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

II. The parasites of *Agromyza* FALLÉN[2]

With textfigures 39—77

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Introduction

The first part of this paper (GRIFFITHS, 1964)[2] dealt with general questions of the taxonomy, biology and evolution of the Alysiinae, with particular reference to the species of the tribe Dacnusini which are parasites of the Agromyzidae. This second part is concerned to establish the identity of the European species which are parasites of *Agromyza* FALLÉN. Fairly extensive material has been available of the parasites of the Gramineae-feeding species (provisionally termed the *nigripes/ambigua* group), the *A. reptans* group and the *A. rubi* group: but only very few parasites have been studied from the numerous *Agromyza* spp. attacking Papilionaceae. Another important gap in the information is the absence of parasite material from *A. cinerascens* MACQUART and the closely related *A. intermittens* BECKER, which are not monophyletic with the other Gramineae-feeding species but probably belong to the *rubi*-group.

The existing concept of *Agromyza* is unlikely to be monophyletic since its distinction from the other genera of Agromyzinae (*Japanagromyza*, *Ophiomyia*,

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Melanagromyza and *Penetagromyza*) is based on plesiomorph characters, i.e. the number of dorsocentral bristles and the white halteres. A breakdown of the "genus" according to the principles of phylogenetic systematics has not yet been attempted. For the purpose of classifying host ranges and comparing host association the customary concept of *Agromyza* has been considered below to consist of four main groups or "natural genera", as shown in Table 5. Two of these four groups, the *nigripes/ambigua* group and the *reptans* group, have been the subject of recent partial revisions (GRIFFITHS, 1963a, SPENCER, 1963 and NOWAKOWSKI, 1964) and may be accepted with confidence as monophyletic. The other two concepts should however be regarded as very provisional. The *Agromyza rubi* group includes species whose aedeagus contains a simple unfolded distiphallus and often a very long right paraphallus. I have derived the concept from SASAKAWA (1958 and 1961). But it is not clear if it represents a monophyletic group as it stands and the relationships between the species included in it and the genus *Japanagromyza* require further study. All species attacking Papilionaceae whose genitalia I have examined have a very similar form of aedeagus, which suggests that they are closely related, but I have not made any studies of their affinity with other groups.

The following abbreviations have been used in the breeding records to indicate the location of material:

BM — British Museum (Natural History), London, England
GCDG — the author's personal collection
HD — Hope Department, Oxford, England
KB — Universitetets Zoologiske Museum, København, Denmark
Lund — Zoological Institute, University of Lund, Sweden
PAN — Polish Academy of Sciences, Warsaw, Poland
Poznan — Institute of Systematic Zoology, Adam Mickiewicz University, Poznan, Poland
Stgt — Staatliches Museum für Naturkunde, Ludwigsburg, near Stuttgart, Germany
Wien — Naturhistorisches Museum, Wien, Austria

Other abbreviations are:

ex. — examples
em. — emerged
leg. — legit (i.e. collected).

The collector's name is stated for all material except that bred by the author.

The policy followed in giving references and synonymies at the head of the description of each species is as follows. All synonymies or nomenclatorial amendments of which I am aware are stated. But otherwise I have only given the references of descriptions which I judge to be of taxonomic importance (generally those of MARSHALL and NIXON). No attempt has been made to list references in check-lists, catalogues or faunal lists which do not contain descriptions.

The wing drawings in this Part are of better quality than those given in Part I through the use of a projector kindly made available to me by Mr. P. AITKENHEAD of the Plant Pathology Laboratory, Harpenden, Herts. Before drawing all wings were mounted between two glass coverslips.

Acknowledgements to the many people who have helped me with the loan or gift of material have already been given in Part I of this paper.

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Previous Records

The host-parasite lists produced in this paper are intended to supersede previous lists for Europe, not to supplement them. Previous records have been conveniently summarised in FULMEK (1962). I have prepared Table 3 below to explain some of the discrepancies between my list and the records given in that book (the comments exclude changes in the generic nomenclature, which affect nearly every parasite name). Further comments on some of the rejected records may be found under the description of the species concerned, when included in this paper.

Table 3

Earlier Records of Alysiinae parasites of *Agromyza* (after FULMEK, 1962) with comments thereon

Host	Parasite	Comment
A. albipennis MEIGEN	*Antrusa melanocera* THOMSON	refers to *Exotela flavicoxa* (THOMSON)
A. albitarsis MEIGEN	*Dacnusa lateralis* HALIDAY	not accepted
	Rhizarcha stramineipes THOMSON	FAHRINGER's (1922) record referred to an *Opius*, not an Alysiine
A. alnibetulae HENDEL	*Toxelea phryne* NIXON	accepted
A. anthracina MEIGEN	*Dacnusa lateralis* HALIDAY	accepted
	Pachysema abdita HALIDAY	accepted
	Toxelea hera NIXON	accepted
A. apfelbecki STROBL	*Grandia cynariphila* RICCHELLO	accepted (but specific name should be spelt *cynaraphila*)
A. distorta GRIFFITHS	*Antrusa melanocera* THOMSON	refers to *Exotela flavicoxa* (THOMSON)
A. mobilis MEIGEN	*Dacnusa lateralis* HALIDAY	not accepted
A. nana MEIGEN	*Alysia truncator* NEES	not accepted (parasite of Calliphoridae)
	Dacnusa flavipes GOUREAU	GOUREAU's (1851) *"Agromyza nana"* was *Cerodontha* (*Dizygomyza*) *iraeos* (ROBINEAU-DESVOIDY)
	Dacnusa incerta GOUREAU	described from a *Liriomyza* sp. on *Euphorbia*, not recorded from *A. nana* MEIGEN
	Dacnusa misella MARSHALL	not accepted (parasite of *Liriomyza congesta* BECKER)
	Pachysema tristis NEES	not accepted
A. nigripes MEIGEN	*Antrusa melanocera* THOMSON	refers to *Exotela flavicoxa* (THOMSON)
	Dacnusa lugubris NIXON	host was *A. albipennis* MEIGEN
	Dacnusa ninella NIXON	not accepted
	Dacnusa nyctia NIXON	accepted (but spelling should be *nydia*)
	Gyrocampa sp.	not accepted
	Pachysema tristis NEES	not accepted
A. niveipennis ZETTERSTEDT	*Stiphrocera* sp.	significance not known
A. phragmitidis HENDEL	*Dacnusa nydia* NIXON	refers to *Chorebus coxator* THOMSON
A. reptans FALLÉN	*Dacnusa deione* NIXON	host was *A. abiens* ZETTERSTEDT
	Dacnusa lateralis HALIDAY	accepted
	Toxelea hera NIXON	accepted
A. rufipes MEIGEN	*Dacnusa deione* NIXON	hosts were *A.* spp. on Boraginaceae
	Dacnusa rufipes NEES	NEES' name is a nomen dubium (type destroyed)
	Pachysema abdita HALIDAY	hosts were *A.* spp. on Boraginaceae
	Toxelea hera NIXON	host was *A. reptans* FALLÉN

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Table 3 (continued)

Host	Parasite	Comment
Agromyza spp.	*Alysia* spp.	not accepted (parasites of Calliphoridae)
	Chorebus (Gyrocampa) affinis NEES	not accepted
	Dacnusa gracilis NEES	not accepted (parasite of *Psila*)
	Dacnusa lugubris NIXON	parasite of *A. albipennis* MEIGEN
	Dacnusa rotundiventris THOMSON	parasite of *A. distorta* GRIFFITHS
A. spiraeae KALTENBACH	*Dacnusa deione* NIXON	refers to *Chorebus bres* (NIXON)
	Dacnusa eros NIXON	refers to *Chorebus bres* (NIXON)
	Mesora sp.	possibly referred to *Dacnusa evadne* NIXON
	Rhizarcha areolaris HALIDAY	not accepted (parasite of *Phytomyza*)
A. viciae KALTENBACH	*Antrusa melanocera* THOMSON	not accepted
Agromyza and *Phytomyza* (sensu antiquo)	*Alysia* sp.	not accepted (parasites of Calliphoridae)
	Dacnusa spec.	record too imprecise to be of value

In a number of cases corrections have been made in this paper to host records given by NIXON (1943—54). Some explanation is perhaps needed here on how I claim to be better able to identify this material than the original author of most of the species concerned. The explanation is that for all except the 1954 part of his paper almost the only bred specimens available to NIXON were from the HAMM collection. This material is badly mounted and many of the specimens appear teneral. NIXON (1948) commented that "due allowance must be made for their limitations as identifiable objects". I have been able to identify HAMM's material with much more confidence because I have had access to other material in good condition bred from the same hosts.

Alysiinae other than Dacnusini

Dapsilarthra is the only genus of Alysiinae containing Agromyzid parasites known to me in Europe which retains the cross-vein *2r–m* (although this is often weak). The most clearly apomorph feature of the genus is its very long antennae (longer than the body length with even the more apical segments at least three times as long as broad). A detailed generic description which will serve for comparison with the other genera of Alysiinae retaining *2r–m* is given by KÖNIGSMANN (1959). The other non-Dacnusine genus is *Grandia*, represented by a single known species, which like the Dacnusini has lost *2r–m*, but can be readily distinguished by its spindle-shaped pterostigma (fig. 5), a feature shared with *Phaenocarpa*, *Alysia* and a number of other genera which seem mainly to contain parasites of Calyptratae.

Dapsilarthra FÖRSTER

Since this genus has recently been revised in detail by KÖNIGSMANN (1959), only a brief summary need be given in this paper. The members of the genus are all parasites of leaf-mining Schizophora and five are parasites of Agromyzidae. The following key (based largely on KÖNIGSMANN's work) may be used for

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identifying the species attacking Agromyzidae, except for *D. gahani* (BAUME-PLUVINIEL) whose characters are inadequately known. Other species are known to attack *Philophylla* (Trypetidae), *Pycnoglossa*[3] and *Pegomyia* (Muscidae) and *Chylizosoma*[4] (Cordyluridae).

Key to species of *Dapsilarthra* attacking Agromyzidae

1 Cell *2Cu* closed (fig. 55 and 56) 2
— Cell *2Cu* widely open apically (fig. 54) 3

2 *1m-cu* rejected from cell $1R_5$: vein *2r* very short (fig. 55). 26—33 antennal segments. Notaulices distinct anteriorly only. Precoxal suture rugose . . . . . *D. rufiventris* (NEES)
— *1m-cu* received into cell $1R_5$: vein *2r* longer (fig. 56). 30—42 antennal segments. Notaulices strongly developed. Precoxal suture represented by a broad punctate impression . . . . . *D. sylvia* (HALIDAY)

3 31—46 antennal segments. Prescutellar suture rugose . . . . *D. balteata* (THOMSON)
— 25—29 antennal segments. Prescutellar suture smooth. . *D. nowakowskii* KÖNIGSMANN

Two of the above species (*rufiventris* and *nowakowskii*) are known only from Phytomyzinae, while the other two species have been bred from *Agromyza* as well as leaf-mining Phytomyzinae. The records from *Agromyza* accepted by me are as follows.

Dapsilarthra sylvia (HALIDAY)

2 ex. from larvae 18. ix. 59 of *Agromyza oycoviensis* BEIGER on *Geranium phaeum*, Ojkov, Poland, em. 20. iv. 60, leg. BEIGER (Poznan).

KÖNIGSMANN (1959) recorded the species from *Phytomyza astrantiae* HENDEL and *P. swertiae* HERING. It seems most closely related to *D. apii* (CURTIS), which is a common parasite of the Trypetid leaf-miner *Philophylla heraclei* LINNAEUS.

Dapsilarthra balteata (THOMSON)

This is a common species and was recorded by KÖNIGSMANN (1959) from four species of *Agromyza* — *A. ferruginosa* WULP, *A. lucida* HENDEL, *A. reptans* FALLÉN and *A. spiraeae* KALTENBACH — on the basis of Polish material bred by Dr. J. T. NOWAKOWSKI (who was responsible for the host identifications). I have personally seen further material bred from the following species of *Agromyza*:

A. arunci HERING — 7 ex. from larvae on *Aruncus silvester*, Kunnersdorf bei Görlitz, Germany, HERING no. 6040 (BM).

A. hendeli GRIFFITHS — 1 ex. from *Phragmites communis*, Woodwalton Fen, Huntingdonshire, England (GCDG).

[3] The species concerned is *D. dictynna* (MARSHALL) which I have bred from *Pycnoglossa flavipennis* (FALLÉN) det. FONSECA (new host record) on *Pteridium aquilinum*.

[4] Four specimens bred from *Chylizosoma* by Prof. E. M. HERING agree substantially with *D. rufiventris* (NEES) except for their large size. I am hesitant to express an opinion on whether they represent the same or a distinct species without more material.

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A. lucida HENDEL — 5 ex. from *Deschampsia caespitosa* in three localities in Herts. and Middlesex, England (GCDG).
A. nigrociliata HENDEL — 1 ex. from *Festuca gigantea*, Scratch Wood, Middlesex (GCDG).
A. oycoviensis BEIGER — 2 ex. from *Geranium phaeum*, Ojcov, Poland, leg. BEIGER (Poznan).

The series from *A. arunci* HERING are unusual in having the petiole brown or yellow, like tergite 3, not contrastingly dark as normally: their antennal segments number 32—33. This species has also been bred frequently from *Cerodontha* (*Poemyza*) spp. and occasionally from other Phytomyzinae.

Grandia GOIDANICH

Grandia cynaraphila (RICCHELLO)

Dacnusa navicularis (NEES) var. *cynaraphila* RICCHELLO, 1928
Grandia cynaraphila (RICCHELLO), GOIDANICH, 1936, NIXON, 1954, DOCAVO ALBERTI, 1955

This species is known from Spain, Sardinia and Italy as a parasite of *Agromyza apfelbecki* STROBL (= *A. andalusiaca* STROBL), a pest of artichoke (*Cynara scolymus*). Very detailed descriptions of the adult have appeared in RICCHELLO (1928) and GOIDANICH (1936), and need not be repeated here. RICCHELLO (1928) also described the larva. My reasons for not accepting this species as a member of the Dacnusini have already been stated in Part I of this paper (GRIFFITHS, 1964).

Dacnusini

Descriptions of four Dacnusini parasites of *Agromyza* — *Protodacnusa tristis* (NEES)[5], *Chorebus nydia* (NIXON), *C. coxator* (THOMSON) and *C. spenceri* GRIFFITHS — have previously been given in Appendices VI and III of the first part of this paper (GRIFFITHS, 1964) and are therefore omitted from the following acount. For species which were described by NIXON (1943—54) only a brief description of the more important characters is offered, but new species and others not included in that work are described at greater length. To avoid excessive verbal description tables of biometric data have again been prepared to include characters which admit of simple numerical expression. The species of Dacnusini bred from *Agromyza* are included in four genera, *Protodacnusa* (see Part I), *Exotela*, *Dacnusa* and *Chorebus*. None of the species recorded in this paper have long ovipositors (since the hosts are leaf-miners), and therefore no mention has been made of ovipositor length in the individual descriptions.

Exotela FÖRSTER

Exotela arunci spec. nov.

Colour. Antennae with scape, pedicel and basal flagellar segments pale. Mandibles yellow or yellow-brown. Clypeus brown or black. Labrum yellow. Palpi deep yellow, sometimes a little infuscated. Legs largely deep yellow, but the

[5] Since that account was written three further bred specimens have come to light, bred from *Agromyza nigrociliata* HENDEL on *Triticum sativum*, Kunnersdorf, near Görlitz, Germany, em. 18. ii. 53, HERING no. 5858 (BM).

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fifth tarsal segments of legs 1 and 2, and the entire tarsi and apex of the tibiae of the hind legs are rather obscurely infuscated. Gaster largely dark, but tergite 3 is yellow-brown basally in most specimens.

Morphology. Head very strongly transverse (see the table of biometric data). Ocelli forming a more or less equilateral triangle. Face shallowly sculptured with fine, mostly upstanding pubescence. Vertex and temples with 3—4 rows of short fine hairs. Antennal segments: ♂, 25; ♀, 24—27. Mandibles 3-toothed, not unusually expanded.

Mesoscutum (fig. 74) with unusually short pubescence evenly distributed over most of its surface: notaulices almost or completely absent. Precoxal suture of mesepisternum represented by a short smooth groove. Metapleural pubescence sparse, directed towards the hind coxa. Propodeum strongly shining, its pubescence fine and inconspicuous. Petiole shorter than in *E. nowakowskii* sp. nov., with sparse inconspicuous pubescence. Tergites 3 and 4 with short pubescence evenly distributed over their surface.

Wing (fig. 44) with *1m–cu* received into cell R_s: Cu_{1b} weak or lost in all except the Tatry specimen.

Breeding records

Host 1 — *Agromyza arunci* HERING

Holotype ♀, paratype ♂ from larvae 27. vi. 62 on *Aruncus silvester*, Kostlan, Haselgraben, near Linz (Donau), Upper Austria, about 400 metres, em. 25. viii. 62 (♂) and 19. ix. 62 (♀), HERING no. 6789 (GCDG). Paratype ♀ from larva 4. ix. 56 on *Aruncus silvester*, Spadowiec Valley, Tatry, Poland, pupated 9. ix., em. 22. iv. 57, leg NOWAKOWSKI (PAN). 3 paratypes from larvae on *Aruncus silvester*, Kunnersdorf, near Görlitz, Germany, em. 4. iii. 53, HERING no. 5854 (BM).

Host 2 — *Agromyza spiraeoidearum* HERING

Paratype ♀, München (Englischer Garten), em. 7. v. 54, leg. GROSCHKE (Stgt)[6]. 12 paratypes from larvae on *Spiraea ulmifolia*, Rostock, Mecklenburg, Germany, em. 11.—18. ii. 53, HERING no. 5868 (BM).

Important characters for recognising this species are the form of the precoxal suture, the mesoscutal pubescence, and the dark clypeus but pale basal flagellar segments. *E. nowakowskii* sp. nov. may be distinguished by its yellow clypeus, entirely dark flagellum and more elongate petiole.

Exotela ? dives (NIXON)

compare *Toxelea dives* NIXON, 1954

Colour. Palpi yellow. Face and clypeus dark. Scape, pedicel and basal flagellar segments contrastingly pale. Legs largely deep yellow, with only the apical tarsal segments infuscated.

Morphology. 24 antennal segments (♀). Mesoscutum with pubescence over its anterior face and central lobe only: notaulices almost lost. Mesepisternum

[6] Since GROSCHKE does not state the food-plant on his label it is possible that the host in this case too was *A. arunci* HERING (which was described as a subspecies of *A. spiraeoidearum* HERING), but I think it more likely that the true *A. spiraeoidearum* HERING is meant.

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with broad rugose precoxal suture. Metapleuron with sparse pubescence directed towards the hind coxa. Petiole almost bare. Base of tergite 3 pubescent.

Wing (fig. 46) with *1m–cu* clearly received into cell R_s: Cu_{1b} retained.

Breeding records

Host — *Agromyza viciae* KALTENBACH

1 ex. from larva on *Vicia sepium*, Linz, Upper Austria, em. 17. ii. 63 (HERING no. 6906) (GCDG).

This specimen agrees in most respects with NIXON's original material of *dives*, but the mandibles are not so large and the head a little more transverse (see the table of biometric data for detailed comparison). Whether it represents the same species I cannot say without more material.

Exotela flavicoxa (THOMSON)

Dacnusa (*Dacnusa*) *flavicoxa* THOMSON, 1895
Dacnusa melanocera THOMSON *sensu* NIXON, 1937 (not *Dacnusa* (*Dacnusa*) *melanocera* THOMSON, 1895)
Antrusa melanocera (THOMSON) *sensu* NIXON, 1943 and 1954 (not *Dacnusa* (*Dacnusa*) *melanocera* THOMSON, 1895)
Exotela flavicoxa (THOMSON), GRIFFITHS, 1964

Colour. Flagellum entirely dark. Palpi golden yellow. Legs largely deep golden yellow, but all tarsi, the apex of the hind tibiae and occasionally the base of the hind coxae are infuscated (in one specimen the hind coxae are dark brown and the hind legs rather extensively darkened).

Morphology. Antennal segments: ♂, 30—34; ♀, 28—32 (bred specimens only). Mandibles with three about equally developed teeth. Mesoscutum bearing short pubescence over most of its surface, with notaulices reaching to about its middle. Mesepisternum with deeply impressed rugose precoxal suture, but this is short and does not extend to its hind margin. Metapleuron (fig. 16) with evenly distributed pubescence. Propodeum strongly shining with only fine inconspicuous pubescence. Petiole with a distinct median keel: its pubescence sparse and inconspicuous, but usually distributed over its entire surface. Tergite 3 often with 2 or 3 rows of hairs and sometimes some rugosity at its base, but both these features are lacking in a few specimens.

Wing (fig. 42). R_s obviously sinuate: pterostigma rather elongate: *1m–cu* usually rather closely approximated to cell R_s, but this is subject to individual variation: Cu_{1b} retained.

Breeding records

Host 1 — *Agromyza albipennis* MEIGEN

3 ex. from puparia 5, 6. ix on *Phalaris arundinacea*, Ash Vale, Surrey, England, em 12. x, 14. iii and 3. iv: 3 ex. from puparia 15. viii. 54, same plant and locality, em. 28. viii (2) and 28. ix. 54 (BM and GCDG). 1 ex. from larva 21. viii. 53, same plant, Woodside Park,

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Middlesex, England, em. 2. x. 53 (BM). 1 ex. from puparium 22. viii. 60, same plant, Woodwalton Fen, Huntingdonshire, England, em. 4. ix. 60 (GCDG). 1 ex. from puparium 25. x. 24, Oxford, England, em. 18. v. 25, leg. HAMM (HD).

Host 2 — *Agromyza nigripes* MEIGEN

4 ex. from puparia 15. viii. 54 on *Glyceria maxima*, Ash Vale, Surrey, em. 25. viii, 2. ix and 3. ix. 54 (2): 21 ex. from larvae and puparia 5, 6. ix on *Glyceria maxima* and *G. fluitans*, same locality, em. ix—x and iv—v (BM and GCDG). About 20 ex. from the SCHLICK, collection (Denmark) with puparia of *A. nigripes* MEIGEN (KB) (localities Randers (Jutland) Donse and Damhusmose (Sealand) and Copenhagen). 1 ex. from larva 25. vii. 64 on *Glyceria aquatica*, Kertyzy, Zukowo, Poland, em. 15. viii. 64, leg. NOWAKOWSKI (PAN).

