

KENNETH A. SPENCER¹

Notes on European Agromyzidae (Diptera) — 3

With 28 text figures

Recent study of the British Agromyzidae (SPENCER, in press) has led to the clarification of a number of European species, which are discussed in this paper. The previous paper in this series was published by SPENCER (1969b). Four species, previously incorrectly identified, are described below as new; three new synonyms are established; two species, previously synonymised, are now resurrected; and the male genitalia of 17 further species are illustrated. In addition, revised keys are provided for the genera *Phytobia* LIOY and *Amauromyza* HENDEL.

I particularly wish to thank the following persons for the loan of type material: Dr. W. HACKMAN, University Museum, Helsinki; Dr. H. J. HANNEMANN, Zoologisches Museum der Humboldt-Universität, Berlin; Dr. A. KALTENBACH, Naturhistorisches Museum, Vienna; Dr. habil. GÜNTER MORGE, custodian of the STROBL collections and of the Natural History Museum Admont, Austria; Dr. L. TSACAS, Muséum National d'Histoire Naturelle, Paris; Dr. TH. VAN LEEUWEN, Zoologisch Museum, Amsterdam. I also wish to thank my wife for preparation of the illustrations.

Genus *Agromyza* FALLÉN

Agromyza bicophaga HERING

Agromyza bicophaga HERING, 1925: 130. Holotype ♀ ex *Vicia tetrasperma* MOENCH in Zoologisches Museum, Berlin.

HENDEL (1931-6: 141) synonymised this species with *A. orobi* HENDEL. HERING never accepted this synonymy and in two letters (in SPENCER 1968: 30 and 34) discusses larval differences which fully confirm the distinctness of the two species.

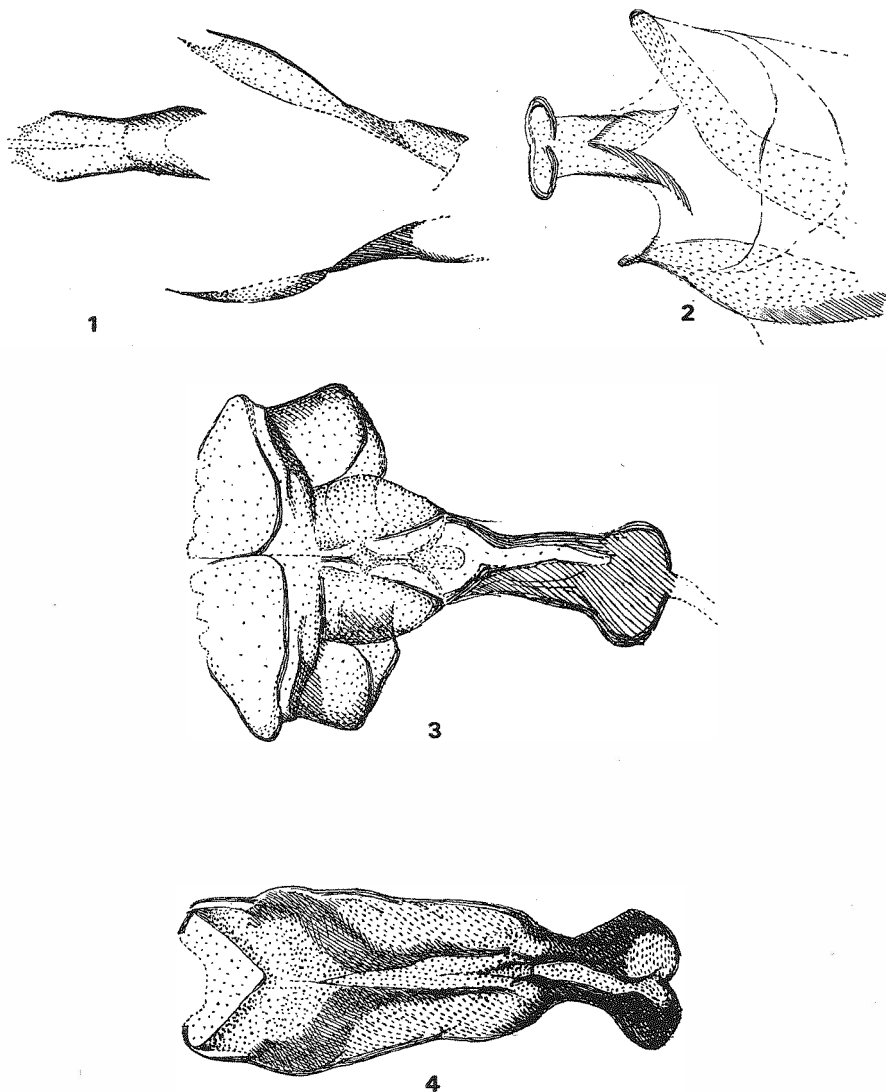
A. bicophaga in fact most closely resembles *A. johanna*e DE MEIJERE and the two cannot be entirely satisfactorily separated on external characters, although the male genitalia are quite distinct, as seen in Figs. 1 and 2.

The posterior spiracles of the larva of *bicophaga* each have three bulbs. However, a female reared from *Vicia sepium* L. at the Botanical Gardens, Berlin, 19 March 1952 (E. M. HERING) is mounted with a puparium in which the posterior spiracles each have an ellipse of some 20 minute bulbs. If this really is the puparium from which the fly emerged, then this must represent a further species in this complex.

Genus *Phytobia* LIOY

While clarifying the four species of this genus known in Great Britain, it became necessary to investigate the species described by HENDEL (1931-6: 22; and in BARNES 1933: 509) and KANGAS (1935, 1949). Of the 13 species previously considered as belonging to *Phytobia*, it was found that *alunulata* HENDEL correctly belongs in *Agromyza* and is a senior synonym of *A. distorta* GRIFFITHS, 1955; that *laticeps* HENDEL is synonymous with *lunulata* HENDEL; that *barnesi* HENDEL and almost certainly *tremulae* KANGAS are synonymous with *cambii* HENDEL and that *latigenis* HENDEL is synonymous with *carbonaria* ZETTERSTEDT. The two latter species were recently synonymised by SPENCER (1971).

¹ Address: 10, Willow Road, Hampstead, London, N.W. 3.



Figs. 1-4. Aedeagus of: Fig. 1. *Agromyza bicophaga* HERING. - Fig. 2. *Agromyza johannae* DE MEIJERE. - Fig. 3. *Phytobia betulae* (KANGAS). - Fig. 4. *Phytobia lunulata* (HENDEL)

A revised key to the 8 European species now known in the genus is given below.

Known hosts for European *Phytobia* species are *Betula* spp. (*betulae* KANGAS); *Salix* spp. and *Populus tremula* L. (*cambii* HD.); *Sorbus aucuparia* L. (*aucupariae* KANGAS); and *Prunus cerasifera* EHRH. (*cerasiferae* KANGAS). The characteristic feeding tracks in the cambium of young trees have also been recorded in *Acer*, *Alnus* and *Pyrus*.

