part deals with the parasites of the following genera of Phytomyzinae: *Amauromyza* HENDEL, *Campanulomyza* NOWAKOWSKI, *Trilobomyza* HENDEL, *Melanophytobia* HERING, *Metopomyza* ENDERLEIN, *Liriomyza* MIK, *Calycomyza* HENDEL and *Pseudonapomyza* HENDEL. The larvae of the great majority of species in these genera are leaf-miners.

The large genus *Liriomyza* is in need of revision: the relationships between the species now included in it are not clear, and it has not been established whether the concept represents a monophyletic group. Most of the other generic names refer

[1] 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. – Part IV in Beitr. Ent., **17**, 653–696; 1967.

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to relatively small groups of species. Some were until recently included as subgenera of "*Phytobia*", but NOWAKOWSKI (1962) clearly demonstrated that this concept was heterogeneous. Some of the former subgenera he has transferred to his new concept of *Cerodontha* s.l., whose parasites will be treated in the next part of this paper: others (including *Amauromyza*, *Trilobomyza* and *Calycomyza*) he recognised as full genera. He has subsequently suggested (NOWAKÓWSKI, 1964) that *Amauromyza*, *Campanulomyza*, *Trilobomyza* and *Melanophytobia* could be united as subgenera of a wider concept of *Amauromyza*: but it seems preferable to retain the now accepted nomenclature of these groups as separate genera until more detailed studies have been made on them. I have restricted the generic name *Metopomyza* to the group of species in which the dorsocentral bristles strongly decline in length forwards: their larval food-plants are, as far as known, Cyperaceae and Gramineae. (*Liriomyza violiphaga* HENDEL does not belong to this group.)

Acknowledgements to the various persons who have helped me with material for this paper have been given in previous parts. In addition I would like to thank Dr. E. KÖNIGSMANN for commenting on the passage about *Dapsilarthra*.

The abbreviations used in this paper were explained in the introduction to Part II (GRIFFITHS, 1966a). Notes on the bases of the measurements and ratios in the tables of biometric data have been given in Part I (GRIFFITHS, 1964, page 904).

Previous Records

As in previous parts of this paper I have prepared a table (Table 18) explaining the discrepancies between my list of host records and the list given by FULMEK (1962). The comments exclude changes in the generic nomenclature which affect some of the host names and nearly all the parasite names. Only a few of the host species listed by FULMEK under the genus "*Phytobia*" belong to the genera treated in this part. The others are now referred to *Cerodontha* s.l., whose parasites will be treated in the next part of this paper. A few old records which are in conflict with confirmed records have been rejected as not based on any good authority, although I have not seen the material on which they were based.

Dapsilarthra FÖRSTER

Two new species of this genus have now come to light in addition to the species included in KÖNIGSMANN's (1959) recent revision. Both belong to what I propose to call the *balteata* group, which now includes five European species. This is clearly established as a monophyletic group within *Dapsilarthra* by two apomorph features of the wing venation (fig. 54 in Part II): (i) cell *2Cu* is completely open distally (vein Cu_{1a} continuing more or less directly from the longitudinal section of Cu_1); and (ii) the cross-vein *2r-m* is much closer to the base of cell $2R_1$ than in other species of *Dapsilarthra* (so that cell $1R_s$ is relatively shorter).

The species of the *Dapsilarthra balteata* group may be distinguished by the following key, which may be considered as a revision of couplets 11—14 of the

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Table 18

Earlier Records of Alysiinae parasites of the host genera treated in this part (after FULMEK, 1962) with comments thereon

Host	Parasite	Comments
Liriomyza amoena MEIGEN	*Dacnusa daimenes* NIXON	accepted
Liriomyza artemisicola DE MEIJERE	*Antrusa melanocera* THOMSON	not accepted
Liriomyza centaureae HERING	*Rhizarcha maculipes* THOMSON	accepted
Liriomyza cicerina RONDANI (+ *Agromyza*)	*Phaenocarpa gracilicornis* NEES	not accepted
	Tanycarpa rufinotata HALIDAY	not accepted
Liriomyza eupatoriana SPENCER	*Rhizarcha maculipes* THOMSON	accepted
Liriomyza mesnili D'AGUILAR	*Dacnusa* (*Merites*) *taras* NIXON	refers to *Coloneura stylata* FÖRSTER (= *Merites taras* NIXON)
Liriomyza ornata MEIGEN	*Phaenocarpa gracilicornis* THOMSON	not accepted
Liriomyza pusilla MEIGEN	*Dacnusa incerta* GOUREAU	host was *L. pascuum* MEIGEN (see Appendix VIII in Part III)
	Dacnusini *indet.*	record insufficiently precise
	Rhizarcha maculipes THOMSON	host was *L. strigata* MEIGEN
	Rhizarcha sp.	record insufficiently precise
Liriomyza pusio MEIGEN	*Dacnusa tarsalis* THOMSON	not accepted (parasite of *Phytomyza autumnalis* GRIFFITHS and *P. farfarae* HENDEL)
Liriomyza sonchi HENDEL	*Dacnusa* sp. vic. *daimenes* NIXON	accepted as *Chorebus daimenes* (NIXON)
Liriomyza strigata MEIGEN	*Chorebus uliginosa* HALIDAY	not accepted (parasite of *Hydrellia*)
	Rhizarcha areolaris NEES	not accepted (parasite of *Phytomyza atricornis* MEIGEN, *P. asteris* HENDEL and *P. nigra* MEIGEN)
Liriomyza trifolii BURGESS	*Dacnusa misella* MARSHALL	host was *L. congesta* BECKER (= *trifolii* auctt. nec BURGESS)
	Dacnusa sp. vic. *daimenes* NIXON	refers to *Chorebus misellus* (MARSHALL) bred from *L. congesta* BECKER
	Rhizarcha maculipes THOMSON	host was *L. congesta* BECKER
Liriomyza valerianae HENDEL	*Rhizarcha areolaris* NEES	not accepted (parasite of *Phytomyza atricornis* MEIGEN, *P. asteris* HENDEL and *P. nigra* MEIGEN)
Liriomyza virgo ZETTERSTEDT	*Dacnusa misella* MARSHALL	refers to *Chorebus artemisiellus* sp. nov. bred from *L. artemisicola* DE MEIJERE (called "*Liriomyza* sp. near *virgo* ZETTERSTEDT" in NIXON, 1945)
Phytobia flavifrons MEIGEN	*Dacnusa lateralis* HALIDAY	not accepted (parasite of *Agromyza*)
	Dacnusini sp.	record insufficiently precise
	Rhizarcha maculipes THOMSON	accepted
Phytobia humeralis v. ROSER	*Dacnusa bellidis* FÖRSTER	nomen nudum (never described)
	Rhizarcha maculipes THOMSON	accepted
Phytobia labiatarum HENDEL	*Dacnusa avesta* NIXON	refers to *Chorebus trilobomyzae* sp. nov.
	Rhizarcha areolaris NEES	refers to *Dacnusa laevipectus* THOMSON
Phytobia verbasci BOUCHÉ	*Alysia truncator* NEES	not accepted (see Appendix VIII in Part III)
	Rhizarcha areolaris NEES	not accepted (parasite of *Phytomyza atricornis* MEIGEN, *P. asteris* HENDEL and *P. nigra* MEIGEN)
	Rhizarcha maculipes THOMSON	accepted

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key to *Dapsilarthra* in KÖNIGSMANN (1959). Couplet 3 of the key to species of *Dapsilarthra* attacking Agromyzidae in Part II (GRIFFITHS, 1966a) may also be considered replaced by couplets 2—4 of the following key.

Key to the *Dapsilarthra balteata* group

1 Mesoscutum with its central lobe pubescent, usually with a distinct posterior fovea (i.e. median furrow): notaulices distinct to about the middle of the mesoscutum. Large species (wing length 3.5—3.8 mm.: body length 2.5—3 mm.) with 45—52 antennal segments . . . . . *D. dictynna* (MARSHALL)
Host: *Pycnoglossa* (Anthomyiidae)

— Mesoscutum with its dorsal surface bare except for a few hairs along the course of the notaulices, without any trace of a posterior fovea. Smaller species 2
Hosts: Agromyzidae

2 Prescutellar suture smooth: notaulices absent: precoxal suture costate. Pterostigma not reaching the middle of cell $2R_1$ (KÖNIGSMANN, 1959, fig. 5). 25—29 antennal segments . . . . . *D. nowakowskii* KÖNIGSMANN

— Prescutellar suture rugose-costate. Pterostigma reaching beyond the middle of cell $2R_1$ (fig. 54) 3

3 Precoxal suture represented by a smooth impression. Notaulices almost absent (with only their lateral extensions weakly indicated). 27—33 antennal segments. Eyes convergent below (minimum distance between them about two-fifths of the head width) . . . . . ***D. levisulca* sp. nov.**

— Precoxal suture sculptured (costate or punctate). Eyes not thus convergent below (minimum distance between them about half the head width) 4

4 Notaulices extending longitudinally to about the middle of the mesoscutum. Petiole dark. (? 31)[2]—34—46 antennal segments . . . . . *D. balteata* (THOMSON)

— Notaulices with only their lateral extensions distinct, not extending longitudinally. Petiole red-brown or testaceous. 31—33 antennal segments. . . ***D. testacea* sp. nov.**

The new species, like *balteata*, *rufiventris* and *sylvia*, are evidently oligophagous, since they have been bred from different genera of Agromyzidae. This low degree of host specificity is in strong contrast with the monophagy which is shown by nearly all the Dacnusini parasites of the Agromyzidae.

***Dapsilarthra rufiventris* (NEES)**

Records of this species from *Phytomyza* hosts have been given in Part III (GRIFFITHS, 1966b). Of the host genera treated in this part, KÖNIGSMANN (1959) has recorded this species from *Trilobomyza labiatarum* HENDEL, *T. verbasci* BOUCHÉ and *Amauromyza lamii* KALTENBACH (the latter record however was

[2] KÖNIGSMANN (1959) gives the lowest number of antennal segments for *balteata* as 31 (♀). However this must be considered as requiring confirmation, as the possibility that specimens of *testacea* were included in the material accepted by him as *balteata* cannot be excluded. The lowest number of antennal segments which he can now confirm is 34 (a male in the Zoological Museum of Humboldt University, Berlin). The lectotype (♀) in the THOMSON collection has 36 segments, which is also the lowest number shown by the British material in my possession. At any rate it is clear that the number of antennal segments in *balteata* is normally higher than in *testacea*.

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possibly based on confusion with *Trilobomyza labiatarum* HENDEL). In addition I have obtained material bred from the following hosts.

Liriomyza centaureae HERING — 1 ex. from *Centaurea nigra*, Brookman's Park, Herts., England (GCDG).

Liriomyza valerianae HENDEL — 1 ex. from *Valeriana officinalis*, Godalming, Surrey, England (GCDG).

Trilobomyza flavifrons MEIGEN — 1 ex. from *Melandrium rubrum*, Chilworth, Surrey, England (BM).

Trilobomyza labiatarum HENDEL — 8 ex. from *Stachys silvatica*, Mühlhausen, Thuringia, Germany, leg. BUHR no. 2255 (GCDG). 1 ex. from same plant, Woodside Park, London (BM). 1 ex. from *Ballota nigra*, Mickleham, Surrey, England (BM).

Dapsilarthra sylvia (HALIDAY)

In addition to the records of this species from *Agromyza* and *Phytomyza* hosts (see Parts II and III) I have received the following material bred from *Trilobomyza*.

Trilobomyza flavifrons MEIGEN — 2 ex. from *Cerastium holosteoides*, Mühlhausen, Thuringia, Germany, leg. BUHR no. 2298 (GCDG).

Trilobomyza labiatarum HENDEL — 3 ex. from *Stachys silvatica*, Mühlhausen, Thuringia, Germany, leg. BUHR no. 2357 (GCDG).

Dapsilarthra balteata (THOMSON)

I have already given records of this species from other genera of Agromyzidae in Parts II and III (GRIFFITHS, 1966a and 1966b). In addition there is one record for a *Liriomyza* host, as follows.

Liriomyza flaveola FALLÉN — 1 ♂ from larva 30. vi. 62 on *Festuca gigantea*, Scratch Wood, London, em. 12. viii. 62 (GCDG).

***Dapsilarthra testacea* sp. nov.**

This species is very similar to *D. balteata* (THOMSON), and may be compared with the description of that species in KÖNIGSMANN (1959) as follows.

Antennae very slender, about twice as long as the body, with 31—33 segments (both sexes — 31 in the holotype). (Basal segments yellowish about as far as the second flagellar segment in the Kunnersdorf series, but only brownish, hardly contrasting, in the typical series).

Notaulices with their lateral extensions deeply impressed and rugose, but hardly extending longitudinally on the dorsal surface of the mesoscutum, which is smooth, strongly shining and almost bare. Propodeum less strongly sculptured, becoming almost smooth centrally.

Petiole red-brown or testaceous: tergites 3 and 4 bright yellow, in strong contrast with the dark succeeding tergites.

Wing apparently identical with that of *balteata* (fig. 54).

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Body length: 1.5—1.8 mm. Wing length: 2.1—2.4 mm. Wing spread: 4.5 to 5.5 mm.

Holotype ♀; 2 ♂♂, 1 ♀ paratypes from larvae of *Liriomyza fasciola* MEIGEN on *Bellis silvestris* (cultivated), Berlin-Dahlem, Germany, em. 11—16. ix. 65, leg. HERING no. 7486 (GCDG). 3 ♂♂, 4 ♀♀ paratypes from larvae of *Agromyza arunci* HERING on *Aruncus silvester*, Kunnersdorf, near Görlitz, Germany, em. 27. vi—1. vii. 54, leg. HERING no. 6040 (BM).

The series bred from *Agromyza arunci* HERING were recorded as *balteata* in Part I (GRIFFITHS, 1966a). Important features for distinguishing this species from other members of the *balteata* group are its characteristic reddish petiole and the reduction of the notaulices.

***Dapsilarthra levisulca* sp. nov.**

To be compared with the description of *D. balteata* (THOMSON) in KÖNIGSMANN (1959) as follows.

Palpi and labrum yellow or ochreous. Legs varying from yellow to ochreous, with the tarsi and tibiae (especially of the hind legs) darker, more or less brown. Antennae relatively shorter, only about 1½ times as long as the body, with the more apical flagellar segments only about 2½ times as long as wide: 27—33 antennal segments (30 in the holotype).

Eyes convergent below (minimum distance between them in a ratio of 2.2 to 2.7 with the head width (i.e. about two-fifths), in contrast with 1.8—2.0 (i.e. about a half) in *balteata* and *testacea*). Notaulices with only their lateral extensions weakly indicated, not extending longitudinally on the dorsal surface of the mesoscutum, which is smooth, strongly shining and almost bare. Precoxal suture of mesepisternum represented by a smooth impression. Propodeum less strongly sculptured, becoming completely smooth centrally.

Gaster with tergites 3 and 4 yellow, in contrast with the dark petiole and succeeding tergites.

Wing apparently identical with that of *balteata* (fig. 54).

Body length: 1.6—2.1 mm. Wing length: 2.0—2.9 mm. Wing spread: 4.5—6.2 mm.

Holotype ♀; 1 ♂, 1 ♀ paratypes from larvae of *Phytomyza bellidina* HERING on *Bellis silvestris*, Jelsa, Hvar Island, Jugoslavia, em. 3—11. x. 65, leg. HERING no. 7332 (GCDG). 2 ♂♂ paratypes from larvae of *Phytomyza* sp. on *Anemone hortensis*, same locality, em. 5. x. 65, leg. HERING no. 7361 (GCDG). 2 ♂♂ paratypes from larvae of *Liriomyza* sp. on *Cyclamen vernale*, same locality, em. 5. x. 65, leg. HERING no. 7335 (GCDG). 1 ♂, 1 ♀ paratypes from larvae of *Liriomyza* sp. on *Securigera securidacea*, same locality, em. 30. ix. 63, leg. HERING no. 7072 (GCDG).

This species will be readily distinguished from other members of the *balteata* group by its smooth precoxal suture and the virtual absence of notaulices.

Pseudopezomachus MANTERO

Pseudopezomachus cursitans (FERRIÈRE)

1 ♂ from larva of *Liriomyza* sp. on *Medicago hispida*, Jelsa, Hvar Island, Jugoslavia, em. 15. ix. 65, leg. HERING no. 7385 (GCDG).

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Other records of this oligophagous species have been given in Part III (GRIFFITHS, 1966b).

Dacnusini

Coloneura FÖRSTER

Coloneura FÖRSTER, 1862, Verh. naturh. Ver. preuss. Rheinl. & Westph., **19**, 276. Type-species: *Coloneura stylata* FÖRSTER, 1862 by original designation and monotypy (priority accorded by GRIFFITHS, 1964 in spite of the page precedence of *Isomerista* and *Trisisa*).

Isomerista FÖRSTER, 1862, Verh. naturh. Ver. preuss. Rheinl. & Westph., **19**, 275. Type-species: *Isomerista oligomera* FÖRSTER, 1862 [= *Coloneura stylata* FÖRSTER, 1862] by original designation and monotypy.

Trisisa FÖRSTER, 1862, Verh. naturh. Ver. preuss. Rheinl. & Westph., **19**, 275. Type-species: *Trisisa exilis* FÖRSTER, 1862 [= *Coloneura stylata* FÖRSTER, 1862] by original designation and monotypy.

Merites NIXON, 1943, Ent. mon. Mag., **79**, 28. Type-species: *Merites taras* NIXON, 1943 [=*Coloneura stylata* FÖRSTER, 1862] by original designation and monotypy.

Priapsis NIXON, 1943, Ent. mon. Mag., **79**, 31. Type-species: *Priapsis dice* NIXON, 1943 by original designation and monotypy. **Syn. nov.**

In Part I of this paper (GRIFFITHS, 1964) I included in this genus only a single species, the genotype *C. stylata* FÖRSTER which is a parasite of *Liriomyza mesnili* D'AGUILAR. The study of additional species associated with *Liriomyza* or the closely related *Metopomyza* has convinced me that *Coloneura stylata* should be regarded as monophyletic with the species which I have hitherto included in *Priapsis*, and the synonymy of the latter name is therefore proposed. This new enlarged concept of *Coloneura* is distinguished (in its groundplan) by the two apomorph characters given for *Priapsis* in Part I: these are (i) the short maxillary palpi, and (ii) that cell *2Cu* is widely open at its lower distal corner following the loss of vein Cu_{1b}. The two characters given for *Coloneura* (in the restricted sense) in Part I (5-segmented maxillary palpi and the shortening of vein *1a*) are apomorph characters of *C. stylata* FÖRSTER which represent further developments of the two above-mentioned characters in the groundplan of *Coloneura* in the new wider sense. The diagnosis of *Coloneura* in the new sense is thus identical with that given for *Priapsis* in Part I (GRIFFITHS, 1964, p. 862).

Both the apomorph characters of *Coloneura* are found (through convergence) in other genera of Dacnusini, as has already been pointed out in the discussion in Part I (p. 854). For purposes of identification it is therefore also important to confirm certain plesiomorph characters: that the mandibles are small and 3-toothed, that the metapleural pubescence does not form a rosette, and that the pterostigma is not sexually dimorphic.

Six of the seven species which I include in this genus have been bred, but only one of these, *dice*, is associated with well-known hosts which can be readily collected. The hosts of three species, *major*, *ate* and *danica*, are among the mysteries of the SCHLICK collection, i.e. species whose life-history is unknown

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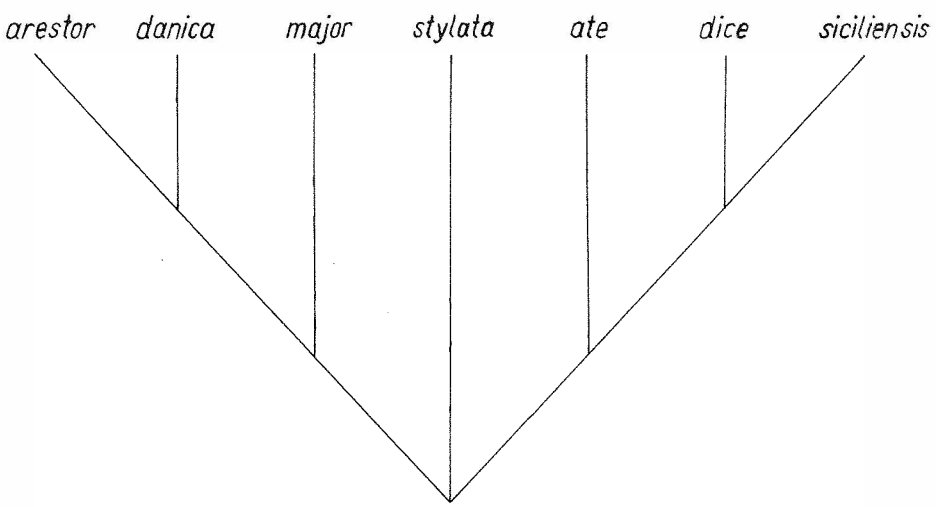
because SCHLICK did not record this information and the secret died with him. The circumstances in which *siciliensis* was bred also require clarification. The remaining species, *stylata*, is associated with a very unusual and elusive host which is the only species of Agromyzidae whose larvae are known to feed on liverworts in Europe. Until more is known about these hosts most species of *Coloneura* will doubtless remain among the rarest, as well as the smallest, Dacnusini in collections.