Host 3 — *Agromyza lucida* HENDEL (= *airae* KARL)

5 ex. from larvae and puparia 5. ix. 60 on *Glyceria maxima*, Ash Vale, Surrey, em. 19. iii to 7. iv. 61 (GCDG).

Host 4 — *Agromyza distorta* GRIFFITHS

2 ex. from larvae and puparia 5, 6. ix on *Glyceria maxima*, Ash Vale, Surrey, em. 3. x (BM and GCDG).

Host 5 — *Cerodontha* (*Poemyza*) *incisa* MEIGEN

1 ex. from larva 21. vi. 61 on *Phalaris arundinacea*, Woodwalton Fen, Huntingdonshire, em. 10. vii. 61: 2 ex. from larvae 5. ix. 60, same plant, Ash Vale, Surrey, em. 13, 17. iii. 61 (GCDG).

Some of the above records have previously been published (as *Antrusa melanocera*) in GRIFFITHS (1956, 1963a and 1963b). In GRIFFITHS (1956) the host-plant of *Agromyza albipennis* MEIGEN was erroneously given as *Phragmites communis*, but this has now been corrected to *Phalaris arundinacea*. The reference to *Agromyza nigripes* MEIGEN on *Phragmites* given in NIXON (1954) also referred to *A. albipennis* MEIGEN on *Phalaris*. In GRIFFITHS (1963a) it was suggested that individuals bred from *A. lucida* HENDEL might represent a distinct species on account of their distinctive longitudinal sculpture of the petiole. But this view is now withdrawn, as in further material studied the sculpture of the petiole shows a wide range of variation which is not correlated with host association. The synonymies have been explained in Part I (GRIFFITHS, 1964).

Exotela hera (NIXON), **comb. nov.**

Dacnusa hera NIXON, 1937
Toxelea hera (NIXON), NIXON, 1954

Colour. Palpi yellow. Basal flagellar segments only slightly paler than the rest. Legs largely yellow, but tarsi and apex of hind tibiae infuscated.

Morphology. Antennal segments: ♂, 29—32; ♀, 28—31. Mesoscutum with pubescence mainly along the course of the notaulices and on the anterior part of its central lobe: notaulices usually distinct only anteriorly. Precoxal suture broad and rugose. Metapleuron bearing long hairs directed towards the hind coxa. Petiole longitudinally striate, almost bare.

Wing (fig. 43) with vein *Im–cu* interstitial or received into cell R_s:Cu_{1b} retained.

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Breeding records

Host 1 — *Agromyza reptans* FALLÉN

3 ex. from puparia 17. ix. 24 on *Urtica dioica*, Oxford, England, em. 5—14. v. 25, leg. HAMM (HD).

Host 2 — *Agromyza anthracina* MEIGEN

2 ex. from larvae 12. ix. 53 and 11. x. 53 on *Urtica dioica*, Boxhill, Surrey, England, em. 20. x. 53 and 21. iv. 54 respectively (BM). 1 ex. from larva 8. xi. 53 on *Urtica dioica*, Brookman's Park, Herts., England, em. 18. vii. 54 (BM).

Host 3 — *Agromyza urticae* NOWAKOWSKI

1 ex. from larva 7. vii. 55 on *Urtica dioica*, Granica, Kampinoska Forest, Poland, pupated 9. vii, em. 11. viii. 55, leg. NOWAKOWSKI (PAN). 1 ex. from larva 24. vii. 61 on *Urtica dioica*, Kraków Ravine, Tatry, Poland, pupated 29. vii, em. 28. viii. 61, leg. NOWAKOWSKI (PAN). 2 ex. from larvae 9. xi. 52, Hampstead, London, em. 27. vii and 2. viii. 53, leg. SPENCER (BM). 8 ex. from larvae 8. viii. 54 on *Urtica dioica*, Boxhill, Surrey, England, em. 1—4. ix. 54 (BM).

In addition I have received three Swedish specimens, Hedlandet, Södermanland, em. 13. vii. 43, 25. viii and 26. viii. 43 (Lund), whose host is given as *Agromyza reptans* (leg. and det. LUNDQVIST), but whether this refers to the true *reptans* cannot be checked in the absence of puparia.

A number of the above records were given in GRIFFITHS (1956), but the identifications of "*Agromyza reptans*" given have been corrected to *A. urticae* NOWAKOWSKI. HAMM's identification of the host of his series as "*A. rufipes*" quoted in NIXON (1937 and 1954) refers in fact to the true *A. reptans* FALLÉN, which can be readily distinguished on puparial characters from *urticae* and *anthracina*.

***Exotela nowakowskii* spec. nov.**

Colour. Antennae with scape and pedicel pale, but all flagellar segments dark. Mandibles pale yellow. Clypeus and labrum yellow. Palpi yellow. Legs largely yellow, but all tarsi and, at least apically, the hind tibiae infuscated. Gaster entirely dark.

Morphology. Ocelli forming a more or less equilateral triangle. Face shallowly sculptured, with long upstanding pubescence. Vertex and temples with 2—3 rows of fine hairs. Antennal segments: ♂, 29; ♀, 26—28. Mandibles 3-toothed, not unusually expanded.

Mesoscutum with pubescence over most of its surface (fig. 75): notaulices distinct anteriorly or virtually absent. Precoxal suture of mesepisternum almost or completely absent. Metapleural pubescence long and sparse, directed towards the hind coxa. Propodeum strongly shining, its pubescence fine and inconspicuous. Petiole (fig. 77) rather elongate, with conspicuous though sparse pubescence. Tergite 3 pubescent basally, in some specimens also sculptured at its extreme base.

Wing (fig. 45) with *1m–cu* received into cell R_s: Cu_{1b} retained.

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Breeding records

Host — *Agromyza spiraeae* KALTENBACH

Holotype ♂, paratype ♀ from larvae 5. ix. 56 on *Rubus idaeus*, Łysanki, Tatry, Poland, pupated 5. ix. 56, em. 25. iv. 57, leg. NOWAKOWSKI (PAN). 3♀♀ paratypes from larvae 9. ix. 60 on *Rubus idaeus*, Spadowiec Valley, Tatry, pupated 18. ix., em. 2. v. 61 and 14. v.61 (2 ex.), leg. NOWAKOWSKI (PAN and GCDG). ♀ paratype, Łeba, Pomerania, Poland (host plant unknown), em. 13. v. 61, leg. NOWAKOWSKI (PAN).

This species is similar to *E. arunci* sp. nov. from which it differs mainly in the more elongate petiole, yellow clypeus and entirely dark flagellum. The absence of the precoxal suture readily distinguishes it from all described species of *Exotela* except *E. arunci* sp. nov. and *E. facialis* (THOMSON).

Exotela phryne (NIXON), **comb. nov.**

Toxelea phryne NIXON, 1954

Colour. Palpi yellow. Basal antennal segments usually contrastingly pale. Legs largely yellow but the apex of the hind tibiae, the whole of the hind tarsi and the apical segments of tarsi 1 and 2 are infuscated.

Morphology. Antennal segments: ♂, 27—28; ♀, 26—28. Mesoscutal pubescence (fig. 76) unusually short, lying mainly in two or three rows along the former course of the notaulices: the latter are only very shortly distinct on the anterior part of the mesoscutum. Precoxal suture represented by a long narrow groove, not or only feebly rugose. Metapleural pubescence long and sparse, directed towards the hind coxa. Petiole almost bare.

Wing with *1m–cu* clearly received into cell R_s: Cu_{1b} retained.

Breeding records

Host — *Agromyza alnibetulae* HENDEL

Holotype ♀ from larva 4. x. 53 on *Alnus glutinosa*, Brookman's Park, Herts., England, em. 6. xi. 53 (BM). 2 ex. from larvae 8. vii. 54 on *Alnus glutinosa*, Chippenham Fen, Cambridgeshire, England, em. viii. 54, leg. SPENCER (GCDG).

Exotela spec.

A single specimen of an undescribed species has been sent me by Dr. NOWAKOWSKI, but I do not propose to name it yet as the host has not been identified to species. It may be compared with *E. flavicoxa* (THOMSON) as follows.

Colour. Flagellum entirely dark. Palpi yellow. All coxae shining black: femora and tibiae of first two legs yellow-brown, of hind legs darker brown: all tarsi infuscated.

Morphology. 26 antennal segments (♀). Mandibles rather large, 3-toothed with tooth 1 distinctly expanded. Mesoscutum extensively pubescent with notaulices reaching to its middle. Metapleuron with irregular sculpture and fine inconspicuous pubescence. Petiole shining, with longitudinally striate sculpture

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and a distinct median keel: its pubescence fine and inconspicuous. Tergite 3 covered with about 4 rows of fine hairs.

Wing with *1m–cu* not very closely approximated to cell R_s.

Breeding records

Host — *Agromyza* spec. (probably *ambigua* group)

1 ex. from larva 23. vi. 54 on *Agropyron repens*, Tomianki, Kampinoska Forest, Poland, pupated 25. vi. 54, em. 13. v. 55, leg. NOWAKOWSKI (PAN).

Exotela interstitialis (THOMSON), another dark-legged species, differs in its clearly 4-toothed mandibles (fig. 35), dark palpi and vestigial notaulices.

Exotela spec.

I have also received a single headless male of an *Exotela* sp. (with *1m–cu* received into cell R_s), with the following data:

from *Agromyza nana* MEIGEN on *Trifolium* sp., Hedlandet, Södermanland, Sweden, em. 4. iii. 44, leg. LUNDQVIST (Lund).

An identification is not possible without further material.

Dacnusa HALIDAY

Dacnusa abdita (HALIDAY)

Alysia (*Dacnusa*) *abdita* HALIDAY, 1839
Dacnusa lepida MARSHALL, 1891, 1895 and 1897
Dacnusa (*Dacnusa*) *incidens* THOMSON, 1895
Dacnusa abdita (HALIDAY), NIXON, 1937, GRIFFITHS, 1964
Pachysema abdita (HALIDAY), NIXON, 1954
Pachysema abditum (HALIDAY), FISCHER, 1961

Colour. Palpi yellow. Antennae with yellow scape, but dark flagellum. Front and middle legs yellow, only the tarsi sometimes infuscated: hind legs with yellow coxae and femora, but the tarsi and tibiae at least apically infuscated. Gaster sometimes yellow-brown beyond petiole, but usually entirely dark.

Morphology. Antennal segments: ♂, 32—36; ♀, 30—36. Mesoscutum with pubescence over most of its surface: notaulices virtually absent. Precoxal suture absent. Metapleuron and propodeum shining, only sparsely pubescent. Petiole with sparse upstanding pubescence. Tergites 3 and 4 with scattered hairs over most of their surface.

Wing (figs. 47 and 48) with wedge-shaped pterostigma in both sexes, larger and darker in the male: *1m–cu* very closely approximated to cell R_s or interstitial.

Breeding records

Host 1 — *Agromyza anthracina* MEIGEN

5 ex. from larvae 11. x. 53 on *Urtica dioica*, Boxhill, Surrey, England, em. 7—18. xii. 53 (BM). 1 ex. from larva 8. xi. 53 on *Urtica dioica*, Brookman's Park, Herts., England, em. 24. i. 54 (BM).

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Host 2 — *Agromyza urticae* NOWAKOWSKI

2 ex. from larvae 15. x. 61 on *Urtica dioica*, Cambridge, England, em. 6, 13. iv. 62 (GCDG).

Host 3 — *Agromyza abiens* ZETTERSTEDT

3 ex. from puparia 14. vii. 24 and 6. vii. 25 (2) on *Cynoglossum officinale*, Tubney, Berks., England, em. 1. ix. 24 and 28., 30. viii. 25 respectively, leg. HAMM (HD). 2 ex. from larvae 20. vii. 53 on *Cynoglossum officinale*, Weeting, Suffolk, England, em. 30. ix. 53, leg. SPENCER (BM). 3 ex. from *Myosotis intermedia*, Berlin Botanical Gardens, Germany, em. 22. iii. 52 (HERING no. 5759) (GCDG).

Host 4 — *Agromyza lithospermi* SPENCER

1 ex. from larva 25. vii. 54 on *Cerinthe minor*, Névache, Alpes Maritimes, France, em. ix. 54, leg. SPENCER (GCDG).

In addition I have seen material from the HAMM collection (HD) bred from an *Agromyza* sp. on *Urtica dioica* (either *A. urticae* NOWAKOWSKI or *A. anthracina* MEIGEN) with the following data: 6 ex. from puparia 17. ix. 24, Oxford, England, em. 24. xi—18. xii. 24 (3 ex.) and 17. v. 25 (3 ex.): 1 ex. from puparium 21. vi. 26, same locality, em. x. 26: 1 ex. from puparium 3. xi. 27, same locality, em. 23. iii. 28: 1 ex. from puparium 20. vi. 31, Bagley Wood, Oxford, em. viii. 31.

A number of the above records have previously been published (NIXON, 1937 and GRIFFITHS, 1956), but the host identifications have needed revision.

Dacnusa maxima (FISCHER), **comb. nov.**

Pachysema maximum FISCHER, 1961

This form, here provisionally accepted as a distinct species differs from *D. abdita* (HALIDAY) in its extremely large size (see the table of biometric data) and more numerous antennal segments (♂, 38—41; ♀, 38—40).

Breeding records

Host — *Agromyza abiens* ZETTERSTEDT

1 ex. from larva 13. ix. 61 on *Cynoglossum officinale*, Llangennydd, Gower, Wales, em. 15. x. 61 (GCDG). 1 ex. from larva on *Pulmonaria officinalis*, Mörkweden, Mecklenburg, Germany, em. 4. ix. 62 (leg. BUHR, HERING no. 1873) (GCDG).

FISCHER (1961) described *Pachysema maximum* on the basis of five caught Austrian specimens. The two bred specimens noted above agree with his material in their large size (they are the largest Dacnusini parasites of Agromyzidae known to me) and very numerous antennal segments. However I can find no other constant differences between this species and *abdita* (FISCHER has suggested some small differences in the wing venation, but I have been unable to find any clear distinction in this respect in the material before me). Since the material of *maxima* available is very small, I am not able to give a firm opinion at present on whether it is a distinct species or only a form of *abdita*.

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Dacnusa dryas (NIXON), **comb. nov.**

Rhizarcha dryas NIXON, 1948

Colour. Palpi yellow or yellow-brown. Scape and pedicel partly yellow-brown, but antennae otherwise dark. Legs largely golden yellow or yellow-brown, only the apical tarsal segments strongly infuscated.

Morphology. Head and mandibles larger than in *D. areolaris* (NEES) and related species (see NIXON, 1948). Antennal segments: ♀, 22, 24. Mesoscutum with pubescence over about its anterior third, but thereafter almost bare: notaulices absent. Short rugose precoxal suture present. Metapleuron clothed with long dense hairs directed towards the hind coxa. Propodeum and petiole likewise clothed with long dense hairs, but tergite 3 almost bare. Petiole large, strongly widened towards its apex.

Wing (fig. 53) with elongate pterostigma, somewhat broadened towards its apex: vein *2r* branching from very close to the base of the pterostigma: R_s strongly sinuate. Cell *2Cu* completely closed at its lower distal corner by Cu_{1b}.

Breeding records

Host — *Agromyza frontella* RONDANI

2 ex. from larvae 14. viii. 54 on *Medicago sativa*, Eynsford, Kent, England, em. 4 and 6. ix. 54 (GCDG).

Dacnusa evadne NIXON

Dacnusa evadne NIXON, 1937
Pachysema evadne (NIXON), NIXON, 1954

Colour. Palpi yellow. Antennae usually entirely dark. Legs entirely yellow, except that the apical tarsal segments and usually the extreme base of the hind coxae are infuscated.

Morphology. Antennal segments: ♂, 27—32; ♀, 29—33. Mesoscutum with pubescence over its central lobe, but the lateral lobes largely bare: notaulices usually distinct anteriorly. Precoxal suture absent. Metapleuron and propodeum shining, only sparsely pubescent. Petiole similar to that of *D. abdita* (HALIDAY), but more sparsely pubescent.

Wing (figs. 49 and 50) with more or less parallel-sided pterostigma, which is larger and darker in the male: *1m–cu* interstitial or almost so.

Breeding records

Host — *Agromyza spiraeae* KALTENBACH

3 ex. from larvae 21. vi. 61 on *Filipendula ulmaria*, Woodwalton Fen, Huntingdonshire, England, em. 24—27. ix. 61 (GCDG). 1 ex. from puparium 27. ix. 24 on *Filipendula* sp., Cothill, Berks., England, em. 17. v. 25, leg. HAMM. (HD). 3 ex. from larvae 25. ix. 60 on *Filipendula ulmaria*, Piekto near Sztum, Pomerania, Poland, pupated 30. ix, em. 19—20. iv. 61, leg. NOWAKOWSKI (PAN). 1 ex. from larva 25. ix. 55 on *Filipendula ulmaria*, Warszawa-Młociny, Poland, pupated 4. x, em. 3. iv. 56, leg. NOWAKOWSKI (PAN). 1 ex. from larva

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4. vii. 56 on *Filipendula ulmaria*, Sieraków Reservation, Kampinoska Forest, pupated 5. vii, em. 14. ix. 56, leg NOWAKOWSKI (PAN). 1 ex. from larva on *Filipendula ulmaria*, Hedlandet, Södermanland, Sweden, em. 12. viii. 42, leg. LUNDQVIST (Lund).

Dacnusa laeta (NIXON), **comb. nov.**

Pachysema laeta NIXON, 1954

Colour. Palpi yellow. First three antennal segments and base of fourth contrastingly bright yellow. Legs entirely yellow except for the fifth tarsal segments.

Morphology. Antennal segments: ♂, 22—25; ♀, 22—24. Mesoscutum with fine pubescence over its anterior face and central lobe, but lateral lobes largely bare: notaulices distinct anteriorly only. Precoxal suture represented by a broad more or less oblong area of rugosity. Metapleuron and propodeum shining, only sparsely pubescent. Petiole sparsely pubescent, similar to that of *D. evadne* NIXON.

Wing (figs. 51 and 52) with strongly dimorphic pterostigma, larger and blackened in the male. Vein *1m–cu* usually distinctly rejected from cell R_s.

Breeding records

Host 1 — *Agromyza arunci* HERING

1 ex. from larva 4. ix. 56 on *Aruncus silvester*, Spadowiec Valley, Tatry, Poland, pupated 5. ix., em. 28. iv. 57, leg. NOWAKOWSKI (PAN).

Host 2 — *Agromyza spiraeae* KALTENBACH

1 ex. from larva 9. ix. 60 on *Rubus idaeus*, Spadowiec Valley, Tatry, Poland, pupated 18. ix, em. 15. ix. 60, leg. NOWAKOWSKI (PAN).

Dacnusa spec. compare ***lissos*** (NIXON)

Colour. Antennae entirely dark. Legs largely yellow-brown, with the tarsi and the apex of the hind tibiae infuscated.

Morphology. 29 antennal segments (♀). Thorax 1.2 times as long as high. Precoxal suture absent. Petiole 1.3 times as long as wide.

Wing with pterostigma longer than the metacarp; cell $2R_1$ reaching almost to the wing-tip; R_s strongly sinuate; *1m–cu* widely rejected from cell R_s; and Cu_{1b} retained.

Breeding record

Host — *Agromyza* ? *nana* MEIGEN

1 ex. from larva 24. vii. 54 on *Trifolium* sp., Vallée de Valoise, Alpes Maritimes, France, leg. SPENCER (GCDG).

This specimen has been largely immersed in adhesive, and as a result some characters, especially the thoracic pubescence, cannot be studied. In the circumstances no identification can be offered, but the wing venation seems identical with that of *Dacnusa lissos* (NIXON), **comb. nov.** (see NIXON, 1954).

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Dacnusa maculipes THOMSON

In the HAMM collection (HD) is what appears to be a very large female (with 25 antennal segments) of this species, which is normally a parasite of leaf-mining Phytomyzinae. The data are: from puparium 6. vii. 25 of *Agromyza abiens* ZETTERSTEDT on *Cynoglossum officinale*, Tubney, Berks., England, em. 13. ix. 25. For a detailed description of this species and its relatives reference should be made to NIXON (1948).

Chorebus HALIDAY

All the *Chorebus* spp. described in this paper belong to the *ovalis/lateralis* complex and do not show much variation in their wing venation, which may be assumed to be similar to that shown in fig. 39 when not specifically mentioned in the descriptions.

***Chorebus baeticus* spec. nov.**

Colour. Antennae entirely dark. Both palpi infuscated. Mandibles dark brown. Labrum brown. All coxae metallic black: trochanters and base of the femora of all legs also infuscated: tibiae and femora of legs 1 and 2 otherwise yellow-brown, but the hind femora are almost entirely black and the hind tibiae are contrastingly infuscated in their apical quarter: tarsi of all legs more or less infuscated. Gaster entirely dark.

Morphology. Ocellar triangle with its base only slightly longer than its sides. Frons bare apart from a few weak hairs along the eye-margin. Face more or less smooth, with sparse inwardly directed hairs at its sides, but bare along its centre: along the eye-margin are a few downwardly directed hairs. Vertex and temples with short inconspicuous hairs in 2—3 rows. Antennae with 28 segments (♀). Mandibles (compare fig. 57) large with 4 clearly defined teeth of which teeth 1 and 2 are much expanded.

Mesoscutum without notaulices and with the posterior fovea weakly developed: its pubescence is thin and erect, so that it has a very shining appearance: there are 5—6 rows of hairs on its central lobe reaching to about its middle, but the lateral lobes are bare. Sides of pronotum with a few weak hairs. Mesepisternum with narrow, rugose precoxal suture: epicnemial suture showing as a shallow rugose furrow along its anterior edge. Metapleural swelling poorly defined, rather smooth and shining; the surrounding pubescence shows some tendency to form a rosette, but this is not as well developed as in most species of *Chorebus*.