Key to European *Phytobia* species

- 1 Only 1+1 dc; host: *Sorbus aucuparia* *aucupariae* KANGAS
- 3+1 dc (rarely 2+1) 2
- 2 Costa ending at vein r_{4+5} *lunulata* HENDEL
 (= *laticeps* HENDEL)
- Costa extending to vein m_{1+2} 3
- 3 Last section of vein m_{3+4} approximately $1\frac{1}{2}$ times length of penultimate 4
- The two sections of m_{3+4} equal or the last slightly shorter 6
- 4 Mesonotum mat-greyish *errans* (MEIGEN)
- Mesonotum more black; smaller species, wing length 3—3.5 mm 5
- 5 Aedeagus as in Fig. 5 *mallochi* (HENDEL)
- Aedeagus as in Fig. 6; host *Prunus cerasiferae* *cerasiferae* (KANGAS)
- 6 Mesonotum distinctly black, somewhat shining; lunule silvery-reddish *carbonaria* (ZETTERSTEDT)
 (= *latigenis* HENDEL)
- Mesonotum mat-grey 7
- 7 Aedeagus as in Fig. 7 *cambii* (HENDEL)
 (= *barnesi* HENDEL,
 ? *tremulae* KANGAS)
- Aedeagus as in Fig. 3 *betulae* (KANGAS)

***Phytobia betulae* (KANGAS), comb. nov.**

Dendromyza (Dizygomyza) betulae KANGAS, 1935: 11. Type series from Finland in Institute of Agricultural and Forest Zoology of the University of Helsinki.

Germany: Silesia, Nimmptsch, 2 ♂♂, 14. v. 28 (E. M. HERING).

KANGAS reared this species from *Betula* sp. and (1949) showed its close similarity with *cambii* HENDEL feeding on *Salix* spp. Illustrations of the male genitalia (1949: 112) give insufficient detail to see the exact form of the aedeagus but it is apparent that it closely resembles that of *cambii*.

The aedeagus of one of the males from Silesia is shown in Fig. 3. The distiphallus is both larger and more complex than in *cambii* but is clearly of the same form and there seems little doubt that this represents *betulae*.

***Phytobia lunulata* (HENDEL), comb. nov.**

Domomyza lunulata HENDEL, 1920: 124. Holotype ♂ from Austria in Naturhistorisches Museum, Vienna.

Dizygomyza (Dendromyza) lunulata HENDEL, 1931—6: 28.

Dizygomyza (Dendromyza) laticeps HENDEL, 1931—6: 28, syn. nov. Holotype ♂ from Austria in Naturhistorisches Museum, Vienna.

Examination of the male genitalia of these two species confirms that they are identical and *laticeps* is synonymised with *lunulata* herewith.

Essential characters of the species are the black mesonotum and costa ending at vein r_{4+5} ; wing length is 3.3 mm. The aedeagus of the holotype of *lunulata* is shown in Fig. 4. This suggests a sister-group relationship with *P. carbonaria* (cf. SPENCER 1971: Fig. 18).

***Phytobia mallochi* (HENDEL), comb. nov.**

Dizygomyza mallochi HENDEL, 1924b: 147. Holotype ♂ from Switzerland in Naturhistorisches Museum, Vienna.

Dizygomyza (Dendromyza) mallochi HENDEL, 1931—6: 30.

The two distinctive characters of this species are the black, rather than grey mesonotum and the long last section of vein m_{3+4} , which is $1\frac{1}{2}$ times the length of the

penultimate. In both these characters *mallochi* agrees with *cerasiferae* KANGAS and with the limited material available the two species can only be distinguished by the male genitalia. The aedeagus of *mallochi* is shown in Fig. 5, that of *cerasiferae* in Fig. 6.

P. mallochi also closely resembles *P. septentrionalis* SPENCER described from Canada. The genitalia are extremely similar, although the aedeagus of *mallochi* is substantially larger (SPENCER 1969a: Figs. 189, 190). There seems little doubt that the two are sister-species, with only slight differentiation between the Palaearctic and Nearctic species.

HENDEL (1931-6: 30) refers to two specimens of this species, from Vienna and from Switzerland and the one from Vienna is labelled as „Typus“. This, however, is not correct, as the description in 1924 was based on the single specimen from Switzerland and this specimen must be treated as the holotype. I have examined both specimens and can confirm that they are indeed identical.

Genus *Amauromyza* HENDEL¹

When studying the Agromyzidae of Canada, it was found that *Cephalomyza luteiceps* HENDEL was clearly congeneric with certain species of *Amauromyza*, and *Cephalomyza* was formally synonymised with *Amauromyza* (SPENCER 1969a: 157). It was further suggested that *Trilobomyza* also should logically be synonymised with *Amauromyza*.

The examination of further species in this complex when preparing the Handbook for the Identification of British Agromyzidae (SPENCER, in press) has shown that there are four distinct groups in Europe, for which sub-generic status has been proposed (SPENCER 1971). *Campanulomyza* NOWAKOWSKI, with type species *gyrans* FALLÉN, is now included within *Amauromyza*, and *Campanulomyza* has been reduced to sub-generic rank (SPENCER 1971).

The genus therefore now has the following structure:

Amauromyza HENDEL, 1931

Type of genus *lamii* KALTENBACH

sub-genus *Amauromyza* HENDEL. Type of sub-genus *lamii* KALTENBACH

sub-genus *Campanulomyza* NOWAKOWSKI. Type of sub-genus *gyrans* FALLÉN

sub-genus *Trilobomyza* HENDEL. Type of sub-genus *flavifrons* MEIGEN

sub-genus *Cephalomyza* HENDEL. Type of sub-genus *luteiceps* HENDEL

KALTENBACH'S description of *lamii* is confusing and in view of its brevity and inaccessibility, it is repeated here:

„Fliege: glänzend schwarz; Flügelwurzel, Schwinger und der Hinterrand des letzten Hinterleibsringes gelb, Knie bräunlichgelb.“

This description is given in the section dealing with insects on *Ballota* but it is stated that the species also occurs on *Lamium*.

It now seems clear that KALTENBACH must have reared and confused the two species, *lamii*, which is „glänzend schwarz“, and *labiatarum* HENDEL, to which the rest of the description applies.

Specimens bred by HERING in Germany from leaf-mines on *Leonurus cardiaca* L. represent a distinct species and this is described below as *leonuri* spec. nov. NOWAKOWSKI (1962: Fig. 10) illustrated the male genitalia of *lamii* and it can be seen that this species is closely related both to *leonuri* and also to *carlinae* HERING, which is discussed below.

¹ As this paper goes to press, I have noticed that NOWAKOWSKI (1964: 212) suggested that *Campanulomyza* and *Trilobomyza*, and also *Melanophytobia* HERING and *Irenomyia* NOWAKOWSKI, (not, however, *Cephalomyza*) might be included in an enlarged, natural genus *Amauromyza*. Preliminary study indicates that NOWAKOWSKI'S suggestion regarding *Melanophytobia* and *Irenomyia* was correct and I hope that he will clarify this proposal in due course.

A further new species from Hungary is described and two further species are discussed.