Within *Coloneura* there appear to be two subordinate monophyletic groups, each of three species. The three species *major*, *danica* and *arestor* appear synapomorph in respect of their dense metapleural and propodeal pubescence: two of these species, *danica* and *arestor*, are probably synapomorph in respect of their weak precoxal suture. The three species *ate*, *dice* and *siciliensis* appear synapomorph in respect of their very dark coloration and low number of antennal segments: two of these species, *dice* and *siciliensis*, are clearly sister-species, distinguished from *ate* by their loss of the precoxal suture and notaulices. The relationship of *stylata* is less clear. Its most characteristic apomorph character, the shortening of vein *1a*, is also found in *danica*, but this must I think represent convergence because the plesiomorph metapleural and propodeal pubescence of *stylata* exclude the possibility of synapomorphy with any single species of the *major/danica/arestor* group. It is possible that its low number of antennal segments represents synapomorphy with the *ate/dice/siciliensis* group, but it seems unwise to rely on this character in isolation in view of the possibility of convergence.

The above suggestions on the phylogeny of *Coloneura* species may be summarised in the following tree.



The species of *Coloneura* may be recognised by the following key.

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Key to *Coloneura* FÖRSTER

1 25 or more antennal segments. Legs almost entirely yellow. Metapleural pubescence dense and adpressed (fig. 185) 2
— 22 or fewer antennal segments. Metapleural pubescence sparser. Very small species, wing length not more than 1.8 mm. 4
2 Larger species, wing length 2.4—2.7 mm. Antennal segments: ♂, 30—31; ♀, 27—29. Ovipositor (♀) shortly projecting beyond the apical tergite in the retracted position. Well developed rugose-costate precoxal suture present. . . . . *C. major* GRIFFITHS (see Part III)

Host: *Phytomyza dasyops* HENDEL

— Smaller species, wing length at most 2.1 mm. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position. Precoxal suture narrow, smooth or only weakly rugose 3
3 Antennal segments: ♂, 31; ♀, 30—32. Pronotum with rather conspicuous whitish pubescence along and below the oblique suture . . . . . ***C. danica* sp. nov.**

Host: *Metopomyza nigrohumeralis* HENDEL

— Antennal segments: ♂, 25—27; ♀, 26. Pronotal pubescence finer, not conspicuous. . . . . *C. arestor* (NIXON), **comb. nov.**
4 Legs largely ochreous yellow or yellow-brown. Vein *1a* not extending beyond the cross-vein *Cu–a*, so that cell *2Cu* is completely open below. 17—19 antennal segments (♀). Short rugose precoxal suture present. Ovipositor (♀) projecting beyond the apical tergite . . . . . *C. stylata* FÖRSTER

Host: *Liriomyza mesnili* D'AGUILAR

— Legs partly or wholly black. Cell *2Cu* closed below by vein *1a*, open only at its lower distal corner (fig. 82) 5
5 Precoxal suture represented by a broad area of rugose-costate sculpture. 21—22 antennal segments. Petiole virtually bare. Notaulices reaching about the middle of the mesoscutum . . . . . *C. ate* (NIXON)

Host: an unidentified *Liriomyza* or *Metopomyza* species

— Precoxal suture almost or completely absent. 16—19 antennal segments. Petiole bare centrally but pubescent along its sides. Notaulices completely absent 6
6 Dorsal surface of mesoscutum virtually bare. Maxillary palpi 6-segmented. Centre of petiole shallowly sculptured . . . . . *C. dice* (NIXON) (see also Part III)

Hosts: *Phytomyza silai* HERING, *P. angelicivora* HERING and *Liriomyza cyparissiae* GROSCHKE

— Dorsal surface of mesoscutum more pubescent, at least with two or three rows of fine hairs near the former course of the notaulices. Maxillary palpi 5-segmented. Centre of petiole completely smooth . . . . . ***C. siciliensis* sp. nov.**

Host: *Pseudonapomyza* sp. (*Ferula*)

Coloneura danica sp. nov.

Colour. Palpi and labrum yellow. Antennae entirely dark, or at most with the scape, pedicel and annellus yellow-brown. Centre of mandibles orange-yellow. Legs clear yellow with only tarsal segments 5 distinctly infuscated. Gaster beyond petiole with tergite 3 red-brown, the following tergites darker.

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Morphology. Antennae longer than the body, with most of the flagellar segments over twice as long as wide: ♂, 31 segments; ♀, 30—32 segments. Palpi short (see the table of biometric data). Mandibles 3-toothed, not expanded.

Pronotum without a distinct medial pit, with fairly dense whitish pubescence covering its narrow dorsal surface and much of its sides (along and below the oblique suture). Mesoscutum virtually smooth, with pubescence covering its anterior face but its dorsal surface largely bare and shining (at most with some pubescence on the anterior part of the central lobe and a few fine hairs along the course of the notaulices): notaulices weak, usually not distinct on the dorsal surface of the mesoscutum (except in one female in which they are distinct as far as the posterior fovea). Precoxal suture visible as a narrow, weakly rugose impression. Metapleural pubescence rather dense, adpressed and whitish, tending to be parted along a longitudinal line (fig. 185). Propodeum largely clothed with similar dense, adpressed, whitish pubescence, which conceals much of the surface beneath. Petiole strongly widened towards its apex, with short pubescence fairly densely distributed over about its basal half, but becoming sparser and confined to its sides on its apical half. Tergite 3 sometimes with a little fine pubescence on either side adjacent to the petiole. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing (fig. 171) with the pterostigma and cell $2R_1$ somewhat elongate: vein R_s sinuate: *1m-cu* widely rejected from cell R_s: Cu_{1b} absent: vein *1a* not or only shortly extending beyond cross-vein *Cu-a*, so that cell *2Cu* is open below.

Host — *Metopomyza nigrohumeralis* HENDEL

Holotype ♀; 3 ♀♀ paratypes, Utterslevmose; 1 ♂, 2 ♀♀ paratypes Damhusmose; Sealand, Denmark, leg. SCHLICK (KB and GCDG).

The food-plant of *M. nigrohumeralis* HENDEL is not known (since SCHLICK did not record this), but related species of *Metopomyza* are known to be leaf-miners on *Carex*.

This species is similar to *C. arestor* (NIXON) but differs clearly in its larger size, more numerous antennal segments and whitish pronotal pubescence.

Coloneura stylata FÖRSTER

Coloneura stylata FÖRSTER, 1862, GRIFFITHS, 1964
Isomerista oligomera FÖRSTER, 1862
Trisisa exilis FÖRSTER, 1862
Merites taras NIXON, 1943 and 1954
Dacnusa (*Merites*) *taras* (NIXON), SELLIER, 1947

Colour. Palpi and labrum ochreous yellow: head and thorax otherwise dark brown or brown (not black as in all other Dacnusini known to me): legs ochreous yellow or yellow-brown: gaster (including petiole) red-brown, becoming darker towards its apex.

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Morphology. Eyes very small. 17—19 antennal segments (♀). Palpi very short: maxillary palpi 5-segmented: labial palpi 3-segmented. Mandibles 3-toothed, not expanded.

Pronotum without a medial pit, its sides almost bare. Mesoscutum smooth, almost bare (with only a few hairs along the former course of the notaulices): notaulices weak, not or hardly extending longitudinally on the dorsal surface of the mesoscutum. Short rugose precoxal suture present. Metapleural pubescence sparse, directed towards the hind coxa. Propodeum with similar fine pubescence at its sides, but becoming completely bare centrally. Petiole subtriangular, virtually bare, with a distinct central keel. Tergite 3 bare. Ovipositor (♀) slightly upcurved, strongly projecting beyond the apical tergite in the retracted position (by about half of the length of the petiole).

Wing with vein R_s weakly sinuate: *1m–cu* very widely rejected from cell R_s: R_s+M weak: Cu_{1b} absent: vein *1a* not extending beyond cross-vein *Cu–a*, so that cell *2Cu* is open below.

Breeding records

Host — *Liriomyza mesnili* D'AGUILAR

Recorded by SELLIER (1947) from larvae in thalli of *Riccia beyrichiana* (Marchantiales), Saint-Thurial, near Rennes, Brittany, France.

This species may be readily distinguished by its low number of antennal segments, projecting ovipositor, sparse metapleural and propodeal pubescence, and the retention of the precoxal suture. The recorded host is the only European species of Agromyzidae known to feed on liverworts. The identification of the bred material is on the authority of M. CH. GRANGER: I have not examined it personally.

Coloneura ate (NIXON), **comb. nov.**

Dacnusa ate NIXON, 1943 and 1946
Priapsis ate (NIXON), GRIFFITHS, 1964

Colour. Palpi and labrum brown or black. Antennae entirely black. Centre of mandibles red-brown. All coxae and trochanters and the femora of legs 2 and 3 virtually black; front femora becoming ochreous apically: tibiae and tarsi of legs 1 and 2 ochreous (with only tarsal segments 5 distinctly infuscated): hind tibiae and tarsi also largely ochreous (Danish specimen) or largely infuscated (holotype). Gaster entirely dark.

Morphology. Antennae short, with the more apical flagellar segments less than twice as long as wide: ♂, 22 segments; ♀, 21 segments. Palpi very short. Mandibles 3-toothed, not expanded.

Pronotum with conspicuous medial pit: its sides are largely bare, with only some fine inconspicuous pubescence along the oblique suture. Mesoscutum largely smooth and shining, with its anterior face and the anterior part of the

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central lobe pubescent, but the rest of its dorsal surface virtually bare: notaulices reaching about the middle of the mesoscutum. Precoxal suture represented by a broad more or less oblong area of shallow rugose-costate sculpture. Metapleural pubescence sparse, directed towards the hind coxa. Propodeum rugose, with only sparse, fine pubescence which in no way conceals the surface beneath. Petiole widened towards its apex, virtually bare. Tergite 3 without basal hairs. Ovipositor of holotype ♀ extruded (NIXON, 1943, fig. 43) (? projecting beyond the apical tergite in the retracted position).

Wing similar to that of *C. dice* (NIXON) (compare fig. 82 in Part III), except that the pterostigma and cell $2R_1$ are slightly more elongate.

Breeding records

I have examined a single male, Præstevangen, Frederiksborg, Sealand, Denmark, leg. SCHLICK (KB) which is mounted with a puparium which I believe to belong to a *Liriomyza* or *Metopomyza* species, but unfortunately it has not been possible to identify this.

The only other known specimen of this species is NIXON's holotype female. (The species has been omitted from the table of biometric data as the Danish specimen is not suitably mounted for measurement and the holotype is damaged.)

The most characteristic feature of this species is the form of the precoxal suture, which will readily distinguish it from the other two dark-legged species of *Coloneura* (*dice* and *siciliensis*).

Coloneura dice (NIXON), **comb. nov.**

Priapsis dice NIXON, 1943 and 1946, GRIFFITHS, 1966b

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

Host 3 — *Liriomyza cyparissiae* GROSCHKE

3 ex. from larvae on *Euphorbia cyparissias*, München-Freimann, Germany, em. 3. vii. 50, leg. GROSCHKE (STGT). 16 ex., same plant and locality, em. 13. ii—15. vi. 53, leg. GROSCHKE (STGT and GCDG). 1 ♂ from larva 20. v. 66 on *Euphorbia cyparissias*, Ochsenburg, Süd-Kyffhäuser, Thuringia, Germany, em. 13. vi. 66, leg. BUHR no. 2784 (GCDG).

This species and its sister-species *C. siciliensis* sp. nov. may be distinguished from other species of *Coloneura* by their entirely black coloration and the virtual absence of the precoxal suture.

***Coloneura siciliensis* sp. nov.**

Similar to *C. dice* (NIXON) (described in Part III), with which it may be compared as follows.

Morphology. Head less transverse (see the table of biometric data). Antennal segments: ♂, 18; ♀, 19 (2 ex.). Palpi even shorter, with the two apical segments of the maxillary palpi more or less fused, so that they appear 5-segmented (I

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think that the labial palpi are also 3-segmented, but these cannot be seen sufficiently clearly to give a firm opinion). Mandibles with tooth 1 slightly expanded.

Mesoscutum more extensively pubescent, with two or three rows of fine hairs near the former course of the notaulices or with its central lobe almost entirely pubescent. The bare centre of the petiole is completely smooth and strongly shining.

Wing with the pterostigma and cell $2R_1$ slightly more elongate.

Host — *Pseudonapomyza* sp.

Holotype ♀; 1 ♂, 1 ♀ paratypes from larvae 8. iv. 64 on *Ferula communis*, Linguaglossa, Etna, Sicily, em. ii—10. iii. 65, leg. SPENCER (GCDG).

The host puparia appeared in a sample of *Ferula* with mines of *Phytomyza ferulivora* GRIFFITHS. No adult flies were obtained, but Mr. SPENCER is of the opinion that the species concerned is a *Pseudonapomyza* on the basis of the characters of the puparium.

Dacnusa HALIDAY

The majority of *Dacnusa* species are associated with *Phytomyza* (see Part III): only a few are associated with the host genera treated in this part. Of these no less than six are species also known from *Phytomyza* hosts, and their association with these other host genera is probably secondary except perhaps in the case of *laeta* (see below). Two of the distinct species, *liopleuris* and *austriaca*, belong to species-groups associated predominantly with *Phytomyza* hosts: their association with other genera is therefore probably the result of a transference. Only the remaining three species of *Liriomyza*-parasites, *adducta*, *obesa* and *groschkeana*, appear to represent an "indigenous" parasite fauna. The first two of these are isolated well-characterised species whose affinities with other species of *Dacnusa* are not clear. The latter species, *groschkeana*, is clearly the sister-species of *laeta*, with which it is synapomorph in respect of the contrastingly yellow basal antennal segments (as far as the second or third flagellar segment) and the elongate, almost parallel-sided pterostigma. These two species may be termed the *laeta* group. I have no doubt that the resemblance of *groschkeana* to *Dacnusa* s.s. in respect of its densely pubescent metapleuron, propodeum and petiole represents convergence (apart from the colour of the antennae, the short tarsi of *groschkeana* clearly indicate that it is not a species of *Dacnusa* s.s.). Its sister-species *laeta* has previously been recorded from *Agromyza* and *Phytomyza* hosts, as well as *Liriomyza impatientis* BRISCHKE. Whether this host distribution represents primitive oligophagy (in which case we may expect that many other hosts will be discovered) or a highly disjunct distribution which has resulted from transference is not yet clear. If the latter, the association of *groschkeana* with a *Liriomyza* host would suggest that the original association of *laeta* was also with *Liriomyza*.

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The key to *Dacnusa* given in Part III (GRIFFITHS, 1966b) may be amended as follows to incorporate two additional species treated in this part (*liopleuris* and *groschkeana*).

The note under couplet 1 to read: "the forms most likely to be confused with those under the first alternative are *groschkeana* and the females of *discolor* and *plantaginis*: but *groschkeana* has the hind tarsi only 0.8 times the length of the tibiae, and the basal flagellar segments contrastingly yellow; *discolor* and *plantaginis* have a rugose, more or less parallel-sided petiole".

19 Basal two or three flagellar segments contrastingly bright yellow. Pterostigma elongate (figs. 51, 52 and 172) . . . . . *D. laeta* group 19a
— Basal flagellar segments not contrastingly yellow 20
19a 22—25 antennal segments. Metapleuron, propodeum and petiole only sparsely pubescent. Precoxal suture represented by a broad more or less oblong area of rugosity. Wing as figs. 51 and 52 . . . . . *D. laeta* (NIXON)
Hosts: *Agromyza arunci* HERING, *A. spiraeae* KALTENBACH, *Liriomyza impatientis* BRISCHKE, *Phytomyza calthophila* HERING and *P. ranunculi* SCHRANK

— 26—30 antennal segments. Metapleuron, propodeum and petiole densely pubescent. Precoxal suture represented by a short, shallow but usually distinctly rugose impression. Wing as fig. 172 . . . . . ***D. groschkeana* sp. nov.**
Host: *Liriomyza veratri* GROSCHKE

37 Pterostigma not much longer than the metacarp (figs. 97, 98, 176 and 177). . . . 37a
— Pterostigma much longer than the metacarp (figs. 93—96) 38
37a 22—24 antennal segments. Palpi very short (see table 14 of biometric data). Wing length 1.7—2 mm. . . . . *D. veronicae* GRIFFITHS
Host: *Phytomyza crassiseta* ZETTERSTEDT

— 27—29 antennal segments. Palpi longer (see tables 14 and 22 of biometric data). Wing length usually over 2 mm. (up to 2.4 mm.) . . . . *D. liopleuris* THOMSON
Hosts: *Campanulomyza gyrans* FALLÉN and *Liriomyza scorzonerae* RYDÉN

46 (♀♀ only). Wing short and broad with the pterostigma not much longer than the metacarp (figs. 97 and 177). *D. veronicae* GRIFFITHS ♀ and *D. liopleuris* THOMSON ♀ (see couplet 37a)
— Wing not so short and broad (figs. 112, 113 and 119) 47

Dacnusa hospita (FÖRSTER)

In addition to the records of this species from a *Phytomyza* host (see Part III), I have received the following material bred from *Liriomyza*.

Host 2 — *Liriomyza bryoniae* KALTENBACH

1 ♀ from larva 18. vii. 35 on *Verbena stricta*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 6. viii. 35, leg. BUHR (GCDG). 1 ♀ from larva on *Anthyllis lotoides*, same locality, em. 22. vi. 53, leg. BUHR no. 498 (BM).

Dacnusa laeta (NIXON)

In addition to the records of this species from *Agromyza* and *Phytomyza* hosts given in Parts II and III, I have received the following specimens bred from *Liriomyza*.

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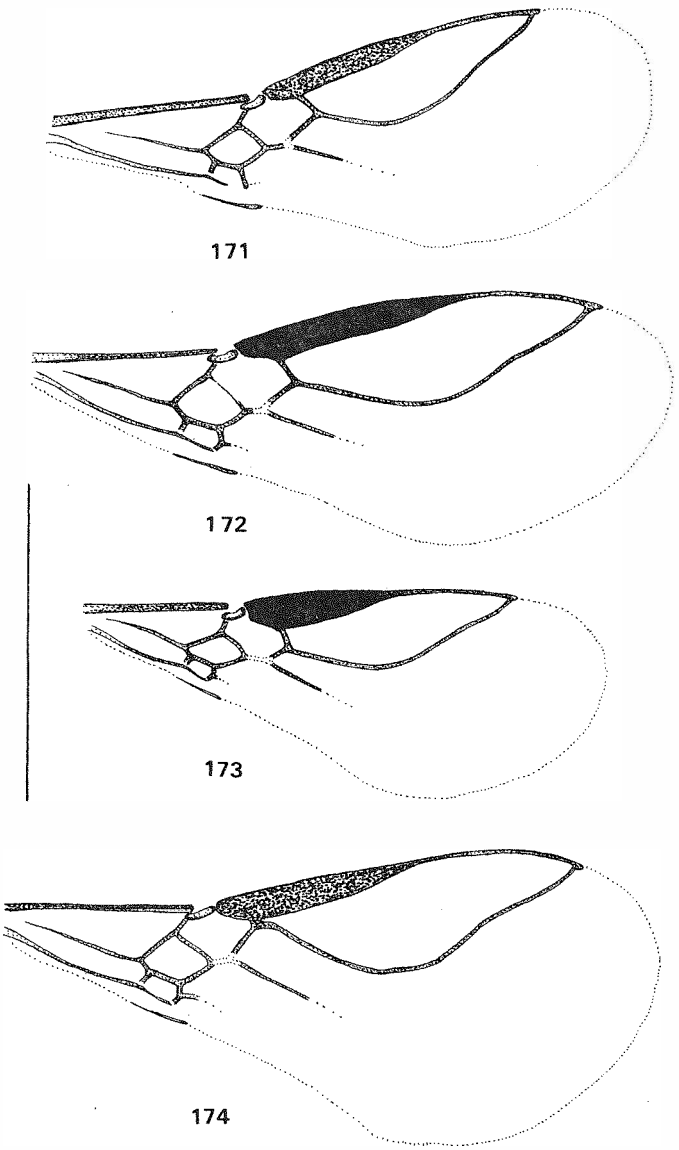

Figs. 171—174. Wings of: 171, *Coloneura danica* sp. nov. ♀; 172, *Dacnusa groschkeana* sp. nov. ♂; 173, *Dacnusa austriaca* (FISCHER) ♂; 174, *Dacnusa adducta* (HALIDAY) ♀. (Scale 1 mm.)