Propodeal pubescence short and adpressed, but not as dense as in many *Chorebus* spp. (the rugosities beneath are still partly visible). Petiole more or less parallel-sided, with irregular coarse sculpture, bearing only a few scattered hairs.

Breeding records

Host — *Agromyza baetica* GRIFFITHS

Holotype ♀ from larva 25. iv. 55 on *Phragmites communis*, Algeciras, Spain, em. 25. v. 55, leg. SPENCER (GCDG).

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This species was briefly mentioned in GRIFFITHS (1963a) as "*Dacnusa* spec. *e*". Apart from the difference in the metapleural pubescence it is very similar to some of the other dark-legged species of *Chorebus*, such as *solstitialis* and *groschkei* (the differences are given in the keys).

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

Dacnusa bres NIXON, 1944

Colour. Palpi yellow-brown, often partly infuscated. Flagellum entirely dark. Legs largely yellow-brown or red-brown, with all coxae infuscated: hind legs with tarsi, the apical third of the tibiae and often the apex or dorsal edge of the femora infuscated.

Morphology. Antennal segments: ♂, 29—36; ♀, 30—34. Mandibles 4-toothed, usually somewhat expanded towards their apex. Mesoscutum roughened anteriorly, with pubescence over its central lobe and the anterior part of its lateral lobes: notaulices vestigial or absent. Metapleural swelling shining, only shallowly rugose. Propodeum with dense adpressed pubescence. Petiole (fig. 68) narrow with evenly distributed pubescence.

Breeding records

Host — *Agromyza spiraeae* KALTENBACH

7 ex. from larvae 19. vi. 62 on *Filipendula vulgaris* in my garden at Barnet, Herts., em. 24—31. viii. 62 (GCDG). 1 ex. from larva on *Potentilla palustris*, Hedlandet, Södermanland, Sweden, em. 13. viii. 43, leg. LUNDQVIST (Lund). 7 ex. from puparia 7. x. 22 on *Potentilla anserina*, Oxford, England, em. 16—27. iv. 23 (6 ex.) and 20. ix. 23, leg. HAMM (HD). 2 ex. from puparia 6. xi. 22 on *Potentilla* sp., Oxford, em. 9. v. 23, leg. HAMM (HD). 1 ex. from larva v—vi. 64 on *Fragaria* × *ananassa*, Treradgin, St. Dominic, Cornwall, em. 13. ix. 64, leg. MORGAN (GCDG). 1 ex. from larva 10. vi. 65 on *Fragaria vesca*, Mullagh More, Clare, Ireland, em. 30. vi. 65 (GCDG). 2 ex. from larvae vii. 53 on *Agrimonia* spp., Kew Gardens, London, em. 21—24. ix. 53, leg. SPENCER (BM). 3 ex., Blackheath, London, em. 25—30. ix. 53, leg. SPENCER (BM).

Chorebus cinctus (HALIDAY)

Alysia (*Dacnusa*) *cincta* HALIDAY, 1839
Dacnusa cincta (HALIDAY), MARSHALL, 1891, 1895 and 1897, NIXON, 1937 and 1944
Dacnusa (*Dacnusa*) *castaneiventris* THOMSON, 1895
Chorebus cinctus (HALIDAY), GRIFFITHS, 1964

Colour. Legs and palpi largely golden yellow. Basal flagellar segments usually yellowish. Gaster beyond petiole red-brown or yellow-brown.

Morphology. Antennal segments: ♂, 41—45; ♀, 38—44. Mandibles clearly 4-toothed. Mesoscutum with fine pubescence covering its central lobe and the front half of the lateral lobes: notaulices distinct to about its middle. Precoxal suture broad. Metapleural swelling rugose. Propodeal pubescence sparse by comparison with many species of *Chorebus*. Petiole (compare fig. 63) broadened towards its apex, its pubescence very sparse.

Breeding records

Host — *Agromyza lucida* HENDEL (= *airae* KARL)

4 ex. from larvae 6. viii. 54 on *Deschampsia caespitosa*, Brookman's Park, Herts., England, em. 1. ix. 54 and 9—10. v. 55: 2 ex. from larvae 7. vii. 62, same plant, Scratch Wood, Midd-

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lesex, England, em. 1. viii. 62 and 11. v. 63: 1 ex. from larva 30. vi. 62, same plant and locality, em. 30. vii. 62: 1 ex. from larva 12. viii. 62, same plant, Hadley Wood, Middlesex, em. 5. ix. 62: 1 ex. from puparium 5 ix. 60 on *Glyceria maxima*, Ash Vale, Surrey, England, em. 3. v. 61 (BM and GCDG). 3 ex. from SCHLICK collection, Køge, Sealand, Denmark, with puparia probably of *A. lucida* (KB). 3 ex. from larvae 28. vii. 64 on *Glyceria aquatica*, Morska, near Gdansk, Krynica, Poland, em. 17—25. viii. 64, leg. NOWAKOWSKI (PAN). 2 ex. from larvae 26. vi. 64 on *Deschampsia caespitosa*, Pyry, Lasy Kabackie, Warszawa, Poland, em. 17. vii. 64, leg. NOWAKOWSKI (PAN).

Some of these records have already been given in GRIFFITHS (1963a).

Chorebus coxator (THOMSON)

See Part I (GRIFFITHS, 1964).

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

Dacnusa credne NIXON, 1944

Colour. Palpi yellow. Scape, pedicel and basal flagellar segments brown, not much paler than the rest of the flagellum. Legs yellow or ochreous yellow, except that the apical tarsal segments are sometimes infuscated: occasionally the hind coxae are infuscated at their base. Tergites 3 and 4 often brown or reddish.

Morphology. Antennal segments: ♂, 32—36; ♀, 31—36 (bred specimens only). Mandibles 4-toothed, not expanded. Mesoscutum bare over much of its surface, with pubescence over its anterior face, along the course of the notaulices and sparsely on the anterior part of its central lobe. Notaulices usually well defined to the middle of the mesoscutum or beyond. Metapleural swelling rugose, but distinctly shining. Propodeal pubescence dense, closely adpressed. Petiole (fig. 69) narrow, usually with pubescence over most of its surface.

Breeding records

Host 1 — *Agromyza spiraeae* KALTENBACH

1 ex. from larva 5. vii. 57 on *Filipendula ulmaria*, Chippenham Fen, Cambridgeshire, England, leg. SPENCER (GCDG). 1 ex. from larva on *Filipendula ulmaria* (linear mine)[7], Wolfersdorf, Thüringen, Germany, leg. BUHR (GCDG). 1 ex. from larva 30. vi. 55 on *Rubus nutkanus*, Hampstead, London, em. 10. x. 55, leg. SPENCER (GCDG). 2 ex. from larvae 19. vi. 57 on *Geum rivale*, Warszawa-Młociny, Poland, pupated 21—24. vii, em. 7, 8. viii. 57, leg. NOWAKOWSKI (PAN). 1 ex. from larva 23. ix. 60 on *Potentilla anserina*, Łeba, Pomerania, Poland, pupated 25. ix, em. 25. iv. 61, leg. NOWAKOWSKI (PAN). 2 ex. from larvae 25. ix. 55 on *Rubus idaeus*, Warszawa-Młociny, pupated 27—30. ix, em. 5, 6. v. 56, leg. NOWAKOWSKI (PAN). 1 ex. from larva 22. x. 57, same plant and locality, pupated 25. x, em. 4. iii. 58, leg. NOWAKOWSKI (PAN). 2 ex. from larvae 9. ix. 55 on *Filipendula ulmaria*, Sieraków, Kampinoska Forest, pupated 11. ix, em. 8, 13. v. 56, leg. NOWAKOWSKI (PAN). From larvae 15. ix. 55 on *Filipendula ulmaria*, Warszawa-Młociny, 2 ex. pupated 16—19. ix, em. 6, 10. x. 55, and 1 ex. pupated 23. ix, em. 8. v. 56, leg. NOWAKOWSKI (PAN). 1 ex. from larva 9. vii. 54 on *Filipendula ulmaria*, Zaborówek, Kampinoska Forest, pupated 12. vii, em. 13. v. 55, leg. NOWAKOWSKI (PAN). 1 ex. from larva 7. vii. 55 on *Filipendula ulmaria*, Granica, Kampinoska Forest, pupated 9—11. vii, em. 9. viii. 57, leg. NOWAKOWSKI (PAN). 1 ex. from larva 20. viii. 57 on *Filipendula ulmaria*, Kilcot, Gloucs., England, leg. Brace-

[7] HERING (1957) considers that these linear mines may be produced by a distinct species, but until more evidence is obtained I have provisionally referred them to *A. spiraeae* KALTENBACH.

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girdle (GCDG). 2 ex., Kaltental, Stuttgart, Germany, em. 3. ix. 54, leg. GROSCHKE (Stgt). 3 ex. from puparia 9. x. 24 on *Filipendula* sp., Hell Copse, Oxfordshire, England, em. 14. v. 25, leg. HAMM (HD).

Host 2 — *Agromyza alnibetulae* HENDEL

2 ex. from larvae 3. vii. 57 on *Alnus incana*, Warszawa-Młociny, Poland, pupated 4. vii, em. 24. vii and 1. viii. 57, leg. NOWAKOWSKI (PAN). 1 ex. from larva on *Betula* sp., Hedlandet, Södermanland, Sweden, em. 16. ii. 43, leg. LUNDQVIST (Lund).

Host 3 — *Agromyza rubi* BRISCHKE

1 ex. München-Freimann, Germany, em. 29. viii. 53, leg. GROSCHKE (Stgt).

The specimens bred from "*Phytomyza ? melana* HEND." (presumably *P. tetrasticha* HENDEL) referred very doubtfully to this species by NIXON (1944) belong in my opinion to *Chorebus abaris* (NIXON).

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

Dacnusa deione NIXON, 1944

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

Colour. Flagellum entirely dark. Legs largely golden-yellow, the hind coxae usually infuscated at their extreme base. Gaster entirely dark.

Morphology. Antennal segments: ♂, 39—43; ♀, 36—40 (except the Yugoslavian specimen which has 34 only). Mandible usually a little more expanded than in *lateralis*.

Breeding records

Host 1 — *Agromyza abiens* ZETTERSTEDT

2 ex. from larvae 24. vi. 63 on *Echium vulgare*, Cologne Airport, Germany, em. 20. vii. 63, leg. SPENCER (GCDG). 2 ex. from larvae on *Onosme stellulata*, Rostock Botanical Gardens, Mecklenburg, Germany, em. 16. ix. 62 (leg. BUHR, HERING no. 1875) (GCDG). 2 ex. from puparia 6. vii. 25 on *Echium vulgare*, Tubney, Oxford, England, em. 11. ix. 25 (holotype ♀) and 1. ix. 25, leg. HAMM (BM). 2 ex. from larvae 11. x. 52 on *Borago officinalis*, Kew Gardens, Surrey, England, em. 20. iv. 53, 3. v. 53, leg. SPENCER (BM). 1 ex. from larva 3. x. 64 on *Pulmonaria officinalis*, Mühlhausen, Thuringia, Germany, em. 7. x. 64, leg. BUHR (GCDG).

Host 2 — *Agromyza myosotidis* KALTENBACH

2 ex. from larvae 24. vi. 55 on *Myosotis* sp. (cultivated), Finchley, London, England, em. 22, 23. ix. 55 (GCDG). 1 ex. from larva 21. vii. 53 on *Myosotis* sp., Igman near Sarajevo, Jugoslavia, pupated 24. vii, em. 11. viii. 53, leg. NOWAKOWSKI (PAN). 1 ex. from larva on *Symphytum* sp., Madrid Botanical Gardens, Spain, em. i. 64, leg. SPENCER (GCDG). 2 ex. from larvae on *Myosotis silvatica*, Mühlhausen, Thuringia, Germany, em. 22. ix. 64, leg. BUHR, HERING no. 2189 (GCDG).

Host 3 — *Agromyza ferruginosa* WULP

1 ex., München-Freimann, em. 26. vii. 53, leg. GROSCHKE (Stgt).

Host 4 — *Agromyza pseudorufipes* NOWAKOWSKI

1 ex. from larva 30. ix. 64 on *Myosotis arvensis*, Ingleborough, Yorks., England, em. 18. iv. 65 (GCDG).

In addition there is one Swedish specimen bred from *Myosotis arvensis*, Hedlandet, Södermanland, em. 1. viii. 43 (Lund), whose host cannot be checked.

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A few of the above records have previously been given in NIXON (1944) and GRIFFITHS (1956) as referring to "*Agromyza rufipes*", but these have required revision in the light of recent research on the hosts. The specimens bred from *A. spiraeae* KALTENBACH tentatively referred by NIXON (1944) to this species are now referred to *C. bres* (NIXON).

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

Dacnusa eros NIXON, 1937 and 1944

Colour. Palpi yellow. Flagellum dark throughout. Legs largely yellow-brown, the hind legs somewhat darker: hind coxae and sometimes the apex of the hind femora infuscated: the hind tarsi and the apex of the hind tibiae are also somewhat infuscated, but the hind tibiae are rarely entirely dark as in *C. thisbe* (NIXON). Gaster entirely dark.

Morphology. Antennal segments: ♂, 37—43; ♀, 36—41 (bred specimens 36, 39(2), 40). Mandibles (fig. 60) broad, obviously 4-toothed. Mesoscutum roughened anteriorly, with pubescence over the middle lobe and at least the anterior half of the lateral lobes: notaulices usually weak. Metapleural swelling rugose. Petiole (fig. 65) with pubescence evenly distributed over its entire surface: the base of tergite 3 also bears pubescence at its sides.

Breeding records

Host — *Agromyza nigrociliata* HENDEL

3 ex. from larvae 17. vi. 62 on *Holcus mollis*, Scratch Wood, Middlesex, England, em. 11, 12. viii. 62, 19. iv. 63 (GCDG).

Two further specimens have been seen: one from an undetermined *Agromyza* sp. on an undetermined Gramineae sp., Hedlandet, Södermanland, Sweden, em. 6. iii. 44, leg. LUNDQVIST (Lund); and one from an undetermined *Agromyza* sp. 26. vi. 64 on *Dactylis glomerata*, Pyry, Lasy Kabackie, Warszawa, Poland, em. 9. ix. 64, leg. NOWAKOWSKI (PAN).

The specimens bred from *Agromyza spiraeae* KALTENBACH referred to this species by NIXON (1937) are now referred to *C. bres* (NIXON).

***Chorebus groschkei* spec. nov.**

Colour. Antennae entirely dark. Mandibles red-brown. Palpi infuscated. Labrum dark brown. Hind legs almost entirely dark: coxae and tarsi of the first two pairs of legs black, femora and tibiae obscurely yellow-brown.

Morphology. Head massive (see table of biometric data), distinctly swollen behind the eyes. Ocelli forming an equilateral triangle. Frons strongly shining, almost bare, with a distinct central groove. Face shining, with shallow sculpture towards its sides, its pubescence fine, not concealing the surface beneath. Vertex and temples shining, with three to four rows of fine hairs. Antennal segments: ♂, 34, 36(2); ♀, 35. Mandibles large and 4-toothed (compare fig. 57), with tooth 1 much expanded. Maxillary palpi rather short (see tables of biometric data).

Mesoscutum with extensive pubescence over its central lobe and the front part of its lateral lobes; notaulices vestigial or absent. Sides of pronotum bare. Mesepisternum with narrow but clearly rugose precoxal suture: epicnemial suture showing as a shallow rugose furrow along its anterior edge: there are a few

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fine hairs lying diagonally across the centre of the mesepisternum. Metapleural swelling rugose, the surrounding pubescence forming a rosette.

Propodeal pubescence adpressed, but rather sparse in comparison with that of many *Chorebus* spp. Petiole (fig. 71) very narrow, of very shining appearance, with sparse inconspicuous pubescence. Tergite 3 also bears one or two rows of hairs at its base.

Breeding records

Host — *Agromyza prespana* SPENCER

Holotype ♂; 2 ♂♂, 1 ♀ paratypes from larvae on *Triticum* sp., Öffingen, Württemberg, Germany, em. 5. iv and 15. iv. 55, leg. GROSCHKE (Stgt, including holotype, and GCDG).

This species seems close to *C. atis* (NIXON), but the latter has the enlargement of its head and mandibles much more exaggerated, comparatively shorter maxillary palpi and 41 antennal segments. Data of one of NIXON's original specimens of *atis* has been included in the table of biometric data for comparative purposes.

***Chorebus hilaris* spec. nov.**

Colour. Antennae with scape, pedicel and flagellum uniformly dark (only the annellus distinctly pale). Palpi golden yellow. Mandibles orange-yellow centrally. Labrum yellow-brown. Legs golden yellow except the tarsi which are largely infuscated.

Morphology. Ocelli forming a triangle whose base is slightly longer than its sides. Frons largely bare, except for a few weak hairs along the eye-margin and the ocellar triangle. Face feebly punctate, with fine inwardly directed pubescence over its centre, and stronger downwardly directed pubescence along its sides. Vertex and temples with sparse hairs in 2—3 rows. Antennal segments: ♂, 33—35; ♀, 30—34. Mandibles (fig. 59) clearly 4-toothed, not expanded.

Mesoscutum shining with its pubescence restricted mainly to the course of the notaulices and its anterior face: notaulices deep and rugose, reaching about the middle of the mesoscutum. Central line of mesoscutum only very feebly impressed, without a very distinct groove as often in *C. lugubris* (NIXON). Sides of pronotum bare. Precoxal and epicnemial sutures of mesepisternum well developed as rugose furrows. Metapleural swelling strong, rugose, surrounded by a rosette of radiating hairs.

Propodeal pubescence as in *lugubris*, short and adpressed but rather sparse by comparison with many *Chorebus* spp. Petiole (fig. 70) similar to that of *lugubris*, bare centrally but with some hairs at its apical corners.

Breeding records

Host — *Agromyza nigripes* MEIGEN

Holotype ♀ from puparium 5. ix. 60 on *Glyceria maxima*, Ash Vale, Surrey, England, em. 12. iii. 61 (GCDG). 16 paratypes from SCHLICK collection (Denmark) mounted with puparia of *A. nigripes* (KB and GCDG) (localities Randers and Århus (Jutland), Damhusmose,

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Utterslevmose and Køge (Sealand) and Copenhagen).
Other material:
2♀♀ paratypes, 23. v. 59, Epen, Limburg, Holland, leg. PETERSEN (KB).

This species was mentioned in GRIFFITHS (1963a) as "*Dacnusa* spec. *c*". It is in all respects very close to *C. lugubris* (NIXON) and the only clear distinction I have found is in the much paler legs. The mesoscutum lacks the central groove shown by the bred material of *lugubris*, but that feature is not shown consistently by all the specimens ascribed to *lugubris* by NIXON. Another yellow-legged species which resembles *hilaris* is *C. raissa* (NIXON), a parasite of *Cerodontha* (*Dizygomyza*) *iraeos* (ROBINEAU DESVOIDY). This differs in having at least the scape and pedicel of the antennae pale, and only the fifth tarsal segments darkened. The differences between these three species are admittedly slight, but since they correspond consistently with the host differences I am of the opinion that different species are involved.

***Chorebus knautiae* spec. nov.**

Colour. Antennae with dark flagellum: scape yellow-brown. Mandibles reddish black. Palpi dull yellow. Labrum yellow. Legs 1 and 2 more or less uniformly ochreous yellow: hind legs darker with brown coxae, the apical half of the femora dark brown and the entire tibiae and tarsi almost black. Gaster beyond petiole largely orange-yellow, darker only towards its apex.

Morphology. Ocelli forming a triangle whose base is slightly longer than its sides. Face shining, more or less smooth, with fine pubescence which does not obscure the surface beneath. Vertex and temples with two to three rows of fine hairs. 39 antennal segments (♂). Mandibles not much expanded, with 4 well-defined teeth.

Mesoscutum more or less smooth, with dense pubescence over its anterior face and central lobe: lateral lobes pubescent on their anterior half only: notaulices distinct anteriorly only. Sides of pronotum almost bare. Mesepisternum with narrow rugose precoxal and epicnemial sutures. Metapleural swelling rugose, not strongly shining, surrounded by a dense fringe of radiating hairs. Propodeal pubescence dense and adpressed. Petiole (fig. 67) broadened towards its apex, only sparsely pubescent.

Wing similar to that of other species of the *lateralis*-group: R_s strongly sinuate.

Breeding records

Host — *Agromyza woerzi* GROSCHKE

Holotype ♂ from larva 27. vii. 56 on *Knautia arvensis*, Cybulice, Kampinoska Forest, Poland, pupated 29—31. vii, em. 13. v. 57, leg. NOWAKOWSKI (PAN).

This species falls within the *lateralis*-group, as defined by NIXON (1944). It resembles *C. perkinsi* (NIXON) in having a brightly coloured gaster and only sparsely pubescent petiole, but can be distinguished most readily by its darker legs, less transverse head and more extensive mesoscutal pubescence.

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Chorebus lar (MORLEY), **comb. nov.**

Dacnusa lar MORLEY, 1924
Dacnusa innana NIXON, 1943 and 1945, **syn. nov.**

Colour. Palpi dark. Antennae entirely dark. Legs dark-brown with all coxae shining black.

Morphology. Antennal segments: ♂, 23—24; ♀, 21—24. Mandibles relatively large, obviously 4-toothed, tooth 1 somewhat expanded. Mesoscutal pubescence very sparse, restricted mainly to the course of the notaulices: these distinct anteriorly only. Metapleural swelling shining, only shallowly sculptured, its surrounding fringe of hairs sparse by comparison with most species of *Chorebus*. Propodeal pubescence short and adpressed, but rather sparse. Petiole (fig. 73) widened towards its apex, almost bare.

Breeding records

Host 1 — *Agromyza genistae* HENDEL

2 ex. from larvae on *Genista tinctoria*, Scratch Wood, Middlesex, England, em. vii. 64, leg. SPENCER (GCDG). 1 ex. from puparium 27. viii. 27 on *Genista tinctoria*, Blaydon, Oxfordshire, England, em. 18. v. 28, leg. HAMM (BM).