HERING considered that *gyrans* (FALLÉN) represents two species, which it is at the moment only possible to separate on the basis of differences in the larval leaf-mines. Species 1 feeds exclusively on *Campanula trachelium*., a number of larvae feed together and form a large greenish blotch. Species 2 feeds on other *Campanula* species and also on *Phyteuma*, with only a single larva forming a small white blotch mine. The differences between the two were discussed by Hering (in SPENCER 1968: 29). Although the differences in leaf-mines are indeed striking, there is no apparent difference either in the external morphology of the adults or in the male genitalia. I have also not been able to confirm the differences in the number of bulbs on the larval hind-spiracles mentioned by HERING. Study of further material will therefore be necessary before being able to decide whether or not two distinct species are involved.

Key to European *Amauromyza* species

- 1 Aedeagus enclosed in strong spinular membrane (Figs. 11–13); 3+1 *dc*; jowls deep, $\frac{1}{3}$ to $\frac{1}{2}$ height of eye; epistoma frequently present (sub-genus *Cephalomyza*) 2
- Aedeagus without strong spinular membrane; 3+0 or more rarely 3+1 *dc*; jowls narrower; epistoma never present 8
- 2 Frons and antennae yellow 3
- Frons and antennae black 4
- 3 Femora with knees narrowly yellow *karli* (HENDEL)
- Femora yellow in distal third *luteiceps* (HENDEL)
- 4 Costa ending at vein r_{4+5} *madrilena* SPENCER
- Costa extending to vein m_{1+2} 5
- 5 Halteres whitish-yellow *monfalconensis* (STROBL)
- Halteres black 6
- 6 Wings distinctly infuscated *stroblii* HENDEL
- Wings clear 7
- 7 Small species, wing 1.9 mm; last section of vein m_{3+4} $2\frac{1}{2}$ times length of penultimate *mihalyii* SPENCER
- Larger species, wing 2.2–3 mm; last section of m_{3+4} $1\frac{1}{2}$ times length of penultimate *chenopodiivora* SPENCER
- 8 Frons and antennae black 9
- Frons yellowish or pale brown (sub-genus *Trilobomyza*) 13
- 9 Frons not projecting above eye 10
- Frons distinctly projecting above eye 12
- 10 Halteres white (sub-genus *Campanulomyza*) *gyrans* (FALLÉN)
- Halteres black (sub-genus *Amauromyza*) 11
- 11 Aedeagus as in Figs. 9, 10 *leonuri* SPENCER
- Aedeagus as in Fig. 8 *carlinae* HERING
- Aedeagus as in NOWAKOWSKI, 1962: Fig. 10 *lamii* (KALTENBACH)
- 12 3+0 *dc*; small species, wing length 1.6–2.2 mm *morionella* (ZETTERSTEDT)
- 3+1 *dc*; larger species, wing length 2–2.5 mm *balkanica* HENDEL
- 13 Third antennal segment black 14
- Third antennal segment yellow *verbasci* (BOUCHÉ)
- 14 Frons bright yellow *flavifrons* (MEIGEN)
- Frons pale to dark-brown *labiatarum* (HENDEL)

***Amauromyza (Amauromyza) carlinae* HERING**

Dizygomyza (Amauromyza) carlinae HERING, 1944: 118. Types in Zoologisches Museum, Berlin.

The aedeagus of this species, originally bred by BUHR from leaf-mines on *Carlina vulgaris* L. in N. France, is shown in Fig. 8. The male genitalia clearly indicate the close relationship of this species to *leonuri* spec. nov. described below (Figs. 9, 10).

***Amauromyza (Amauromyza) leonuri* spec. nov.**

Head: frons $1\frac{1}{2}$ times width of eye, projecting only slightly above eye in profile; orbits not conspicuously differentiated, with two equal ors and two (on one side three) similar ori; orbital setulae upright or slightly reclinate; jowls slightly extended at rear, about one-fifth vertical height of eye, cheeks forming only narrow ring below eye; third antennal segment slightly longer than broad, rounded at end, arista distinctly pubescent, long, only slightly shorter than vertical height of eye, in ratio 15:18.

Mesonotum: three strongly developed *dc*, fourth presutural weak or scarcely differentiated; *acr* irregularly in four or five rows, some extending beyond level of first *dc*.

Wing: length from 1.9 mm in male to 2.2 mm in female, last section of vein $m_{3,4}$ just over twice length of penultimate, first cross-vein at midpoint of discal cell.

Colour: uniformly dark; frons mat black, somewhat brownish in centre below ocellar triangle; orbits only weakly shining; mesonotum distinctly shining black, pleura, legs, abdomen entirely black; squamae dark grey, margin and fringe black; halteres brownish-black.

Male genitalia: aedeagus ending in two short, broad tubular processes (Figs. 9, 10); ninth sternite uniformly rounded.

Puparium: dark, reddish-brown, posterior spiracles each with three bulbs, two circular, one more elongate.

Host-plant/Biology: *Leonurus cardiaca* L., larva forming initial linear mine, after first instar producing an irregular, greenish blotch, which may entirely envelope the early linear section; frass deposited in irregular black strips or lumps; pupation externally.

Holotype ♂, Germany, Berlin, Botanical Gardens, emerged 6 July 1957 ex leaf-mines on *Leonurus cardiaca* var. *crispa* hort. leg. 18 June 1957; paratypes: one female, same data as holotype; two females, Crossen/Oder, 27-29 July 1940 ex same host (all E. M. HERING), in author's collection.

Remarks: This species was misidentified by Prof. HERING as *lamii* (KALTENBACH). *A. leonuri* is a uniformly dark species closely resembling both *lamii* and *carlinae* and the three can only be reliably separated by their male genitalia.