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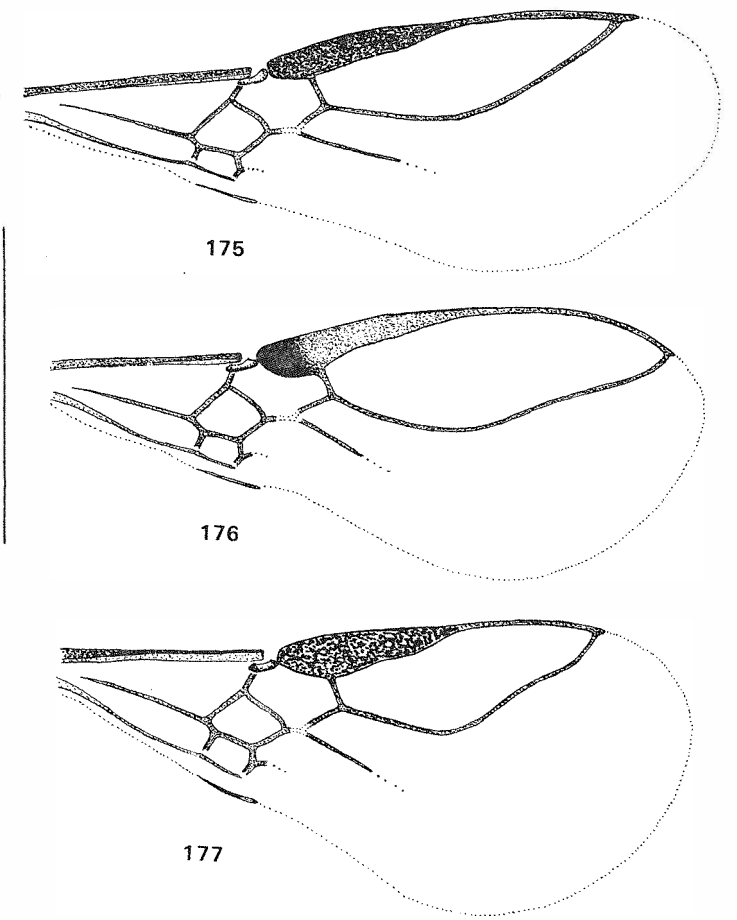

Figs. 175—177. Wings of *Dacnusa* spp.: 175, *D. obesa* STELFOX ♂; 176, *D. liopleuris* THOMSON ♂; 177, *D. liopleuris* THOMSON ♀. (Scale 1 mm.)

Host 5 — *Liriomyza impatientis* BRISCHKE

1 ♂ from larva 12. vi. 57 on *Impatiens noli-tangere*, Warszawa-Młociny, Poland, em. 13. viii. 57, leg. NOWAKOWSKI (PAN). 1 ♂, 3 ♀♀, Hälsingborg, Skåne, Sweden, em. 26—29. vii (3 ex.) and 3. ix. 51, leg. RYDÉN (LUND).

A new species synapomorph with *laeta* in respect of its elongate pterostigma and contrastingly yellow basal antennal segments is described below as *D. groschkeana* sp. nov. This species and *laeta* form the *Dacnusa laeta* group.

***Dacnusa groschkeana* sp. nov.**

Colour. Palpi and labrum yellow. Clypeus yellow or yellow-brown. Basal antennal segments as far as the second or third flagellar segment yellow, strongly contrasting with the dark succeeding flagellar segments. Centre of mandibles

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yellow. Legs entirely deep yellow. Gaster beyond petiole more or less brown, with tergite 3 usually paler than the following tergites.

Morphology. Antennal segments: ♂, 27—30; ♀, 26—28. Palpi of moderate length (see the table of biometric data). Mandibles 3-toothed, not expanded. Face slightly punctate, covered with rather dense pubescence (directed downwards at its sides but inwards over its centre).

Pronotum with small medial pit. Mesoscutum conspicuously punctate anteriorly, with short dense pubescence either covering its entire surface or absent only from the posterior half of the lateral lobes: notaulices extending as V-shaped impressions as far as the posterior fovea (although often weak and poorly defined). Precoxal suture represented by a short, shallow but usually distinctly rugose impression. Metapleuron clothed with moderately dense, whitish pubescence directed towards the hind coxa. Propodeum with similar whitish pubescence at its sides, giving way over its centre to finer inconspicuous pubescence which does not conceal in posterior view the shining, only shallowly sculptured surface beneath. Petiole subtriangular, covered with dense but fine pubescence which does not obscure its shining surface (except in the female from Orterer Alm in which the pubescence of the petiole is coarser and denser, approaching the condition found in species of *Dacnusa* s.s.). Tergite 3 usually with some fine pubescence on either side adjacent to the petiole. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing (fig. 172) with an elongate, almost parallel-sided pterostigma, which is strongly blackened in the male: cell $2R_1$ rather elongate: *1m-cu* rejected from cell R_s, but often only narrowly so: R_s+M weak.

Host — *Liriomyza veratri* GROSCHKE

Holotype ♂; 7 ♂♂, 3 ♀♀ paratypes from larvae 11—12. vii. 53 on *Veratrum album*, Schongau, Oberbayern, Germany, em. 11. ii—17. iv. 54, leg. GROSCHKE (STGT and GCDG). 1 ♀ paratype from larva 20. vii. 52 on *Veratrum album*, Orterer-Alm, near Kochel, Oberbayern, Germany, em. 10. vii. 53, leg. GROSCHKE (STGT).

This species is named in honour of the late Dr. FRANZ GROSCHKE.

This species resembles its sister-species *D. laeta* (NIXON) in its combination of an elongate pterostigma and yellow basal antennal segments. However it differs obviously from that species in having more numerous antennal segments and densely pubescent metapleuron, propodeum and petiole. In the latter respect it resembles species of *Dacnusa* s.s.: but no species of that group has contrastingly yellow basal antennal segments or short tarsi as in *groschkeana*.

Dacnusa austriaca (FISCHER)

Pachysema austriacum FISCHER, 1961
Dacnusa austriaca (FISCHER), GRIFFITHS, 1966b

Colour. Palpi and labrum yellow. Clypeus dark. Antennae dark, at most yellow-brown basally as far as about the base of the first flagellar segment.

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Centre of mandibles orange-yellow. Legs almost entirely yellow, with only tarsal segments 5 weakly infuscated. Petiole largely reddish yellow, with a darker central marking: the rest of the gaster largely yellow-brown, becoming darker towards its apex.

Morphology. Antennal segments: ♂, 21—23; ♀, 21—24. Palpi of moderate length (see the table of biometric data). Mandibles 3-toothed, not expanded. Face almost smooth, with fine pubescence (directed downwards at its sides but inwards over its centre) which does not obscure the surface beneath.

Pronotum with medial pit. Mesoscutum largely smooth, with pubescence distributed over its entire surface or absent only from the posterior half of the lateral lobes: notaulices weak or absent. Precoxal suture absent. Metapleuron with sparse pubescence directed towards the hind coxa. Propodeum shining, distinctly rugose only apically and towards its sides, becoming finely punctate or almost smooth centrally, with sparse fine pubescence which does not conceal the surface beneath. Petiole almost bare, at most with a few fine hairs along its sides. Tergite 3 bare. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing (fig. 173) with tapering, sexually dimorphic pterostigma (broader and blackened in the male); metacarp shorter than the pterostigma; *1m-cu* widely rejected from cell R_s.

Breeding records

Host 1 — *Liriomyza dracunculi* HERING

9 ♂♂ 2 ♀♀ from larvae on *Artemisia campestris*, Warnemünde, Mecklenburg, Germany, em. 9—19. ix. 62, leg. BUHR, HERING no. 1874 (GCDG).

Host 2 — *Liriomyza artemisicola* DE MEIJERE

1 ♂ from larva 12. viii. 65 on *Artemisia vulgaris*, Kirschberge, Mühlhausen, Thuringia, Germany, em. 2—11. ix. 65, leg. BUHR no. 2627 (GCDG).

In addition I have received one Swedish female, from larva 15. vi. 54 on *Artemisia vulgaris*, Erstagatan, Stockholm, Södermanland, em. 15—17. vii. 54, leg. RYDÉN (LUND) (host not identified but presumably either *L. artemisicola* DE MEIJERE or *L. demeijerei* HERING).

This species is very similar to some of the species associated with *Phytomyza* spp. mining Ranunculaceae (see the key in Part III), and its association with *Liriomyza* is doubtless the result of transference from *Phytomyza*. Its distinguishing characters are its small size, low number of antennal segments and characteristically coloured petiole.

Dacnusa adducta (HALIDAY)

Alysia (*Dacnusa*) *adducta* HALIDAY, 1839
Agonia adducta (HALIDAY), FÖRSTER, 1862, NIXON, 1954
Dacnusa adducta (HALIDAY), MARSHALL, 1891, 1895 and 1897, NIXON, 1937, GRIFFITHS, 1966b

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Colour. Palpi and labrum yellow. Clypeus dark. Antennae dark, becoming only slightly paler towards their base. Centre of mandibles orange-yellow. Legs almost entirely yellow, with only tarsal segments 5 weakly infuscated. Gaster beyond petiole brownish.

Morphology. Antennal segments: ♂, 28—31; ♀, 28—31. Palpi very long (see the table of biometric data). Mandibles 3-toothed, not expanded. Face almost smooth, with fine pubescence (directed downwards at its sides but inwards over its centre) which does not obscure the surface beneath.

Pronotum with a medial pit. Mesoscutum slightly punctate anteriorly, with rather dense pubescence covering its entire surface: notaulices not extending longitudinally on the dorsal surface of the mesoscutum. Precoxal suture absent or represented by a shallow smooth impression. Metapleuron with fine, fairly dense pubescence directed towards the hind coxa. Propodeum clothed with similar dense but very fine pubescence, beneath which its sculpture (which has a distinct striate element) can be seen in posterior view. Petiole also covered with similar fairly dense, long, fine pubescence. Tergite 3 bare. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing (♀, fig. 174) remarkable for the virtual or complete elimination of vein *2r*: the distal section of R_s is bent at its base and fused with (♂) or virtually contiguous with (♀) the pterostigma: pterostigma sexually dimorphic, broader and blackened in the male: cell $2R_1$ rather elongate with vein R_s strongly sinuate: *1m–cu* rejected from cell R_s.

Breeding records

Host — *Liriomyza flaveola* FALLÉN

1 ♀ from larva 17. vi. 62 on *Poa nemoralis*, Scratch Wood, London, em. 18. vii. 62 (GCDG).

In addition I have received one female, Præstevangen, Frederiksborg, Sealand, Denmark, leg. SCHLICK (KB), mounted with a puparium of another *Liriomyza* species which I have not been able to identify.

This species is immediately recognisable by its unique wing venation.

Dacnusa obesa STELFOX

Dacnusa (*Pachysema*) *obesa* STELFOX, 1954
Pachysema obesa (STELFOX), NIXON, 1954
Dacnusa obesa STELFOX, GRIFFITHS, 1966b

Colour. Palpi yellow or ochreous. Labrum yellow-brown. Clypeus dark. Antennae more or less entirely dark. Centre of mandibles orange-yellow. Legs almost entirely yellow, with only tarsal segments 5 distinctly infuscated. Gaster dark, at most with tergite 3 brownish.

Morphology. Antennal segments: ♂, (26)—27—30; ♀, 27—29. Palpi short (see the table of biometric data). Mandibles 3-toothed, not expanded. Face

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almost smooth, with fine pubescence (directed downwards at its sides but inwards over its centre) which does not obscure the surface beneath.

Pronotum with medial pit. Mesoscutum with its anterior face and central lobe roughened, with fine pubescence covering much of its surface but absent from about the posterior half of the lateral lobes: notaulices extending to about the middle of the mesoscutum. Precoxal suture represented by a virtually smooth impression, at most with a slight trace of rugosity anteriorly. Metapleuron with long, moderately dense pubescence directed towards the hind coxa. Propodeum clothed with similar long, moderately dense pubescence, but this is not sufficiently dense to conceal much of the rugose surface beneath in posterior view. Petiole subtriangular, with short, fairly dense pubescence covering its entire surface. Tergite 3 without basal hairs. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing (fig. 175) with the pterostigma narrow in both sexes, only weakly sexually dimorphic (darker in the male): metacarp slightly thickened, about the same length as the pterostigma: cell $2R_1$ rather elongate: *1m–cu* widely rejected from cell R_s.

Breeding records

Host — *Liriomyza virgo* ZETTERSTEDT

48 ♂♂, 9 ♀♀, Utterslevmose, Sealand; 2 ♂♂, 3 ♀♀, Damhusmose, Sealand; 2 ♂♂, 1 ♀, Køge, Sealand, ♂♀ Donse, Sealand; 11 ♂♂, 1 ♀, Randers, Jutland; Denmark, leg. SCHLICK (KB and GCDG).

The host is known to feed in stems of *Equisetum fluviatile*.

Important points for recognising this species are the narrow pterostigma, distinct notaulices and short petiole.

Dacnusa sibirica sibirica TELENGA

In addition to the records of this species from *Phytomyza* hosts (see Part III) I have received the following material bred from *Liriomyza*.

Host 5 — *Liriomyza bryoniae* KALTENBACH (= *solani* auctt.)

11 ex. from larvae on tomato (*Lycopersicon esculentum*), Guernsey, Channel Isles, em. 15–30. vi. 38, leg. SPEYER (BM). 1 ♂ from larva on tomato (*Lycopersicon esculentum*), Jersey, Channel Isles, em. 10. vi. 38, leg. SPEYER (BM). 2 ♀♀ from larvae on tomato (*Lycopersicon esculentum*), Cheshunt, Herts., England, em. 30. iv and 5. v. 54 (GCDG). 1 ♂ from larva on *Cleome graveolens*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 1. viii. 35, leg. BUHR (GCDG): 1 ♀ from larva on *Collinsia heterophylla*, same locality, em. 22. vi. 53, leg. BUHR no. 509 (BM).

Dacnusa discolor (FÖRSTER)

In addition to the records of this species from *Phytomyza* hosts (see Part III), I have received the following material.

Host 3 — *Calycomyza humeralis* VON ROSER

2 ♂♂ from puparia 27. vi. 54 on *Aster tripolium*, Faversham, Kent, England, em. vii. 54, leg. SPENCER (GCDG). 2 ♂♂, 3 ♀♀, Vesterfælled, Copenhagen, Denmark, leg. SCHLICK (KB).

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Host 4 — *Liriomyza strigata* MEIGEN

1 ♀ from larva on *Campanula rapunculoides*, Berlin-Dahlem, Germany, em. 30. vi. 53, leg. HERING no. 5940 (BM): 1 ♀ from larva on *Lactuca tatarica*, same locality, em. 3. ii. 66, leg. HERING no. 7490 (GCDG). 1 ♀ from larva on *Lamium purpureum*, Hedlandet, Södermanland, Sweden, em. 23. viii. 43, leg. LUNDQVIST (LUND).

The number of antennal segments in this material is: ♂♀, 25—26 (ex *C. humeralis* ROSER); ♀, 26, 27, 28 (ex. *L. strigata* MEIGEN).

Dacnusa liopleuris THOMSON

Dacnusa (*Dacnusa*) *liopleuris* THOMSON, 1895

Similar to *D. discolor* (FÖRSTER) (described in Part III), with which it may be compared as follows.

Colour. Antennae more or less entirely dark, at most with the scape and pedicel brownish. Gaster beyond petiole more or less uniformly brown or black (tergite 3 not contrastingly paler).

Morphology. Antennal segments: ♂, 29; ♀, 27, 29 (3 ex.) — broken in the holotype. Mesoscutum entirely pubescent, or with only about the posterior half of the lateral lobes bare. Tergite 3 sometimes with conspicuous pubescence at its base (as in the holotype), but virtually bare in some specimens. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Wing (figs. 176 and 177) with a much shorter pterostigma (compare *D. veronicae* GRIFFITHS, see Part III), only slightly longer than the metacarp: cell $2R_1$ broad, not extending so far towards the apex of the wing, with vein R_s strongly sinuate in both sexes.

Breeding records

Host 1 — *Campanulomyza gyrans* FALLÉN

♂♀ from larvae on *Campanula persicifolia*, Linz, Upper Austria, em. 18. vii. 62, leg. HERING no. 6802 (GCDG). 1 ♀ from larva 24. vii. 65 on *Campanula rapunculoides*, Katzentreppen, Mühlhausen, Thuringia, Germany, em. 5. iii. 66, leg. BUHR no. 2516 (GCDG): 1 ♀ from larva 24. v. 66, same plant and locality, em. 10. vii. 66, leg. BUHR no. 2759 (GCDG).

Host 2 — *Liriomyza scorzonerae* RYDÉN

1 ♂, 2 ♀♀ from larvae 23. vi. 54 on *Scorzonera humilis*, Dziekanów Leśny, Kampinoska Forest, Poland, em. 15. vii. 54 and 2. viii. 54 (2 ex.), leg. NOWAKOWSKI (PAN).

This species differs from *D. veronicae* GRIFFITHS (described in Part III), which has a similar wing venation, in being larger, having more numerous antennal segments and longer palpi. Details of THOMSON's holotype female (from Ringsjön, Sweden) have already been included in table 14 of biometric data in Part III. The female might easily be confused with *D. centaureae* GRIFFITHS (see Part III), but its wing is shorter and broader, with the metacarp slightly shorter than the pterostigma.

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Dacnusa maculipes THOMSON

In addition to the records of this species given in Parts II and III, I have seen the following material bred from the host genera treated in this paper.

Host 37 — *Calycomyza humeralis* VON ROSER (= *bellidis* KALTENBACH)

2 ex. from puparia x—xi. 21 on *Bellis perennis*, Oxford, England, em. spring' 22, leg. HAMM (HD).

Host 38 — *Trilobomyza flavifrons* MEIGEN

2 ex. from larvae 21. vi. 61 on *Lychnis flos-cuculi*, Woodwalton Fen, Hunts., England, em. 10. vii and 28. viii. 61 (GCDG). 2 ex. from larvae 6. x. 22 on *Melandrium rubrum*, Oxford, England, em. 23—28. iv. 23, leg. HAMM (HD). 3 ex. from larvae on *Melandrium album*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 30. ix and 8. x. 35, leg. BUHR (GCDG).

Host 39 — *Trilobomyza labiatarum* HENDEL

2 ex. from larvae 30. x. 24 on *Lamium album*, Oxford, England, em. 15 and 30. iv. 25, leg. HAMM (HD): 1 ex. from larva x. 25, same plant and locality, em. 6. iv. 26, leg. HAMM (HD). 1 ex. from larva 17. vii. 51 on *Galeopsis* sp., Promno, near Poznań, Poland, em. 15. viii. 51, leg. NOWAKOWSKI (PAN).

Host 40 — *Trilobomyza verbasci* BOUCHÉ

1 ex. from larva 12. ix. 53 on *Verbascum nigrum*, Boxhill, Surrey, England, em. 8. x. 53 (BM): 3 ex. from larvae 11. x. 53, same plant and locality, em. 22. iv—8. v. 54 (BM). 3 ex. from larvae on *Verbascum* sp., Oxford, England, em. 11—23. viii. 18, leg. HAMM (HD): 2 ex. from larvae 12. ix. 24, same plant and locality, em. 20. xi. 24 and 7. v. 25, leg. HAMM (HD).

Host 41 — *Liriomyza amoena* MEIGEN

1 ex. from larva vii. 31 on *Sambucus* sp., Oxford, England, em. 5. viii. 31, leg. HAMM (HD): 1 ex. from larva ix. 33, same plant and locality, em. 31. x. 33, leg. HAMM (HD).

Host 42 — *Liriomyza asphodeli* SPENCER

3 ex. from larvae 24. iv. 55 on *Asphodelus microcarpus*, Algeciras, Spain, em. 15. xi. 55, leg. SPENCER (GCDG).

Host 43 — *Liriomyza bryoniae* KALTENBACH

1 ex. from larva on *Cleome speciosissima*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 11. viii. 35, leg. BUHR (GCDG). 2 ex. from larvae on *Verbascum thapsiforme*, Halle/Saale, Germany, em. 20. viii. 62, leg. BUHR, HERING no. 1867 (GCDG). 1 ex. from larva 29. vii. 57 on *Linaria vulgaris*, Leszno, near Warszawa, Poland, em. 12. viii. 57, leg. NOWAKOWSKI (PAN). 1 ex. from larva 25. ix. 54 on *Linaria vulgaris*, Dziekanów Leśny, Kampinoska Forest, Poland, em. 30. iv. 55, leg. NOWAKOWSKI (PAN).

Host 44 — *Liriomyza centaureae* HERING

2 ex. from larvae 22. viii. 60 on *Centaurea nigra*, Woodwalton Fen, Hunts., England, em. 10. ix. 60 and 2. iii. 61 (GCDG). 2 ex. from larvae 3. ix. 53 on *Centaurea nigra*, Woodside Park, London, em. 31. ix and 2. x. 53 (BM). 1 ex. from larva 10. ix. 54 on *Centaurea nigra*, Scratch Wood, London, em. 24. x. 54 (BM). 1 ex. from larva 10. ix. 53 on *Centaurea nigra*, Rickmansworth, Herts., England, em. 31. ix. 53 (BM).

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Host 45 — *Liriomyza congesta* BECKER (= *trifolii* auctt.)

1 ex. from larva 21. viii. 55 on *Vicia sepium*, Cosford Mill, Surrey, England, em. 4. ix. 55, leg. SPENCER (GCDG). 1 ex. from larva 17. vi. 53 on *Trifolium repens*, Primrose Hill, London, em. 22. ix. 53, leg. SPENCER (BM). 1 ex. from larva 25. viii. 53 on *Trifolium* sp., Mill Hill, London, em. 14. ix. 53 (BM). 1 ex. from larva 29. viii. 22 on *Trifolium campestre*, Oxford, England, em. 6. x. 22, leg. HAMM (HD).

Host 46 — *Liriomyza eupatoriana* SPENCER

2 ex. from larvae 1. viii. 53 on *Eupatorium cannabinum*, Headington, Wilts., England, em. 8 and 11. viii. 53, leg. SPENCER (BM).

Host 47 — *Liriomyza fasciola* MEIGEN

2 ex. from larvae x—xi. 21 on *Bellis perennis*, Oxford, England, em. spring' 22, leg. HAMM (HD).

Host 48 — *Liriomyza graminicola* DE MEIJERE

6 ex. from larvae 25. viii. 60 on *Arrhenatherum elatius*, Woodwalton Fen, Hunts., England, em. 19—23. ix. 60 (4 ex.), 1 and 5. iii. 61 (GCDG). 1 ex. from larva 31. vii. 54 on Gramineae sp., Chilworth, Surrey, England, em. 3. ix. 54 (GCDG).