Host 2 — *Agromyza johannae* DEMEIJERE

1 ex. from larva 31. vii. 54 on *Sarothamnus scoparius*, Chilworth, Surrey, England, em. 16. iii. 55 (GCDG).

Chorebus lateralis (HALIDAY)

Alysia (*Dacnusa*) *lateralis* HALIDAY, 1839
Dacnusa lateralis (HALIDAY), MARSHALL, 1891, 1895 and 1897, NIXON, 1937 and 1944
Dacnusa (*Dacnusa*) *albicoxa* THOMSON, 1895
Chorebus lateralis (HALIDAY), GRIFFITHS, 1964

Colour. Palpi pale yellow. Basal flagellar segments yellow, tipped with black. Legs largely pale yellow, including the hind coxae which are never infuscated basally as in *C. deione* (NIXON): hind tarsi and apex of hind tibiae darkened. Gaster beyond petiole usually yellow-brown.

Morphology. Antennal segments: ♂, 40—44; ♀, 37—43 (bred specimens only). Mandibles 4-toothed, not much expanded. Mesoscutum smooth and shining, its anterior face and central lobe pubescent, but its lateral lobes largely bare: notaulices sometimes distinct to about the middle of the mesoscutum, but often virtually lost. Metapleural swelling of strongly shining appearance, only feebly rugose. Petiole (fig. 66) more or less parallel-sided, with sparse evenly distributed pubescence.

Breeding records

Host 1 — *Agromyza anthracina* MEIGEN

3 ex. from larvae 11. x. 53 on *Urtica dioica*, Boxhill, Surrey, England, em. 23. xi. 53, 23. iv. 54, 10. v. 54 (BM). 4 ex. from larvae 4. x. 53 on *Urtica dioica*, Brookman's Park, Herts.,

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England, em. 31. x, 22. xi, 4. xii. 53, 27. v. 54 and 1 ex., same plant and locality, from larva 8. xi. 53, em. 19. v. 54 (BM). 1 ex. from larva 13. ix. 55 on *Urtica dioica*, Sieraków Reservation, Kampinoska Forest, Poland, pupated 15. ix, em. 3. x. 55, leg. NOWAKOWSKI (PAN). 1 ex. from larva 21. ix. 54 on *Urtica dioica*, Sieraków, Kampinoska Forest, pupated 24. ix, em. 7. v. 55, leg. NOWAKOWSKI (PAN). 2 ex., Ängelholm, Skåne, Sweden, em. 29. vii. 55, 4. viii. 55, leg. RYDÉN (Lund).

Host 2 — *Agromyza urticae* NOWAKOWSKI

2 ex. from larvae 15. x. 61 on *Urtica dioica*, Cambridge, England, em. 29. iii. 62, 6. iv. 62 (GCDG). 1 ex. from larva 8. viii. 54 on *Urtica dioica*, Boxhill, Surrey, England, em. 29. viii. 54 (BM). 1 ex. from larva 27. ix. 55 on *Urtica dioica*, Sieraków Reservation, Kampinoska Forest, Poland, pupated 28. ix, em. 18. x. 55, leg. NOWAKOWSKI (PAN). 1 ex. from larva on *Urtica dioica*, Bere, Devon, England, em. 30. ix. 52, leg. SPENCER (GCDG). 3 ex., München, Germany, em. 1. vii. 53, leg. GROSCHKE (Stgt). 2 ex., Eglharting, near München, em. 10 and 20. viii. 53, leg. GROSCHKE (Stgt).

Host 3 — *Agromyza ferruginosa* WULP

3 ex. from larvae 28. ix. 60 on *Symphytum officinale*, Woodwalton Fen, Huntingdonshire, England, em. 17. iii. 61, leg. SPENCER (GCDG). 3 ex. from larvae 10. ix. 55 on *Symphytum officinale*, Warszawa-Młociny, Poland, pupated 12—15. ix, em. 4. x. 55, 5. x. 55, 13. v. 56, leg. NOWAKOWSKI (PAN). 1 ex. from larva 20. vi. 57, same plant and locality, pupated 22—24. vi, em. 9. vii. 57, leg. NOWAKOWSKI (PAN). 1 ex. from larva 3. vii. 57, same plant and locality, pupated 8. vii, em. 3. viii. 57, leg. NOWAKOWSKI (PAN). 1 ex. from larva 3. vii. 55 on *Symphytum officinale*, Zaborówek, Kampinoska Forest, pupated 13. vii, em. 12. v. 56, leg. NOWAKOWSKI (PAN).

The host of HAMM's specimens recorded in NIXON (1944) (from puparia 17. ix. 24 on *Urtica dioica*, Oxford, England, em. 6. v. 25 (HD)) was either *A. anthracina* MEIGEN or *A. urticae* NOWAKOWSKI according to the puparia. I have also seen further Swedish material with the following data: 2 ex. from "*Agromyza reptans*" (leg. and det. LUNDQVIST), Hedlandet, Södermanland, em. 20. viii. 43: 1 ex. from *Agromyza* sp. on *Urtica dioica*, same locality, em. 18. viii. 42, leg. LUNDQVIST: 1 ex. from "*Agromyza reptans*" (leg. and det. RYDÉN), Vågåmo, Norrbotten, em. 25. vii. 53: 1 ex. from "*Agromyza rufipes*" (leg. and det. RYDÉN), Domsten, Skåne, em. 27. vii. 53 (Lund). These host records obviously require revision, but as the puparia have not been preserved this is now not possible.

A few of the above records were previously published in GRIFFITHS (1956 and 1963b). I have not found any reliable record of this species having been bred from the true *Agromyza reptans* FALLÉN, which has in the past been generally confused with *A. urticae* NOWAKOWSKI Parasites of some other *Agromyza* and *Phytomyza* species have been recorded in the literature as "*Dacnusa lateralis*" (see FULMEK, 1962), but I have no doubt that these records refer to other species.

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

Dacnusa lugubris NIXON, 1937 and 1945

Colour. Palpi yellow or somewhat infuscated. Flagellum dark throughout. Coxae and tarsi darkened: femora and tibiae yellow-brown, those of the hind legs a little darker.

Morphology. Antennal segments: ♂, 33—36; ♀, 30—35 (in bred specimens examined — ♂, 33(2), 34, 35; ♀, 30, 33(2)). Mandibles 4-toothed, not expanded. Mesoscutum strongly shining with its pubescence restricted to the course of the notaulices and its anterior face: notaulices usually distinct, converging on the

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posterior fovea: a groove, often very deep and conspicuous, continues from the fovea along the centre line of the mesoscutum. Metapleural swelling rugose. Petiole (compare fig. 70) with its centre largely bare, but with pubescence along its sides and at its apical corners.

Breeding records

Host — *Agromyza albipennis* MEIGEN

8 ex. from puparia 18. x. 24 probably on *Phalaris arundinacea*, Oxford, England, em. 15—22. v. 25, leg. HAMM (HD, BM and GCDG). 2 ex. from puparia probably on *Phalaris arundinacea*, Hendon, Middlesex, England, leg. BLAIR (BM). 1 ex. from puparium 12. ix. 24 probably on *Phalaris arundinacea*, Cothill, Berkshire, England, em. 21. v. 25, leg. HAMM (BM).

I have also seen a specimen which may possibly be *lugubris* bred from a species of the *Agromyza ambigua* group on *Hordeum* sp., Öffingen, Württemberg, Germany, em. 13. vii. 54, leg. GROSCHKE (Stgt), but more material is needed before a firm identification can be given.

The English breeding records given above have required correction. The host data was originally given in NIXON (1945) as "*Agromyza nigripes* MEIGEN on reeds", but the puparia and a bred fly with the parasites clearly belong to *A. albipennis* MEIGEN. The "reeds" in question are presumably *Phalaris arundinacea*, since *Phragmites* is not a host of that fly. In GRIFFITHS (1963a) it was erroneously suggested (on the assumption that "reeds" meant *Phragmites*) that the host might be *A. phragmitidis* HENDEL, but examination of the host puparia has since shown that this is not the case.

The specimens bred from *Phytomyza fallaciosa* BRISCHKE (= *pseudohellebori* HENDEL) recorded in GRIFFITHS (1956) as *Dacnusa lugubris* were misidentified and belong to an apparently undescribed species.

The bred specimens from *A. albipennis* MEIGEN all show a deep mesoscutal groove, and the description offered above has been based on them. However NIXON's caught material is rather variable in this respect, and the significance of this character will need to be reassessed when more bred material is available.

The name "*Dacnusa lugubris* REINHARD" in BRISCHKE (1882) is a nomen nudum and does not preoccupy NIXON's name.

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

Dacnusa ninella NIXON, 1945

Colour. Palpi yellow. First two or three flagellar segments yellow. Legs yellow except that the tarsi, especially the hind pair, are sometimes infuscated.

Morphology. Antennal segments: ♂, 33—38; ♀, 31—36 (NIXON, 1945) — the bred ♀ has 35 segments. Mandibles 4-toothed, not expanded. Mesoscutum with pubescence over its central lobe: notaulices weak. Petiole entirely covered with short adpressed hairs, and with well-defined apical tufts.

Breeding records

Host — *Agromyza hendeli* GRIFFITHS (= *lucida* auctt.)

1 ex. formerly on the same mount as the allotype of *A. hendeli* GRIFFITHS, with data Bredow bei Nauen, on *Phragmites communis*, em. 9. iv. 23, HERING no. 2154 (Wien).

The record of this species being bred by HAMM from "*Agromyza nigripes* on reeds" given by NIXON (1945) and repeated in GRIFFITHS (1963a) is puzzling because I can find no such

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specimens in the HAMM collection or the British Museum and NIXON's remarks on the bred specimens lead me to suspect confusion with *lugubris*. In the circumstances the record is best discounted.

Chorebus nydia (NIXON)

See Part I (GRIFFITHS, 1964). Since that account was written I have also seen about 50 further specimens from Denmark (Damhusmose Donse and Utterslev-mose (Sealand) and Copenhagen) mostly with puparia of *Agromyza nigripes* MEIGEN but 6 specimens from Donse with puparia of *Agromyza albipennis* MEIGEN, from the SCHLICK collection (KB).

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

Dacnusa perkinsi NIXON, 1944

Colour. Palpi golden yellow. Pedicel and flagellum dark, but scape yellow-brown. Legs yellow, with only the hind tarsi (occasionally also the extreme apex of the hind tibiae) and at most segments 4 and 5 of the first two pairs of tarsi infuscated. Gaster beyond petiole largely yellow-brown or reddish yellow.

Morphology. Antennal segments: ♂, 34—39; ♀, 35—38. Mandibles clearly 4-toothed, not expanded. Mesoscutum bare over much of its surface, with pubescence over its anterior face, along the course of the notaulices and sparsely (at most 4—5 rows) on its central lobe: notaulices usually distinct to about its middle. Metapleural swelling rugose, but distinctly shining. Propodeal pubescence dense and adpressed. Petiole (compare fig. 67) with very sparse pubescence.

Breeding records

Host 1 — *Agromyza albitarsis* MEIGEN

2 ex. from larvae 5. viii. 55 on *Populus nigra*, Minden, Westphalia, Germany, em. 15. v. 56, leg. SPENCER (GCDG). 3 ex., Nittenau, Oberpfalz, Germany, em. 5—13. viii. 53, leg. GROSCHKE (Stgt).

Host 2 — *Agromyza lygophaga* HERING

1 ex. from larva 19. viii. 60 on *Salix repens*, Woodwalton Fen, Huntingdonshire, England, em. 16. v. 61 (GCDG).

Two of the above records have previously been mentioned in GRIFFITHS (1963 b).

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

Dacnusa pione NIXON, 1944

Colour. Palpi yellow-brown. Legs yellow or yellow-brown, but the hind tarsi and, at least apically, the hind tibiae infuscated. Gaster beyond petiole dark brown.

Morphology. Antennal segments: ♂, 40; ♀, 40—43. Petiole (fig. 63) very strongly broadened towards its apex, almost bare. Otherwise as in *C. cinctus* (HALIDAY).

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Breeding records

Host — *Agromyza phragmitidis* HENDEL

5 ex. from larvae 23. viii. 60 and 28. ix. 60 on *Phragmites communis*, Woodwalton Fen, Huntingdonshire, England, em. vii. 61 (GCDG and BM). 1 ex. from larva 9. ix. 55 on *Phragmites communis*, Sieraków Reservation Kampinoska Forest, Poland, pupated 10. ix, em. 11. v. 56, leg. NOWAKOWSKI (PAN).

The Woodwalton record has previously been published in GRIFFITHS (1963a and 1963b).

***Chorebus polygoni* spec. nov.**

Colour. Antennae entirely dark. Mandibles dark red. Palpi infuscated. Labrum yellow-brown. All coxae dark brown or black: femora and tibiae of legs 1 and 2 yellow-brown, of hind legs dark brown: all tarsi brown.

Morphology. Ocelli forming a triangle with its base a little longer than its sides. Face shining, shallowly sculptured, its pubescence long and sparse, not obscuring the surface beneath. Vertex and temples with two to three rows of fine hairs. Antennal segments: ♂, 39, 42; ♀, 35, 37, 41, 43. Mandibles small, with 4 clearly defined teeth.

Mesoscutum strongly roughened anteriorly, with pubescence over its central lobe and the anterior part of its lateral lobes: notaulices well defined, reaching to the middle of the mesoscutum (except in the smallest female in which they are virtually absent). Sides of pronotum bare or very sparsely pubescent. Mesepisternum with narrow rugose precoxal suture: epicnemial suture showing as a narrow rugose furrow along its anterior edge. Metapleural swelling shining, only shallowly rugose, surrounded by a dense fringe of radiating hairs. Propodeal pubescence dense and adpressed. Petiole (compare fig. 66) more or less parallel-sided, with sparse evenly-distributed pubescence.

Wing (fig. 40) with R_s only feebly sinuate.

Breeding records

Host 1 — *Agromyza polygoni* HERING

Holotype ♀, 4♀♀ paratypes and 1 ♂ paratype from larvae on *Polygonum bistorta*, Lüsewitz, Mecklenburg, Germany, em. 15. iii. 52 (BUHR 197/1951, bred HERING) (GCDG).

Host 2 — *Agromyza nigrescens* HENDEL

♂♀ paratypes from larvae 25. vi. 52, Mullhyttemo, Närke, Sweden, em. 19—22. viii. 53, leg. RYDÉN (Lund).

This species clearly falls within the *lateralis*-group concept defined by NIXON (1944). Its very dark legs make it readily distinguishable from all other described species of that group except *C. bres* (NIXON). From the latter it differs most clearly in its more numerous antennal segments and the retention of distinct notaulices (except in one female which is very small and probably untypical).

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

Dacnusa resa NIXON, 1937, 1943 and 1944

Colour. Palpi and basal flagellar segments yellow. Legs largely golden-yellow, but hind tibiae and tarsi infuscated. Gaster beyond petiole golden-yellow.

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Morphology. 42 antennal segments (3 ♀♀). Mandibles large with tooth 1 expanded, but tooth 3 very weak. Mesoscutum with pubescence over its central lobe and the front part of the lateral lobes: notaulices weakly developed. Metapleural swelling rugose. Metapleural and propodeal pubescence rather dense. Petiole (fig. 64) extraordinarily narrow, about three times as long as broad, parallel-sided, its surface largely bare and shining.

Breeding records

Host — *Agromyza ambigua* group (not identified to species)

1 ex. from larva 18. vii. 54 on undetermined Gramineae sp., Slade Green, Kent, England, em. 28. v. 55 (GCDG). 2 ex. from undetermined Gramineae sp., Hedlandet, Södermanland, Sweden, em. 3. iv. 44, leg. LUNDQVIST (Lund).

The specimen in very poor condition which NIXON (1944) says might possibly be this species (bred by HAMM from "*Phytomyza* ? *melana* HD." (i.e. *P. tetrasticha* HENDEL) on *Mentha aquatica*) I refer to *Chorebus abaris* (NIXON).

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

Dacnusa (*Dacnusa*) *rotundiventris* THOMSON, 1895

Colour. Antennae entirely dark. Mandibles dark orange-yellow. Palpi pale yellow. Legs yellow except that the tarsal segments are progressively darkened. Tergites 3 and 4 brown, the following tergites black.

Morphology. Ocellar triangle with its base slightly longer than its sides. Frons bare above the antennal base, but with 2—3 rows of short hairs near the eye-margin, and several hairs in and around the ocellar triangle. Face with reticulate sculpture, its centre evenly covered with short upwardly directed pubescence. Vertex and temples with short hairs roughly in two rows. Antennal segments[8]: ♂, 27—32; ♀, 29—31. Mandibles 4-toothed (fig. 58), but the third tooth lies above tooth 2 (so that they might at first sight seem 3-toothed in lateral view).

Mesoscutum with deeply impressed notaulices reaching almost to the posterior fovea: the middle lobe strongly roughened with about 8 rows of hairs: lateral lobes almost smooth, pubescent at most on their anterior half. Sides of pronotum bare. Precoxal suture of mesepisternum large and rugose: epicnemial suture poorly defined. Metapleural pubescence dense, forming a rosette around a rugose swelling.

Propodeum with a pair of densely matted oblique bands of pubescence, but only sparsely pubescent over the rest of its surface. Petiole (fig. 62) at most slightly longer than broad, very shining and almost bare, with irregular shallow sculpture.

Wing (fig. 41) with narrow pterostigma and R_s rather feebly sinuate.

[8] The antennae of the holotype ♀ are broken.

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Breeding records

Host — *Agromyza distorta* GRIFFITHS

1 ♂ from puparium 6. ix. 54 on *Glyceria maxima*, Ash Vale, Surrey, England, em. 26. iv. 55 (GCDG). 17 ex. from SCHLICK collection, Donse, Sealand, Denmark, with puparia of *A. distorta* GRIFFITHS (KB).

Other material examined:

Holotype ♀, Blekinge, Sweden (THOMSON collection, Lund). 5 ♂♂ from the HALIDAY collection (National Museum, Dublin) probably from Lough Neagh, Northern Ireland (found by Mr. A. W. STELFOX in a series of insects above a label "L. Neagh" in HALIDAY's writing).

The English breeding record has previously been mentioned in GRIFFITHS (1963a), where this species is referred to as "*Dacnusa* spec. *d*". The species has been redescribed in view of the inadequacy of the original description. It is one of the most easily recognisable *Chorebus* species, the most characteristic features being the shape of the mandibles and the broad almost bare petiole, contrasting with very dense bands of pubescence on the propodeum.

Chorebus solstitialis (STELFOX), **comb. nov.**

Dacnusa solstitialis STELFOX, 1952

Colour. Palpi infuscated. Flagellum dark throughout. Legs largely dark brown, with all coxae, the hind femora and the hind tibiae apically black.

Morphology. Antennae 26 – 29 segmented (both sexes). Mandibles very large, with teeth 1 and 2 very much expanded: tooth 3 relatively small (fig. 57). Mesoscutum smooth and shining with pubescence only on its anterior face and along the former course of the notaulices, which are absent. Metapleural swelling only feebly rugose, more or less shining. Propodeal pubescence rather sparse in comparison with many *Chorebus* spp. Petiole (fig. 72) largely bare centrally, with sparse hairs along its sides and at its apical corners.

Breeding records

Host — *Agromyza megalopsis* HERING

1 ex. from larva 30. vi. 62 on *Hordeum vulgare*, Jena, Thüringen, Germany, em. 5. ii. 63 (leg. BUHR, HERING no. 1857) (GCDG). 16 ex., same plant and locality, em. vii. 64, 3. ix. 64 (3 ex.), 16. ix. 64 and spring '65 (11 ex.) (leg. BUHR, HERING no. 2052, 2063 and 2064) (GCDG).

The identification of this material is based on comparison with two of Mr. A. W. STELFOX's original series.

Chorebus spenceri GRIFFITHS

See Part I (GRIFFITHS, 1964).

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

Dacnusa thisbe NIXON, 1937 and 1944

Colour. Palpi yellow. Basal flagellar segments brown. Front and middle legs largely yellow, but hind legs extensively infuscated, especially the coxae and

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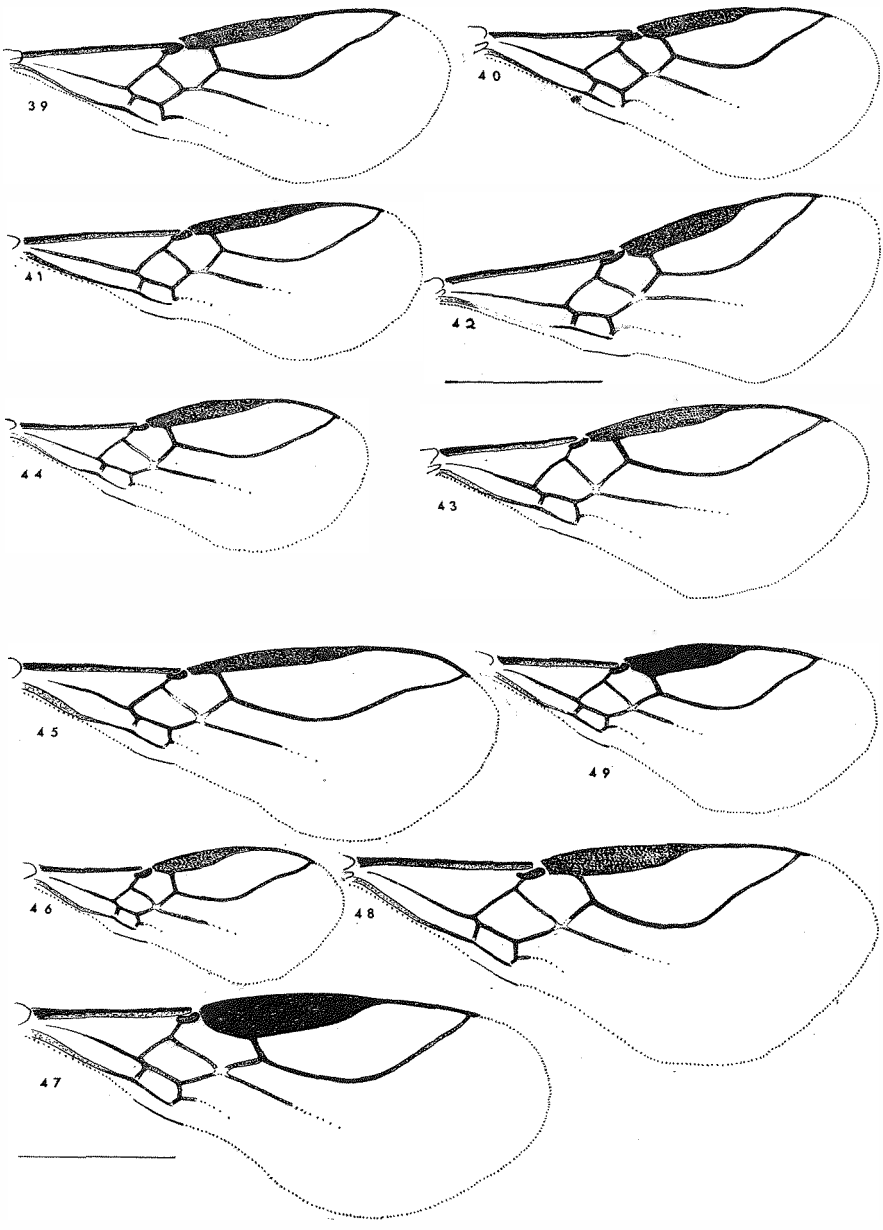

Figs. 39—49. Wings of: 39, *Chorebus eros* (NIXON) ♀; 40, *Chorebus polygoni* spec. nov. ♀; 41, *Chorebus rotundiventris* (THOMSON) ♂; 42, *Exotela flavicoxa* (THOMSON) ♀; 43, *Exotela hera* (NIXON) ♀; 44, *Exotela arunci* spec. nov. ♂; 45, *Exotela nowakowskii* spec. nov. ♀; 46, *Exotela? dives* (NIXON) ♀ ex *Agromyza viciae* KALTENBACH; 47, *Dacnusa abdita* (HALIDAY) ♂; 48; *Dacnusa abdita* (HALIDAY) ♀; 49, *Dacnusa evadne* NIXON ♂. (Scale 1 mm.)