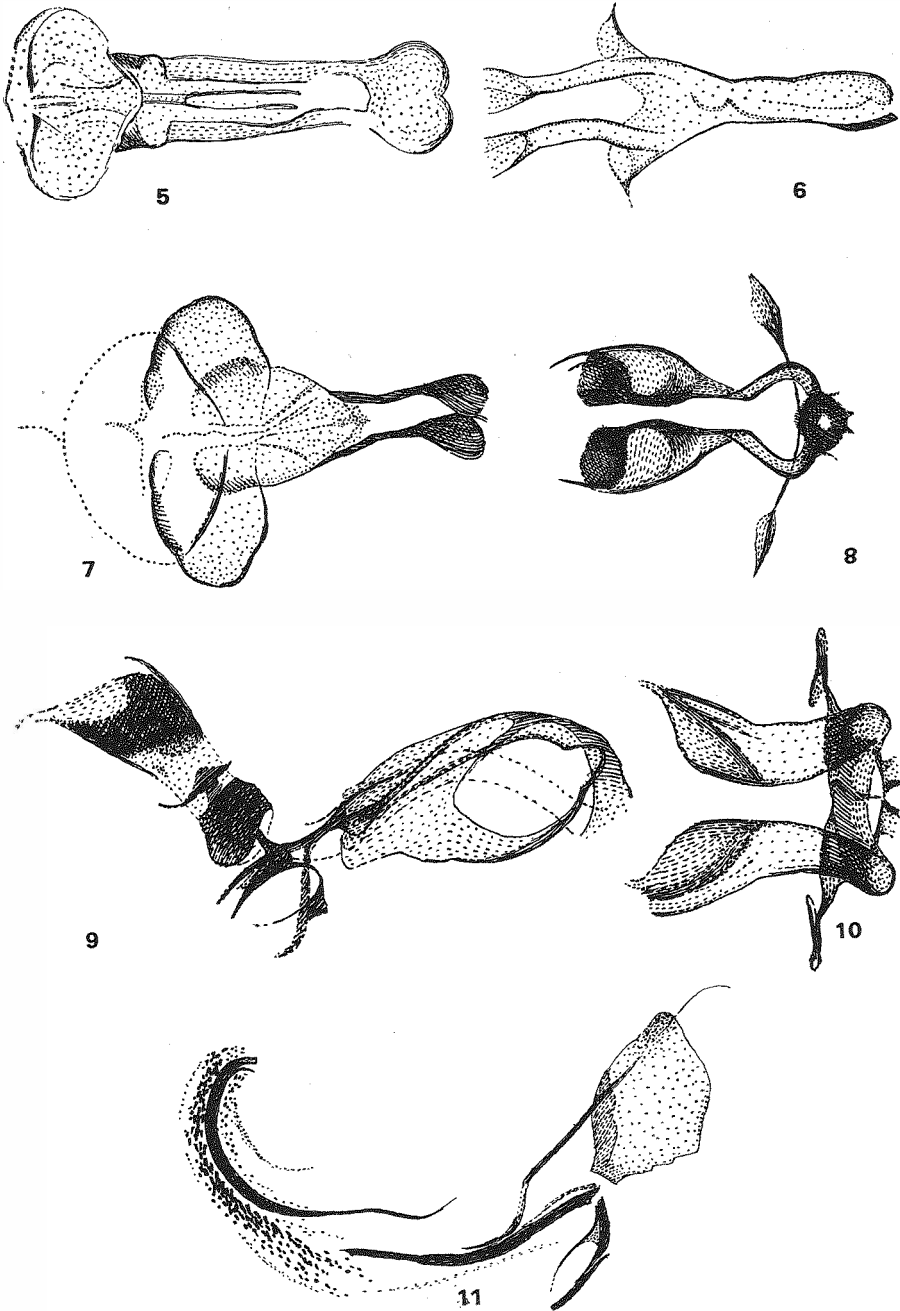
***Amauromyza (Cephalomyza) abnormalis* (MALLOCH)**

HENDEL identified European specimens bred from stems of *Chenopodium album* L. as the Nearctic species, *abnormalis* (MALLOCH). Although the adults of the Nearctic and Palaearctic populations cannot be distinguished on external characters, the differences in the male genitalia are substantial and justify treating the two as representing distinct species.

The European species was recently described as *chenopodivora* spec. nov., with illustrations of the aedeagus (SPENCER 1971: Figs. 28, 29). The aedeagus of *abnormalis* from Canada was illustrated by SPENCER (1969a: Fig. 273).

***Amauromyza (Cephalomyza) mihalyii* spec. nov.**

Head: frons broad, twice width of eye, distinctly projecting above eye in profile; 2 ors, 3 (on one side 4) ori; orbital setulae short, sparse, irregular; cheeks forming broad ring below eye, jowls broad, at deepest point one-third vertical height of eye; third antennal segment small, round, arista appearing virtually bare.



Figs. 5-11. Aedeagus of: Fig. 5. *Phytobia mallochi* (HENDEL). - Fig. 6. *Phytobia cerasiferae* (KANGAS). - Fig. 7. *Phytobia cambii* (HENDEL). - Fig. 8. *Amauromyza (Cephalomyza) carlinae* HERING - Figs. 9-10. *Amauromyza (Cephalomyza) leonuri* spec. nov., side view and distiphallus, ventral view. - Fig. 11. *Amauromyza (Cephalomyza) mihalyii*

Mesonotum: 3+1 strong *dc*, *acr* in 4 rows.

Wing: length in male 1.9 mm, second costal section nearly 4 times length of fourth; discal cell small, last section of m_{3+4} $2\frac{1}{2}$ times length of penultimate.

Colour: entirely dark species; frons dark brown behind, black in front; antennae, pleura and legs entirely black; mesonotum conspicuously mat, greyish-black; squamae, fringe and halteres black; wings clear.

Male genitalia: aedeagus with paired distiphallus surrounded by spinulose membrane, as in Fig. 11.

Holotype ♂, Hungary, Harmashhatahegy, nr. Budapest, 27. v. 64 (K.A.S.), in author's collection.

Remarks: This species is immediately distinguishable from *chenopodivora* by the smaller discal cell and longer last section of vein m_{3+4} . With the limited material available, it is only possible to distinguish it from *morionella* and *lamii* by the entirely different male genitalia.

Amauromyza (Cephalomyza) strobli (HENDEL), **comb. nov.**

Agromyza obscuripennis STROBL, 1906: 381.

Dizygomyza Stroblii HENDEL, 1920: 138, *nom. nov.* for *obscuripennis* STROBL preoccupied by *obscuripennis* MACQUART, 1835. Lectotype ♂ in coll. STROBL, Admont.

Dizygomyza (Amauromyza) stroblii HENDEL, 1931-6: 64.

NOWAKOWSKI (1962: 93), apparently without having examined STROBL's specimens, synonymised *stroblii* with *abnormalis* MALLOCH. I have now seen the five specimens in the type series — two males and three females — and can confirm that *stroblii* is a distinct species. It is readily distinguishable from *chenopodivora* by the broader and more projecting frons, deeper jowls and darkened wings. The male genitalia are typical of the sub-genus *Cephalomyza* and the aedeagus is shown in Figs. 12, 13.

One of the two males is herewith designated and has been labelled as lectotype.

Genus *Cerodontha* RONDANI

Cerodontha (Dizygomyza) morosa (MEIGEN)

Agromyza morosa MEIGEN, 1830: 170. Holotype ♂ ex coll. WINTHEM in Naturhistorisches Museum, Vienna.

Dizygomyza morosa HENDEL, 1920: 132; 1931: 90-92, p.p.

Cerodontha (Dizygomyza) morosa NOWAKOWSKI, 1967: 644.

This species has in the past been misidentified by HENDEL, HERING and all subsequent workers, until NOWAKOWSKI examined the holotype and established its correct identity from its distinctive genitalia. The aedeagus of the holotype is shown in Fig. 14.