Host 49 — *Liriomyza groschkei* SPENCER

1 ex. from larva 28. viii. 54 on *Tragopogon pratensis*, Neuffen, Württemberg, Germany, em. 1. x. 54, leg. SPENCER (GCDG).

Host 50 — *Liriomyza impatientis* BRISCHKE

1 ex. from larva 4. vii. 53 on *Impatiens parviflora*, Berlin-Dahlem, Germany, em. 29. ix. 53, leg. SPENCER (BM). 1 ex. from larva 4. vii. 56 on *Impatiens noli-tangere*, Sieraków reservation, Kampinoska Forest, Poland, em. 5. viii. 57, leg. NOWAKOWSKI (PAN).

Host 51 — *Liriomyza pisivora* HERING

4 ex. from larvae 24. vii. 65 on *Pisum sativum arvense*, Katzentreppen, Mühlhausen, Thuringia, Germany, em. 10. viii—1. x. 65, leg. BUHR no. 2509 (GCDG).

Host 52 — *Liriomyza pumila* MEIGEN

2 ex. from larvae 6. vii. 53 on *Achillea ptarmica*, Taunus, Kronberg, Germany, em. ix and 11. x. 53, leg. SPENCER (BM). 1 ex. from larva 29. vi. 66 on *Achillea ptarmica*, Rammenau, Oberlausitz, Saxony, Germany, em. 18. vii. 66, leg. BUHR no. 2947a (GCDG).

Host 53 — *Liriomyza strigata* MEIGEN

3 ex. from larvae 21. vi. 61 on *Hydrocotyle vulgaris*, Woodwalton Fen, Hunts., England, em. 10. vii, 17. vii and 28. ix. 61 (GCDG). 1 ex. from larva vii. 31 on *Lathyrus latifolius*, Oxford, England, em. 11. x. 31, leg. HAMM (HD) (host recorded as *L. pusilla* MEIGEN in NIXON, 1937 and 1948).

Host 54 — *Liriomyza violiphaga* HENDEL

2 ex. from larvae 1. viii. 64 on *Viola* sp., Maloja, Switzerland, em. 1 and 7. iii. 65, leg. SPENCER (GCDG). 1 ♀, Schöngeising an der Amper, Germany, em. vii. 49, leg. GROSCHKE (STGT). 1 ♂, München—Waldfriedhof, Germany, em. 25. viii. 51, leg. GROSCHKE (STGT).

Some of the above records were previously published by NIXON (1937 and 1948) or myself (GRIFFITHS, 1956 and 1963). The host nomenclature of HAMM's material has been revised. *Liriomyza strigata* MEIGEN (host 53), which normally

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mines in the midrib of the leaf, appears to be only rarely attacked (see also the remarks in GRIFFITHS, 1963).

Dacnusa laevipectus THOMSON

In addition to the records of this species from *Phytomyza* hosts given in Part III, I have received a single specimen bred from *Trilobomyza*, as follows.

Host 19 — *Trilobomyza labiatarum* HENDEL

1 ♀ from larva 17. xii. 22 on *Lamium* sp., Forest Hill, Kent, England, em. 4. iv. 23, leg. HAMM (HD).

This record is considered an example of xenophagy. The specimen was previously identified as *D. areolaris* (NEES) by NIXON (1937 and 1948).

Chorebus HALIDAY

The species of *Chorebus* treated in this part include two, *asphodeli* and *subfuscus*, which are plesiomorph in respect of their lacking a rosette of metapleural pubescence. In this respect they are to be compared with the *cybele*-group (treated in Part IV) and the species included in the key on page 878 in Part I (GRIFFITHS, 1964). All the other species belong to what I have referred to as the *ovalis/lateralis* complex (see Part I, page 850). In these species the metapleural pubescence forms a well-defined rosette of radiating hairs.

A number of the species of the *ovalis/lateralis* complex associated with *Liriomyza* hosts probably belong to the concept of the *alecto* group (suggested under my description of *alecto* in Part III), characterised by the dense pubescence of the petiole with distinct apical tufts and weak or absent notaulices: the species concerned are *pseudomisellus*, *avesta*, *varuna*, *incertus*, *daimenes*, *testaceipes*, *cambricus*, *misellus*, *artemisiellus* and possibly *melanophytobiae* (if the bare mesoscutum of the latter is secondary). Six of these species (*incertus*, *daimenes*, *testaceipes*, *cambricus*, *misellus* and *artemisiellus*) appear to form a subordinate monophyletic group characterised by unusually dense pubescence on the sides of the pronotum (undoubtedly synapomorphy) and a more strongly widened petiole than in most other species of the group (except however *melanophytobiae*, *amasis* and *pimpinellae*). The division of this group into species is somewhat problematical and would be an appropriate subject for breeding experiments.

The other species of the *lateralis/ovalis* complex treated in this part are all well-defined species whose affinities with each other are by no means clear. Two species appear most closely related to species associated with *Agromyza* (treated in Part I). These are *trilobomyzae*, referable to the *lateralis* group, and *schlicki* (a parasite of *Liriomyza virgo* ZETTERSTEDT), which I believe to be the sister-species of *C. rotundiventris* (THOMSON), associated with *Agromyza distorta* GRIFFITHS (both these hosts being miners of subaquatic plants).

It is my intention to provide keys to the *lateralis/ovalis* complex in the next part of this paper, when the species associated with *Cerodontha* s. l. have been treated.

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In the descriptions which follow the following characters may be assumed whenever nothing to the contrary is stated.

Face almost smooth or with shallow punctate sculpture, covered with fairly dense fine pubescence, which is directed mostly inwards over its centre but downwards along the eye-margins. Clypeus black like the face. Mesepisternum with a well-defined rugose-costate precoxal suture. Metapleural pubescence dense, forming a rosette around a raised swelling. Wing venation rather uniform in most species (compare fig. 88), with the pterostigma longer than the metacarp, *1m-cu* clearly rejected from cell R_s, and vein Cu_{1b} weak or absent, so that cell *2Cu* is more or less open at its lower distal corner. Ovipositor (♀) not projecting beyond the apical tergite in the retracted position.

Chorebus asphodeli sp. nov.

Colour. Palpi dark brown. Labrum black. Centre of mandibles red-brown. Antennae entirely black. Legs dark brown, with the coxae and hind femora virtually black. Gaster entirely black.

Morphology. Antennae short, the more apical flagellar segments being only 1½—2 times as long as wide, with 23—24 segments (♀). Palpi short (see the table of biometric data). Mandible slightly expanded towards its apex, with all four teeth strongly developed (compare *alecto*, fig. 132 in Part III). Facial pubescence short, directed mostly downwards.

Thorax about 1.3 times as long as high. Sides of pronotum with only fine inconspicuous pubescence. Mesoscutum slightly roughened anteriorly, with pubescence covering its anterior face and central lobe, but the lateral lobes largely bare or pubescent anteriorly only: notaulices not extending longitudinally on the dorsal surface of the mesoscutum. Metapleuron slightly rugose on its lower half but without a distinct raised swelling, entirely covered with dense white adpressed pubescence which only shows a weak tendency towards differentiation in the direction of the hairs (compare the figure of *C. cybele* (Nixon) in Part I (fig. 21), although the pubescence is denser in *asphodeli*). Propodeum with some similar white pubescence at its sides but most of its surface is clothed with dense but fine pubescence, beneath which its rugose-punctate surface can be clearly seen in posterior view. Petiole widened towards its apex, bare centrally but with a little fine inconspicuous pubescence near its base and along its sides. Tergite 3 without basal hairs. Wing (fig. 178) with vein R_s weakly sinuate.

Host — *Liriomyza asphodeli* Spencer

Holotype ♀ from larva 7. iv. 65 on *Asphodelus* sp., near Marbella, Spain, em. 29. xii. 65, leg. Spencer (GCDG). 2 ♀♀ paratypes from larvae 24. iv. 55 on *Asphodelus microcarpus*, Algeciras, Spain, em. 30. xi. 55, leg. Spencer (GCDG).

This species is well characterised by its short antennae and metapleural pubescence (which does not form a rosette as in most *Chorebus* spp.). A very similar but smaller insect is described below as *subfuscus* sp. nov.

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***Chorebus subfuscus* sp. nov.**

Very similar to *C. asphodeli* sp. nov., with which it may be compared as follows.

Morphology. Antennal segments: ♂, 21, 22 (4 ex.). Mesoscutum with its dorsal surface entirely smooth and shining, its pubescence less extensive (the central lobe being pubescent anteriorly only or almost bare). Metapleuron with a distinct rugose swelling on its lower half, but its pubescence is as in *asphodeli* (so that the swelling is evenly covered with pubescence, not tending to be bare or only sparsely pubescent centrally as in most *Chorebus* spp.).

Size smaller (wing length 1.8 mm.).

Host — *Liriomyza buhri* DE MEIJERE

Holotype ♂, 3 ♂♂ paratypes from larvae in stems of *Phyteuma limoniifolium*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 7. vii. 53, leg. BUHR no. 532 (BM). Paratype ♂ from larva 26. vi. 66 on *Campanula patula*, Rammenau, Oberlausitz, Saxony, Germany, em. 20. vii. 66, leg. BUHR no. 2901 (GCDG).

***Chorebus ampliator* (NEES)**

Alysia ampliator NEES, 1834
Alysia (Dacnusa) ampliator NEES, HALIDAY, 1839 (in part)
Stiphrocera nigricornis FÖRSTER, 1862
Dacnusa ampliator (NEES), MARSHALL, 1891, 1895 and 1897, NIXON, 1937, 1943 and 1946
Chorebus ampliator (NEES), GRIFFITHS, 1964

Colour. Palpi and labrum dark brown. Centre of mandibles yellow-brown. Antennae entirely dark. Legs dark brown or black, except that the front femora and tibiae are somewhat paler (yellow-brown or brown). Gaster beyond petiole entirely dark.

Morphology. Antennae unusually short, the flagellar segments being very short (mostly no more than 1½ times as long as wide) and few in number (♂, 19 (2 ex.); ♀, 15—17). Palpi very short (see the table of biometric data). Mandible slightly expanded towards its apex, with all four teeth distinct, but tooth 3 relatively small.

Thorax about 1.3 times as long as high. Sides of pronotum virtually bare. Mesoscutum very shining, almost completely smooth, with fine pubescence over its anterior face and part of the central lobe, but much of its dorsal surface is bare: notaulices virtually absent. Precoxal suture represented by a smooth impression or absent. Metapleural swelling poorly defined, shining, only weakly rugose, surrounded by at least a partial rosette of pubescence (although this is less dense than in most species of *Chorebus* associated with *Liriomyza*). Propodeum with adpressed fairly dense pubescence, but this is not so dense as in most other species of *Chorebus* and does not fully obscure the shining rugose surface beneath. Petiole widened towards its apex, strongly shining, with short inconspicuous

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pubescence rather sparsely distributed over most of its surface. Tergite 3 with few or no basal hairs. Wing (fig. 179) with an unusually broad pterostigma; vein R_s weakly sinuate.

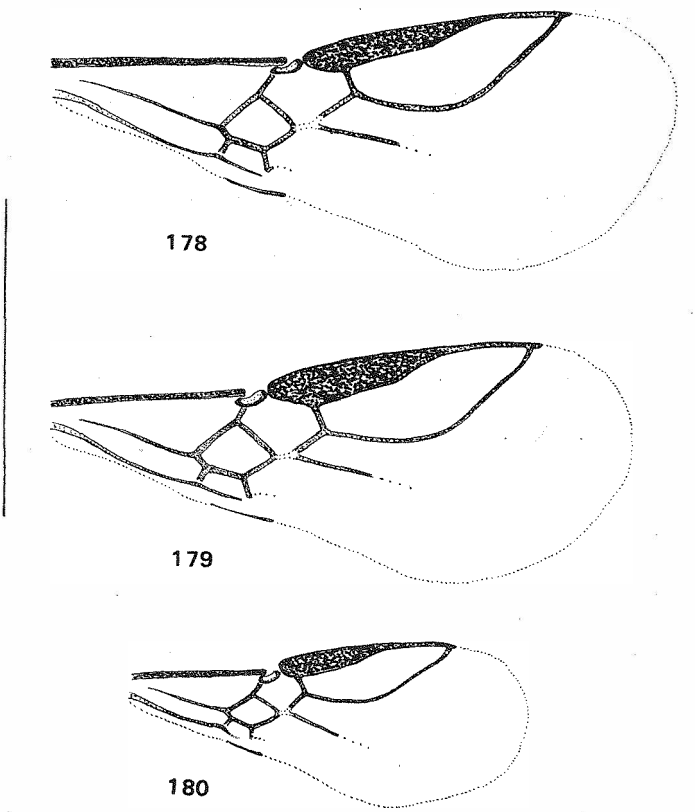
Breeding records

Host — *Liriomyza lutea* MEIGEN

2 ♂♂ from larvae in seeds of *Pastinaca sativa*, Nohra, near Weimar, Thuringia, Germany, em. 24 and 29. iv. 63, leg. HERING no. 1900 (GCDG): 1 ♀, same plant and locality, em. 4. iv. 63, leg. BUHR, HERING no. 1895 (GCDG).

STELFOX (1953) has recorded the association of this species with flowerheads of *Heracleum sphondylium*. This observation is in conformity with the known host association, since larvae of *L. lutea* MEIGEN are known to feed in seeds of *Heracleum*, as well as *Pastinaca*.

The most characteristic features of this species are its extremely short antennae, reduced precoxal suture and broad pterostigma.



Figs. 178—180. Wings of *Chorebus* spp.: 178, *C. asphodeli* sp. nov. ♀; 179, *C. ampliator* (NEES) ♂; 180, *C. melanophytobiae* sp. nov. ♂. (Scale 1 mm.)

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***Chorebus amauromyzae* sp. nov.**

Colour. Palpi and labrum ochreous yellow. Centre of mandibles reddish. Antennae dark, becoming obscurely brownish towards their base. Legs 1 and 2 ochreous yellow or yellow-brown; the hind legs are somewhat darker, more or less red-brown. Gaster beyond petiole with tergites 3 and 4 conspicuously yellow-brown, with only the more apical tergites dark.

Morphology. Antennae short, the more apical flagellar segments being little more than 1½ times as long as wide: ♂, 27 segments (2 ex.); ♀, 26 segments. Palpi moderately long (see the table of biometric data). Mandible only slightly expanded, with all four teeth distinct.

Thorax about 1.2 times as long as high. Sides of pronotum with rather dense pubescence along and below the oblique suture. Mesoscutum slightly roughened anteriorly, with dense pubescence covering most of its surface but tending to be absent from the posterior half of the lateral lobes: notaulices indicated anteriorly only or virtually absent. Mesepisternum often with some fine pubescence extending diagonally across its centre. Metapleural swelling shining, only weakly rugose. Metapleural pubescence dense. Propodeal pubescence dense and adpressed, but very fine, not fully concealing the shining, rugose surface beneath in posterior view. Petiole strongly widened towards its apex, strongly shining, with only very shallow largely longitudinal sculpture and a conspicuous central keel, finely pubescent on about its basal half, but bare on its apical half except for a few hairs near the corners. Tergite 3 with some fine pubescence adjacent to the petiole. Wing with vein R_s strongly sinuate.

Host 1 — *Amauromyza carlinae* HERING

Holotype ♂ from larva on *Carlina vulgaris*, Kunitzburg, Jena, Thuringia, Germany, em. vii. 64, leg. BUHR, HERING no. 2086 (GCDG). 1 ♂, 1 ♀ paratypes from larvae on *Carlina vulgaris*, Spitzberg, Jena-Lobeda, Thuringia, em. vii. 64, leg. BUHR, HERING no. 2055 (GCDG).

Host 2 — *Amauromyza morionella* ZETTERSTEDT

1 ♂, 3 ♀♀ paratypes from *Ballota nigra*, Silesia, 19th century, leg. SCHOLTZ (PAN).

This species should be recognised by its short antennal segments and the form of the petiole. The specimens from Silesia are all unfortunately headless: the head which has been gummed onto one female belongs to an entirely different insect (not Dacnusini).

***Chorebus veratri* sp. nov.**

Colour. Palpi and labrum yellow-brown or brown. Centre of mandibles red-brown or red-black. Antennae entirely dark. Legs largely yellow-brown with the coxae infuscated (brown or almost black). Gaster entirely dark.

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Morphology. Antennae short, the more apical flagellar segments being little more than 1½ times as long as wide: ♂, 25 segments; ♀, 23—24 segments. Palpi fairly short (see the table of biometric data). Mandibles (fig. 181) not or hardly expanded, with all four teeth well developed, tooth 2 being relatively long and pointed.

Thorax about 1.2 times as long as high. Sides of pronotum with only fine inconspicuous pubescence. Mesoscutum with its anterior face and central lobe slightly roughened, strongly shining, with fine pubescence densely distributed over its anterior face and central lobe but the lateral lobes largely or partly bare: notaulices well developed, almost reaching the posterior fovea in the two females, but very weak in the male. Metapleural swelling strongly rugose, surrounded by a dense rosette of pubescence as in the majority of *Chorebus* spp. Propodeal pubescence dense but rather fine (so that in posterior view much of the deeply rugose surface beneath can be seen). Petiole (fig. 184) strongly widened towards its apex, rather coarsely sculptured, bare centrally, but with some short fine inconspicuous pubescence near its base, along its sides and at its apical corners. Tergite 3 without basal hairs. Gaster (♀) somewhat pointed apically, with the tergites clearly projecting beyond the apical sternites in lateral view: ovipositor rather long, slightly projecting beyond the apical tergite in the retracted position. Wing with vein R_s weakly sinuate.

Host — *Liriomyza veratri* GROSCHKE

Holotype ♀; 1 ♂, 1 ♀ paratypes from larvae 11—12. vii. 53 on *Veratrum album*, Schongau, Oberbayern, Germany, em. 1. viii. 53 (2 ex.) and 17. iv. 54 (holotype), leg. GROSCHKE (STGT and GCDG).

Important features for recognising this species are its short antennae, long ovipositor and the form of the petiole.

Chorebus schlicki sp. nov.

Very similar to *C. rotundiventris* (THOMSON) (see Part II), with which it may be compared as follows.

Colour. Usually only tarsal segments 5 distinctly infuscated.

Morphology. Antennal segments: ♂, (29)—30—33—(34); ♀, 28—31. Palpi shorter (see the table of biometric data). Mandibles (fig. 182) with tooth 3 weak, visible as a small projection from the side of tooth 2.

Mesoscutal pubescence not extending onto the lateral lobes: notaulices extending at least to the middle of the mesoscutum, often almost to the posterior fovea. Propodeal pubescence sparser than in most other species of the *lateralis/ovalis* complex: the oblique bands of pubescence are inconspicuous, not white and matted as in *rotundiventris*: in posterior view the deeply rugose surface of the propodeum is clearly visible.

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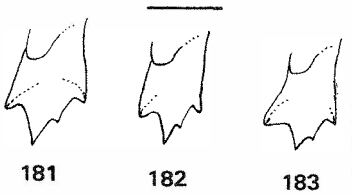
Host — *Liriomyza virgo* ZETTERSTEDT

Holotype ♀; 25 ♂♂, 9 ♀♀ paratypes, Denmark (1 ♂, holotype ♀, Damhusmose, Sealand; 3 ♂♂, Donse, Sealand; 8 ♂♂, 3 ♀♀, Utterslevmose, Sealand; 1 ♀, Præstevangen, Frederiksborg, Sealand; 13 ♂♂, 5 ♀♀, Randers, Jutland), leg. SCHLICK (KB and GCDG).

This species can be distinguished from other species of *Liriomyza*-parasites by its broad bare petiole, well developed notaulices and the form of the mandibles. It has been named in honour of RASMUS WILLIAM TRAUGOTT SCHLICK (1839 to 1916), in whose collection the type material has been found.

The host is known to feed in stems of *Equisetum fluviatile*.



Figs. 181—183. Mandibles of *Chorebus* spp.: 181, *C. veratri* sp. nov.; 182, *C. schlicki* sp. nov.; 183, *C. dirona* (NIXON). (Scale 0.1 mm.)

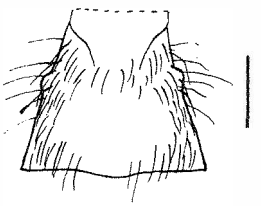


Fig. 184. Petiole of *Chorebus veratri* sp. nov. (Scale 0.1 mm.)

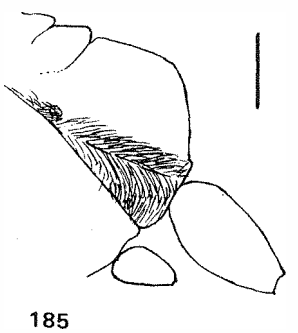


Fig. 185. Metapleuron of *Coloneura danica* sp. nov. (Scale 0.1 mm.)

Chorebus aphantus (MARSHALL)

This species is normally a parasite of two common *Phytomyza* spp. whose larvae mine in Gramineae, namely *P. nigra* MEIGEN and *P. milii* KALTENBACH (see Part III). In addition I have received a single specimen mounted with a malformed *Liriomyza* puparium identified by GROSCHKE as *Liriomyza flaveola* FALLÉN (also a miner on Gramineae). The details are:

Host 3 — *Liriomyza flaveola* FALLÉN

1 ♀, Stuttgart-Wildpark, Germany, em. 8. iv. 54, leg. GROSCHKE (STGT).