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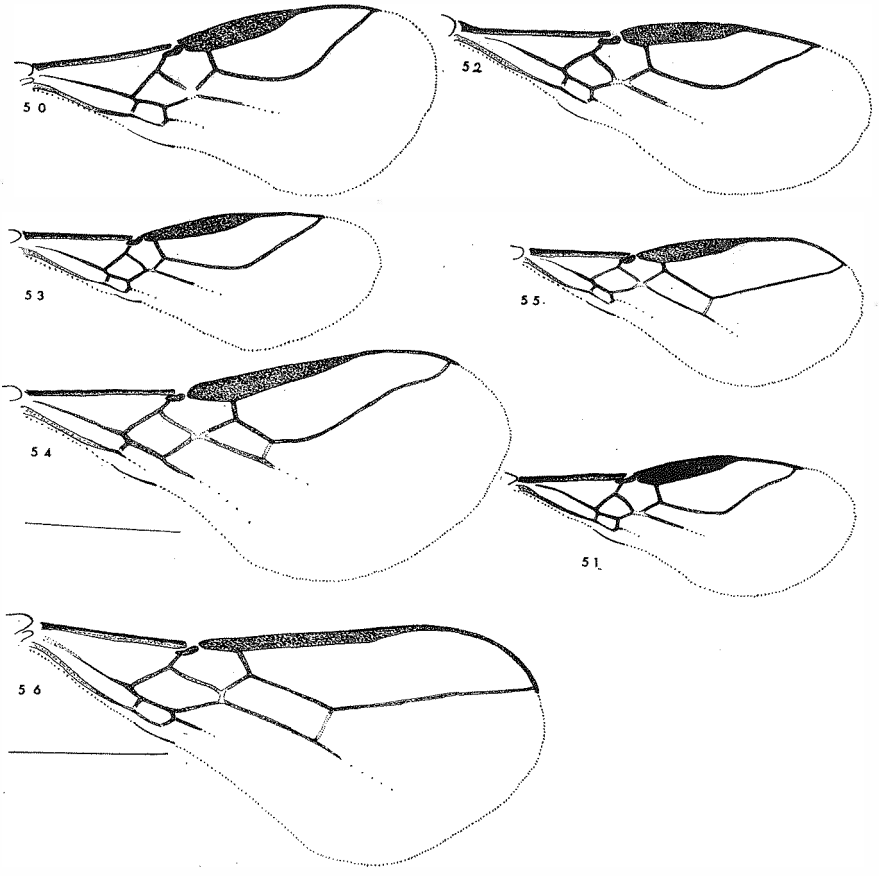

Figs. 50—56. Wings of: 50, *Dacnusa evadne* NIXON ♀; 51, *Dacnusa laeta* (NIXON) ♂; 52, *Dacnusa laeta* (NIXON) ♀; 53, *Dacnusa dryas* (NIXON) ♀; 54, *Dapsilarthra balteata* (THOMSON) ♀; 55, *Dapsilarthra rufiventris* (NEES) ♀; 56, *Dapsilarthra sylvia* (HALIDAY) ♀. (Scale 1 mm.)

the entire tibiae and tarsi (in *C. eros* (NIXON) the hind tibiae are usually not strongly infuscated). Gaster beyond petiole largely reddish or orange.

Morphology. Antennal segments: ♂, 45, 48; ♀, 45, 46, 48. Mandibles 4-toothed with tooth 1 expanded but tooth 3 small. Mesoscutum extensively roughened, with pubescence over its central lobe and the front part of the lateral lobes: notaulices very weak. Metapleural swelling rugose. Propodeal pubescence adpressed and fairly dense. Petiole (compare fig. 65) with pubescence evenly distributed over its entire surface.

Breeding records

Host — *Agromyza nigrociliata* HENDEL

1 ex. from larva on *Bromus racemosus*, Rhöndorf, Siebengebirge, Rheinland, Germany, em. 9. iii. 62, HERING no. 6713 (GCDG). 1 ex. from larva 4. vii. 64 on *Brachypodium silvaticum*, Luccombe, Isle of Wight, England, em. 11. ii. 65, HERING no. 7258 (GCDG).

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Keys to the Dacnusini Parasites of particular Host-groups

1. The *Agromyza nigripes/ambigua* group (Gramineae-feeders)

1 Mandibles 3-toothed (fig. 61). Metapleural pubescence sparse, directed mainly downwards towards the hind coxa (fig. 16) 2

— Mandibles 4-toothed, the additional tooth usually situated between the original teeth 2 and 3 (figs. 57—60), but sometimes feeble or apparently absent. Metapleural pubescence forming a rosette of radiating hairs (fig. 22) except in *Chorebus nydia*, *C. coxator* and *C. spenceri*, whose mandibles are very obviously 4-toothed 4

2 Head massive, 1.4—1.6 times as wide as thorax, with the temples (in dorsal and lateral views) at least as broad as the eye-width. Mandibles considerably enlarged (0.22—0.3 mm.wide) with tooth 3 expanded laterally (fig. 2), not angulate. Cell *2Cu* widely open (fig. 11) at its lower distal corner (Cu_{1b} lost). Notaulices absent: mesoscutum largely bare and shining. Legs largely dark. *Protodacnusa tristis* (NEES) see Part I (GRIFFITHS, 1964)

Host: *A. nigrociliata* HENDEL

— Head and mandibles proportionately smaller, the latter less than 0.2 mm. wide, never with tooth 3 more expanded than tooth 1. Cell *2Cu* more or less closed by Cu_{1b} at its lower distal corner (fig. 42). Mesoscutum with pubescence at least over its central lobe 3

3 Legs largely yellow, at most the hind coxae a little darkened at their base. 27—34 antennal segments . . . . . *Exotela flavicoxa* (THOMSON)

Hosts: *A. albipennis* MEIGEN, *A. distorta* GRIFFITHS, *A. lucida* HENDEL, *A. nigripes* MEIGEN and *Cerodontha* (*Poemyza*) *incisa* MEIGEN

— All coxae black. 26 antennal segments . . . . . *Exotela* spec.

Host: *ambigua* group (not identified to species)

4 Metapleuron with a conspicuous rugose swelling, but its pubescence does not form a rosette (figs. 17 and 18). Propodeum bare or with inconspicuous scattered hairs. Petiole bare or almost so (figs. 31 and 32), with longitudinal striation. Femora always yellow 5

— Metapleural pubescence (fig. 22) forming a dense rosette of radiating hairs around a raised swelling (which may be smooth or rugose). Propodeum at least partly covered with adpressed pubescence 7

Note: *Chorebus baeticus* sp. nov., in which the metapleural rosette is poorly developed, has dark femora.

5 Coxae yellow. Mesoscutum densely clothed with short hairs (fig. 30) over almost its entire surface. Metapleural pubescence rather dense (fig. 18). . . . . *Chorebus spenceri* GRIFFITHS see Part I (GRIFFITHS, 1964)

Host: *A. phragmitidis* HENDEL

— Coxae dark. Metapleural pubescence sparser (fig. 17) 6

6 At least the four apical tarsal segments darkened . . . . *Chorebus nydia* (NIXON) see Part I (GRIFFITHS, 1964)

Hosts: *A. nigripes* MEIGEN and *A. albipennis* MEIGEN

— Tarsal segments 1—4 yellow, but segment 5 contrastingly black . . . . . *Chorebus coxator* (THOMSON) see Part I (GRIFFITHS, 1964)

Hosts: *A. hendeli* GRIFFITHS and *A. phragmitidis* HENDEL

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7 Antennae with at least 36 segments. Petiole without conspicuous apical tufts of hair 8
— Antennae with fewer than 36 segments except sometimes in *Chorebus ninella*, whose petiole has conspicuous apical tufts 13

8 Petiole strongly widened towards apex, not more than 1.6 times as long as broad, largely bare (fig. 63) 9
— Petiole more elongate, at least 1.8 times as long as broad, not broadened towards its apex except sometimes in *Chorebus eros*, in which it is evenly covered with pubescence (fig. 65) 10

9 Gaster beyond petiole reddish yellow. Legs bright yellow-red throughout. . . . . *Chorebus cinctus* (HALIDAY)

Host: *A. lucida* HENDEL

— Gaster dark brown. Legs largely yellow, but hind tibiae infuscated in about apical third . . . . . *Chorebus pione* (NIXON)

Host: *A. phragmitidis* HENDEL

10 Petiole extremely narrow, about 3 times as long as broad, largely bare (fig. 64). Gaster beyond petiole yellow. Hind coxae dull yellow. 42 antennal segments . . . . . *Chorebus resa* (NIXON)

Host: *ambigua* group (not identified to species)

— Petiole less narrow, with obvious pubescence evenly distributed over its surface. Hind coxae darkened at least at base 11

11 Mandibles large (compare fig. 57) with tooth 1 expanded. Notaulices absent. Hind coxae, femora and tibiae almost entirely dark. Petiole (fig. 71) sparsely pubescent. 34—36 antennal segments . . . . . ***Chorebus groschkei* spec. nov.** (see also couplet 16)

Host: *A. prespana* SPENCER

— Mandibles smaller (fig. 60), their teeth less expanded. Petiole (fig. 65) with denser, evenly distributed pubescence 12

12 45—48 antennal segments. Hind coxae, femora and tibiae extensively infuscated. Gaster beyond petiole red or orange . . . . . *Chorebus thisbe* (NIXON)

Host: *A. nigrociliata* HENDEL

— Fewer antennal segments. Hind femora and tibiae usually only partly infuscated. Gaster entirely dark . . . . . *Chorebus eros* (NIXON)

Host: *A. nigrociliata* HENDEL

13 Petiole at most slightly longer than broad (fig. 62), almost bare, in contrast with the propodeum which bears a pair of densely matted bands of pubescence. Mandibles (fig. 58) with the additional tooth arising above tooth 2 (so that at first sight they might appear only 3-toothed) . . . . . *Chorebus rotundiventris* (THOMSON)

Host: *A. distorta* GRIFFITHS

— Petiole obviously longer than broad. Mandibles with the additional tooth (described as tooth 3) clearly arising after tooth 2 (the largest tooth) in lateral view 14

14 Mandibles large (fig. 57), at least tooth 1 obviously expanded. Notaulices absent. Coxae dark 15
— Mandibles not expanded (fig. 59). Notaulices usually present, at least anteriorly. 17

15 Mesoscutal pubescence consisting solely of a few weak hairs along the former course of the notaulices. Petiole somewhat broadened towards apex (fig. 72). 26—29 antennal segments . . . . . *Chorebus solstitialis* (STELFOX)

Host: *A. megalopis* HERING

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— Central lobe of mesoscutum pubescent. Petiole narrower (see fig. 71 and the table of biometric data) 16

16 Metapleural swelling ill-defined and only feebly sculptured, the pubescence around it not forming a fully developed rosette. 28 antennal segments . . . . . ***Chorebus baeticus* spec. nov.**

Host: *A. baetica* GRIFFITHS

— Metapleuron bearing a rugose swelling whose surrounding pubescence forms a complete rosette (cf. fig. 22). 34—36 antennal segments . . . . . ***Chorebus groschkei* spec. nov.** (see also couplet 11)

Host: *A. prespana* SPENCER

17 Central lobe of mesoscutum obviously pubescent. Petiole closely hairy all over with conspicuous apical tufts. Coxae yellow. 33—38 antennal segments . . . . . *Chorebus ninella* (NIXON)

Host: *A. hendeli* GRIFFITHS

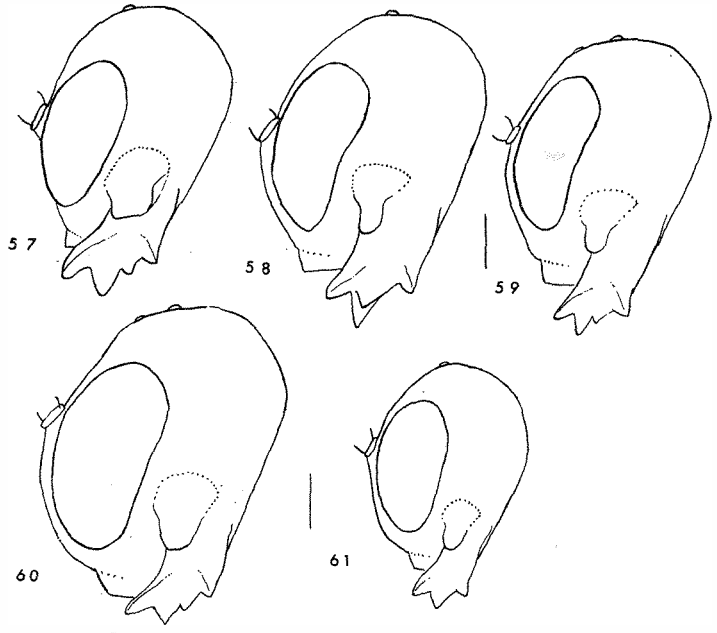
— Central lobe of mesoscutum virtually bare. Notaulices usually conspicuous. Petiole (fig. 70) always bare centrally, without dense apical tufts. 30—35 antennal segments 18

18 Legs yellow with only the tarsi darkened . . . . . ***Chorebus hilaris* spec. nov.**

Host: *A. nigripes* MEIGEN

— Legs darker — at least the hind coxae infuscated . . . . *Chorebus lugubris* (NIXON)

Host: *A. albipennis* MEIGEN



Figs. 57—61. Heads and mandibles in lateral view of: 57, *Chorebus solstitialis* (STELFOX); 58, *Chorebus rotundiventris* (THOMSON); 59, *Chorebus hilaris* spec. nov.; 60, *Chorebus eros* (NIXON); 61, *Dacnusa evadne* NIXON. (Scale 0.1 mm.)

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2. The *Agromyza reptans* group (on *Urtica* and Boraginaceae)

1 Mandibles 4-toothed, the additional tooth situated between the original teeth 2 and 3 (compare figs. 59 and 60). Metapleural pubescence forming a rosette of radiating hairs (fig. 22). Petiole narrow with evenly distributed pubescence (fig. 66). 36—43 antennal segments 2

— Mandibles 3-toothed (compare fig. 61). Metapleural pubescence directed mainly downwards towards the hind coxa (compare fig. 16) 3

2 Basal flagellar segments yellow tipped with black. Hind coxae entirely pale yellow. . . . . *Chorebus lateralis* (HALIDAY)

Hosts: *A. anthracina* MEIGEN, *A. ferruginosa* WULP and *A. urticae* NOWAKOWSKI

— Flagellum entirely dark. Hind coxae dark yellow, usually infuscated at their base . . . . . *Chorebus deione* (NIXON)

Hosts: *A. abiens* ZETTERSTEDT, *A. ferruginosa* WULP, *A. myosotidis* KALTENBACH and *A. pseudorufipes* NOWAKOWSKI

3 Pubescence of metapleuron, propodeum and petiole very long and dense, concealing the surface beneath. Pterostigma very elongate (compare fig. 10) with vein *2r* branching from its extreme base. Legs extensively infuscated. Short rugose precoxal suture present . . . . . *Dacnusa maculipes* THOMSON

Hosts: many Phytomyzinae, bred once from *A. abiens* ZETTERSTEDT

— Propodeum and petiole of shining appearance, bearing only a few scattered hairs. Legs largely yellow 4

4 Rugose precoxal suture present. Wing (fig. 43) not sexually dimorphic, with narrow pterostigma . . . . . *Exotela hera* (NIXON)

Hosts: *A. anthracina* MEIGEN, *A. reptans* FALLÉN and *A. urticae* NOWAKOWSKI

— Precoxal suture absent. Wing (figs. 47 and 48) with sexually dimorphic pterostigma, wedge-shaped in both sexes but larger and darker in the male 5

5 30—36 antennal segments. Wing-length not exceeding 3.5 mm . . . . . *Dacnusa abdita* (HALIDAY)

Hosts: *A. abiens* ZETTERSTEDT, *A. anthracina* MEIGEN, *A. lithospermi* SPENCER and *A. urticae* NOWAKOWSKI

— 38—41 antennal segments. Wing-length 3.8—4.4 mm . *Dacnusa maxima* (FISCHER)

Host: *A. abiens* ZETTERSTEDT

3. The *Agromyza rubi* group (on Betulaceae, Salicaceae, Rosaceae, Geraniaceae and *Polygonum*)

1 Mandibles 4-toothed, the additional tooth situated between the original teeth 2 and 3 (compare figs. 59 and 60). Metapleural pubescence forming a rosette of radiating hairs (compare fig. 22) 2

— Mandibles 3-toothed (fig. 61). Metapleural pubescence directed mainly downwards towards the hind coxa (compare fig. 16) 5

2 Legs largely yellow (Hind coxae at most infuscated basally: hind tibiae usually entirely yellow, but sometimes infuscated at their extreme apex in *Chorebus perkinsi* (NIXON)) 3

— Legs extensively infuscated (All coxae dark: hind tibiae dark at least in apical third) 4

3 Petiole (compare fig. 67) widened towards its apex, with only very sparse pubescence. Gaster beyond petiole largely yellow-brown or reddish yellow . . . . . *Chorebus perkinsi* (NIXON)

Hosts: *A. albitarsis* MEIGEN and *A. lygophaga* HERING

— Petiole (fig. 69) narrower with rather denser pubescence. Gaster largely dark, at most tergite 3 brown or reddish . . . . . *Chorebus credne* (NIXON)

Hosts: *A. alnibetulae* HENDEL, *A. rubi* BRISCHKE and *A. spiraeae* KALTENBACH

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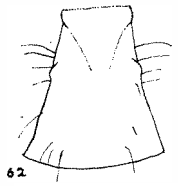
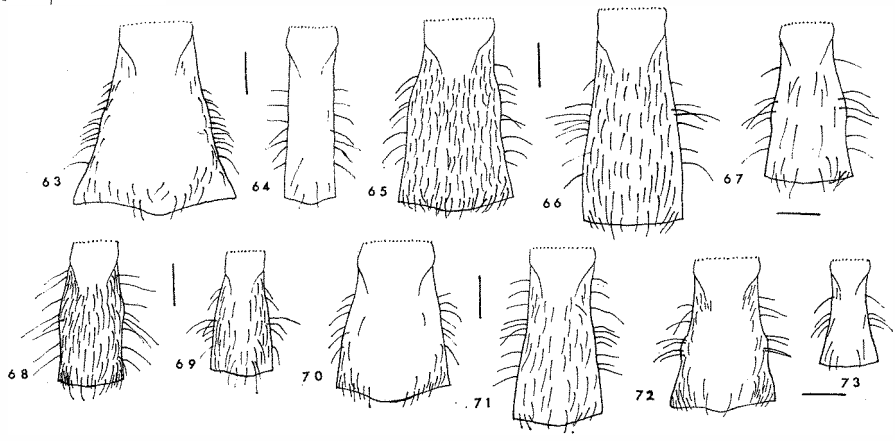
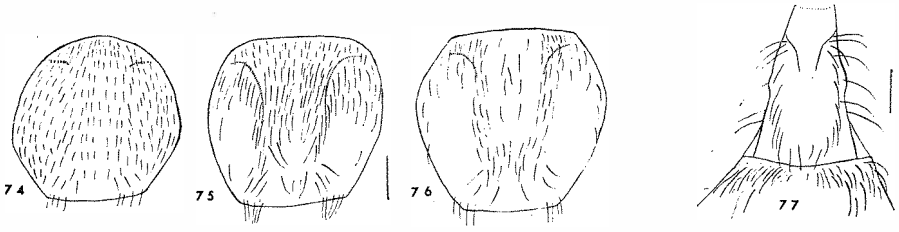


Figs. 62—73. Petioles of *Chorebus* spp.: 62, *C. rotundiventris* (THOMSON); 63, *C. pione* (NIXON); 64, *C. resa* (NIXON); 65, *C. eros* (NIXON); 66, *C. lateralis* (HALIDAY); 67, *C. knautiae* spec. nov.; 68, *C. bres* (NIXON); 69, *C. credne* (NIXON); 70, *C. hilaris* spec. nov.; 71, *C. groschkei* spec. nov.; 72, *C. solstitialis* (STELFOX); 73, *C. lar* (MORLEY). (Scale 0.1 mm.)