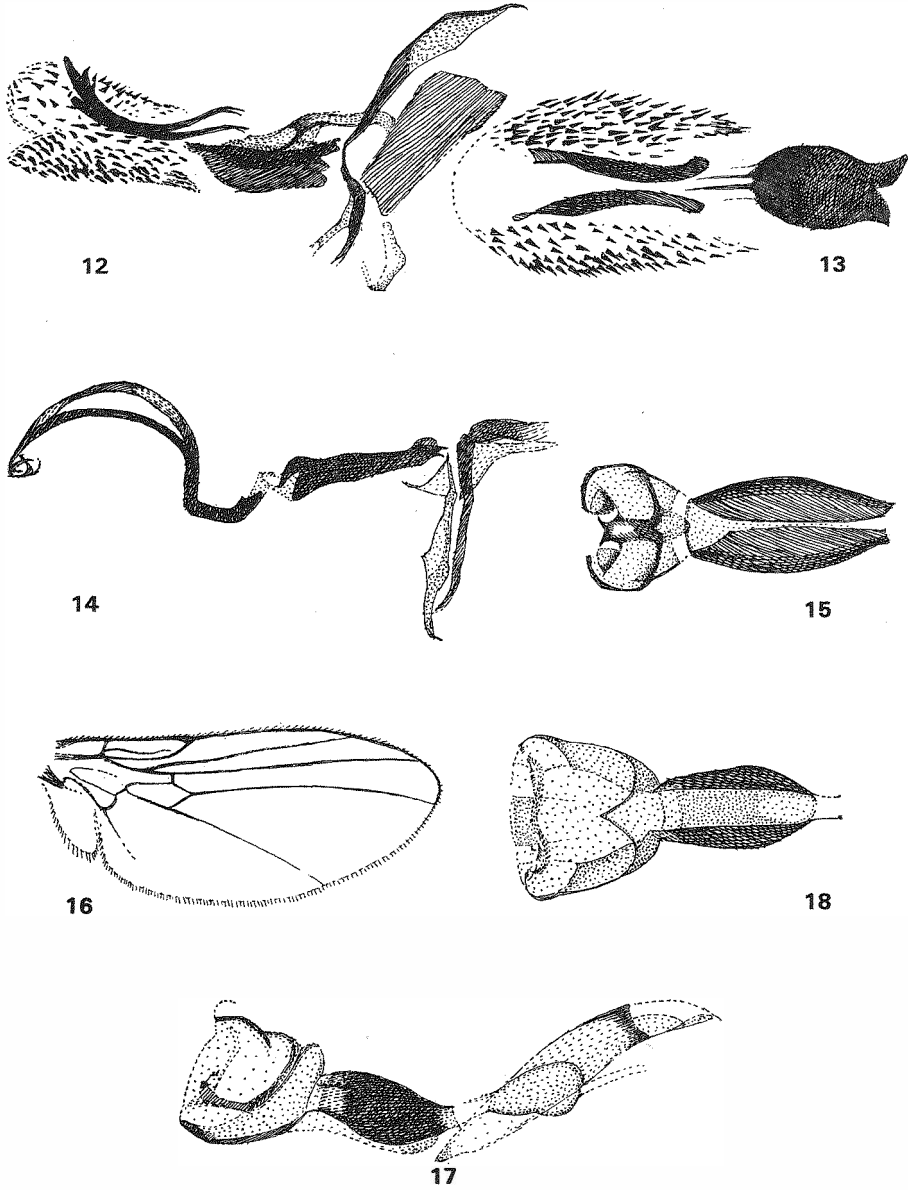
The name *morosa* has been widely applied to the common miner on *Carex* with the notopleura partially yellow. HENDEL noted a form in which the notopleura are even more conspicuously yellow and named it *morosa* var. *suturalis*, adding the comment „vielleicht eigene Art“. From the differences in genitalia it can now be seen that *suturalis* is indeed a good species and most specimens identified as *morosa* during the past 50 years in fact represent this species.

In the true *morosa* the notopleura are not significantly paler but all knees are conspicuously bright yellow (as in *suturalis*). NOWAKOWSKI (1967: 644) states that the species is common but it apparently does not occur in England.

Specimens in the United States and Canada identified as *morosa* do not represent the European species and in future the available name *magnicornis* (LOEW) should be used. This species is very close to *suturalis* but in view of a slight but consistent difference in the form of the aedeagus, it seems desirable to treat the Holarctic and Palaearctic populations as distinct, particularly since the larvae are not known in North America.

Genus *Liriomyza* MIK

One new species is described below and three further species are briefly discussed and illustrations are given of their male genitalia.



Figs. 12-18. Aedeagus of: Figs. 12-13. *Amauromyza (Cephalomyza) strobli* (HENDEL), side view and distiphallus, ventral view. - Fig. 14. *Cerodontha (Dizygomyza) morosa* (MEIGEN). - Fig. 15. *Liriomyza flavopicta* HENDEL. - Figs. 16-18. *Liriomyza hieracivora* spec. nov. wing; aedeagus, side view and distiphallus, ventral view

***Liriomyza flavopicta* HENDEL**

Liriomyza flavopicta HENDEL, 1931-6: 222. Lectotype ♂ from Sweden in University Museum, Helsinki.

I have examined the two specimens in the University Museum, Helsinki (labelled by HENDEL as *picta* but described as *flavopicta*) and one has been labelled and is here-with designated as lectotype. The distinctive aedeagus is shown in Fig. 15.

HERING (1957: 25 and in SPENCER 1968: 246) recorded this species as a stem-miner on *Achillea millefolium* L. A species caught on this plant on Hampstead Heath, London was believed to represent *flavopicta*, until the examination of the genitalia has shown that it is a distinct species, which has now been described as *hampsteadensis* spec. nov. (SPENCER 1971).

***Liriomyza hieracivora* spec. nov.**

Head: frons only slightly projecting above eye in profile; 2 equal, reclinate ors, 2 incurved ori, the lower distinctly weaker, cheeks forming conspicuous ring below eye, jowls broad, extended at rear, almost one-third height of eye; third antennal segment round, with short, normal pubescence.

Mesonotum: 3+1 *dc*, second well before level of supra-alar; in holotype and topotypical paratype small additional *dc* beyond fourth; *acr* irregularly in 4 rows, not extending beyond level of second *dc*.

Wing (Fig. 16): length in male 1.6-1.8 mm; second cross-vein conspicuously oblique, last section of vein m_{3+4} almost 3 times length of penultimate.

Colour: frons, orbits, entire hind-margin of head, all antennal segments bright yellow; mesonotum distinctly mat, blackish-grey, though with some shine; hind-corners with large yellow patches; mesopleura with only small black bar at front lower corner; area above mid-coxa broadly yellow, dividing black of sterno- and hypopleura; legs: coxae entirely yellow, femora largely so but at least fore-femora with faint, irregular brownish striations; tibiae and tarsi yellowish-brown; tergites essentially black but sides and hind-margins conspicuously yellow.

Male genitalia: aedeagus as in Figs. 17, 18.

Holotype ♂, E. Germany, Thuringia, Vogtland-Jocketal, emerged spring 1961 from blotch-mine on *Hieracium lachenalii* GMEL. (BUHR, No. 1656); Paratypes: 1 ♂, same data as holotype; 1 ♂, Güntersberg/Oder, emerged spring 1925 ex *H. vulgatum* (FR.) ALMQ. (HERING, No. 2608), Holotype and paratypes in author's collection.

Remarks: The male genitalia immediately confirm that this species is distinct from *Liriomyza hieracii* (KALTENBACH); the tubular base of the distiphallus is shorter and broader and the distiphallus itself is distinctly larger. The aedeagus of *L. hieracii* was illustrated by SPENCER (1971: Fig. 44).