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Probably this record is an instance of xenophagy. This interpretation is supported by the abnormality of the puparium (which is elongate, showing that the host had been unable to complete the normal process of contraction before pupation). Normally it appears that Dacnusini larvae do not develop beyond the first instar until after the pupation of the host, which is allowed to pupate normally (see Part I).

Chorebus thecla (NIXON)

In addition to the series bred from *Phytomyza lithospermi* NOWAKOWSKI recorded in Part III (GRIFFITHS, 1966b), I have an additional female bred from a *Liriomyza* host with the following data.

Host 2 — *Liriomyza* sp. (compare *pusilla* MEIGEN)

1 ♀ from larva 24. vi. 62 on *Hieracium pilosella*, Boxhill, Surrey, England, em. 17. vii. 62 (GCDG).

This specimen agrees fully with the description in Part III, except that it has only 24 antennal segments, and the hind coxae are somewhat infuscated.

The known host distribution of this species is remarkably disjunct. Its association with the *Phytomyza* host is clearly prior to that with the *Liriomyza* (since it appears monophyletic with *C. nana* (NIXON) and *C. abaris* (NIXON), parasites of other members of the *Phytomyza obscura* group). Whether its association with the *Liriomyza* host is regular or represents an isolated case of xenophagy is not yet clear. (There is no possibility of any confusion in the host data.)

The characteristic pubescence of the petiole (fig. 145 in Part III) and distinct hind coxal tufts should readily distinguish this species from all other species of *Chorebus* associated with *Liriomyza*.

Chorebus venustus (TOBIAS), **comb. nov.**

Dacnusa venusta TOBIAS, 1962

Colour. Palpi and labrum ochreous yellow. Clypeus red-brown or black. Centre of mandibles yellow-brown or red-brown. Antennae dark, but becoming brownish towards their base. Legs uniformly ochreous yellow, at most with the hind coxae slightly darker (more or less brown). Petiole black or reddish: gaster beyond petiole with tergites 3 and 4 orange-yellow, the following tergites darker.

Morphology. Antennal segments: ♂, 28—30; ♀, (24)—25—29. Palpi of moderate length (see the table of biometric data). Mandible slightly expanded towards its apex, with all four teeth well developed (compare *alecto*, fig. 132 in Part III).

Thorax 1.2—1.4 times as long as high. Sides of pronotum with only fine inconspicuous pubescence Mesoscutum largely smooth and shining, with fine pubescence covering its anterior face and central lobe, but the lateral lobes largely bare: notaulices weak, extending longitudinally on the dorsal surface of

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the mesoscutum only as faint impressions. Metapleural swelling shining, only shallowly rugose-punctate (but surrounded by a dense rosette of pubescence as in the majority of *Chorebus* spp.). Propodeal pubescence dense, adpressed and whitish, but not covering the whole of the tergite, so that in posterior view some of its shining rugose surface can be seen. Petiole very elongate, almost parallel-sided, only shallowly sculptured, shining and almost bare (with only a few short, fine isolated hairs on its dorsal surface). Tergite 3 without basal hairs. Wing (TOBIAS, 1962, fig. 62) with vein R_s strongly curved, hardly sinuate: *1m-cu* widely rejected from cell R_s.

Breeding records

Host 1 — *Liriomyza soror* HENDEL

2 ♂♂ from larvae on *Cirsium acaule*, Eule, Jena, Thuringia, Germany, em. 15. vii. 63, leg. BUHR, HERING no. 1592 (GCDG).

Host 2 — *Liriomyza sonchi* HENDEL

1 ♂ from larva 28. vi. 56 on *Sonchus arvensis*, Sieraków, Kampinoska Forest, Poland, em. 20. vii. 56, leg. NOWAKOWSKI (PAN).

Host 3 — *Liriomyza* sp. (compare *pusilla* MEIGEN)

1 ♀ from larva 2. vii. 54 on *Hieracium pilosella*, Leszno, near Warszawa, Poland, em. 28. vii. 54, leg. NOWAKOWSKI (PAN). 1 ♀ from larva 24. v. 66 on *Hieracium pilosella*, Katzentreppen, Mühlhausen, Thuringia, Germany, em. 13. vi. 66, leg. BUHR no. 2775 (GCDG).

This species differs from all other *Liriomyza*-parasites in the length of its petiole.

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

Dacnusa dirona NIXON, 1945

Colour. Palpi and labrum yellow or ochreous yellow. Centre of mandibles orange-yellow. Antennae dark, but becoming brown beneath towards their base. Legs deep yellow or yellow-brown with tarsal segments 5 and usually the hind coxae somewhat infuscated. Gaster beyond petiole entirely dark, or with tergites 3 and 4 yellow-brown.

Morphology. Antennal segments: ♂, 28—30; ♀, 26—29. Palpi fairly long (see the table of biometric data). Mandible (fig. 183) slightly expanded towards its apex, with tooth 3 appearing as a projection from the side of tooth 2.

Thorax 1.2—1.4 times as long as high. Sides of pronotum with only fine inconspicuous pubescence. Mesoscutum largely smooth, bare and shining, with pubescence almost confined to its anterior face except for a few hairs along the course of the notaulices: notaulices usually well-defined, visible as smooth grooves which converge on the posterior fovea. Precoxal suture rather broad, strongly rugose-costate, extending almost to the hind margin of the mesepisternum. Metapleural swelling rugose-punctate. Metapleural and propodeal pubescence very dense and whitish. Petiole widened towards its apex, shining and almost bare centrally, but with some fine pubescence near its base and along its sides,

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and conspicuous white apical tufts. Tergite 3 without basal hairs. Wing with the pterostigma and cell $2R_1$ rather elongate; vein R_s only weakly sinuate.

Breeding records

Host — *Liriomyza graminicola* DE MEIJERE

2 ♂♂ from larvae 25. viii. 60 on *Arrhenatherum elatius*, Woodwalton Fen, Hunts., England, em. 21. iii and 5. iv. 61 (GCDG) (previously recorded in GRIFFITHS, 1963). 1 ♀ from larva on *Sesleria coerulea*, Lobeda, Jena, Thuringia, Germany, em. vii. 64, leg. BUHR, HERING no. 2061 (GCDG).

This species is well characterised by the combination of an almost bare mesoscutum with conspicuous apical tufts on the petiole. The only other species treated in this paper showing this combination of characters is *xanthaspidae* sp. nov., which has more numerous antennal segments and tooth 3 of the mandibles almost lost.

Chorebus xanthaspidae sp. nov.

Colour. Palpi and labrum deep yellow. Centre of mandibles yellow-brown. Antennae yellow-brown at their base as far as the first or second flagellar segment. Legs deep yellow, usually with only tarsal segments 5 infuscated (but occasionally the hind coxae are more or less brown). Gaster with tergite 3 red-brown, the following tergites darker.

Morphology. Antennal segments: ♂, 30—33; ♀, 29—31. Palpi of moderate length (see the table of biometric data). Mandible not expanded, almost 3-toothed, with tooth 3 developed as no more than a feeble angulation on the side of tooth 2.

Thorax 1.2—1.3 times as long as high. Sides of pronotum with some whitish pubescence along the oblique suture, but not so conspicuously pubescent as for instance in *daimenes* and *cambricus*. Mesoscutum largely bare, smooth and shining, with its pubescence largely confined to its anterior face except for a few hairs along the course of the notaulices, which are well developed, reaching the posterior fovea as well-defined linear grooves. Metapleural swelling finely rugose-punctate. Metapleural and propodeal pubescence very dense and whitish. Petiole widened towards its apex, with fairly dense but fine and inconspicuous pubescence distributed over most of its surface (but tending to be absent from the centre line apically) and forming small apical tufts. Tergite 3 with few or no basal hairs. Wing with vein R_s usually only weakly sinuate.

Host — *Metopomyza xanthaspida* HENDEL

Holotype ♀; 8 ♂♂, 5 ♀♀ paratypes, Rudehegn, Sealand, Denmark, leg. SCHLICK (KB and GCDG): 1 ♂ paratype, Præstevangen, Frederiksborg, Sealand, leg. SCHLICK (KB).

The food-plant of *M. xanthaspida* HENDEL is not known (since SCHLICK did not record this), but related species of *Metopomyza* are known to be leaf-miners on *Carex*.

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This species resembles *dirona* in having a bare mesoscutum in combination with conspicuous apical tufts on the petiole, but has more numerous antennal segments and tooth 3 of the mandibles almost lost.

Chorebus incertus (GOUREAU), **comb. nov.**

Dacnusa incerta GOUREAU, 1851

Colour. Palpi and labrum yellow or orange-yellow. Clypeus red-brown or black. Centre of mandibles yellow-brown. Antennae dark, but usually becoming obscurely yellow-brown towards their base. Legs uniformly deep orange-yellow, sometimes slightly brownish tinged, with only tarsal segments 5 somewhat infuscated. Gaster beyond petiole entirely dark, or with tergites 3 and 4 yellow-brown or red-brown.

Morphology. Antennal segments: ♂, 27, 29; ♀, 26—29. Palpi fairly long (see the table of biometric data). Mandible slightly expanded towards its apex, with all four teeth well developed (compare *alecto*, fig. 132 in Part III).

Thorax about 1.2 times as long as high. Sides of pronotum along and below the oblique suture with dense pubescence which has an opaque whitish appearance (similar to that of *daimenes*, *cambricus* and *artemisiellus*). Mesoscutum slightly roughened anteriorly, with its entire surface densely pubescent: notaulices not extending longitudinally on the dorsal surface of the mesoscutum. Metapleural swelling finely rugose-punctate. Metapleural and propodeal pubescence extremely dense and whitish. Petiole strongly widened towards its apex, entirely covered with extremely dense pubescence which forms very conspicuous white apical tufts. Tergite 3 without basal hairs. Wing with vein R_s distinctly sinuate.

Host — *Liriomyza pascuum* MEIGEN

♂ ♀ from larvae 5. vi. 63 on *Euphorbia amygdaloides*, Portland, Dorset, England, em. 28 to 30. vi. 63, leg. SPENCER (GCDG). 1 ex. from larva on *Euphorbia amygdaloides*, Folkestone, Kent, England, em. viii. 65, leg. WAKELY (GCDG). 1 ♀ from larva 18. vii. 54 on *Euphorbia amygdaloides*, Stokenchurch, Bucks., England, em. viii. 54, leg. SPENCER (GCDG). 2 ♀♀ from larvae 28. vi. 25 on *Euphorbia* sp., Bagley, Oxford, England, em. 20. vii. 25, leg. HAMM (BM). ♂ ♀ from larvae 1. x. 41 on *Euphorbia amygdaloides*, Selsdon, Surrey, England, em. 1. xi. 41 and 1. vi. 42, leg. BRITTEN (BM).

As already explained in Appendix VIII in Part III (GRIFFITHS, 1966b) the name *Dacnusa incerta* appears to have been originally intended for a parasite of *Liriomyza pascuum* MEIGEN. Although the description is entirely inadequate, it seems reasonable to revive the use of the name for the present species.

This species, like *daimenes*, *cambricus*, *testaceipes*, *misellus* and *artemisiellus*, is characterised by unusually dense pronotal pubescence. This feature should enable these species to be distincuished from other members of the *alecto* group, which they otherwise closely resemble. Another character common to these five species is that the petiole is more strongly widened and has more conspicuous apical tufts than in most other species of the group (except *C. amasis* (NIXON), *C. pimpinellae* GRIFFITHS and *C. melanophytobiae* sp. nov.).

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

Dacnusa daimenes NIXON, 1945

Very similar to *C. incertus* (GOUREAU), with which it may be compared as follows.

Colour. Legs uniformly deep yellow, usually with only tarsal segments 5 distinctly infuscated.

Morphology. Antennal segments: ♂, 26—29; ♀, 24—28. Mesoscutum more sparsely pubescent, with its lateral lobes largely bare.

Breeding records

Host 1 — *Liriomyza amoena* MEIGEN

2 ♂♂, 3 ♀♀ (including the holotype ♀) from larvae ix. 33 on *Sambucus nigra*, Oxford, England, em. 4—20. xi. 33, leg. HAMM (BM). 2 ♂♂ from larvae on *Sambucus nigra*, Munford, Cambs., England, em. 9—10. viii. 53, leg. SPENCER (BM). 1 ♂ from larva 17. vi. 53 on *Sambucus nigra*, Primrose Hill, London, em. 30. ix. 53, leg. SPENCER (BM).

Host 2 — *Liriomyza sonchi* HENDEL

1 ♀ from larva 16. viii. 58 on *Sonchus* sp., Ivinghoe, Bucks., England, em. 31. viii. 58, leg. SPENCER (GCDG). 1 ♂, 2 ♀♀ from larvae 19. vii. 58 on *Sonchus* sp., Wrotham, Kent, England, em. 7. viii. 58, leg. SPENCER (BM). 1 ♀ from larva 15. viii. 53 on *Sonchus arvensis*, Bookham, Surrey, England, em. 23. v. 54 (BM) (recorded as "*Dacnusa* sp. nr. *daimenes* NIX." in GRIFFITHS, 1956).

Host 3 — *Liriomyza pascuum* MEIGEN

1 ♂ from larva 31. vii. 61 on *Euphorbia amygdaloides*, Chochołowska Valley, Tatry, Poland, em. 28. viii. 61, leg. NOWAKOWSKI (PAN).

Host 4 — *Liriomyza bryoniae* KALTENBACH

1 ♂ from larva on *Plantago major*, Lüsewitz, Mecklenburg, Germany, em. 22. vi. 53, leg. BUHR no. 508 (BM).

Host 5 — *Liriomyza strigata* MEIGEN

1 ♀ from larva 9. viii. 47 on *Lathyrus palustris*, Wicken Fen, Cambs., England, em. ix. 47, leg. COLLENETTE (BM).

The evidence for the separation of this species from *incertus* is not conclusive. The only significant difference — the extent of the mesoscutal pubescence — seems clear-cut in the case of British material. But the only available continental specimen bred from *L. pascuum* MEIGEN (the host of *incertus*) agrees with *daimenes* in this respect. It is to be hoped that additional continental material will throw light on this problem.

I am also tentatively identifying as *daimenes* the following material:

Host 6 — *Liriomyza millefolii* HERING

1 ♂ from larva 7. viii. 55 on *Achillea millefolium*, Godalming, Surrey, England, em. 24. viii. 55 (GCDG). ♂ ♀ from larvae 19. vii. 57 on *Achillea millefolium*, Cybulice, Kampinoska Forest, Poland, em. 9. viii. 57, leg. NOWAKOWSKI (PAN).

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Host 7 — *Liriomyza pumila* MEIGEN

1 ♀ from larva on *Achillea ptarmica*, Hedlandet, Södermanland, Sweden, em. 21. iii. 44, leg. LUNDQVIST (LUND).

These insects are very small (wing length 1.4—1.6 mm.) with only 24 and 26 (♂♂) and 23—24 (♀♀) antennal segments. Their mesoscutal pubescence tends to extend onto the anterior half of the lateral lobes. It is possible that they represent a distinct species, but no firm opinion can be given without more material.

Chorebus testaceipes sp. nov.

Very similar to *C. incertus* (GOUREAU), with which it may be compared as follows.

Colour. Legs darker, largely ochreous yellow-brown with the coxae somewhat infuscated (brown or dark brown): tarsi usually with only segments 5 distinctly infuscated, but sometimes the hind tarsi are entirely infuscated. Gaster beyond petiole entirely dark.

Morphology. Antennal segments: ♂, 27—29; ♀, 26—29. Mesoscutum more sparsely pubescent, with its lateral lobes largely bare (as in *daimenes*).

Host 1 — *Liriomyza scorzonerae* RYDÉN

Holotype ♀; 3 ♂♂, 2 ♀♀ paratypes from larvae 20. viii. 56 on *Scorzonera humilis*, Piaśnica, Darzlubska Forest, distr. Puck, Poland, em. 22. iv—3. v. 57, leg. NOWAKOWSKI (PAN and GCDG). 2 paratypes (1 ♂, 1 sex unknown) from larvae 28. vi. 56 on *Scorzonera humilis*, Sieraków, Kampinoska Forest, Poland, em. 16. vii. 56, leg. NOWAKOWSKI (PAN). 4 ♂♂, 2 ♀♀ paratypes from larvae 10. vi. 54 on *Scorzonera humilis*, Dziekanów Leśny, Kampinoska Forest, em. 28. vi. 54, leg. NOWAKOWSKI (PAN).

Host 2 — *Liriomyza pusilla* MEIGEN

1 ♂ paratype from larva on *Hieracium lachenalii*, Linz (Donau), Upper Austria, em. 4. viii. 62, leg. HERING no. 6800 (GCDG).

Host 3 — *Liriomyza puella* MEIGEN

♂ ♀ paratypes from larvae on *Prenanthes purpurea*, Linz (Donau), Upper Austria, em. 25 and 31. vii. 62, leg. HERING no. 6897 (GCDG).

This insect can be distinguished from *daimenes* only by its darker coloration. Another similar dark-legged species bred from one of the same hosts (*L. pusilla* MEIGEN) is described below as *C. cambricus* sp. nov. This is a larger species with more numerous antennal segments and the entire surface of the mesoscutum densely pubescent.

Chorebus cambricus sp. nov.

Very similar to *C. incertus* (GOUREAU), with which it may be compared as follows.

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Colour much darker. Palpi and labrum yellow-brown. Clypeus black. Centre of mandibles red or red-brown. Antennae entirely dark, not becoming paler towards their base. Legs yellow-brown or brown, with the tarsi dark brown and at least the hind coxa virtually black. Gaster beyond petiole entirely dark.

Morphology. Antennal segments: ♂, 31; ♀, 30. Mandibles slightly larger, rather strongly expanded towards their apex.

Host — *Liriomyza pusilla* MEIGEN

Holotype ♀, paratype ♂ from larvae 16. ix. 61 on *Hieracium* sp. (*sagittata* or *glandulosa* groups), Clydach, Breconshire, Wales, em. 6—7. vi. 62 (GCDG).

This species differs from *testaceipes* in having more numerous antennal segments and the entire surface of the mesoscutum pubescent.

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

Dacnusa misella MARSHALL, 1891, 1895 and 1897, NIXON, 1937 (in part), 1943 (in part) and 1945 (in part)

Colour. Palpi and labrum usually yellow-brown or brown (occasionally ochreous yellow). Centre of mandibles orange-yellow. Antennae usually entirely dark (occasionally becoming brownish towards their base). Legs yellow-brown or brown with the hind coxae infuscated. Gaster beyond petiole entirely dark, at most with tergite 3 red-brown.

Morphology. Antennal segments: ♂, (21)—22—24; ♀, 21—22. Palpi of moderate length (see the table of biometric data). Mandible slightly expanded towards its apex, with all four teeth well developed (compare *alecto*, fig. 132 in Part III).

Thorax 1.1—1.3 times as long as high. Sides of pronotum with very dense matted whitish pubescence, especially along and below the oblique suture. Mesoscutum largely smooth and shining, with pubescence covering its anterior face and central lobe but its lateral lobes almost bare: notaulices not extending longitudinally on the dorsal surface of the mesoscutum. Metapleural swelling finely rugose-punctate. Metapleural and propodeal pubescence extremely dense and whitish. Petiole strongly widened towards its apex, entirely covered with extremely dense pubescence which forms conspicuous whitish apical tufts. Tergite 3 without basal hairs. Wing with vein R_s hardly sinuate, more or less evenly curved.

Size very small (wing length less than 2 mm.).

Breeding records

Host 1 — *Liriomyza congesta* BECKER

♂ ♀ from larvae 12. ix. 60 on *Vicia cracca*, Woodwalton Fen, Hunts., England, em. 9 and 27. iii. 61 (GCDG). 1 ♀ from larva 24. iv. 55 on *Vicia faba*, Algeciras, Spain, em. 20. v. 55, leg. SPENCER (GCDG). 2 ♂♂ from larvae on *Medicago lupulina*, Berlin-Dahlem, Germany, em. 14. viii. 65, leg. HERING no. 7481 (GCDG). 4 ex. from larva 19. ix. 53 on *Vicia* sp.,

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Chorleywood, Herts., England, em. 21. x. 53 and 11. v—12. vi. 54 (BM). 1 ♀ from larva 29. vi. 65 on *Vicia sepium*, Stadtwald, Mühlhausen, Thuringia, Germany, em. 18. vii. 65, leg. BUHR no. 2415c (GCDG). 1 ♀, München-Nymphburg, em. 5. ix. 53, leg. GROSCHKE (STGT). 1 ♀ from larva 16. vii. 59 on *Medicago lupulina*, Avala, near Beograd, Yugoslavia, em. 29. vii. 59, leg. NOWAKOWSKI (PAN).

Host 2 — *Liriomyza centaureas* HERING

1 ♂ from larva 10. ix. 54 on *Centaurea nigra*, Scratch Wood, London, em. 25. iv. 55 (GCDG).

Host 3 — *Phytomyza atricornis* MEIGEN

1 ♀ from puparium 31. viii. 65 on *Picris hieracioides*, Forstberg, Mühlhausen, Thuringia, Germany, em. 17. ix. 65, leg. BUHR no. 2651 (GCDG).

Host 4 — *Liriomyza cyparissiae* GROSCHKE

2 ♂♂, 1 ♀ from larvae on *Euphorbia cyparissias*, München-Freimann, Germany, em. 3. vii. 50 and 25. iii. 53 (2 ex.), leg. GROSCHKE (STGT).