Figs. 74—76. Mesoscuta of *Exotela* spp.: 74, *E. arunci* spec. nov.; 75, *E. nowakowskii* spec. nov.; 76, *E. phryne* (NIXON). (Scale 0.1 mm.)

Fig. 77. Petiole and base of tergite 3 of *Exotela nowakowskii* spec. nov. (Scale 0.1 mm.)

4 29—36 antennal segments. Notaulices vestigial or absent . . . *Chorebus bres* (NIXON)
Host: *A. spiraeae* KALTENBACH

— 35—43 antennal segments. Notaulices usually well-defined to the middle of the mesoscutum . . . . . ***Chorebus polygoni* spec. nov.**
Hosts: *A. nigrescens* HENDEL and *A. polygoni* HERING

5 Precoxal suture represented by a broad area of rugosity. Wing (figs. 51 and 52) with strongly dimorphic pterostigma, larger and blackened in the male. First three antennal segments and base of fourth contrastingly bright yellow. 22—25 antennal segments . . . . . *Dacnusa laeta* (NIXON)
Hosts: *A. arunci* HERING and *A. spiraeae* KALTENBACH

— Precoxal suture represented by a smooth groove or absent. Antennal segments usually more numerous 6

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6 Wing (figs. 49 and 50) with broad sexually dimorphic pterostigma: *1m-cu* interstitial or rejected from cell R_s. Precoxal suture absent . . . . *Dacnusa evadne* NIXON
Host: *A. spiraeae* KALTENBACH

— Wing (figs. 44 and 45) with narrow pterostigma, not sexually dimorphic: *1m-cu* received into cell R_s 7

7 Mesoscutal pubescence (fig. 76) mainly in two or three rows along the former course of the notaulices. Precoxal suture represented by a long narrow groove. Petiole almost bare . . . . . *Exotela phryne* (NIXON)
Host: *A. alnibetulae* HENDEL

— Mesoscutum pubescent over most of its surface (figs. 74 and 75). Precoxal suture represented by a very short groove or completely absent. Petiole with sparse pubescence 8

8 Basal flagellar segments paler than the rest. Clypeus dark. Petiole about 1.5 times as long as broad . . . . . ***Exotela arunci* spec. nov.**
Hosts: *A. arunci* HERING and *A. spiraeoidearum* HERING

— Flagellum entirely dark. Clypeus yellow. Petiole about 1.9 times as long as broad (fig. 77) . . . . . ***Exotela nowakowskii* spec. nov.**
Host: *A. spiraeae* KALTENBACH

4. *Agromyza* spp. on Papilionaceae

1 Mandibles obviously 4-toothed (compare fig. 60). Legs largely brown and black . . . . . *Chorebus lar* (MORLEY)
Hosts: *A. genistae* HENDEL and *A. johannae* DE MEIJERE

— Mandibles 3-toothed (compare fig. 61) 2

2 *1m-cu* clearly rejected from cell R_s 3

— *1m-cu* received into cell R_s (fig. 46) 4

3 Metapleuron, propodeum and petiole clothed with very dense pubescence. Pterostigma elongate (fig. 53), broadened towards its apex, with vein *2r* branching off very close to its base. Rugose precoxal suture present . . . *Dacnusa dryas* (NIXON)
Host: *A. frontella* RONDANI

— Pterostigma shorter and broader (see NIXON, 1954, fig. 315). Precoxal suture absent . . . . . *Dacnusa* spec. compare *lissos* (NIXON)
Host: *A.* ? *nana* MEIGEN

4 Mesoscutum with pubescence only over its central lobe. 24 antennal segments (♀). Basal flagellar segments paler than the rest. All coxae yellow . . . . . *Exotela* ? *dives* (NIXON)
Host: *A. viciae* KALTENBACH

— Hind coxae darkened. Mesoscutal pubescence also extending over the anterior half of the lateral lobes. (Characters of head not known) . . . . . *Exotela* spec.
Host: *A. nana* MEIGEN

5. *Agromyza* spp. on Dipsacaceae

1 Mandibles 4-toothed, the additional tooth situated between the original teeth 2 and 3 (compare fig. 59). Metapleural pubescence forming a rosette of radiating hairs (compare fig. 22). Antennae 39-segmented. Gaster beyond petiole orange-yellow. Hind legs with brown coxae, the apical half of the femora dark brown and the entire tibiae and tarsi almost black . . . . . ***Chorebus knautiae* spec. nov.**
Host: *A. woerzi* GROSCHKE

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Revised Key of *Exotela* FÖRSTER

The concept of *Exotela* proposed in this paper includes three of the four species included by NIXON (1954) in *Antrusa* and *Dacnusa interstitialis* THOMSON (= *mamertes* NIXON), as well as all the species included by NIXON in *Toxelea*. Some rearrangement of the *Toxelea* key itself is also necessary to incorporate the two new species described in this paper, since they cut across the distinction in the number of antennal segments given at an early couplet in NIXON's key. I have therefore attempted to produce a revised consolidated key below. Some of the couplets of course remain based on NIXON's work.

1 Vein *1m-cu* rejected from cell R_s (though often only narrowly so) (fig. 42) 2

— Vein *1m-cu* interstitial or received into cell R_s (figs. 43—46) 6

2 Mandibles 4-toothed (fig. 35). 21—26 antennal segments. Legs extensively darkened, including all the coxae. Tergite 3 pubescent . . . . . *E. interstitialis* (THOMSON) (= *Dacnusa mamertes* NIXON)

— Mandibles 3-toothed 3

3 Tergite 3 extensively pubescent with conspicuous, somewhat broken, longitudinal aciculation. 29—32 antennal segments. Petiole without a distinct keel. Coxae yellow . . . . . *E. vaenia* (NIXON), **comb. nov.**

— Tergite 3 without such aciculation (smooth or with rugose sculpture only at its extreme base). Petiole usually with a distinct median keel 4

4 All coxae shining black: hind femora and tibiae brown. 26 antennal segments (♀). Tergite 3 covered with about 4 rows of fine hairs . . . . . *E.* spec.

Host: *Agromyza* spec. (*ambigua* group)

— Largely yellow-legged species, at most the base of the hind coxae darkened. Tergite 3 usually without hairs distributed over its entire surface, there being a gap between those at the base and the apical row 5

5 Antennal segments: ♂, 25—28; ♀, 23—26 . . . . . *E. melanocera* (THOMSON) (= *Antrusa persimilis* NIXON)

Host: *Cerodontha* (*Poemyza*) *pygmaea* MEIGEN

— Antennal segments: ♂, 30—34; ♀, 28—32 . . . . . *E. flavicoxa* (THOMSON) (= *Antrusa melanocera* sensu NIXON)

Hosts: *Agromyza* spp. (*nigripes* group) and *Cerodontha* (*Poemyza*) *incisa* MEIGEN

6 Hind tarsus as long as its tibia. Ovipositor sheath (♀) projecting freely beyond the apex of the gaster by a distance equal to at least the length of the second segment of the hind tarsus; ovipositor itself downcurved (see NIXON, 1954, fig. 335). Broad rugose precoxal suture present . . . . . *E. gilvipes* (HALIDAY)

Host: *Phytomyza ranunculi* SCHRANK

— Hind tarsus shorter, distinctly shorter than its tibia; ovipositor not projecting beyond the apex of the gaster in normal attitude of insect 7

7 Precoxal suture showing as a long very narrow groove, which is smooth or only feebly rugose and more or less sharply margined below 8

— Precoxal suture showing as a short smooth impression or completely absent . . . 9

— Rugose precoxal suture retained 11

8 Postscutellum with a sharp spine (NIXON, 1954, fig. 345). 24—27 antennal segments (♀). Mesoscutum pubescent over most of its surface. . . . . *E. spinifer* (NIXON), **comb. nov.**

Hosts: *Phytomyza alpina* GROSCHKE and *P. cirsii* HENDEL

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8 Postscutellum without such a spine. 26—28 antennal segments. Mesoscutal pubescence lying mainly in two or three rows along the former course of the notaulices . . . . . *E. phryne* (NIXON)
Host: *Agromyza alnibetulae* HENDEL

9 Face and clypeus bright yellow. 24 antennal segments (♂), the scape, pedicel and first two flagellar segments being bright yellow, in contrast with the rest of the flagellum. Mesoscutum extensively pubescent with notaulices distinct anteriorly only . . . . . *E. facialis* (THOMSON)
(A single specimen only known — for other details see the table of biometric data)
— Face dark 10

10 Basal flagellar segments paler than the rest. Clypeus dark. Petiole about 1.5 times as long as broad. 24—27 antennal segments. . . . . ***E. arunci* spec. nov.**
Hosts: *Agromyza arunci* HERING and *A. spiraeoidearum* HERING

— Flagellum entirely dark. Clypeus yellow. Petiole about 1.9 times as long as broad (fig. 77). 26—29 antennal segments . . . . . ***E. nowakowskii* spec. nov.**
Host: *Agromyza spiraeae* KALTENBACH

11 28—32 antennal segments. Basal flagellar segments not much paler than the rest . . . . . *E. hera* (NIXON)
Hosts: *Agromyza* spp. on *Urtica*

— Not more than 27 antennal segments 12

12[9] Head larger and less transverse, swollen behind the eyes; mandible large, widened towards apex; first flagellar segment not much longer than the second. (See table of biometric data) . . . . . *E. dives* (NIXON), **comb. nov.**
— Head more transverse; mandible not unusually large; first flagellar segment markedly long in proportion to the second 13

13 Antennae with 24—27 segments. Scape, pedicel and at least the first flagellar segment bright yellow: coxae and clypeus pale yellow. . . . . *E. cyclogaster* FÖRSTER (= *Toxelea bellina* NIXON)
Hosts: *Phytomyza* spp. on Compositae and Umbelliferae

— Antennae with 22—24 segments. First three antennal segments mainly dark; clypeus at most brownish and a little paler than the face; coxae to some extent infuscate, especially the hind pair . . . . . *E. umbellina* (NIXON), **comb. nov.**
Hosts: *Phytomyza* spp. on Umbelliferae

Incorporation of new *Chorebus* spp. in existing Keys

The genus *Chorebus* is the most numerous in species of the Dacnusini genera in Europe. The provision of keys for identifying caught specimens is fraught with serious difficulties because of the convergent development of characters significant for group classification (such as the form of the petiole, the shape of the mandibles and the number of antennal segments) and the large number of species whose morphological differentiation from their near relatives is only slight. The keys given by NIXON (1943—54) (see the comments in Part I of this paper) seem to me to require revision in a number of respects. A partial key to some plesiomorph species which lack the characteristic rosette of metapleural pubescence shown by most species of the genus has already been offered in

[9] See also the key to the parasites of *Agromyza* spp. on Papilionaceae for reference to two other specimens which will run to this couplet. Their specific identity has not yet been clarified.

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Part I of this paper. But I will attempt to fit, as far as possible, all new species except those included in that partial key into the framework of NIXON's "*Dacnusa*" key, as I cannot yet offer a comprehensive revised key. Suggested amendments are now given.

1. Two new species described in this paper clearly fall within NIXON's (1944) concept of the *lateralis*-group, and amendments to his key to incorporate them are suggested as follows:

3 Hind coxae darkened at least on about basal third 4
— Hind coxae yellow or brownish (*C. knautiae* spec. nov.) throughout 7

4 45—48 antennal segments. Gaster beyond petiole dull reddish. Hind tibiae infuscated virtually throughout . . . . . *C. thisbe* (NIXON)
Host: *Agromyza nigrociliata* HENDEL

— At most 43 antennal segments. Gaster usually dark (occasionally tergite 3 reddish) 5

5 29—34 antennal segments. Small species 1.9—2.1 mm. with legs extensively infuscated, including the apical quarter of the hind tibiae. Metapleural swelling shining, only shallowly rugose. Notaulices weak or absent. . . . . *C. bres* (NIXON)
Host: *Agromyza spiraeae* KALTENBACH

— 35—43 antennal segments 5a

5a Hind coxae usually extensively infuscated 6
— Hind coxae infuscated at most on about basal third. Anterior half of mesoscutum at most slightly roughened. Petiole about two and a half times as long as wide. Hind femora entirely yellow. Metapleural swelling strongly shining, only weakly rugose . . . . . *C. deione* (NIXON)
Hosts: *Agromyza* spp. on Boraginaceae

6 Metapleural swelling rugose, hardly shining. Hind femora darkened at most at apex . . . . . *C. eros* (NIXON)
Host: *Agromyza nigrociliata* HENDEL

— Metapleural swelling shining, only shallowly rugose. Propodeal pubescence denser but mesoscutal pubescence sparser than in *eros*. Femora and tibiae of hind legs uniformly dark brown . . . . . ***C. polygoni* spec. nov.**
Hosts: *Agromyza polygoni* HERING and *A. nigrescens* HENDEL

7 Gaster beyond petiole predominantly bright reddish with at most suffusions of darker colouring along sides. Basal flagellar segments not pale. Pubescence of petiole sparse 7a
— Gaster predominantly dark, sometimes reddish over tergites 3 and 4, sometimes conspicuously marked with one or more yellowish blotches along the middle but in this case the flagellum is bright yellowish towards its base 8

7a Head very strongly transverse (see table of biometric data): ocelli forming a triangle with base very distinctly longer than its sides. Legs yellow except for the tarsi and occasionally the extreme apex of the hind tibiae. 34—39 antennal segments. Mesoscutal pubescence sparse (along the course of the notaulices and in about 4—5 rows over the central lobe) . . . . . *C. perkinsi* (NIXON)
Hosts: *Agromyza albitarsis* MEIGEN and *A. lygophaga* HERING

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7a Head transverse, but less strongly so: ocelli forming a triangle with base only slightly longer than sides. Hind legs with brown coxae, the apical half of the femora dark brown and the entire tibiae and tarsi almost black. 39 antennal segments (1 ♂). Central lobe of mesoscutum more densely pubescent . . . . . ***C. knautiae* spec. nov.**

Host: *Agromyza woerzi* GROSCHKE

2. Two species described as new in this paper, as well as *C. solstitialis* (STELFOX), will run in NIXON's (1943) "*Dacnusa*" key to couplets 40—44, but should probably not be included in the *lateralis*-group because of their large expanded mandibles (two other such species — *C. iphias* (NIXON) and *C. atis* (NIXON) — are already included in this part of the key). The following amendment is suggested to incorporate the three additional species (I have omitted *C. thusa* (NIXON) as NIXON (1946) states that its affinities are with *C. acco* (NIXON) (see couplet 16), with which view I agree):

41 Not more than 29 antennal segments or, if 29, the mandibles are much expanded . . 42

— At least 29 antennal segments or, if 29, the mandibles are small, not at all expanded 44

42 Tooth 1 of mandibles not noticeably expanded. Legs and palpi predominantly yellowish. Petiole fully twice as long as apically wide (poorly characterised species with the hind femora frequently darkened along their upper surface) . . . . . *C. aphantus* (MARSHALL), **comb. nov.**

Hosts: *Phytomyza nigra* MEIGEN and *P. milii* KALTENBACH

— Mandibles large, with tooth 1 much expanded. 43

43 Legs entirely, and antennae on almost basal half, yellow. 29 antennal segments (1♀). Petiole hardly widened to apex, twice as long as apically wide, its hairs very sparse but slightly more numerous basally and towards the apical corners; head considerably wider than thorax, the temples swollen . . . . . *C. iphias* (NIXON), **comb. nov.**

— Legs extensively infuscated 43a

43a Mesoscutal pubescence consisting solely of a few weak hairs along the former course of the notaulices. Petiole somewhat broadened towards apex (about 1.4 times as long as its apical width). 26—29 antennal segments. . . . *C. solstitialis* (STELFOX)

Host: *Agromyza ambigua* FALLÉN

— Central lobe of mesoscutum pubescent. Petiole narrow and parallel-sided (about twice as long as its apical width). 28 antennal segments (1♀). . . ***C. baeticus* spec. nov.**

Host: *Agromyza baetica* GRIFFITHS

44 Head massive, the temples distinctly swollen: mandibles large (over 0.2 mm. wide) with tooth 1 much expanded. Petiole narrow, about twice as long as apically wide. Dark-legged species. 44a

— Head not massive and rarely a little widened behind the eyes: mandibles smaller, usually not much expanded. Petiole long and rather narrow, its hairs on the whole evenly distributed . . . . . *lateralis* group

44a 41 antennal segments (1♂). Large species, about 2.8 mm., with the swelling of the temples very exaggerated (head width about 1 mm.) and mandibles about 0.3 mm. wide. Maxillary palpi very short, the two apical segments clearly shorter than scape + pedicel . . . . . *C. atis* (NIXON), **comb. nov.**

— 34—36 antennal segments. Smaller species (2.4—2.6 mm.) with mandibles 0.22—0.24 mm. wide: temples not so swollen (maximum head width about 0.75 mm.). Maxillary palpi longer. . . . . ***C. groschkei* spec. nov.**

Host: *Agromyza prespana* SPENCER

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3. *C. rotundiventris* (THOMSON), which was not included in NIXON's work, is an easily recognised species which could be fitted into NIXON's (1943) "*Dacnusa*" key in several places. I suggest a new couplet 31 as follows:

31 Petiole about as long as broad, almost bare. Mandibles with tooth 3 arising above tooth 2 (so that at first sight they appear only 3-toothed). *C. rotundiventris* (THOMSON)

Host: *Agromyza distorta* GRIFFITHS

— Petiole more elongate. Mandibles otherwise 31a

31a (as original couplet 31)

4. The following emendation to NIXON's (1945) key to the "*ovalis*-group" is offered to accommodate *C. hilaris* spec. nov.:

17 Antenna with 30—35 segments; maxillary palpi almost always clear yellow, the 6th (apical) segment evenly cylindrical, as long as the 4th. Notaulices usually distinct, deep, reaching to about the middle of the disc; petiole evenly and rather strongly tumescent in apical half, with any hairs present confined mainly to its sides and the depressed apical corners 17a

— Antenna with 25—26 segments; maxillary palpi darkened, the 6th segment hardly evenly cylindrical, shorter than 4th. (Species with the legs, on the whole, of dingy coloration; the hind femora considerably darkened; notaulices showing usually as rugulose scratches, rarely as smooth grooves; middle lobe ot the mesoscutum more hairy than in *lugubris*; petiole not at all tumescent in apical half, but sometimes with an indication of a medial keel here; its hairs short, sparse and on the whole evenly distributed; no trace of apical tufts.) . . . . . *C. angelicae* (NIXON), **comb. nov.**

Host: *Phytomyza angelicae* KALTENBACH

17a Legs (including coxae) yellow, with only the tarsi darkened . . ***C. hilaris* spec. nov.**

Host: *Agromyza nigripes* MEIGEN

— Legs darker, with at least the hind coxae infuscated . . . . . *C. lugubris* (NIXON)

Host: *Agromyza albipennis* MEIGEN

Host Specificity

The host ranges of the species of Alysiinae treated in this paper are given in Table 4. The definitions of the terms used in the classification were explained in Part I of this paper (GRIFFITHS, 1964).

Other Alysiinae

Grandia cynaraphila (RICCHELLO)	Monophagy, 1st degree
Dapsilarthra balteata (THOMSON)	Oligophagy, 1st degree
sylvia (HALIDAY)	Oligophagy, 1st degree

As can be seen from Table 4 the overwhelming majority of Dasnusini bred from *Agromyza* exhibit monophagy of the first or second degree (in contrast with the non-Dacnusine genus *Dapsilarthra*). Exceptions are *Dacnusa maculipes* THOMSON (normally a Phytomyzinae parasite) and *Exotela flavicoxa* (THOMSON), which has been bred from *Cerodontha* (*Poemyza*) *incisa* MEIGEN as well as several

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Table 4

Classification of host ranges of Alysiinae parasites of *Agromyza* (excluding species of doubtful identity)

Tribe Dacnusini

Exotela		*Dacnusa*	
flavicoxa (THOMSON)	Combined Generic Monophagy	*abdita* (HALIDAY)	Monophagy, 2nd or 3rd degree
hera (NIXON)	Monophagy, 2nd degree	*maxima* (FISCHER)	Monophagy, 1st degree
nowakowskii spec. nov.	Monophagy, 1st degree	*evadne* NIXON	Monophagy, 1st degree
		laeta (NIXON)	Monophagy, 2nd degree
arunci spec. nov.	Monophagy, 2nd degree	*dryas* (NIXON)	Monophagy, 1st degree
phryne (NIXON)	Monophagy, 1st degree	*maculipes* THOMSON	Oligophagy, 1st degree
Protodacnusa			
tristis (NEES)	Monophagy, ?1st degree		
Chorebus		*Chorebus*	
nydia (NIXON)	Monophagy, 2nd degree	*thisbe* (NIXON)	Monophagy, 1st degree
coxator (THOMSON)	Monophagy, 2nd degree	*eros* (NIXON)	Monophagy, 1st degree
		resa (NIXON)	Monophagy, 1st degree
spenceri GRIFFITHS	Monophagy, 1st degree	*lateralis* (HALIDAY)	Monophagy, 2nd degree
lugubris (NIXON)	Monophagy, ?1st degree	*deione* (NIXON)	Monophagy, 2nd degree
hilaris spec. nov.	Monophagy, 1st degree	*bres* (NIXON)	Monophagy, 1st degree
ninella (NIXON)	Monophagy, 1st degree	*credne* (NIXON)	Monophagy, 2nd degree
rotundiventris (THOMSON)	Monophagy, 1st degree	*polygoni* spec. nov.	Monophagy, 2nd degree
groschkei spec. nov.	Monophagy, 1st degree	*perkinsi* (NIXON)	Monophagy, 2nd degree
baeticus spec. nov.	Monophagy, 1st degree		
solstitialis (STELFOX)	Monophagy, 1st degree	*knautiae* spec. nov.	Monophagy, 1st degree
cinctus (HALIDAY)	Monophagy, 1st degree	*lar* (MORLEY)	Monophagy, 2nd degree
pione (NIXON)	Monophagy, 1st degree		

species of the *Agromyza nigripes* group. This range has presumably arisen because the *Cerodontha* often attacks the same food-plant as some of the *Agromyza* species (e. g. *A. albipennis* MEIGEN on *Phalaris*). Apart from these two species none of the Dacnusini bred from *Agromyza* attack other genera of the family, nor is there any species which attacks more than one of the four "natural genera" into which *Agromyza* has been divided in Table 5.