The two species can also be distinguished as follows:

	<i>L. hieracivora</i>	<i>L. hieracii</i>
Hind-margin of eye	entirely yellow	black beyond base of <i>ote</i>
Mesonotum	distinctly greyish-black	less grey, more shining
Mesopleura	only small bar at lower front corner	entire lower margin black
Second cross-vein	black	
	conspicuously oblique	at rightangles to m_{3+4}

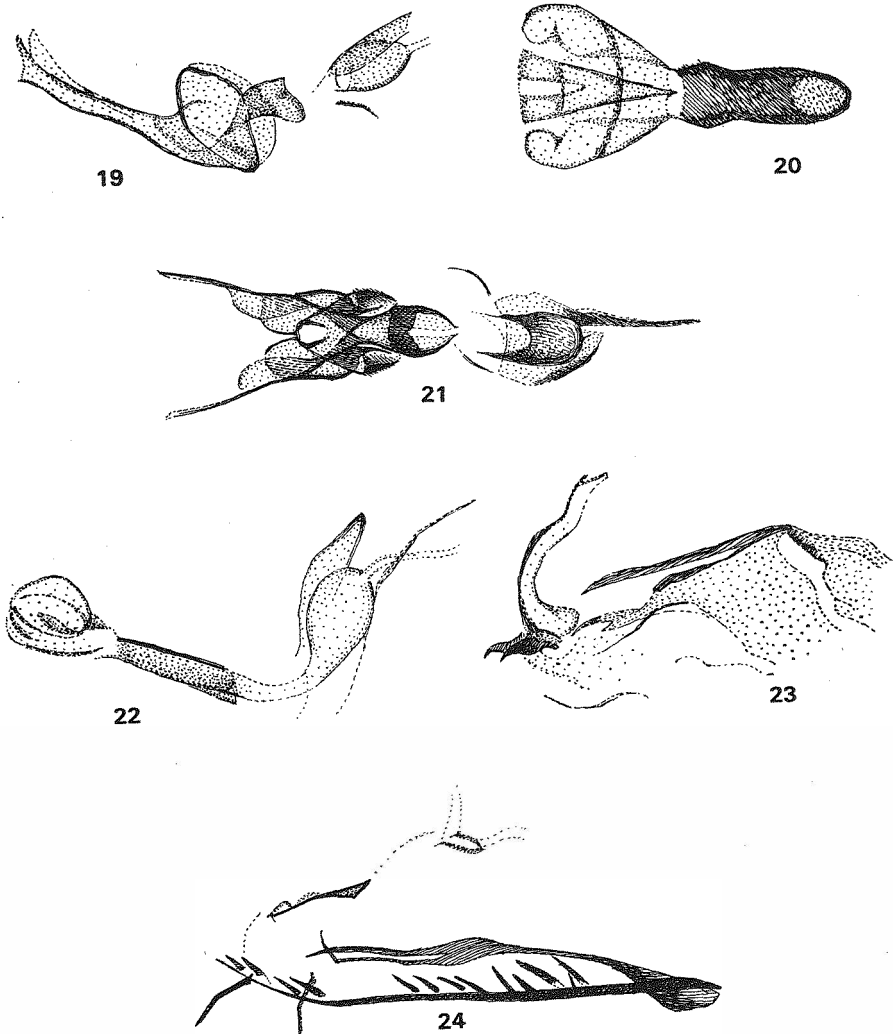
L. hieracivora closely resembles *L. sonchi* but is readily distinguishable by the more oblique second cross-vein.

Although the only known hosts of this new species are *Hieracium lachenalii* and *H. vulgatum*, it remains to be established whether it in fact also feeds on other *Hieracium* species. *L. hieracii* (KALTENBACH) has been recorded from *H. murorum* L., *H. laevigatum* WILLD., *H. lachenalii* GMEL. and *H. vulgatum* (FR.) ALMQ.

***Liriomyza larissa* HERING**

Liriomyza larissa HERING, 1956: 118. Holotype ♂ from Germany: Oberlausitz in author's collection.

This species resembles *L. equiseti* DE MEIJERE (SPENCER 1971: Fig. 40) and the male genitalia indicate a close relationship. The aedeagus in side view is shown in Fig. 19.



Figs. 19 - 24. Aedeagus of: Fig. 19. *Liriomyza larissa* HERING. - Fig. 20. *Liriomyza obliqua* HENDEL. - Fig. 21. *Liriomyza oldenbergi* HERING. - Fig. 22. *Liriomyza scorzonerae* RYDÉN. - Fig. 23. *Paraphytomyza flavoscutellata* (HENDEL). - Fig. 24. *Phytomyza campanulivora* spec. nov.

***Liriomyza obliqua* HENDEL**

Liriomyza obliqua HENDEL, 1931 - 6: 235. Lectotype ♂ from Hungary: Mt. Meszes in Naturhistorisches Museum, Vienna.

I have examined the three specimens referred to by HENDEL in his description of this species and designate as lectotype the male from Mt. Meszes. This specimen is in perfect condition; the aedeagus is shown in Fig. 20.

L. obliqua closely resembles but is somewhat larger than *L. flavopicta* HENDEL. The male genitalia of the species in this group are of the same general form but are distinctively different in detail.

NOWAKOWSKI (1962: 93) synonymised *L. subobliqua* HENDEL with *obliqua*. In view of the differences cited by HENDEL and in the absence of a male of *subobliqua*, I feel this synonymy requires confirmation.

Liriomyza oldenbergi HERING

Liriomyza oldenbergi HERING, 1933: 34. Types from Berlin in Zoologisches Museum, Berlin.

I have confirmed from examination of the genitalia of a male paratype that this species is distinct from *L. lutea* (MEIGEN). The aedeagus is shown in Fig. 21.

HERING in SPENCER (1968: 369) includes this species in couplet 17a of his revision of HENDEL's key to European *Liriomyza* species, differentiating it from *melanorhabda* HENDEL by the dark area of the mesonotum being mat. However, I obtained a number of specimens of *melanorhabda* (= *lutea* MEIGEN) from the type locality, Lautaret in Savoy, 7. vii. 60, and in fact on external characters there is no apparent difference between *oldenbergi* and this dark form of *lutea*.

L. oldenbergi was consistently caught on *Armeria vulgaris* L. and it seems possible that it feeds in the seeds of this plant, in view of its obviously close relationship to *lutea*, a seed-feeder on Umbelliferae.

Liriomyza scorzonerae RYDÉN

Liriomyza scorzonerae RYDÉN, 1951: 189. Holotype ♀ from Sweden in Zoological Institute, Lund.

This species very closely resembles *L. tragopogonis* DE MEIJERE (= *pusio* MEIGEN sensu HENDEL, cf. SPENCER 1971). However, the leaf-mine is entirely distinct, the larva forming a blotch-mine at the margin of the leaf.

The aedeagus of a specimen bred from *Scorzonera* at Stolp, Pomerania, 15. vii. 25 (O. KARL) is shown in Fig. 22.