The three specimens bred from *Liriomyza cyparissiae* GROSCHKE (21 antennal segments in both sexes) probably represent a distinct species, as their pronotal pubescence is slightly less dense than in the other material and their palpi unusually short. But additional material from this host is needed before a firm judgement can be made.

A few of the specimens bred from *L. congesta* BECKER have been previously recorded in GRIFFITHS (1956 and 1963), where I called the host "*Liriomyza trifolii* BURGESS". SPENCER (1965) has subsequently shown that this name should not be applied to the European species. Some of the Chorleywood series were referred to as "*Dacnusa* sp. nr. *daimenes* NIX." in GRIFFITHS (1956).

The record of the host as "*Domomyza nana* MG. on Hogweed" given in NIXON (1945) is erroneous. The label with this specimen reads "Napweed" (i.e. *Lapsana communis*), not Hogweed (*Heracleum*): the puparium on the mount is probably of a *Liriomyza* species, but it cannot be the puparium from which the parasite emerged because it is intact. In the circumstances I think the record must be discarded.

The association of this species with *Phytomyza atricornis* MEIGEN appears to represent a clear example of xenophagy. The host puparium was kept in isolation and there is no reason to doubt the accuracy of the record.

A very similar species not previously distinguished from *misellus* is described below as *artemisiellus* sp. nov. The true *misellus* is characterised by denser pronotal pubescence than the other four species (*incertus*, *daimenes*, *cambricus* and *artemisiellus*) which show this feature.

Chorebus artemisiellus sp. nov.

Dacnusa misella MARSHALL sensu NIXON, 1937 (in part), 1943 (in part) and 1945 (in part) (nec *Dacnusa misella* MARSHALL, 1891)

Very similar to *C. misellus* (MARSHALL), with which it may be compared as follows.

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Morphology. Antennal segments: ♂, 20—22; ♀, 18—20. Sides of pronotum with fairly dense pubescence, similar to that of *incertus* and *daimenes*: however this pubescence is not so dense and conspicuous as in *misellus*.

Mesoscutum usually with at least its central lobe somewhat roughened; its pubescence is more extensive, extending at least onto the anterior part of the lateral lobes, sometimes covering these completely.

Host 1 — *Liriomyza artemisicola* DE MEIJERE

Holotype ♀; 1 ♂, 1 ♀ paratypes from larvae 12. viii. 65 on *Artemisia vulgaris*, Kirschberge, Mühlhausen, Thuringia, Germany, em. 30. viii—11. ix. 65, leg. BUHR no. 2598 and 2627 (GCDG). 1 ♂, 3 ♀♀ paratypes from larvae 3. ix. 65 on *Artemisia vulgaris*, Mühlhausen, em. 23. ix—5. x. 65, leg. BUHR no. 2653 (GCDG). 1 ♂ paratype from larva 30. ix. 23 on *Artemisia vulgaris*, Shotover, Oxford, England, em. 21. v. 24, leg. HAMM (BM) (host recorded by NIXON, 1945, as "*Liriomyza* sp. near *virgo* ZETT."). 1 ♀ paratype from larva 27. vi. 31 on *Artemisia vulgaris*, Oxford, em. 15. vii. 31, leg. HAMM (BM).

Host 2 — *Liriomyza dracunculi* HERING

4 ♂♂, 1 ♀ paratypes from larvae on *Artemisia campestris*, Warnemünde, Mecklenburg, Germany, em. 19 and 26. ix. 62 and 6—7. ii. 63, leg. BUHR, HERING no. 1874 and 1889 (GCDG).

***Chorebus melanophytobiae* sp. nov.**

Colour. Palpi and labrum yellow. Centre of mandibles yellow-brown. Antennae dark, but usually with the scape, pedicel and about the first flagellar segment obscurely yellow-brown. Legs deep yellow, with only the more apical tarsal segments somewhat infuscated. Gaster beyond petiole entirely dark, or with tergites 3 and 4 brownish.

Morphology. Antennal segments: ♂, 21—23; ♀, 22. Palpi of moderate length (see the table of biometric data). Mandibles slightly expanded, with all four teeth well developed (compare *alecto*, fig. 132 in Part III).

Thorax 1.1—1.3 times as long as high. Sides of pronotum with some whitish pubescence along the oblique suture, but not so conspicuously pubescent as in *misellus*. Mesoscutum with its anterior face roughened and densely pubescent, but its dorsal surface smooth, shining and almost bare, at most with a little pubescence anteriorly: notaulices completely absent or with only their lateral extensions distinct. Metapleural swelling finely rugose-punctate. Metapleural and propodeal pubescence very dense. Petiole somewhat widened towards its apex, entirely covered with dense pubescence which forms conspicuous white apical tufts. Tergite 3 without basal hairs. Wing (fig. 180) with cell $2R_1$ rather elongate, with vein R_s distinctly curved: vein *1a* not or only shortly extending beyond cross-vein *Cu–a*, so that cell *2Cu* is open below.

Size extremely small (wing length 1.4—1.6 mm.).

Host — *Melanophytobia chamaebalani* HERING

3 ♂♂ paratypes from larvae 9. ix. 65 on *Lathyrus tuberosus*, Mühlhausen, Thuringia, Germany, em. 2. x. 65 and 13. iii. 66 (2 ex.), leg. BUHR no. 2653a (GCDG). Holotype ♀ from larva 4. vi. 66, same plant and locality, em. 18. vi. 66, leg. BUHR no. 2829 (GCDG). 1 ♂

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paratype from larva 16. vi. 66, same plant and locality, em. 13. vii. 66, leg. BUHR no. 2879 (GCDG).

This very small species can be distinguished from others with a densely pubescent petiole and similar range of antennal segments by its yellow legs and largely bare mesoscutum.

***Chorebus pseudomisellus* sp. nov.**

Very similar to *C. alecto* (MORLEY) (see Part III), with which it may be compared as follows.

Colour. Antennae becoming obscurely yellow-brown towards their base in most specimens. Legs almost unicolorous yellow-brown (the hind coxae not distinctly infuscated).

Morphology. Antennal segments: ♂, (19)[3], 23; ♀, 21—22. Mandible not expanded towards its apex.

Thorax about 1.3 times as long as high. Mesoscutum with its lateral lobes smooth (only the anterior face and central lobe roughened), with pubescence restricted to its anterior face and central lobe: notaulices rather distinct in most specimens, reaching almost the posterior fovea. Vein *1a* tending to become weak, or occasionally not extending beyond cross-vein *Cu-a*.

Size extremely small (wing length not exceeding 1.6 mm.).

Host — *Liriomyza congesta* BECKER

Holotype ♀; 2 ♂♂, 4 ♀♀ paratypes, München-Freimann, em. 10—13. viii. 53, leg. GROSCHKE (STGT and GCDG).

This species has a similar range of antennal segments to *misellus*, which is associated with the same host. It differs in having only fine inconspicuous pubescence on the sides of the pronotum, the mandibles not expanded, and the petiole less strongly widened towards its apex with somewhat smaller apical tufts. In all these respects it resembles *C. alecto* (MORLEY), a *Phytomyza*-parasite (see Part III).

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

Dacnusa avesta NIXON, 1944 and 1945

Colour. Palpi and labrum yellow. Centre of mandibles yellow-brown. Basal antennal segments as far as about the second flagellar segment yellow or yellow-brown. Legs entirely yellow. Gaster beyond petiole with tergite 3 yellow-brown or red-brown, the following tergites darker.

Morphology. Antennal segments: ♂, 29—30; ♀, (25)—27—29 (bred specimens only). Palpi long (see the table of biometric data). Mandible not expanded, with all four teeth distinct.

[3] An abnormally small individual.

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Thorax 1.2—1.3 times as long as high. Sides of pronotum with only fine pubescence. Mesoscutum extensively roughened, especially anteriorly, with dense pubescence covering its entire surface: notaulices not extending longitudinally on the dorsal surface of the mesoscutum. Metapleural swelling finely rugose-punctate. Metapleural and propodeal pubescence extremely dense and whitish. Petiole elongate, slightly widened towards its apex, evenly covered with dense whitish pubescence which usually tends to form apical tufts. Tergite 3 with few or no basal hairs. Wing with vein R_s distinctly sinuate.

Breeding records

Host 1 — *Liriomyza morio* BRISCHKE

2 ♀♀ from larvae 4. vii. 65 on *Galium silvaticum*, Stadtwald, Mühlhausen, Thuringia, Germany, em. 22—23. vii. 65, leg. BUHR no. 2447 (GCDG). 8 ex., Stuttgart-Kräherwald, Germany, em. 28. vii—1. viii. 54, leg. GROSCHKE (STGT).

Host 2 — *Liriomyza eupatoriana* SPENCER

1 ♀ from larva 8. vii. 54 on *Eupatorium cannabinum*, Chippenham Fen, Cambs., England, em. 24. vii. 54, leg. SPENCER (GCDG).

The above records are the first breeding records for this species. Material bred from *Trilobomyza* recorded as *avesta* in GRIFFITHS (1956) is now referred to *C. trilobomyzae* sp. nov.

The antennal coloration is an important feature for distinguishing this species from other members of the *alecto* group (especially *C. armida* (NIXON) which has a similar range of antennal segments). Its pronotal pubescence is not unusually dense (contrast *daimenes*, *testaceipes*, *incertus* and *cambricus*).

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

Dacnusa varuna NIXON, 1945

Colour. Palpi and labrum ochreous yellow. Centre of mandibles yellow-brown. Antennae largely dark, but yellowish ventrally at their base as far as about the second flagellar segment. Legs largely ochreous yellow with the hind coxae, the apex of the hind tibiae and the hind tarsi somewhat infuscated (brown or dark brown). Gaster with tergite 3 brown, the following tergites becoming virtually black.

Morphology. Head relatively large, with the eyes strongly convergent below (see ratio C in the table of biometric data and NIXON, 1945, fig. 168). Antennae unusually short, with most of the flagellar segments less than twice as long as wide; 25 segments (♀). Palpi fairly short (see the table of biometric data). Mandible slightly expanded, with all four teeth well developed.

Thorax about 1.2 times as long as high. Sides of pronotum with only fine inconspicuous pubescence. Mesoscutum roughened anteriorly, with fine pubescence covering almost its entire surface (but becoming sparse on the posterior half of the lateral lobes): notaulices weak, but extending to about the middle of

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the mesoscutum. Metapleural swelling rugose-punctate, like the propodeum and petiole. Metapleural and propodeal pubescence very dense and whitish. Petiole somewhat widened towards its apex, with dense pubescence covering most of its surface (tending to be absent only from the centre-line) and forming distinct apical tufts (similar to that of *alecto* and *armida*). Tergite 3 with some fine pubescence at its base. Wing with vein R_s weakly sinuate.

Breeding records

Host — *Metopomyza flavonotata* HALIDAY

1 ♀ from larva 26. vi. 64 on *Dactylis glomerata*, Kabackie Forest, Warszawa-Pyry, Poland, em. 12. v. 65, leg. NOWAKOWSKI (PAN).

The above description refers solely to the bred specimen. This agrees substantially with what NIXON (1945) regarded as typical examples of *varuna* in having densely pubescent metapleuron, propodeum and petiole: it is however relatively pale in colour, with the basal flagellar segments yellowish ventrally and only the hind coxae somewhat infuscated. NIXON also included under *varuna* specimens with the metapleuron, propodeum and petiole much less pubescent. Additional bred material is needed to clarify whether such specimens are in fact conspecific.

The characteristic features of this species are its convergent eyes, short palpi and short antennae. In other respects typical specimens (including the bred specimen described above) are very similar to other members of the *alecto* group.

Chorebus trilobomyzae sp. nov.

Colour. Palpi and labrum yellow. Centre of mandibles yellow-brown. Antennae becoming at least yellow-brown or reddish towards their base (rather brightly yellowish for about their basal third in the München series). Legs pale yellow, but usually with the hind tarsi and the apex of the hind tibiae somewhat infuscated. Gaster beyond petiole with tergites 3 and 4 yellow or yellow-brown, the following tergites darker.

Morphology. Antennal segments: ♂, 34—38; ♀, (32)—33—36. Palpi very long (see the table of biometric data). Mandible not or hardly expanded, with all four teeth distinct.

Thorax about 1.2 times as long as high. Sides of pronotum with only fine inconspicuous pubescence. Mesoscutum extensively roughened, with pubescence covering almost its entire surface: notaulices weak, indicated anteriorly only or virtually absent. Metapleural swelling weakly rugose-punctate. Metapleural and propodeal pubescence extremely dense and whitish. Petiole (compare fig. 66 in Part II) elongate, almost parallel-sided, with dense pubescence covering its entire surface, but with only a slight tendency to become denser at the apical corners (i.e. apical tufts either absent or weak). Tergite 3 with few or no basal hairs. Wing similar to that of other species of the *lateralis* group (compare fig. 39), with vein R_s strongly sinuate.

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Host 1 — *Trilobomyza labiatarum* HENDEL

Holotype ♀, paratype ♂ from larvae 11. x. 53 on *Stachys silvatica*, Boxhill, Surrey, England, em. 28. xi. 53 and 18. v. 54 (holotype) (BM). Paratype ♂ from larva 4. x. 53 on *Stachys palustris*, Brookman's Park, Herts., England, em. 15. v. 54 (BM). 3 ♀♀ paratypes from larvae 29. vii. 53 on *Stachys silvatica*, Woodside Park, London, em. 20. viii. 53 (BM): 1 ♀ paratype from larva 3. ix. 53, same plant and locality, em. 28. ix. 53 (BM). 2 ♀♀ paratypes from larvae 10. ix. 53 on *Stachys silvatica*, Rickmansworth, Herts., em. 5. x. 53 (BM). 1 ♂ paratype from larva 3. vii. 54 on *Stachys* sp., Chesham, Bucks., England, em. viii. 54, leg. SPENCER (GCDG). 1 ♂ paratype from larva 24. vii. 22 on *Stachys* sp., Tubney, Berks., England, em. viii. 22, leg. HAMM (HD). 3 ♀♀ paratypes, München-Freimann, em. 13. viii, 5. ix and 10. ix. 53, leg. GROSCHKE (STGT). 1 ♂ paratype from larva 29. vi. 65 on *Galeopsis tetrahit*, Stadtwald, Mühlhausen, Thuringia, Germany, em. 19. vii. 65, leg. BUHR no. 2429 (GCDG). 2 ♂♂, 1 ♀ paratypes from larvae 11. ix. 64 on *Stachys silvatica*, same locality, em. ii—iv. 65, leg. BUHR nos. 2255 and 2357 (GCDG). 2 ♀♀ paratypes from larvae 8. vii. 55 on *Ajuga reptans*, Granica reservation, Kampinoska Forest, Poland, em. 31. vii and 2. viii. 55, leg. NOWAKOWSKI (PAN). 1 ♂, 1 ♀ paratypes from larvae 9. vii. 55 on *Ajuga reptans*, Nart reservation, Kampinoska Forest, em. 2. viii and 6. ix. 55, leg. NOWAKOWSKI (PAN). 1 ♀ paratype from larva 17. vii. 55 on *Lamium maculatum*, Warszawa-Młociny, em. 7. viii. 55, leg. NOWAKOWSKI (PAN). 1 ♂ paratype from larva 22. x. 57, same plant and locality, em. 11. iii. 58, leg. NOWAKOWSKI (PAN): 1 ♂, 2 ♀♀ paratypes from larvae 2. ix. 54 on *Stachys palustris*, Dziekanów Leśny, Kampinoska Forest, em. 8—12. v. 55, leg. NOWAKOWSKI (PAN): 1 ♂ paratype from larva 17. ix. 54 on *Galeobdolon luteum*, same locality, em. 9. v. 55, leg. NOWAKOWSKI (PAN). 2 ♂♂, 1 ♀ paratypes from larvae 15. vii. 55 on *Galeobdolon luteum*, Zamczysko reservation, Kampinoska Forest, em. 5—6.viii. 55, leg. NOWAKOWSKI (PAN). 1 ♂ paratype from larva 21. vi. 61 on *Melittis melissophyllum*, Kabackie Forest, Warszawa, Poland, em. 30. vii. 61, leg. NOWAKOWSKI (PAN). 2 ♀♀ paratypes from larvae 18. viii. 56 on *Stachys silvatica*, Radunia reservation, near Żukowo, distr. Kartuzy, Poland, em. 27. iv. 57, leg. NOWAKOWSKI (PAN). 1 ♂ paratype from larva 1. vii. 61 on *Galeopsis* sp., Migdzylesie, near Warszawa, Poland, em. 3. viii. 61, leg. NOWAKOWSKI (PAN).

Host 2 — *Trilobomyza flavifrons* MEIGEN

2 ex. from larvae 13. viii. 53 on *Silene cucubalus*, Langley Vale, Surrey, England, em. 8. ix. 53, leg. NIBLETT (BM)[4]. 1 ♂ paratype from larva 3. x. 64 on *Stellaria holostea*, Stadtwald, Mühlhausen, Thuringia, Germany, em. 7. v. 65, leg. BUHR no. 2335 (GCDG). 1 ♂ paratype, Hälsingborg, Skåne, Sweden, em. 20. vii. 25, leg. RYDÉN (LUND). 2 paratypes (1 ♀, 1 sex unknown) from larvae 14. vii. 55 on *Stellaria holostea*, Zamczysko reservation, Kampinoska Forest, Poland, em. 5 and 7. viii. 55, leg. NOWAKOWSKI (PAN). 1 ♀ paratype from larva 4. vii. 56 on *Stellaria holostea*, Sieraków reservation, Kampinoska Forest, em. 24. vii. 56, leg. NOWAKOWSKI (PAN).

Host 3 — *Trilobomyza verbasci* BOUCHÉ

1 ♂ paratype from larva 15. vii. 55 on *Scrophularia nodosa*, Zamczysko, Kampinoska Forest, Poland, em. 4. viii. 55, leg. NOWAKOWSKI (PAN).

This species appears referable to the *lateralis*-group, whose other members are parasites of *Agromyza*. Although clearly very common, it has not been recognised as a distinct species in caught material, presumably through confusion with other species. In GRIFFITHS (1956) it was erroneously recorded as *Dacnusa avesta* NIXON. It closely resembles *C. lateralis* (HALIDAY), differing in having fewer antennal segments and more extensive mesoscutal pubescence. *C. uma*

[4] These two specimens were not reexamined at the time of writing this description, as they had been mislaid.

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(NIXON) has the same coloration and range of antennal segments, but differs in having a coarsely sculptured metapleural swelling (compare *C. eros* (NIXON)), less extensive mesoscutal pubescence (tending to be absent from the posterior half of the lateral lobes), sparser propodeal pubescence, a shorter petiole and larger, distinctly expanded mandibles.

Keys to the Dacnusini Parasites of particular Host-Groups

Keys are given below to the parasites of *Trilobomyza*, *Metopomyza* and certain groups of *Liriomyza* spp. I have not thought it necessary to give keys to the parasites of *Amauromyza*, *Calycomyza*, *Campanulomyza*, *Melanophytobia* and *Pseudonapomyza*, since only one or two parasite species have so far been recorded from each of these genera (see Table 20). Within *Liriomyza* there are a number of species of distinctive biology with only one or two recorded parasites species which again it does not seem necessary to include in these keys: these are *L. morio* BRISCHKE, *L. impatientis* BRISCHKE, *L. violiphaga* HENDEL, *L. asphodeli* SPENCER, *L. veratri* GROSCHKE, *L. virgo* ZETTERSTEDT, *L. mesnili* D'AGUILAR, *L. buhri* DE MEIJERE and *L. lutea* MEIGEN. The main need is for a key to parasites of the numerous species feeding on Compositae (with which I have also included *L. amoena* MEIGEN on *Sambucus*, since it is clearly closely related to certain Compositae-feeding species such as *L. pusilla* MEIGEN and *L. sonchi* HENDEL). Keys are also given to the parasites of *Liriomyza* spp. on *Euphorbia*, Papilionaceae and Gramineae. Records of parasites of the two polyphagous species, *L. bryoniae* KALTENBACH and *L. strigata* MEIGEN, are included both in keys relating to Compositae-feeding and Papilionaceae-feeding hosts, since these species occur on foodplants of both families (as well as many other families).

1. *Trilobomyza* spp.

1 Mandibles 4-toothed. Metapleural pubescence forming a dense rosette of radiating hairs (compare fig. 22). Wing not sexually dimorphic (compare fig. 39). Antennal segments: ♂, 34—38; ♀, (32)—33—36. Petiole almost parallel-sided, about twice as long as wide, evenly covered with dense pubescence. Legs largely pale yellow. . . . . ***Chorebus trilobomyzae* sp. nov.**

Hosts: *T. flavifrons* MEIGEN, *T. labiatarum* HENDEL and *T. verbasci* BOUCHÉ

— Mandibles 3-toothed. Metapleural pubescence very dense but not forming a rosette. Pterostigma elongate (figs. 123 and 127), blackened in the male. 19—26 antennal segments. Petiole subtriangular (not much longer than wide) and densely pubescent. 2

2 Mesepisternum without any indication of a precoxal suture. Pterostigma not widened towards its apex (fig. 127). Legs largely deep yellow. . . . . *Dacnusa laevipectus* THOMSON

Oligophagous species, once bred from *T. labiatarum* HENDEL

— Precoxal suture visible as a short groove which is usually rugose. Pterostigma conspicuously widened towards its apex (fig. 123). Legs largely brown . . . . . *Dacnusa maculipes* THOMSON

Oligophagous species commonly bred from *Trilobomyza*

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2. *Metopomyza* spp.