Not too much stress should yet be placed on the distinction between monophagy of the first and second degrees, since it is likely that some species now classed as monophagous in the first degree on the basis of one or two breeding records will in the future be found on other related hosts. But it seems unlikely, in view of the considerable volume of material examined, that species already classed as monophagous in the second degree will be found to have more extensive host ranges.

Evolution of Hosts and Parasites

The known host associations (except for the oligophagous *Dapsilarthra*) are given in Table 5. Groups of host species which may on reasonably good evidence be accepted as monophyletic are indicated by the brackets in the left-hand margin of the table (after GRIFFITHS, 1963, for the *Agromyza nigripes/ambigua*

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group and after NOWAKOWSKI, 1964, for the *Agromyza reptans* group). Outside these two groups the phylogenetic relationships between the host species have not been established in detail, and I have only indicated two species-pairs.

Exotela FÖRSTER

Exotela species are known to me from all the four "natural genera" in Table 5, but the material from the species attacking Papilionaceae is inadequate for specific determination. An important feature in the known host-association of this genus is the vicariance between species which are plesiomorph in respect of the rejection (although often narrowly) of vein *1m–cu* from cell R_s and those in which *1m–cu* is received into that cell. The former species are only known to be associated with the *Agromyza nigripes/ambigua* group and *Cerodontha* subgenus *Poemyza*, while the latter are associated with other *Agromyza* spp., *Paraphytomyza*[10] (an apparently undescribed species) and *Phytomyza*. The significance of this vicariance was discussed in the first part of this paper (GRIFFITHS, 1964).

It seems likely that the species in which *1m–cu* is received into cell R_s form a monophyletic group, since that character is apomorph. *E. hera* (NIXON) is probably the most plesiomorph species within this group, since in that species *1m–cu* is only narrowly received into cell R_s and is virtually interstitial in some specimens: an other plesiomorph character is the broad rugose precoxal suture. Interpreting the relationships of the remaining species is not easy. The two species *nowakowskii* and *arunci* are probably monophyletic vicariants, since they have both lost the precoxal suture and are associated with closely related hosts. The host association of *phryne* suggests that it should be linked with *nowakowskii* and *arunci* (all parasites of the *Agromyza rubi* group) and its weak precoxal suture considered to represent synapomorphy with those species. The affinities of the species associated with *Agromyza* spp. on Papilionaceae can hardly be discussed on the basis of the inadequate material available.

The interrelationships of the species are unfortunately not sufficiently clear on present evidence to construct a phylogeny tree. If *phryne*, *arunci* and *nowakowskii* are monophyletic, they afford an example of parallel or at least closely correlated evolution of hosts and parasites at a low taxonomic level. But at higher levels there has been no such parallelism, although speciation within the genus has clearly been associated with host specialisation.

Dacnusa HALIDAY

Of the four species of *Dacnusa* referred to in this paper, *D. evadne* NIXON and *D. abdita* (HALIDAY) may be monophyletic (both having *1m–cu* interstitial or virtually so), but the other two species do not appear to be very closely related. *D. laeta* (NIXON) is plesiomorph in that it retains the precoxal suture, which has

[10] This record was previously given as refering to *Phytagromyza* (GRIFFITHS, 1964). The genus *Paraphytomyza* (= *Rubiomyza*) has been separated from HENDEL's concept of *Phytagromyza* by NOWAKOWSKI (1962).

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Table 5. List of Records of Alysiinae Parasites of *Agromyza* (except *Dapsilarthra* spp.). (Brackets in the left-hand margin indicate probable monophyletic groups.)

Hosts	*Exotela*	*Dacnusa*	*Chorebus lateralis* group	Other *Chorebus* spp.	Other Genera
I. *Agromyza nigripes/ambigua* group					
albipennis	*flavicoxa*			*nydia, lugubris*	
nigripes	*flavicoxa*			*nydia, hilaris*	
lucida	*flavicoxa*		*cinctus*		
hendeli				*coxator, ninella*	
phragmitidis			*pione*	*coxator, spenceri*	
prespana				*groschkei*	
baetica				*baeticus*	
distorta	*flavicoxa*			*rotundiventris*	
megalopsis				*solstitialis*	
nigrociliata[11]			*thisbe, eros*		
ambigua — group, not identified					
to species	sp.		*resa*	sp. (cf. *lugubris*)	*Protodacnusa tristis*
II. *Agromyza reptans* group					
anthracina	*hera*	*abdita*	*lateralis*		
urticae	*hera*	*abdita*	*lateralis*		
reptans	*hera*				
myosotidis			*deione*		
abiens		*abdita, maxima*			
		maculipes	*deione*		
lithospermi		*abdita*			
ferruginosa			*lateralis, deione*		
pseudorufipes			*deione*		
III. *Agromyza rubi* group					
rubi			*credne*		
spiraeae	*nowakowskii*	*laeta, evadne*	*credne, bres*		
spiraeoidearum	*arunci*				
arunci[12]	*arunci*	*laeta*			
alnibetulae	*phryne*		*credne*		
polygoni			*polygoni*		
nigrescens			*polygoni*		
albitarsis			*perkinsi*		
lygophaga			*perkinsi*		
IV. *Agromyza* spp. on Papilionaceae					
frontella		*dryas*			
nana	sp.	sp.			
viciae	*?dives*				
genistae				*lar*	
johannae				*lar*	
V. Other *Agromyza* spp.					
woerzi			*knautiae*		
apfelbecki					*Grandia cynaraphila*

[11] Some confusion still remains about the larval characters of the *ambigua* group. The identification "*nigrociliata*" refers to the type of larva described by HERING (1953) with the dorsal surface of its eighth abdominal segment covered with spines.

[12] HERING (personal communication) now considers his *A. arunci* to be a full species, not a subspecies of *A. spiraeoi dearum* HERING.

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Table 6
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	Heigth	Femur	Tibia	Tarsus	1	2	3	4	5
1	♀	65	37	46	21	30	26	13	17	12	11	11	11	11	—	95	50	80	61	81	69	26	12	9	7	11
2	♀	71	37	52	20	32	30	13	17	13	11	—	14	11	13	98	54	83	67	95	65	24	12	9	7	11
3	♀	65	37	48	21	30	26	11	14	11	11	9	13	11	12	85	46	67	52	80	67	24	13	10	7	11
4	♂	76	43	54	21	34	26	17	15	13	13	11	16	11	15	98	56	81	65	91	76	26	17	13	9	11
5	♀	65	39	52	19	30	24	19	13	11	10	9	11	8	10	85	48	59	58	78	65	26	13	10	7	9
6	♂	69	34	52	19	35	22	15	17	13	11	13	13	13	13	93	52	78	65	87	67	26	13	11	7	9
7	♀	78	37	52	21	39	24	17	17	13	11	13	15	13	13	102	59	87	71	100	69	26	14	11	7	9
8	♂	63	34	46	18	32	22	11	17	12	12	11	15	8	9	83	48	72	61	81	59	24	13	9	6	8
9	♂	67	32	46	16	35	24	13	19	14	13	13	17	15	15	93	48	78	67	89	72	28	15	11	7	11
10	♀	69	34	52	19	37	21	13	19	14	13	13	17	15	13	95	50	83	72	102	74	28	15	12	8	11
11	♀	58	32	46	19	30	19	13	15	11	11	11	13	9	11	78	44	74	54	72	58	21	11	9	7	9
12	♂	56	30	43	16	28	19	13	14	11	11	9	13	10	9	72	41	63	54	69	52	19	11	9	6	9
13	♂	58	28	43	15	28	21	11	13	11	11	11	12	9	11	69	32	71	56	74	56	21	11	8	6	9
14	♀	59	35	43	17	30	19	17	12	11	10	9	9	6	8	69	41	63	46	69	52	19	11	7	6	7
15	♀	58	30	39	15	28	19	13	12	10	9	7	11	7	9	72	37	59	48	69	56	21	13	8	6	9

Nos. 1—4. *Exotela flavicoxa* (THOMSON): 1, from type locality (ex Thomson collection); 2, ex *A. albipennis* MEIGEN, Woodwalton Fen, England; 3, ex *Cerodontha* (*Poemyza*) *incisa* MEIGEN, Woodwalton Fen, England; 4, ex *A. nigripes* MEIGEN, Ash Vale, England.

No. 5. *Exotela* spec. ex *Agromyza* spec. on *Agropyron*, Poland.

Nos. 6—7. *Exotela hera* (NIXON): 6, ex *A. urticae* NOWAKOWSKI, Granica, Poland; 7, ex *Agromyza* spec. on *Urtica*, Sweden.

No. 8. *Exotela phryne* (NIXON), Chippenham Fen, England.

been lost in most *Dacnusa* spp. No suggestions on the phylogeny of *Dacnusa* can be put forward until the species attacking Phytomyzinae have been studied in more detail.

Chorebus HALIDAY

The species of *Chorebus* attacking *Agromyza* have been divided in Table 5 into the *lateralis*-group and others. The *lateralis*-group concept in this paper is identical with that proposed by NIXON (1944) except that one additional species — *C. resa* (NIXON) — has been included. All except two of the species included in this group have normally 35 or more antennal segments, which I consider to be an apomorph character. Two species with fewer antennal segments — *C. bres* (NIXON) and *C. credne* (NIXON) — are included here (following NIXON, 1944) in view of their close resemblance to other species of the group, particularly in the form and vestiture of the petiole and mesoscutum. Possibly the number of antennal segments has been secondarily reduced in these species in

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26	27	28	29	30	31	32	Ratios														
							A	B	C	D	E			F	G	H	I	J					K	L
Hind Coxa				Petiole							Antennal Segments							Hind Tarsal Segments						
Width	Length	Wing Length	Gaster Length	Width	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	3	4	5	Height/ Length of Thorax	Thorax/ Head Width	Wing Length/ Body Length	Hind Tibia/ Tarsus	1	2	3	4	5	Lengths of Petiole/ Gaster	Width/ Length of Petiole
17	28	267	120	23	39	238	1.8	1.3	2.2 : 1 : 0.9	2.9	1.4	: 1	: 1	1.2	1.3	0.9	0.8	2.2	: 1 : 0.8	: 0.6	: 1.0		3.1	1.6
17	30	291	133	32	44	262	1.9	1.4	2.2 : 1 : 0.9	2.9	1.3	: 1	: 0.9	1.2	1.3	0.9	0.7	1.9	: 1 : 0.7	: 0.6	: 0.8		3.0	1.4
15	28	262	109	24	35	238	1.7	1.3	2.2 : 1 : 0.9	3.3	1.3	: 1	: 1	1.3	1.4	0.9	0.8	1.9	: 1 : 0.8	: 0.6	: 0.9		3.1	1.5
19	26	295	148	30	44	276	1.8	1.3	2.3 : 1 : 0.8	2.5	1.1	: 1	: 1	1.2	1.4	0.9	0.8	1.6	: 1 : 0.8	: 0.7	: 0.7		3.3	1.5
15	26	224	—	23	35	—	1.7	1.3	2.2 : 1 : 0.8	2.1	1.2	: 1	: 0.9	1.4	1.3	—	0.8	2.0	: 1 : 0.8	: 0.6	: 0.7		—	1.5
17	28	276	108	28	41	238	2.1	1.6	1.9 : 1 : 0.6	2.2	1.3	: 1	: 0.9	1.2	1.3	0.9	0.8	2.0	: 1 : 0.9	: 0.6	: 0.7		2.6	1.5
15	32	319	124	30	44	262	2.1	1.4	2.0 : 1 : 0.6	2.2	1.3	: 1	: 0.9	1.2	1.3	0.8	0.8	2.0	: 1 : 0.9	: 0.6	: 0.7		2.8	1.5
13	26	257	100	21	30	205	1.9	1.4	2.0 : 1 : 0.7	3.0	1.3	: 1	: 0.9	1.2	1.3	0.8	0.7	1.9	: 1 : 0.7	: 0.5	: 0.6		3.4	1.5
14	32	310	187	21	41	271	2.1	1.5	1.9 : 1 : 0.7	2.4	1.4	: 1	: 0.9	1.2	1.4	0.9	0.8	1.9	: 1 : 0.8	: 0.5	: 0.8		3.4	1.9
15	34	319	132	22	43	257	2.1	1.6	1.9 : 1 : 0.6	2.6	1.4	: 1	: 0.9	1.1	1.4	0.8	0.7	1.9	: 1 : 0.8	: 0.5	: 0.8		3.1	1.9
15	24	243	93	21	30	209	1.8	1.5	1.9 : 1 : 0.6	2.4	1.4	: 1	: 1	1.1	1.3	0.9	0.8	1.8	: 1 : 0.8	: 0.6	: 0.8		3.1	1.5
13	24	224	87	19	28	181	1.9	1.4	2.0 : 1 : 0.7	2.3	1.2	: 1	: 1	1.1	1.4	0.8	0.8	1.6	: 1 : 0.8	: 0.5	: 0.8		3.1	1.5
12	26	233	113	19	30	190	2.1	1.5	2.1 : 1 : 0.7	2.5	1.2	: 1	: 1	1.0	1.8	0.8	0.7	1.8	: 1 : 0.7	: 0.5	: 0.8		3.8	1.6
13	21	219	89	16	30	186	1.7	1.2	2.0 : 1 : 0.6	2.1	1.1	: 1	: 0.9	1.1	1.5	0.8	0.7	1.7	: 1 : 0.7	: 0.6	: 0.7		3.0	1.8
11	21	200	118	17	34	190	1.9	1.3	2.1 : 1 : 0.7	2.3	1.2	: 1	: 0.9	1.2	1.5	1.0	0.8	1.6	: 1 : 0.6	: 0.5	: 0.7		3.6	1.9

Nos. 9—10. *Exotela nowakowskii* spec. nov., Poland: 9, holotype; 10, Spadowiec Valley.

Nos. 11—12 *Exotela arunci* spec. nov. ex *A. arunci* HERING: 11, Spadowiec Valley, Poland; 12, Linz, Austria.

No. 13. *Exotela facialis* (THOMSON) holotype.

No. 14. *Exotela dives* (NIXON), Degeberga, Sweden.

No. 15. *Exotela* ? *dives* (NIXON) ex *A. viciae* KALTENBACH, Austria.

association with their small size. The form of petiole in the group varies from the relatively short and broad form (probably plesiomorph) shown for instance by *C. cinctus* (HALIDAY) to the apomorph elongate form shown for instance by *C. lateralis* (HALIDAY) or at its most extreme by *C. resa* (NIXON). The pubescence of the petiole varies from being virtually absent (e.g. in *cinctus*) to the evenly distributed, fairly dense pubescence shown for instance by *C. eros* (NIXON). No dense apical tufts are developed (contrast for instance *C. ninella* (NIXON)). For further details reference should be made to the long general description given by NIXON (1944).

The members of the *lateralis*-group are all parasites of *Agromyza*, and it is clear from Table 5 that many species are host vicariants. There are two obvious species-pairs — *cinctus/pione* and *lateralis/deione* — which may each be accepted as monophyletic in view of their minimal morphological differentiation. Another two species which may possibly be monophyletic are the two dark species *bres* and *polygoni*, vicariants on different hosts of the *Agromyza rubi* group.

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Table 7
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	♀	98	46	69	25	50	30	26	24	17	16	21	24	19	21	141	78	113	100	141	104	39	22	17	12	13
2	♂	96	52	69	24	50	28	25	24	17	15	—	24	17	19	132	69	106	95	132	98	37	21	15	11	15
3	♂	78	37	54	21	39	26	19	19	15	14	12	17	14	15	104	52	81	76	106	74	28	15	11	9	11
4	♀	72	34	48	19	43	24	15	19	13	13	13	17	13	13	100	50	80	69	93	76	28	17	11	8	11
5	♀	72	39	50	21	41	22	18	17	14	13	13	17	13	14	102	54	81	74	102	76	28	17	11	9	11
6	♀	58	32	41	21	30	17	12	17	13	11	10	13	7	9	76	39	65	59	80	59	21	13	9	7	10
7	♂	54	30	37	15	27	17	12	15	12	11	11	12	7	9	67	37	63	52	69	54	21	11	8	6	9
8	♀	61	34	46	15	—	—	13	22	15	13	—	—	—	—	80	44	71	65	89	69	25	14	10	7	11
9	♂	48	24	39	11	26	17	9	18	15	13	8	12	—	—	63	32	54	50	65	54	19	11	9	6	10
10	♀	52	30	39	13	28	19	15	14	13	12	6	9	7	7	61	34	48	48	69	65	25	13	10	7	9

Nos. 1—2. *Dacnusa maxima* (FISCHER): 1, Mörkweden, Germany; 2, Gower, Wales.
Nos. 3—5. *Dacnusa abdita* (HALIDAY): 3, ex *A. urticae* NOWAKOWSKI, Cambridge, England; 4, ex *A. abiens* ZETTERSTEDT, Berlin, Germany; 5, ex *A. lithospermi* SPENCER, Alpes Maritimes, France.

The other species of *Chorebus* listed include the three highly plesiomorph species of the *nydia* group already discussed in Part I of this paper. The remaining species all belong, like the *lateralis*-group, to what I have termed the *Chorebus lateralis/ovalis* complex, characterised by their rosette of metapleural pubescence and the reduction of vein Cu_{1b}. Three species — *solstitialis*, *baeticus* and *groschkei* — have unusually large mandibles and I think that they may form, with the unbred *C. atis* (NIXON), a monophyletic group which I term the *atis*-group. The group is as far as known confined to Gramineae-feeding species of *Agromyza*: the large mandibles, as in *Protodacnusa*, probably represent an adaption to facilitate emergence from hard strongly-arched puparia.

The remaining species associated with Gramineae-feeding hosts — *lugubris*, *hilaris*, *ninella* and *rotundiventris* — all retain largely bare mesoscuta with well-developed notaulices and small mandibles. These are plesiomorph characters and need not indicate monophyly. However *lugubris* and *hilaris* I consider to be monophyletic, as they are host vicariants whose differentiation is largely confined to colour. Their association with *A. albipennis* MEIGEN and *A. nigripes* MEIGEN respectively is an interesting example of a monophyletic pair of host species being attacked by a monophyletic pair of parasite species. Whether there is any close affinity between these species and *ninella* or *rotundiventris* is however doubtful, as the resemblances rest on symplesiomorphy.

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							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 Mandibles/ /Length of Head	Antennal Segments			Height/Length of Thorax	Thorax/Head Width/ Width	Wing/Body Length/ Length	Hind Tibia/Tarsus	Hind Tarsal Segments					Lengths of Petiole/ Gaster	Width/Length of Petiole
Width	Length			Width	Length						3	4	5					1	2	3	4	5		
22	44	438	182	37	61	348	2.1	1.5	2.0 : 1 : 0.6	1.8	1.4	1	1	1.2	1.3	0.8	0.7	1.8	1	0.7	0.5	0.6	3.0	1.7
22	37	395	170	32	56	329	1.9	1.3	1.9 : 1 : 0.6	2.0	1.4	1	0.9	1.2	1.4	0.8	0.7	1.8	1	0.7	0.5	0.7	3.1	1.8
17	32	338	124	22	41	267	2.1	1.4	2.0 : 1 : 0.7	2.0	1.3	1	0.9	1.3	1.5	0.8	0.7	1.9	1	0.7	0.6	0.7	3.0	1.8
19	35	314	111	26	37	228	2.2	1.4	1.7 : 1 : 0.6	2.2	1.4	1	1	1.3	1.4	0.7	0.8	1.7	1	0.7	0.5	0.7	3.0	1.4
17	34	343	95	26	37	228	1.9	1.3	1.8 : 1 : 0.5	2.2	1.2	1	0.9	1.3	1.3	0.7	0.7	1.7	1	0.7	0.5	0.7	2.6	1.4
15	26	257	93	18	26	190	1.8	1.3	1.9 : 1 : 0.6	2.5	1.3	1	0.9	1.2	1.5	0.7	0.7	1.6	1	0.7	0.6	0.8	3.6	1.4
13	26	252	87	17	27	176	1.9	1.3	2.0 : 1 : 0.6	2.3	1.3	1	0.9	1.1	1.5	0.7	0.8	1.8	1	0.7	0.5	0.8	3.3	1.6
13	28	271	102	22	35	214	1.8	1.4	—	2.6	1.5	1	0.9	1.2	1.4	0.8	0.8	1.8	1	0.6	0.5	0.8	2.9	1.6
11	25	238	87	15	26	167	2.0	1.5	1.9 : 1 : 0.7	2.6	1.2	1	0.9	1.2	1.5	0.7	0.8	1.7	1	0.8	0.6	0.9	3.4	1.7
11	21	200	76	22	26	167	1.7	1.3	1.9 : 1 : 0.7	2.0	1.1	1	0.9	1.3	1.6	0.8	0.9	2.0	1	0.8	0.6	0.7	2.9	1.2

Nos. 6—7. *Dacnusa evadne* NIXON: 6, Woodwalton Fen, England; 7, Młociny, Poland.
Nos. 8—9. *Dacnusa laeta* (NIXON), Tatry, Poland: 8, ex *A. spiraeae* KALTENBACH; 9, ex *A. arunci* HERING.
No. 10. *Dacnusa dryas* (NIXON) ex *A. frontella* RONDANI, England.

The remaining species, *C. lar* (MORLEY), does not seem to be very closely related to any of the other species treated in this paper.

The *Chorebus* spp. parasitising *Agromyza* can be seen from Table 5 to be highly host specific, and their speciation has clearly been associated with host vicariance. Unfortunately their relationships above the lowest superspecific level are not sufficiently clear on present evidence to be expressed as a phylogeny tree.