Genus *Paraphytomyza* ENDERLEIN

Paraphytomyza flavoscutellata (HENDEL), **comb. nov.**

Phytomyza flavoscutellata HENDEL, 1931-6: 283. Holotype ♂ from Vienna in Naturhistorisches Museum, Vienna.

There has been doubt about the status of this species which is only known from the holotype. Following examination of the genitalia, I can confirm that this represents a distinct species, certainly congeneric with the type of the genus, *luteoscutellata* DE MEIJERE (as *xylostei* ROBINEAU-DESVOIDY). The aedeagus is shown in Fig. 23.

Genus *Phytomyza* FALLÉN

One new species is described below and two new synonyms are established. In addition the *Phytomyza* species feeding on *Artemisia* are clarified and the male genitalia of two further species are illustrated.

1. A new *Phytomyza* on *Campanula*

When checking *Phytomyza campanulae* HENDEL during the preparation of the Identification Handbook of British species, I noticed that a specimen bred from *Campanula scheuchzeri* VILL. near Garmisch in the Bavarian Alps in September 1955 differed in a number of characters from typical *campanulae*. Examination of the male genitalia immediately confirmed that this represented a different species, which is in fact undescribed.

***Phytomyza campanulivora* spec. nov.**

Head: frons yellowish-orange; upper ors substantially weaker than lower; all antennal segments black, third small, round; face black.

Mesonotum: all *dc* strong, fourth slightly beyond level of pre-sutural; *acr* irregularly in 4 rows in front, only a single hair beyond second *dc*; colour: entirely mat, greyish-black, no yellow patches at hind-corners.

Pleura: uniformly greyish-black, only upper margin of mesopleura narrowly yellowish.

Legs: black, only knees on fore-femora yellowish.

Wing: length 1.8 mm, second costal section 3 times length of fourth.

Male genitalia: aedeagus as in Fig. 24.

Biology: host *Campanula scheuchzeri* subsp. *kernerii* (WITASEK) HAYEK, larva forming whitish linear mine, which can entirely fill small leaves, thus producing a secondary blotch; frass in irregular black strips or pellets; puparium black, smooth, without inter-segmental depressions; posterior spiracles each with 20 bulbs.

Holotype ♂, Germany: Alps above Garmisch, emerged Nov. 1955 from leaf-mine leg. 3. ix. 55, in author's collection.

Remarks: This species can be included in HENDEL's key as amended by HERING (in SPENCER 1968: 383) in an extension to couplet 91, as follows:

For couplet 91, second alternative, read:

- 5-6 postsuturale *ia*-Härchen; Gesicht und Lunula dunkel, braun oder schwarz. 2. Flügelrandabschnitt
 $2\frac{1}{2}$ -3 mal so lang wie der 4. Größe 1.8 bis 2.2 mm 91a

Add new couplet:

- 91a Kleine Art, Flügellänge im Männchen 1.8 mm; Gesicht schwarz. Larva an *Campanula*
 *campanulivora* spec. nov.
 - Größere Art, Flügellänge 2.1-2.3 mm; Gesicht dunkelbraun. Larva an *Solidago*
 *virgaureae* HERING

P. campanulivora is readily distinguishable from *campanulae* HENDEL by the smaller size (wing 2.3-2.7 in *campanulae*), darker legs (all knees yellow) and shorter second costal section (ratio to fourth, $3\frac{1}{2}$ -4 in *campanulae*). The puparium of *campanulae* is distinguishable by having deeply incised segmental boundaries.

2. Clarification of some leaf-miners on Umbelliferae

In Europe 54 *Phytomyza* species have been described as leaf-miners on Umbelliferae. Prior to my present study 6 of these had been synonymised by earlier workers. I have now discovered 9 further synonyms; two of these are established below and 7 were established by SPENCER (1971) among species occurring in Britain.

***Phytomyza aurei* HERING**

Phytomyza aurei HERING, 1931a: 104. Holotype ♀ ex *Chaerophyllum aureum* L. from Bavaria in Zoologisches Museum, Berlin.

HERING (1931a) felt justified in differentiating *P. aurei* ex *Chaerophyllum aureum* from *P. aromatici* ex *C. aromaticum* on the apparent difference in leaf-mines on the two hosts.

Examination of the holotype of *P. aromatici* from the Botanical Gardens, Berlin has shown that this represents *Phytomyza chaerophylli* KALTENBACH, which occurs commonly also on *C. bulbosum* L., *C. temulum* L. and *Anthriscus sylvestris* (L.) HOFFM. HENDEL (1931-6: 371) correctly synonymised *P. aromatici* with *P. chaerophylli*. The aedeagus was illustrated by SPENCER (1971: Fig. 85).

The female holotype of *P. aurei* is a large specimen, with wing length of 2.8 mm. A male ex *C. aureum* from Thuringia is substantially smaller, with wing length of 2 mm, but this is nevertheless accepted as *P. aurei*. The distinctive aedeagus is shown in Fig. 25. This same species, with identical genitalia, has also been seen ex

C. aromaticum from Kunnersdorf, nr. Görlitz and ex *Conium maculatum* from Berka a. d. Wipper (both leg. HERING).

The species with black frons ex *Conium* described by HERING as *coniophila* (HERING 1931b: 534) proved to represent *chaerophylli* KALTENBACH (SPENCER 1971).

The mine of *P. aurei*, both from the type locality in Bavaria and from the Görlitz area in Saxony, is essentially linear and cannot be differentiated from that of *P. chaerophylli*. The blotch mine illustrated by HERING (1931a: Fig. 3) is secondary and is from *C. aureum* at the Botanical Gardens, Berlin. This probably represents *C. chaerophylli*.

Phytomyza ferulae HERING

Phytomyza ferulae HERING, 1927: 437. Holotype ♂ from Tenerife in author's collection.

Phytomyza umbelliferarum HERING, 1935: 8, syn. nov.; HENDEL, 1936: 494. Type ♂ from Istria in Zoologisches Museum, Berlin.

Phytomyza dauci SPENCER, 1957: 115. Holotype ♀ from Spain: Algeciras, in author's collection.

Examination of a male paratype of *umbelliferarum* has confirmed that this represents the widespread Mediterranean species, *ferulae* HERING, and this synonymy is formally established herewith.

In addition to the numerous localities for this species which have already been cited, I found many mines with larvae on *Daucus* sp. on Menorca, 29. ii. 68, which produced adults 2 weeks later.

Phytomyza thysselini HERING

Phytomyza thysselini HENDEL, 1924a: 387. Types from Germany, Güntersberg/Oder in Zoologisches Museum, Berlin.

Phytomyza carvifoliae HENDEL, 1924b: 144, syn. nov. Holotype from Germany, Lausitz in Naturhistorisches Museum, Vienna.