1 Metapleural pubescence dense, tending to be parted along a longitudinal line, but not forming a rosette (fig. 185). Mandibles 3-toothed. 30—32 antennal segments. Legs yellow. Pubescence of petiole largely confined to its basal half (no apical tufts). . . . . ***Coloneura danica* sp. nov.**

Host: *M. nigrohumeralis* HENDEL

— Metapleural pubescence forming a rosette of radiating hairs (compare fig. 22). Petiole with small apical tufts 2

2 Dorsal surface of mesoscutum bare except for a few hairs along the course of the notaulices. 29—33 antennal segments. Mandibles barely 4-toothed, with tooth 3 developed as no more than a feeble angulation on the side of tooth 2. Eyes not markedly convergent below: minimum distance between eyes about half the width of the head . . . . . ***Chorebus xanthaspidae* sp. nov.**

Host: *M. xanthaspida* HENDEL

— Mesoscutum with almost its entire surface pubescent. 21—26 antennal segments. Mandibles with all four teeth well developed (compare fig. 132). Eyes strongly convergent below (see NIXON, 1945, fig. 168): minimum distance between eyes two-fifths of the width of the head . . . . . *Chorebus varuna* (NIXON)

Host: *M. flavonotata* HALIDAY

3. *Liriomyza* spp. on Gramineae

1 Mandibles 4-toothed (figs. 129 and 183). Metapleural pubescence forming a dense rosette of radiating hairs (compare fig. 22). Pterostigma not sexually dimorphic. 2

— Mandibles 3-toothed. Metapleural pubescence directed mainly downwards towards the hind coxa, not forming a rosette. Pterostigma sexually dimorphic, blackened in the male 3

2 Dorsal surface of mesoscutum bare except for a few hairs along the course of the notaulices. Petiole widened towards its apex, shining and almost bare centrally, but with some fine pubescence near its base and along its sides, and conspicuous white apical tufts . . . . . *Chorebus dirona* (NIXON)

Host: *L. graminicola* DE MEIJERE

— Dorsal surface of mesoscutum largely pubescent. Petiole almost parallel-sided, covered with dense, evenly distributed pubescence (no apical tufts) . . . . . *Chorebus aphantus* (MARSHALL)

Once bred from *L. flaveola* FALLÉN (normal hosts *Phytomyza nigra* MEIGEN and *P. milii* KALTENBACH)

3 Wing (fig. 174) with the distal section of R_s bent at its base and fused with (♂) or contiguous with (♀) the pterostigma. 28—31 antennal segments. Pubescence of metapleuron, propodeum and petiole fairly dense, but much less so than in *maculipes*. Precoxal suture absent or represented by a smooth impression. Legs yellow . . . . . *Dacnusa adducta* (HALIDAY)

Host: *L. flaveola* FALLÉN

— Wing (fig. 123) with an elongate pterostigma which is conspicuously widened towards its apex. 19—25 antennal segments. Pubescence of metapleuron, propodeum and petiole extremely dense. Precoxal suture visible as a short groove which is usually rugose. Legs largely brown . . . . . *Dacnusa maculipes* THOMSON

Oligophagous species

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4. *Liriomyza* spp. on Compositae and *Sambucus*

1 Mandibles 3-toothed. Metapleural pubescence directed mainly downwards towards the hind coxa, not forming a rosette. Pterostigma sexually dimorphic, blackened in the male at least at its base 2

— Mandibles 4-toothed, the additional tooth situated between the original teeth 2 and 3 (compare fig. 132). Metapleural pubescence forming a dense rosette of radiating hairs (compare fig. 22). Pterostigma not sexually dimorphic 7

2 R_s+M completely lost (figs. 100 and 101): pterostigma short and broad. Short rugose precoxal suture present. Metapleuron densely pubescent, but the petiole almost bare . . . . . *Dacnusa hospita* (FÖRSTER)

Hosts: *L. bryoniae* KALTENBACH and a *Phytomyza* sp. (see Part III)

— R_s+M present. Precoxal suture represented by a smooth impression or absent except in *Dacnusa maculipes* THOMSON 3

3 Metapleural pubescence sparse (compare fig. 16): petiole almost bare 4

— Metapleuron and petiole densely pubescent 5

4 Wing (fig. 173) with the pterostigma blackened throughout its length in the male. Petiole reddish yellow with a darker central marking. . . *Dacnusa austriaca* (FISCHER)

Hosts: *L. artemisicola* DE MEIJERE and *L. dracunculi* HERING

— Wing as figs. 91 and 92, with the pterostigma becoming paler near its apex in the male. Petiole dark. (Legs yellow — contrast subspecies *comis* (NIXON)) . . . . . *Dacnusa sibirica sibirica* TELENGA

Hosts: *L. bryoniae* KALTENBACH and certain *Phytomyza* spp. (see Part III)

5 Petiole more or less smooth, subtriangular (strongly widened towards its apex, only about 1.1 times as long as wide). Pterostigma conspicuously widened towards its apex (fig. 123), blackened throughout its length in the male. Precoxal suture visible as a short groove which is usually rugose . . . . . *Dacnusa maculipes* THOMSON

Oligophagous species

— Petiole rugose, more or less parallel-sided, 1.3—1.7 times as long as wide. Pterostigma (figs. 93, 94, 176 and 177) not widened towards its apex, blackened only at its base in the male. Precoxal suture represented by a smooth impression 6

6 Pterostigma very elongate, much longer than the metacarp (figs. 93 and 94). 24—28 antennal segments . . . . . *Dacnusa discolor* (FÖRSTER)

Hosts: *L. strigata* MEIGEN, *Calycomyza humeralis* VON ROSER, *Phytomyza primulae* ROBINEAU-DESVOIDY and *P. sedicola* HERING

— Pterostigma not much longer than the metacarp (figs. 176 and 177). 27—29 antennal segments . . . . . *Dacnusa liopleuris* THOMSON

Hosts: *L. scorzonerae* RYDÉN and *Campanulomyza gyrans* FALLÉN

7 Petiole extremely long and narrow (2.7—3.0 times as long as wide) and almost bare. Legs uniformly ochreous yellow, at most with the hind coxae slightly darker. Gaster with tergites 3 and 4 orange-yellow . . . . . *Chorebus venustus* (TOBIAS)

Hosts: *L. soror* HENDEL, *L. sonchi* HENDEL and *L.* sp. on *Hieracium pilosella*

— Petiole usually less than twice as long as wide (at most 2.1 times as long as wide in *Chorebus avesta* (NIXON)), densely pubescent at least on its basal half 8

8 Petiole densely pubescent on its basal half but more sparsely pubescent towards its apex (no apical tufts). Hind coxa with a distinct tuft of whitish pubescence at its base. Legs largely deep yellow, sometimes ochreous tinged . . *Chorebus thecla* (NIXON)

Hosts: *L.* sp. on *Hieracium pilosella* (once) and *Phytomyza lithospermi* NOWAKOWSKI

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— Petiole almost or completely covered with dense pubescence which usually forms distinct apical tufts. Pubescence at base of hind coxa not forming a distinct tuft. 9

9 Basal antennal segments as far as about the second flagellar segment contrastingly yellow or yellow-brown. Legs entirely yellow. Antennal segments: ♂, 29—30; ♀, (25)—27—29. Sides of pronotum with only fine pubescence. Entire surface of mesoscutum pubescent. Petiole relatively elongate, 1.8—2.1 times as long as wide . . . . . *Chorebus avesta* (NIXON)

HOSTS: *L. eupatoriana* SPENCER and *L. morio* BRISCHKE

— Flagellum usually entirely dark (at most becoming obscurely yellow-brown towards its base). Sides of pronotum with denser, more conspicuous pubescence at least along and below the oblique suture. Petiole more strongly widened towards its apex, 1.3—1.6 times as long as wide 10

10 18—24 antennal segments. Legs yellow-brown or brown with the hind coxae infuscated. Wing length less than 2 mm. 11

— 24—31 antennal segments: if 24 (*Chorebus daimenes* (NIXON)) the legs (including coxae) are yellow 12

11 Antennal segments: ♂, (21)—22—24; ♀, 21—22. Pubescence on sides of pronotum conspicuously dense and matted . . . . . *Chorebus misellus* (MARSHALL)

HOSTS: *L. congesta* BECKER, *L. centaureae* HERING and *L. cyparissiae* GROSCHKE

— Antennal segments: ♂, 20—22; ♀, 18—20. Pubescence on sides of pronotum not so dense as in *misellus*, similar to that of *Chorebus daimenes* (NIXON). . . . . ***Chorebus artemisiellus* sp. nov.**

HOSTS: *L. artemisicola* DE MEIJERE and *L. dracunculi* HERING

12 Legs uniformly deep yellow. Lateral lobes of mesoscutum largely bare. 24—29 antennal segments . . . . . *Chorebus daimenes* (NIXON)

HOSTS: *L. amoena* MEIGEN, *L. sonchi* HENDEL, *L. pumila* MEIGEN, *L. millefolii* HERING, *L. bryoniae* KALTENBACH, *L. strigata* MEIGEN and *L. pascuum* MEIGEN

— Legs varying from ochreous yellow to brown, with at least the hind coxae infuscated. 13

13 Entire surface of mesoscutum pubescent. 30—31 antennal segments. . . . . ***Chorebus cambricus* sp. nov.**

HOST: *L. pusilla* MEIGEN

— Lateral lobes of mesoscutum largely bare. 26—29 antennal segments. . . . . ***Chorebus testaceipes* sp. nov.**

HOSTS: *L. puella* MEIGEN, *L. pusilla* MEIGEN and *L. scorzonerae* RYDÉN

5. *Liriomyza* spp. on *Euphorbia*

1 Metapleural pubescence directed mainly downwards towards the hind coxa, not forming a rosette. Mandibles 3-toothed. Entirely black species with 16—19 antennal segments. Precoxal suture absent . . . . . *Coloneura dice* (NIXON)

HOSTS: *L. cyparissiae* GROSCHKE, *Phytomyza silai* HERING and *P. angelicivora* HERING

— Metapleural pubescence forming a rosette of radiating hairs (compare fig. 22). Mandibles 4-toothed (compare fig. 132). Legs largely yellow or brown. Sides of pronotum with dense pubescence at least along and below the oblique suture. Petiole almost or completely covered with dense pubescence which forms conspicuous apical tufts. Rugose precoxal suture present 2

2 21—24 antennal segments. Legs yellow-brown or brown with the hind coxae infuscated. Lateral lobes of mesoscutum largely bare . . . *Chorebus misellus* (MARSHALL)

HOSTS: *L. cyparissiae* GROSCHKE, *L. congesta* BECKER and *L. centaureae* HERING

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— 24—29 antennal segments. Legs usually deep yellow 3
3 Entire surface of mesoscutum pubescent . . . . . *Chorebus incertus* (GOUREAU)
Host: *L. pascuum* MEIGEN

— Lateral lobes of mesoscutum largely bare . . . . . *Chorebus daimenes* (NIXON)
Once bred from *L. pascuum* MEIGEN (normally on other *Liriomyza* spp.)
Note: the distinction of the above two species is not beyond doubt

6. *Liriomyza* spp. on Papilionaceae

1 Metapleural pubescence very dense but not forming a rosette. Mandibles 3-toothed. Pterostigma elongate (fig. 123), conspicuously widened towards its apex, blackened in the male. Petiole subtriangular (not much longer than wide), evenly covered with very dense pubescence . . . . . *Dacnusa maculipes* THOMSON
Oligophagous species

— Metapleural pubescence forming a rosette of radiating hairs (compare fig. 22). Mandibles 4-toothed (compare fig. 132). Pterostigma not widened towards its apex, not sexually dimorphic. Petiole densely pubescent, with distinct apical tufts . . 2
2 Sides of pronotum with conspicuously dense matted whitish pubescence. Petiole strongly widened towards its apex (1.3—1.4 times as long as wide) . . . . . *Chorebus misellus* (MARSHALL)
Hosts: *L. congesta* BECKER, *L. centaureae* HERING and *L. cyparissiae* GROSCHKE

— Sides of pronotum with only fine inconspicuous pubescence. Petiole less strongly widened towards its apex, 1.5—1.7 times as long as wide. . . . . ***Chorebus pseudomisellus* sp. nov.**
Host: *L. congesta* BECKER

Host Association

The host ranges of the species of Alysiinae treated in this paper are given in Table 19. I have indicated in this table where revision has been made of the classifications previously given in Tables 4 and 10. The definitions of the terms used in the classification were explained in Part I (GRIFFITHS, 1964, p. 874): the classification relates to normal host selection and is not affected by cases of xenophagy.

Table 19

Classification of host ranges of Alysiinae parasites of *Amauromyza*, *Campanulomyza*, *Trilobomyza*, *Melanophytobia*, *Metopomyza*, *Liriomyza*, *Calycomyza* and *Pseudonapomyza*

Tribe Dacnusini

Coloneura danica sp. nov.	Monophagy, 1st degree	*laeta* (NIXON)	Oligophagy, 1st degree or Disjunctive Monophagy (revised)
stylata FÖRSTER	Monophagy, 1st degree		
ate (NIXON)	Monophagy, 1st degree		
dice (NIXON)	Disjunctive Monophagy (revised)	*groschkeana* sp. nov.	Monophagy, 1st degree
		austriaca (FISCHER)	Monophagy, 2nddegree
siciliensis sp. nov.	Monophagy, 1st degree	*adducta* (HALIDAY)	Monophagy, 2nd degree
Dacnusa hospita (FÖRSTER)	Disjunctive Monophagy (revised)	*obesa* STELFOX	Monophagy, 1st degree
		sibirica sibirica TELENGA	DisjunctiveMonophagy

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Table 19 (continued)

discolor (FÖRSTER)	Disjunctive Monophagy (revised)
liopleuris THOMSON	Disjunctive Monophagy
maculipes THOMSON	Oligophagy, 1st degree
laevipectus THOMSON	Oligophagy, 1st degree (but xenophagous on *Trilobomyza*)
Chorebus asphodeli sp. nov.	Monophagy, 1st degree
subfuscus sp. nov.	Monophagy, 1st degree
ampliator (NEES)	Monophagy, 1st degree
amauromyzae sp. nov.	Monophagy, 2nd degree
veratri sp. nov.	Monophagy, 1st degree
schlicki sp. nov.	Monophagy, 1st degree
venustus (TOBIAS)	Monophagy, 2nd degree
aphantus (MARSHALL)	Monophagy, 2nd degree (xenophagous on *Liriomyza*)
thecla (NIXON)	Disjunctive Monophagy (revised)
dirona (NIXON)	Monophagy, 1st degree
xanthaspidae sp. nov.	Monophagy, 1st degree
incertus (GOUREAU)	Monophagy, 1st degree
daimenes (NIXON)	Monophagy, 2nd degree
testaceipes sp. nov.	Monophagy, 2nd degree
cambricus sp. nov.	Monophagy, 1st degree
misellus (MARSHALL)	Monophagy, 2nd degree
artemisiellus sp. nov.	Monophagy, 2nd degree
melanophytobiae sp. nov.	Monophagy, 1st degree
pseudomisellus sp. nov.	Monophagy, 1st degree
varuna (NIXON)	Monophagy, 1st degree
avesta (NIXON)	Disjunctive Monophagy
trilobomyzae sp. nov.	Monophagy, 2nd degree
Other Alysiinae	
Dapsilarthra rufiventris (NEES)	Oligophagy, 1st degree
sylvia (HALIDAY)	Oligophagy, 1st degree
balteata (THOMSON)	Oligophagy, 1st degree
testacea sp. nov.	Oligophagy, 1st degree
levisulca sp. nov.	Oligophagy, 1st degree
Pseudopezomachus cursitans (FERRIÈRE)	Oligophagy, 1st degree

The very high degree of host specificity shown by the species of *Chorebus* listed above gives further weight to the comment made in Part III that this genus tends to show a higher degree of host specificity than *Dacnusa* and *Exotela*. The discovery of a number of disjunct host ranges, particularly in *Dacnusa*, is of importance for our understanding of the process of speciation in the Dacnusini. I propose to discuss this question in a later part of this paper.

Table 20 below lists the known host associations of Dacnusini with the host genera treated in this part (excluding a few records referring to hosts whose identity has not been established).

Table 20

List of Records of Dacnusini Parasites of *Amauromyza*, *Campanulomyza*, *Trilobomyza*, *Melanophytobia*, *Metopomyza*, *Liriomyza*, *Calycomyza* and *Pseudonapomyza*

Hosts	*Dacnusa*	*Coloneura*	*Chorebus*
I. *Amauromyza*			
carlinae			*amauromyzae*
morionella			*amauromyzae*
II. *Campanulomyza*			
gyrans	*liopleuris*		
III. *Trilobomyza*			
flavifrons	*maculipes*		*trilobomyzae*
labiatarum	*maculipes*, *laevipectus* (once)		*trilobomyzae*
verbasci	*maculipes*		*trilobomyzae*

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Table 20 (continued)

Hosts	*Dacnusa*	*Coloneura*	*Chorebus*
IV. *Melanophytobia*			
chamaebalani			*melanophytobiae*
V. *Metopomyza*			
flavonotata			*varuna*
nigrohumeralis		*danica*	
xanthaspida			*xanthaspidae*
VI. *Liriomyza*			
morio			*avesta*
impatientis	*laeta, maculipes*		
violiphaga	*maculipes*		
asphodeli	*maculipes*		*asphodeli*
veratri	*groschkeana*		*veratri*
flaveola	*adducta*		*aphantus* (once)
graminicola	*maculipes*		*dirona*
virgo	*obesa*		*schlicki*
mesnili		*stylata*	
buhri			*subfuscus*
lutea			*ampliator*
bryoniae	*hospita, sibirica sibirica, maculipes*		*daimenes*
strigata	*discolor, maculipes*		*daimenes*
centaureae	*maculipes*		*misellus*
eupatoriana	*maculipes*		*avesta*
fasciola	*maculipes*		
artemisicola	*austriaca*		*artemisiellus*
dracunculi	*austriaca*		*artemisiellus*
pumila	*maculipes*		*daimenes*
millefolii			*daimenes*
puella			*testaceipes*
amoena	*maculipes*		*daimenes*
soror			*venustus*
sonchi			*venustus, daimenes*
sp. (*Hieracium pilosella*)			*venustus, thecla* (once)
pusilla			*testaceipes, cambricus*
groschkei	*maculipes*		
scorzonerae	*liopleuris*		*testaceipes*
pascuum			*incertus, daimenes*
cyparissiae		*dice*	*misellus*
congesta	*maculipes*		*misellus, pseudomisellus*
pisivora	*maculipes*		
VII. *Calycomyza*			
humeralis	*discolor, maculipes*		
VIII. *Pseudonapomyza*			
sp. (*Ferula*)		*siciliensis*	

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Summary

1. This paper, the fifth of a series, deals with the Alysiinae parasites in Europe of the following genera of Phytomyzinae: *Amauromyza* HENDEL, *Campanulomyza* NOWAKOWSKI, *Trilobomyza* HENDEL, *Melanophytobia* HERING, *Metopomyza* ENDERLEIN, *Liriomyza* MIK, *Calycomyza* HENDEL and *Pseudonapomyza* HENDEL. The parasites belong to three genera of Dacnusini (*Coloneura*, *Dacnusa* and *Chorebus*) and two non-Dacnusine genera, *Dapsilarthra* and *Pseudopezomachus*.

2. *Priapsis* NIXON is synonymised with *Coloneura* FÖRSTER and a new key to *Coloneura* species given. Revisions are given to the key to *Dacnusa* in Part III (GRIFFITHS, 1966b). Keys are also given to the parasites of certain host-groups, to facilitate the identification of bred material.

3. Most of the Dacnusini treated in this paper show a high degree of host specificity, although some interesting examples of disjunctive monophagy have come to light. A complete host/parasite list for Europe has again been prepared, including revision of previous records.

4. Seventeen new species are described, two in *Dapsilarthra*, two in *Coloneura*, one in *Dacnusa* and twelve in *Chorebus*.

Zusammenfassung

1. Dieser Artikel ist der fünfte einer Reihe und behandelt die europäischen Alysiinae-Parasiten der folgenden Gattungen von Phytomyzinae: *Amauromyza* HENDEL, *Campanulomyza* NOWAKOWSKI, *Trilobomyza* HENDEL, *Melanophytobia* HERING, *Metopomyza* ENDERLEIN, *Liriomyza* MIK, *Calycomyza* HENDEL und *Pseudonapomyza* HENDEL. Die Parasiten gehören zu drei Gattungen von Dacnusini (*Coloneura*, *Dacnusa* und *Chorebus*) und zu zwei Gattungen außerhalb der Dacnusini, *Dapsilarthra* und *Pseudopezomachus*.

2. *Priapsis* NIXON wird mit *Coloneura* FÖRSTER synonymisiert und eine neue Bestimmungstabelle für die *Coloneura*-Arten mitgeteilt. An der *Dacnusa*-Tabelle in Teil III (GRIFFITHS, 1966b) werden Revisionen vorgenommen. Ferner werden Bestimmungstabellen für die Parasiten bestimmter Wirtsgruppen aufgestellt, um die Identifizierung gezogenen Materials zu erleichtern.

3. Die meisten der in diesem Artikel behandelten Dacnusini zeigten einen hohen Grad von Wirtsspezifik, obwohl einige interessante Beispiele von disjunktiver Monophagie auftauchten. Es wurde eine neue vollständige Liste von Wirten und Parasiten für Europa aufgestellt, in der die Revisionen früherer Feststellungen berücksichtigt sind.