A discussion of the implications of the results of this investigation for the parasitophyletic rules which have been developed in the theoretical literature is best deferred until the parasite faunas of other host genera have been studied. Suffice it to say for the present that the host/parasite distribution pattern of the Dacnusini and Agromyzidae has some similar features to that of the Agromyzidae and their host plants (see NOWAKOWSKI, 1962). Complete correspondance of host and parasite evolution (whether through simultaneous or "retarded" speciation) seems uncommon and one is led to suspect that speciation has often followed on secondray expansions of the host-range (or "leaps" as NOWAKOWSKI (1962) calls them). For this reason much caution should be used in using the evidence of parasite relationships to suggest host relationships or vice versa.

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Table 8

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							Antennal Segments			Maxillary Palpus Segments				Thorax			Hind Leg			Hind Tarsal Segments				
		Width	Length	Height	Eye-width (lateral)	Distance between Eyes	Clypeus Width	Mandibles Width	3	4	5	3	4	5	6	Length	Width	Height	Femur	Tibia	Tarsus	1	2	3	4	5
1	♀	67	39	52	19	30	19	19	15	14	13	9	13	—	—	91	50	71	67	100	85	34	18	12	9	11
2	♀	76	48	61	21	39	19	24	17	13	11	11	14	9	11	98	54	74	74	96	83	32	18	13	9	11
3	♂	72	44	52	19	32	21	22	17	11	11	11	14	11	11	98	58	74	67	91	74	28	15	11	9	10
4	♂	67	37	50	13	28	18	20	13	11	11	9	11	9	12	85	46	63	56	83	72	28	15	10	8	11
5	♂	60	58	74	17	43	26	30	17	13	14	11	13	9	9	115	65	87	76	106	96	37	22	15	10	13
6	♀	65	34	48	13	32	17	14	17	13	13	—	—	—	—	87	52	71	59	87	78	28	14	11	9	14
7	♀	63	32	48	15	—	—	13	15	13	11	—	—	—	—	85	44	74	59	81	71	26	13	11	7	12
8	♀	67	34	48	17	30	22	12	17	15	14	9	13	11	14	89	46	74	63	87	78	32	15	11	9	12
9	♂	65	37	44	17	28	19	15	15	11	10	7	12	8	11	78	48	63	61	87	63	24	13	9	7	11
10	♀	78	41	50	15	37	23	17	17	12	11	—	—	—	—	—	—	—	69	96	67	24	15	9	7	11
11	♀	72	41	54	22	34	24	17	18	14	11	11	17	11	12	93	56	81	71	93	76	28	15	11	9	12
12	♂	78	41	54	22	39	22	21	19	14	13	12	17	13	17	98	59	80	78	98	78	28	17	11	9	12
13	♀	78	41	56	21	37	22	19	19	15	13	11	15	13	15	93	59	81	71	95	74	26	15	11	9	13
14	♂	65	35	48	21	—	15	14	15	11	11	—	15	11	13	81	50	65	61	76	71	24	13	11	9	12
15	♀	78	43	59	21	35	22	17	22	16	15	15	21	17	16	109	63	83	81	115	85	30	18	13	11	11
16	♀	69	39	48	21	26	19	17	17	13	12	13	19	13	17	87	50	72	71	93	74	28	15	11	9	11
17	♀	69	37	50	19	34	17	17	19	14	13	9	13	11	13	80	48	71	63	85	74	30	15	11	7	9
18	♀	65	39	50	22	32	17	15	17	13	14	11	13	11	13	80	48	65	65	83	71	27	14	11	7	11
19	♀	71	39	52	22	34	22	19	21	15	13	13	17	13	15	83	48	80	71	91	74	28	17	11	9	9
20	♂	69	35	50	22	34	22	17	21	15	13	11	15	11	15	87	44	71	67	87	76	30	16	13	7	9
21	♀	71	39	52	21	32	—	21	19	15	13	—	16	10	19	87	50	76	72	93	76	30	17	13	7	9
22	♂	78	37	54	19	39	24	19	19	16	14	13	17	13	17	100	54	78	76	104	87	34	19	14	9	11
23	♀	56	32	43	18	28	22	11	13	12	11	9	12	8	10	71	37	59	50	67	52	19	12	9	6	7
24	♂	52	30	39	17	26	19	11	15	12	11	8	11	8	11	61	34	52	46	65	50	19	9	7	6	9
25	♂	50	28	39	15	26	19	10	13	11	11	11	13	9	9	65	34	54	50	69	52	19	11	8	6	9
26	♀	67	34	48	18	35	21	14	17	15	13	9	13	9	9	80	46	72	63	80	63	22	13	11	7	9
27	♂	56	26	41	15	28	21	11	15	13	12	9	11	7	9	74	41	65	54	71	56	21	10	9	7	9
28	♂	52	28	39	13	24	19	12	14	12	11	9	12	7	9	71	37	54	50	65	54	19	11	7	7	9
29	♀	61	30	44	17	30	22	13	15	13	11	9	12	9	11	81	44	67	59	74	63	24	12	9	7	9
30	♀	69	35	50	21	27	19	14	18	13	13	8	15	10	11	100	52	80	69	93	72	28	15	11	7	9
31	♂	58	32	41	16	30	19	10	13	11	11	7	12	7	9	74	41	63	54	71	59	22	11	9	7	9
32	♀	72	43	52	24	—	—	17	19	15	14	—	—	—	—	102	54	93	76	100	83	32	17	12	9	11
33	♂	59	34	44	17	34	22	15	15	12	11	12	15	10	11	85	44	65	61	85	67	26	15	11	7	9
34	♂	50	30	35	14	24	15	15	11	10	9	6	6	6	6	59	34	48	43	58	52	19	11	7	6	9
35	♀	48	28	37	12	26	15	15	11	9	9	6	7	6	7	58	35	52	44	58	44	17	9	6	5	7

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Hind Coxa				Petiole			Ratios																
26	27	28	29	30	31	32	A	B	C	D	E			F	G	H	I	J					K	L
Width	Length	Wing Length	Gaster Length	Width	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/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
15	28	271	—	23	44	220	1.7	1.3	2.2 : 1 : 0.6	2.0	1.1	1	1	1.3	1.3	0.8	0.9	1.9	1	0.7	0.5	0.6	—	2.0
17	26	300	120	22	43	257	1.6	1.3	2.0 : 1 : 0.5	2.0	1.3	1	0.9	1.3	1.4	0.9	0.9	1.8	1	0.7	0.5	0.6	2.8	1.9
15	26	295	124	21	41	248	1.6	1.2	2.3 : 1 : 0.6	2.0	1.5	1	1	1.3	1.3	0.8	0.8	1.9	1	0.7	0.6	0.7	3.0	2.0
15	26	243	120	26	37	252	1.8	1.3	2.4 : 1 : 0.6	1.4	1.2	1	1	1.4	1.4	1.0	0.9	1.9	1	0.7	0.5	0.7	3.2	1.4
22	35	362	154	26	48	333	1.7	1.3	2.3 : 1 : 0.6	1.9	1.3	1	1	1.3	1.5	0.9	0.9	1.7	1	0.7	0.4	0.6	3.2	1.9
17	26	271	120	27	39	243	1.9	1.4	2.0 : 1 : 0.5	2.5	1.2	1	1	1.2	1.3	0.9	0.9	2.0	1	0.7	0.6	1.0	3.1	1.4
15	26	243	111	30	39	233	2.0	1.5	—	2.4	1.1	1	0.9	1.2	1.4	1.0	0.9	2.0	1	0.9	0.6	1.0	2.9	1.3
17	26	286	106	26	41	233	2.0	1.4	2.2 : 1 : 0.7	2.6	1.1	1	0.9	1.2	1.4	0.8	0.9	2.1	1	0.7	0.6	0.8	2.6	1.6
17	24	267	93	34	35	205	1.8	1.2	2.3 : 1 : 0.7	2.5	1.3	1	0.9	1.2	1.3	0.8	0.7	1.9	1	0.7	0.6	0.9	2.6	1.1
17	24	300	—	43	43	—	1.9	1.2	2.1 : 1 : 0.6	2.4	1.4	1	1	—	—	—	0.7	1.6	1	0.6	0.5	0.8	—	1.0
21	32	286	120	28	44	248	1.8	1.3	2.2 : 1 : 0.7	2.4	1.3	1	0.8	1.1	1.3	0.9	0.8	1.9	1	0.7	0.6	0.8	2.7	1.6
19	32	291	—	32	46	—	1.9	1.3	2.0 : 1 : 0.6	2.0	1.4	1	1	1.2	1.3	—	0.8	1.7	1	0.7	0.6	0.7	—	1.5
19	28	281	96	37	44	257	1.9	1.4	2.1 : 1 : 0.6	2.2	1.3	1	0.9	1.1	1.3	0.9	0.8	1.7	1	0.7	0.6	0.8	2.2	1.2
19	26	228	98	26	35	214	1.8	1.4	—	2.6	1.3	1	1	1.3	1.3	0.9	0.9	1.9	1	0.9	0.6	0.9	2.8	1.4
17	30	310	141	23	48	281	1.8	1.4	2.2 : 1 : 0.6	2.6	1.4	1	0.9	1.3	1.2	0.9	0.7	1.7	1	0.7	0.6	0.6	2.9	2.1
15	30	300	111	26	46	228	1.8	1.2	2.6 : 1 : 0.7	2.3	1.3	1	1	1.2	1.4	0.8	0.8	1.9	1	0.7	0.6	0.7	2.4	1.8
15	26	262	106	14	43	233	1.8	1.3	2.1 : 1 : 0.5	2.2	1.4	1	1	1.1	1.4	0.9	0.9	2.0	1	0.7	0.5	0.6	2.5	3.0
14	26	252	93	14	39	228	1.7	1.3	2.1 : 1 : 0.5	2.6	1.3	1	1	1.2	1.3	0.9	0.9	2.0	1	0.8	0.5	0.8	2.4	2.9
17	26	300	106	20	48	233	1.8	1.3	2.1 : 1 : 0.7	2.1	1.4	1	0.9	1.0	1.5	0.8	0.8	1.7	1	0.7	0.5	0.6	2.2	2.4
17	28	271	122	20	39	257	1.9	1.4	2.1 : 1 : 0.7	2.1	1.4	1	0.9	1.2	1.5	0.9	0.9	1.8	1	0.8	0.5	0.6	3.1	2.0
16	26	291	111	18	41	228	1.8	1.3	2.2: 1 : —	1.9	1.2	1	0.9	1.1	1.4	0.8	0.8	1.8	1	0.8	0.4	0.6	2.7	2.3
19	30	319	132	21	52	286	2.1	1.4	2.0 : 1 : 0.6	2.0	1.1	1	0.9	1.3	1.4	0.9	0.8	1.8	1	0.8	0.5	0.6	2.5	2.5
14	22	228	93	14	32	181	1.8	1.4	2.0 : 1 : 0.8	2.8	1.1	1	0.9	1.2	1.5	0.8	0.8	1.6	1	0.7	0.5	0.6	2.9	2.2
15	22	224	81	13	30	176	1.8	1.3	2.0 : 1 : 0.7	2.7	1.3	1	1	1.2	1.5	0.8	0.8	2.0	1	0.8	0.6	0.9	2.8	2.3
12	21	214	83	13	30	167	1.8	1.4	1.9 : 1 : 0.7	3.0	1.2	1	1	1.2	1.5	0.8	0.8	1.7	1	0.7	0.5	0.8	2.8	2.3
15	26	257	108	22	43	228	2.0	1.4	1.9 : 1 : 0.6	2.4	1.1	1	0.8	1.1	1.4	0.9	0.8	1.7	1	0.8	0.6	0.7	2.5	1.9
13	21	214	96	15	32	190	2.1	1.6	2.0 : 1 : 0.7	2.3	1.1	1	0.9	1.1	1.4	0.9	0.8	1.1	1	0.9	0.8	0.9	3.1	2.0
13	22	214	78	17	33	162	1.9	1.4	2.2 : 1 : 0.8	2.3	1.2	1	0.9	1.3	1.4	0.8	0.8	1.7	1	0.7	0.6	0.8	2.4	2.0
17	24	243	93	15	35	219	2.1	1.5	2.1 : 1 : 0.8	2.3	1.1	1	0.9	1.2	1.4	0.9	0.8	1.9	1	0.7	0.6	0.7	2.6	2.4
18	30	276	133	21	45	271	1.9	1.4	2.6 : 1 : 0.7	2.5	1.4	1	1	1.3	1.3	1.0	0.8	1.9	1	0.7	0.5	0.6	3.0	2.2
15	24	224	111	16	34	209	1.8	1.3	1.9 : 1 : 0.6	3.2	1.2	1	1	1.2	1.4	0.9	0.8	2.0	1	0.8	0.6	0.8	3.7	2.1
17	32	324	130	21	46	276	1.7	1.2	—	2.6	1.3	1	0.9	1.1	1.3	0.9	0.8	1.9	1	0.7	0.5	0.7	2.8	2.3
17	26	257	113	21	39	224	1.8	1.3	1.8 : 1 : 0.7	2.3	1.2	1	0.9	1.3	1.3	0.9	0.8	1.7	1:	0.7	0.5	0.6	2.9	2.0
11	19	181	76	15	26	162	1.7	1.2	2.1 : 1 : 0.6	2.0	1.1	1	0.9	1.2	1.5	0.9	0.9	1.7	1	0.7	0.5	0.9	2.9	1.7
11	18	181	69	15	26	153	1.7	1.3	1.9 : 1 : 0.6	1.9	1.2	1	1	1.1	1.4	0.8	0.8	1.8	1	0.7	0.5	0.8	2.6	1.7

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Table 8 (continued)

No. 1. *Chorebus baeticus* spec. nov. holotype.

Nos. 2—3. *Chorebus groschkei* spec. nov., Germany: 2, paratype; 3, holotype.

No. 4. *Chorebus solstitialis* (STELFOX), Germany.

No. 5. *Chorebus atis* (NIXON) ex Ruthe collection (BM).

Nos. 6—7. *Chorebus hilaris* spec. nov.: 6, holotype, England; 7, paratype, Denmark.

No. 8. *Chorebus ninella* (NIXON), Ring Sjö, Sweden (type locality).

Nos. 9—10. *Chorebus rotundiventris* (THOMSON): 9, ex *A. distorta* GRIFFITHS, England; 10, holotype, Sweden.

Nos. 11—12. *Chorebus cinctus* (HALIDAY), England: 11, Scratch Wood, Middlesex; 12, Ash Vale, Surrey.

Nos. 13—14. *Chorebus pione* (NIXON): 13, Woodwalton Fen, England; 14, Poland.

No. 15. *Chorebus thisbe* (NIXON), Germany.

No. 16. *Chorebus eros* (NIXON) ex *A. nigrociliata* HENDEL, England.

Nos. 17—18. *Chorebus resa* (NIXON): 17, Kent, England; 18, Sweden.

Nos. 19—20. *Chorebus lateralis* (HALIDAY): 19, ex *A. urticae* NOWAKOWSKI, Cambridge, England; 20, ex *A. ferruginosa* WULP, Poland.

Nos. 21—22. *Chorebus deione* (NIXON): 21, ex *A. myosotidis* KALTENBACH, Middlesex, England; 22, ex *A. abiens* ZETTERSTEDT, Cologne, Germany.

Nos. 23—25. *Chorebus credne* (NIXON): 23, ex *A. spiraeae* KALTENBACH, Chippenham Fen, England; 24, ex *A. alnibetulae* HENDEL, Młociny, Poland; 25, ex *A. rubi* BRISCHKE, München, Germany.

Nos. 26—27. *Chorebus perkinsi* (NIXON): 26, ex *A. lygophaga* HERING, Woodwalton Fen, England; 27, ex *A. albitarsis* MEIGEN, Germany.

Nos. 28—29. *Chorebus bres* (NIXON): 28, Barnet, England; 29, Sweden.

Nos. 30—32. *Chorebus polygoni* spec. nov.: 30, holotype ex *A. polygoni* HERING, Germany; 31, paratype ex *A. polygoni* HERING, Germany; 32, paratype ex *A. nigrescens* HENDEL, Sweden.

No. 33. *Chorebus knautiae* spec. nov. holotype.

Nos. 34—35. *Chorebus lar* (MORLEY), England: 34, ex *A. johannae* DE MEIJERE, Surrey; 35, ex *A. genistae* HENDEL, Middlesex.

Appendix VII. MORLEY's (1924) new Species of *Dacnusa* HALIDAY and *Rhizarcha* FÖRSTER

The types of MORLEY's (1924) six new species are now in the British Museum (Natural History). MORLEY's names were not used by NIXON (1943—54) in his revisionary work, as he was unable to examine the types at that time. MORLEY's treatment of the Dacnusini was extremely superficial, and his descriptions so brief as to be almost worthless. Nevertheless under the existing rules of nomenclature his names are valid and must stand in cases where they are senior synonyms of names later proposed by NIXON. My observations on the types are as follows.

Dacnusa nemesis MORLEY

This is a specimen of *Bassus senilis* NEES, 1814, in the sense used by NIXON (1944). The species is now referred to *Chorebus*. With reference to MORLEY's comment on the short antennae of his species it should be noted that the antennae are broken.

Dacnusa naenia MORLEY

This I consider to be a synonym of *Alysia* (*Dacnusa*) *leptogaster* HALIDAY, 1839, now referred to the genus *Chorebus*.

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Dacnusa lar MORLEY

The type is a male with 24 antennal segments which I believe to be the same species as *Dacnusa innana* NIXON, 1943, now referred to *Chorebus*. This species is treated in the main text of this paper.

Dacnusa apollyon MORLEY

The type is a male which seems very close to *Chorebus ninella* (NIXON) (particularly in respect of its pubescent petiole with dense apical tufts), but its number of antennal segments (40) is above the range previously attributed to that species. For this reason I doubt if it represents the same species. Additional material will be needed before its status can be clarified.

Rhizarcha alecto MORLEY

The type is labelled as captured on *Artemisia vulgaris* and is clearly the same species as *Dacnusa turissa* NIXON, 1937, now referred to *Chorebus*, a parasite of *Phytomyza albiceps* MEIGEN on that plant.

Rhizarcha nox MORLEY

This is a male of *Dacnusa laevipectus* THOMSON, in the sense defined by NIXON (1948).

Summary

1. This paper, the second of a series, deals with the Alysiinae parasites of *Agromyza* FALLÉN in Europe. These belong to four genera of the Dacnusini (*Exotela, Dacnusa, Chorebus* and *Protodacnusa*) and two non-Dacnusine genera, *Dapsilarthra* and *Grandia*. *Protodacnusa* has already been treated in the previous paper (GRIFFITHS, 1964).

2. The majority of the Dacnusini bred from *Agromyza* exhibit monophagy of the first or second degree and it is considered that host specialisation has played an important part in the speciation of the group. However *Dapsilarthra* spp. have more extensive host-ranges, none being confined to *Agromyza*. *Grandia* is represented by the single known species attacking *Agromyza apfelbecki* STROBL.

3. The "genus" *Agromyza* is unlikely to be monophyletic and has been provisionally divided into four main groups for the purposes of this paper. Keys to the Dacnusini parasites of each of these groups are given.

4. The host/parasite lists produced in this paper are intended to be complete and to supersede previously published lists for Europe.

5. Seven new species are described, five in *Chorebus* and two in *Exotela*.

Zusammenfassung

1. Dieser Artikel ist der zweite einer Reihe und behandelt die Alysiinae-Parasiten von *Agromyza* FALLÉN in Europa. Sie gehören zu vier Gattungen von Dacnusini (*Exotela, Dacnusa, Chorebus* und *Protodacnusa*) und zu zwei Gattungen außerhalb der Dacnusini, nämlich *Dapsilarthra* und *Grandia*. *Protodacnusa* wurde schon in dem vorangegangenen Artikel (GRIFFITHS, 1964) besprochen.

2. Die meisten Dacnusini, die auf *Agromyza* gezüchtet wurden, zeigten Monophagie ersten oder zweiten Grades, und es ist anzunehmen, das die Spezialisierung auf den Wirt bei der Artenbildung in dieser Gruppe eine wichtige Rolle gespielt hat. Die *Dapsilarthra*-

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Arten haben jedoch einen größeren Wirtsbereich, und keine von ihnen beschränkt sich auf *Agromyza*. *Grandia* ist durch die einzige bekannte Art vertreten, die *Agromyza apfelbecki* STROBL befällt.

3. Die „Gattung" *Agromyza* ist wahrscheinlich kaum monophyletisch und wurde für den Zweck dieser Untersuchung provisorisch in vier Hauptgruppen eingeteilt. Es werden Schlüssel der Dacnusini-Parasiten jeder dieser vier Gruppen mitgeteilt.

4. Die Listen von Wirten und Parasiten, die in dieser Arbeit enthalten sind, dürften vollständig sein und die früher veröffentlichten Listen für Europa ersetzen.

5. Sieben neue Arten werden beschrieben, fünf bei *Chorebus* und zwei bei *Exotela*.

Резюме

1. Зта статья вторая в одном ряду и занимается с паразитами Alysiinae рода *Agromyza* FALLÉN в Европе. Они относятся к четырём родам Dacnusini (*Exotela, Dacnusa, Chorebus* и *Protodacnusa*) и к двумя родам вне Dacnusini, *Dapsilarthra* и *Grandia*. С *Protodacnusa* занимались уже раньше (GRIFFITHS, 1964).

2. Большинство Dacnusini, которых выращивали на *Agromyza*, показали монофагию первой или второй степени и можно принять, что специализация на хозяйн играло большую роль при видовой образовании в этой группе. Виды рода *Dapsilarthra* имеют уже более большой круг хозяйнов и ни один вид только на *Agromyza*. *Grandia* представлена единственным знакомым видом, который поражает *Agromyza apfelbecki* STROBL.

3. „Род" *Agromyza* наверно не монофилетический, и для цели этого исследования разделялся временно в четыре главные группы. Даются ключи паразитов Dacnusini каждой группы.

4. Списки хозяйнов и паразитов, которые имеются в этой работе, должны быть комплектны и заместить раньше публикованных список для Европы.

5. Семь новых видов описиваются, пять у *Chorebus* и две у *Exotela*.

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