4. Es werden siebzehn neue Arten beschrieben, davon zwei bei *Dapsilarthra*, zwei bei *Coloneura*, eine bei *Dacnusa* und zwölf bei *Chorebus*.

Резюме

1. Эта статья пятая по очереди и занимается с европейскими паразитами Alysiinae следующих родов Phytomyzinae: *Amauromyza* HENDEL, *Campanulomyza* NOWAKOWSKI, *Trilobomyza* HENDEL, *Melanophytobia* HERING, *Metopomyza* ENDERLEIN, *Liriomyza* MIK, *Calycomyza* HENDEL, и *Pseudonapomyza* HENDEL. Паразиты принадлежат тремя родами Dacnusini (*Coloneura*, *Dacnusa* и *Chorebus*)и двумя родами вне Dacnusini, *Dapsilarthra* и *Pseudopezomachus*.

2. *Priapsis* NIXON синонимизируется с *Coloneura* FÖRSTER и даётся новая определительная таблица для видов *Coloneura*. Делаются ревизии у *Dacnusa*

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из части III (GRIFFITHS, 1966b). В дальнейшем даются определительные таблицы для паразитов нескольких групп хозяевов, чтобы облехчать идентификацию выращенного материала.

3. Большинство обработанных в этой статье Dacnusini выявляют высокую степень специфики к хозяевам, всё-таки возникали некоторые интересные примеры „disjunctive monophagy". Составлялся новый полный список хозяев и паразитов для Эвропы, в которой учитывались ревизии раньших данных.

4. Описываются семнадцать новых видов, два у *Dapsilarthra*, два у *Coloneura*, один у *Dacnusa* и двенадцать у *Chorebus*.

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Tables of Biometric Data

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Table 21
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	♀	46	24	32	13	22	–	7	13	12	10	5	8	4	6	58	34	48	43	59	48	17	9	7	5	9
2	♂	44	24	31	11	22	–	6	12	11	10	–	–	–	–	54	31	46	41	56	47	17	9	7	5	9
3	♀	40	26	32	9	17	10	11	9	8	8	4	4	6	none	48	28	41	34	48	46	17	9	6	5	8
4	♂	35	21	28	7	17	10	9	8	7	7	4	4	4		46	22	34	32	44	41	15	8	6	5	7
5	♀	37	21	29	9	22	13	8	11	10	9	4	4	4		49	26	39	34	49	44	17	8	6	5	7

Nos. 1–2. *Coloneura danica* sp. nov. (1 the holotype).
Nos. 3–4. *Coloneura siciliensis* sp. nov. (3 the holotype).
No. 5. *Coloneura stylata* FÖRSTER, Germany (BM, ex RUTHE collection).

Table 22
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	♂	42	22	32	12	22	15	8	14	13	12	7	9	7	7	53	29	41	37	51	39	15	7	6	5	6
2	♀	41	22	32	12	21	13	7	12	12	11	7	8	6	7	50	31	40	38	50	37	12	7	6	5	7
3	♀	46	24	35	14	25	15	9	14	13	12	8	10	9	11	58	31	49	47	65	53	21	9	8	7	8
4	♂	52	25	36	11	25	17	8	14	12	11	7	8	6	7	65	37	58	50	67	59	22	12	9	6	10
5	♀	54	29	40	13	28	–	–	14	12	11	–	–	–	–	69	40	59	52	69	59	23	10	8	6	12
6	♂	50	28	37	15	27	17	12	17	14	13	7	10	7	8	65	35	50	51	71	58	21	11	9	7	9
7	♀	55	26	39	17	27	17	10	17	13	13	7	10	9	9	65	37	56	52	71	58	21	11	9	7	9
8	♂	58	31	44	17	34	19	12	17	14	12	10	13	7	9	78	44	65	56	80	64	26	11	10	7	10
9	♀	58	28	40	16	31	19	9	14	13	11	9	11	6	7	72	43	60	50	71	59	22	11	9	7	8

Nos. 1–2. *Dacnusa austriaca* (FISCHER) ex *Liriomyza dracunculi* HERING, Germany.
No. 3. *Dacnusa adducta* (HALIDAY) ex *Liriomyza flaveola* FALLÉN, London.
Nos. 4–5. *Dacnusa obesa* STELFOX ex *Liriomyza virgo* ZETTERSTEDT, Denmark.

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157	54	16	22	119	1.8	1.4	1.7:1:0.6	2.4	1.1:1:0.9	1.3	1.4	0.8	0.9	2.0:1:0.8:0.6:0.9	2.5	1.4

					Ratios											
28	29	30	31	32	A	B	C	D	E	F	G	H	I	J	K	L
Wing Length	Gaster Length	Petiole Width	Petiole Length	Total Body Length	Length/ Width of Head	Length/ Height of Head	Width of Head/ Distance between Eyes/ Width of Clypeus	Width of Mandibles/ Length of Head	Antennal Segments 3:4:5	Height/Length of Thorax	Thorax Width/ Head Width	Wing Length/ Body Length	Hind Tibia/Tarsus	Hind Tarsal Segments 1:2:3:4:5	Lengths of Petiole/ Gaster	Width/Length of Petiole
181	65	15	21	148	1.9	1.4	1.9:1:0.7	2.7	1.1:1:0.9	1.3	1.5	0.8	0.7	2.0:1:0.8:0.6:0.8	3.2	1.4
176	58	12	21	133	1.8	1.4	1.9:1:0.6	3.0	1.0:1:0.9	1.3	1.3	0.8	0.7	1.6:1:0.8:0.6:0.9	2.8	1.6
224	87	14	23	172	1.9	1.5	1.9:1:0.6	2.8	1.1:1:0.9	1.2	1.5	0.8	0.8	2.2:1:0.9:0.7:0.9	3.8	1.7
243	93	19	23	189	2.1	1.4	2.1:1:0.7	3.1	1.2:1:0.9	1.1	1.4	0.8	0.9	1.9:1:0.8:0.5:0.9	3.9	1.3
257	83	22	26	183	1.9	1.4	1.9:1:–	–	1.2:1:0.9	1.2	1.3	0.7	0.9	2.3:1:0.8:0.6:1.2	3.2	1.2
214	96	19	24	186	1.8	1.3	1.9:1:0.6	2.4	1.2:1:0.9	1.3	1.4	0.9	0.8	1.8:1:0.8:0.6:0.8	4.0	1.3
224	76	16	25	181	2.1	1.5	2.0:1:0.6	2.6	1.3:1:1.0	1.2	1.5	0.8	0.8	1.9:1:0.8:0.6:0.8	3.0	1.6
252	104	28	28	214	1.9	1.4	1.7:1:0.6	2.5	1.2:1:0.9	1.2	1.3	0.8	0.8	2.3:1:0.9:0.6:0.9	3.7	1.0
228	89	28	30	195	2.1	1.4	1.9:1:0.6	3.0	1.1:1:0.9	1.2	1.3	0.9	0.8	2.0:1:0.8:0.6:0.7	3.0	1.1

-7. *Dacnusa liopleuris* THOMSON: 6, ex *Liriomyza scorzonerae* RYDÉN, Poland; 7, ex *Campanulomyza gyrans* FALLÉN, Austria.

-9. *Dacnusa groschkeana* sp. nov., Schongau, Germany (8 the holotype).

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Table 23
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	♀	63	32	46	15	32	17	16	13	12	11	6	8	6	6	78	44	61	59	74	69	26	13	10	7	11
2	♂	50	27	37	15	25	17	13	11	10	9	5	7	6	4	69	41	52	41	56	49	17	10	8	6	9
3	♂	56	30	42	15	26	21	13	12	10	9	6	7	5	5	74	39	56	44	61	58	21	10	9	6	10
4	♀	54	30	39	17	24	19	13	10	9	7	6	7	4	6	65	39	50	39	52	48	17	9	7	6	9
5	♂	59	32	46	16	34	24	13	14	11	10	7	11	7	9	83	46	67	56	73	65	24	13	11	7	10
6	♀	59	28	44	15	33	–	11	11	10	9	7	11	–	–	78	44	65	50	70	61	21	13	11	7	9
7	♂	59	32	42	15	34	23	13	15	11	10	6	9	6	6	77	48	65	48	65	60	22	12	9	7	9
8	♀	58	32	42	17	31	22	12	12	10	9	7	8	6	6	72	41	59	48	67	56	20	11	8	7	9
9	♂	55	32	43	13	28	–	10	15	13	11	–	9	7	7	74	41	61	54	74	64	24	13	9	7	11
10	♀	61	31	46	15	28	22	10	14	11	10	8	9	7	7	83	48	67	58	79	63	24	12	8	7	13
11	♂	50	26	37	12	28	19	13	15	12	11	7	9	7	9	69	35	50	48	63	56	21	12	8	7	9
12	♀	48	24	38	15	25	15	10	13	11	11	6	8	6	6	59	34	50	44	59	52	17	11	7	6	8
13	♂	52	28	38	14	26	18	12	13	10	10	7	10	7	7	59	34	50	48	67	54	21	11	8	7	9
14	♀	39	25	34	13	19	14	7	13	11	10	–	9	7	7	56	27	41	39	54	48	17	9	7	6	8
15	♂	51	28	41	14	27	19	7	14	11	10	6	10	6	7	69	34	59	51	66	56	21	10	7	6	9
16	♀	52	31	41	15	26	–	9	13	12	10	–	–	–	–	71	36	54	54	69	56	21	11	8	6	9
17	♂	59	28	44	16	33	21	13	14	13	13	9	12	9	10	80	41	67	54	72	64	23	13	10	7	10
18	♀	57	31	43	17	31	21	12	15	13	12	8	11	8	8	75	41	61	53	72	62	22	13	11	7	9
19	♂	56	29	43	15	30	19	13	15	13	13	6	9	6	7	68	39	58	49	65	58	21	12	9	7	9
20	♀	52	30	41	17	28	19	12	15	11	11	7	9	7	7	65	34	54	49	65	54	21	11	7	6	9
21	♂	52	28	39	14	28	16	14	14	12	11	7	10	7	8	68	35	54	46	63	56	21	11	8	7	10
22	♀	58	28	41	16	31	21	13	15	13	11	8	10	7	9	76	44	61	54	71	62	24	12	9	7	9
23	♀	63	31	44	15	35	20	17	15	13	11	7	12	8	9	78	44	65	56	74	69	23	14	11	8	11
24	♂	44	23	34	11	24	16	11	12	11	11	6	8	6	6	55	30	43	39	54	48	18	9	7	6	8
25	♀	44	24	34	11	22	16	12	12	11	10	6	8	6	6	50	28	44	39	56	47	16	9	7	6	9

No. 1. *Chorebus asphodeli* sp. nov. (holotype).

No. 2. *Chorebus subfuscus* sp. nov. (holotype).

Nos. 3–4. *Chorebus ampliator* (NEES) ex *Liriomyza lutea* MEIGEN, Germany.

Nos. 5–6. *Chorebus amauromyzae* sp. nov. (5 the holotype).

Nos. 7–8. *Chorebus veratri* sp. nov. (8 the holotype).

Nos. 9–10. *Chorebus schlicki* sp. nov., Denmark: 9, Damhusmose; 10, Randers.

Nos. 11–12. *Chorebus venustus* (TOBIAS): 11, ex *Liriomyza soror* HENDEL, Germany; 12, ex *Liriomyza* sp. on *Hieracium pilosella*, Poland.

Nos. 13–14. *Chorebus dirona* (NIXON) ex *Liriomyza graminicola* DE MEIJERE: 13, Woodwalton, England; 14, Thuringia, Germany.

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224	80	26	37	190	1.9	1.5	1.8:1:0.7	2.4	1.2:1:0.9	1.2	1.3	0.9	0.9	1.9:1:0.9:0.6:0.8	2.2	1.4
200	81	24	35	189	2.1	1.6	1.8:1:–	2.5	1.1:1:0.9	1.2	1.3	0.9	0.9	1.6:1:0.9:0.6:0.7	2.3	1.5
209	87	26	34	195	1.9	1.3	1.8:1:0.7	2.4	1.3:1:0.9	1.2	1.2	0.9	0.9	1.8:1:0.8:0.6:0.8	2.6	1.3
198	80	23	28	176	1.8	1.3	1.9:1:0.7	2.6	1.2:1:0.9	1.2	1.4	0.9	0.8	1.8:1:0.7:0.6:0.8	2.9	1.2
241	100	22	34	205	1.8	1.4	2.0:1:–	3.0	1.1:1:0.9	1.2	1.3	0.8	0.9	1.9:1:0.7:0.6:0.9	3.0	1.5
254	102	28	35	224	2.0	1.5	2.2:1:0.8	2.9	1.3:1:0.9	1.2	1.3	0.9	0.8	2.0:1:0.6:0.5:1.1	2.9	1.3
186	87	13	35	172	1.9	1.4	1.8:1:0.7	2.0	1.2:1:0.9	1.4	1.4	0.9	0.9	1.7:1:0.7:0.5:0.7	2.5	2.7
167	96	11	31	176	2.0	1.6	1.9:1:0.6	2.4	1.2:1:1.0	1.2	1.4	1.0	0.9	1.5:1:0.7:0.6:0.7	3.1	2.8
205	72	17	28	157	1.9	1.4	2.0:1:0.7	2.4	1.2:1:1.0	1.2	1.5	0.8	0.8	1.8:1:0.7:0.6:0.8	2.6	1.6
170	67	15	24	143	1.6	1.3	2.0:1:0.7	3.3	1.2:1:0.9	1.4	1.4	0.8	0.9	1.8:1:0.8:0.6:0.9	2.8	1.6
209	93	22	30	195	1.8	1.5	1.9:1:0.7	3.7	1.2:1:0.9	1.2	1.5	0.9	0.8	2.1:1:0.7:0.6:0.9	3.1	1.3
209	85	23	30	186	1.7	1.3	2.0:1:–	3.5	1.1:1:0.8	1.3	1.4	0.9	0.8	1.8:1:0.7:0.6:0.8	2.9	1.3
219	100	29	37	209	2.1	1.6	1.8:1:0.6	2.1	1.1:1:1.0	1.2	1.5	1.0	0.9	1.8:1:0.8:0.6:0.8	2.7	1.3
219	81	28	37	183	1.9	1.4	1.9:1:0.7	2.5	1.1:1:0.9	1.2	1.4	0.8	0.9	1.7:1:0.9:0.6:0.7	2.2	1.3
203	91	20	32	186	2.0	1.5	1.9:1:0.6	2.2	1.1:1:1.0	1.2	1.4	0.9	0.9	1.7:1:0.8:0.6:0.8	2.8	1.6
205	78	21	30	167	1.8	1.4	1.9:1:0.7	2.4	1.3:1:1.0	1.2	1.6	0.8	0.8	1.8:1:0.7:0.6:0.8	2.6	1.4
195	83	19	28	172	1.9	1.4	1.9:1:0.6	2.0	1.2:1:0.9	1.3	1.5	0.9	0.9	1.8:1:0.7:0.6:0.9	3.0	1.4
208	91	26	35	195	2.1	1.5	1.9:1:0.7	2.1	1.1:1:0.9	1.2	1.3	0.9	0.9	2.0:1:0.8:0.6:0.8	2.6	1.3
233	93	26	39	200	2.0	1.4	1.8:1:0.6	1.8	1.1:1:0.9	1.2	1.4	0.9	0.9	1.7:1:0.8:0.6:0.8	2.4	1.5
167	71	17	24	157	1.9	1.4	1.8:1:0.6	2.1	1.1:1:1.0	1.3	1.5	0.9	0.9	1.9:1:0.8:0.6:0.9	2.9	1.4
167	63	19	24	143	1.8	1.4	2.0:1:0.7	2.0	1.1:1:0.9	1.1	1.6	0.9	0.8	1.7:1:0.8:0.7:0.9	2.6	1.3

-16. *Chorebus xanthaspidae* sp. nov., Rudehegn, Denmark (16 the holotype).

-18. *Chorebus incertus* (GOUREAU) ex *Liriomyza pascuum* MEIGEN, England: 17, Portland; 18, Stokenchurch.

-20. *Chorebus daimenes* (NIXON), England: 19, ex *Liriomyza amoena* MEIGEN, London; 20, ex *L. sonchi* HENDEL, Ivinghoe.

-22. *Chorebus testaceipes* sp. nov.: 21, ex *Liriomyza scorzonerae* RYDÉN, Piásnica, Poland; 22, ex *L. puella* MEIGEN, Austria.

Chorebus cambricus sp. nov. holotype.

-25. *Chorebus misellus* (MARSHALL) ex *Liriomyza congesta* BECKER: 24, Berlin, Germany; 25, Woodwalton, England.

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Table 23 (continued)

		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
26	♂	47	24	32	12	26	14	13	13	11	10	6	7	4	6	56	30	43	38	52	48	17	10	8	6	7
27	♀	37	19	29	9	21	13	7	10	10	9	5	6	4	6	43	24	34	34	44	41	15	8	6	5	6
28	♂	41	22	31	11	21	13	10	11	10	9	5	6	4	4	48	28	37	34	44	41	14	8	6	5	7
29	♀	44	27	37	15	23	17	9	13	12	11	6	7	6	6	50	32	44	41	53	46	17	9	7	6	8
30	♂	35	18	26	9	20	12	7	10	9	8	5	6	4	4	43	23	33	28	40	36	13	7	6	4	6
31	♀	39	21	30	9	21	15	7	11	9	9	5	7	4	5	46	24	35	33	43	38	13	7	6	4	6
32	♂	49	26	36	15	26	16	9	16	12	12	7	10	6	7	65	34	50	44	61	53	21	10	7	6	9
33	♀	50	26	39	16	26	17	11	15	13	11	7	9	7	9	67	35	54	50	68	55	20	11	9	6	9
34	♀	56	30	39	17	22	17	13	13	11	10	–	9	6	6	69	37	56	48	61	51	18	10	8	6	9
35	♂	61	31	46	15	31	21	13	18	14	13	10	16	10	13	81	41	69	61	81	65	24	16	11	7	9
36	♀	62	30	44	19	30	21	11	17	13	13	9	14	9	13	76	41	65	59	78	60	22	13	9	7	8

Right part of table 23

							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						3	4	5					1	2	3	4	5		
9	16	162	78	17	25	153	2.0	1.3	1.8:1:0.5	1.9	1.2:1:0.9			1.3	1.6	0.9	0.9	1.7:1:0.8:0.6:0.7					3.2	1.4
7	14	141	69	14	19	131	1.9	1.5	1.8:1:0.6	2.6	1.1:1:0.9			1.3	1.5	0.9	0.9	1.8:1:0.7:0.6:0.8					3.7	1.3
8	15	143	74	15	20	143	1.8	1.4	2.0:1:0.6	2.2	1.1:1:0.9			1.3	1.5	1.0	0.9	1.7:1:0.8:0.6:0.9					3.8	1.3
10	17	162	76	19	26	143	1.6	1.4	1.9:1:0.7	2.9	1.1:1:0.9			1.1	1.4	0.9	0.9	1.8:1:0.7:0.6:0.9					2.9	1.4
7	13	138	58	11	17	122	2.0	1.5	1.8:1:0.6	2.6	1.2:1:1.0			1.3	1.5	0.9	0.9	1.9:1:0.8:0.6:0.9					3.4	1.5
7	14	153	59	13	22	133	1.9	1.5	1.9:1:0.7	2.8	1.2:1:0.9			1.3	1.6	0.9	0.9	1.8:1:0.8:0.6:0.9					2.8	1.7
12	19	190	81	15	27	181	1.9	1.4	1.9:1:0.6	2.8	1.2:1:1.0			1.3	1.5	0.9	0.9	2.0:1:0.7:0.5:0.8					3.0	1.8
14	19	200	79	15	32	167	1.9	1.5	1.9:1:0.6	2.3	1.1:1:0.9			1.2	1.4	0.8	0.8	1.8:1:0.8:0.6:0.8					2.5	2.1
11	21	197	93	17	31	184	1.9	1.3	2.5:1:0.8	2.3	1.2:1:0.9			1.2	1.5	0.9	0.8	1.8:1:0.8:0.6:0.9					3.1	1.7
15	26	262	93	15	35	205	2.0	1.5	2.0:1:0.7	2.3	1.2:1:0.9			1.2	1.5	0.8	0.8	1.6:1:0.8:0.5:0.6					2.6	2.3
16	25	257	83	18	35	198	2.1	1.5	2.1:1:0.7	2.7	1.3:1:1.0			1.2	1.5	0.8	0.8	1.7:1:0.7:0.5:0.6					2.4	2.0

Nos. 26–27. *Chorebus artemisiellus* sp. nov., Germany: 26, ex *Liriomyza dracunculi* HERING; 27, holotype ex *L. artemisicola* DE MEIJERE. — Nos. 28–29. *Chorebus melanophytobiae* sp. nov. (29 the holotype). — Nos. 30–31. *Chorebus pseudomisellus* sp. nov. (31 the holotype). — Nos. 32–33. *Chorebus avesta* (NIXON) ex *Liriomyza morio* BRISCHKE, Germany: 32, Stuttgart; 33, Mühlhausen. — 34. Nos. *Chorebus varuna* (NIXON) ex *Metopomyza flavonotata* HALIDAY, Poland. — Nos. 35–36. *Chorebus trilobomyzae* sp. nov. ex *Trilobomyza labiatarum* HENDEL: 35, Brookman's Park, England; 36, München, Germany.

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