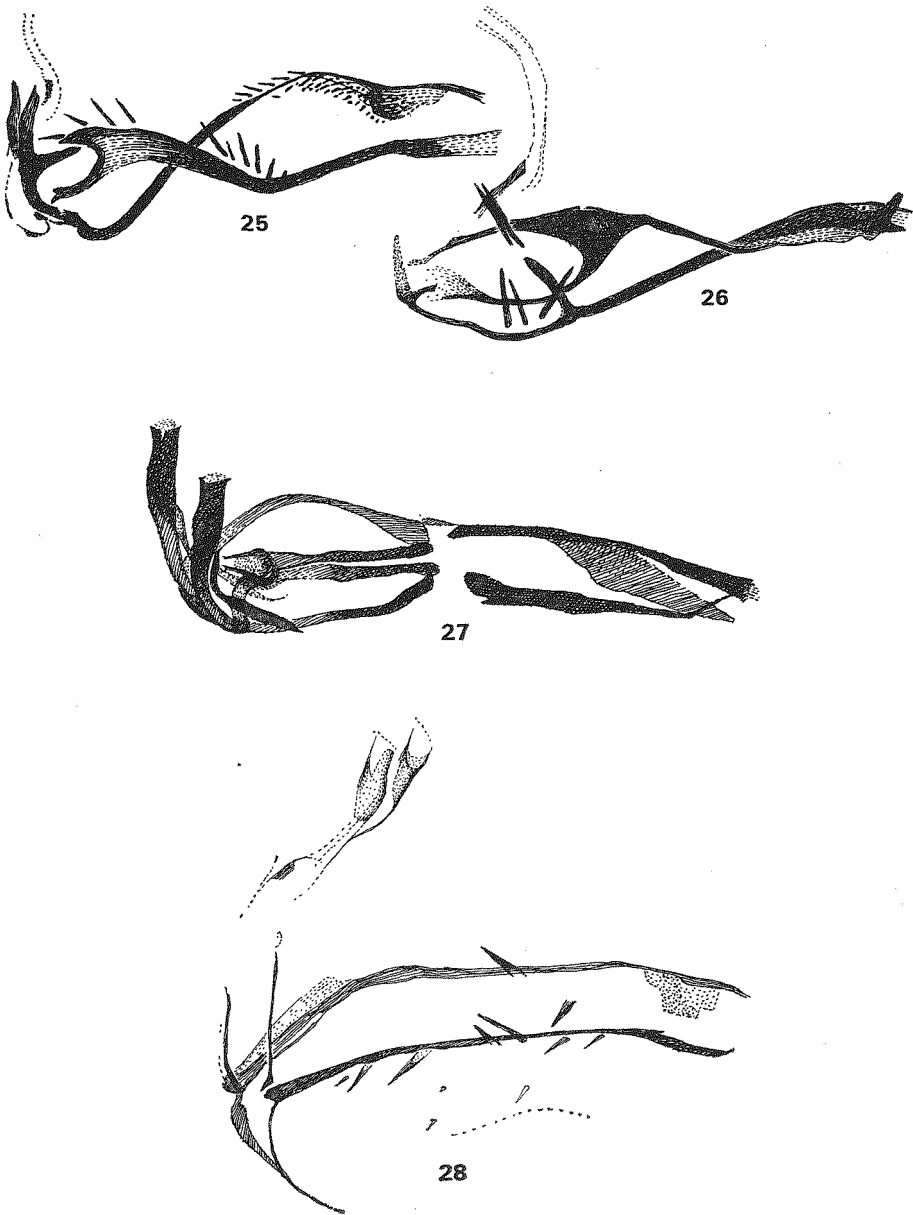
I have examined males of *thysselini* bred from *Peucedanum palustre* (L.) MOENCH and of *carvifoliae* from *Selinum carvifolia* L. The aedeagus is distinctive and identical (Fig. 26) and I therefore synonymise *carvifoliae* with *thysselini* herewith.

The unusually long pubescence on the third antennal segment is characteristic of this species.

3. The *Phytomyza* species on *Artemisia* in Europe and Japan

HENDEL identified as *albiceps* MEIGEN the common leaf-miner on *Artemisia vulgaris* L. Examination of the type of *albiceps* in Vienna has shown that HENDEL's identification was not correct. *P. albiceps* probably represents a senior synonym of *rydeniana* HERING but more material is required before this synonymy can be formally established. No name is available for the *Artemisia* miner and this was therefore described as new by SPENCER (1971). It occurs throughout the palaeartic Region and has been described and illustrated in Japan by SASAKAWA, as *albiceps* (1961: 438).

KURODA (1954) described *P. artemisiae* from Japan, later (1960) describing the larva (as *albiceps* MEIGEN) and noting that the posterior spiracles have 3 bulbs, whereas the common palaeartic *Artemisia* miner has 16–26 bulbs. *P. artemisiae* KURODA is a valid name (*P. artemisiae* KALTENBACH is a nomen nudum, cf. HENDEL, 1931–6: 338) and the male genitalia of this species are entirely distinctive. In January, 1960 I found larvae feeding near freezing point on *Artemisia keiskeana* MIQ. in the Botanical Gardens, Tokyo and, from 4 puparia obtained, flies emerged at the end of March and on 3, 10 and 17 April. I had believed that this species also represented *artemisiae* KURODA but the male genitalia show that this is a further, undescribed species. The larvae have numerous minute bulbs on the posterior spiracles, as in the common European species.



Figs. 25 – 28. Aedeagus of: Fig. 25. *Phytomyza aurei* HERING. – Fig. 26. *Phytomyza thysselini* HERING.
– Fig. 27. *Phytomyza lappivora* HENDEL. – Fig. 28. *Phytomyza montana* GROSCHKE

4. Clarification of *Phytomyza albiceps* MEIGEN

Phytomyza albiceps MEIGEN

Phytomyza albiceps MEIGEN, 1830: 194. Lectotype ♀ in Naturhistorisches Museum, Vienna.

I have examined the two type specimens of *albiceps*, a female in Vienna from the VON WINTHEM collection and a male in Paris bearing MEIGEN's label „Phytomyza albiceps“. MEIGEN's description emphasises the pale coloration of the sides of the thorax — „Seitenstrieme des Rückenschildes und Knie weisslich“; and later „Mittelleib schwärzlich grau, mit mehr oder weniger breiter weisslicher Seitenstrieme vor der Flügelwurzel“. He also states „Von Hrn. von Winthem“. The male in Paris has the sides of the thorax black and thus only the female in Vienna can correctly be designated as lectotype.

The lectotype is a large specimen, with wing length of 2.8 mm; the second costal section is unusually long, 5 times length of the fourth. The upper ors (detectable from basal pits) is clearly weaker than the lower. The notopleura are entirely whitish-yellow, the mesopleura only narrowly yellow, with the bristle at the margin of the pale and dark ground.

HENDEL finally (1931—6: 337) associated this species with the common leaf-miner on *Artemisia vulgaris*. He gives the wing length as 2 mm and states that the mesopleura are yellow in the upper half. These two critical characters apply exactly to the species on *Artemisia* but do not apply to the lectotype of *albiceps*. I have carefully studied all species with the sides of the thorax yellow and the only known species which could represent *albiceps* is *rydeniana* HERING. Three females I have examined have the following measurements:

wing length	costal ratio
2.8 mm	5 :1.3
2.8 mm	5.4 :1.4
3.1 mm	5.5 :1.5

Although these three specimens agree more or less exactly in colour and in wing length with *albiceps*, in no case does the costal ratio approach 5. In view of this disparity I hesitate formally to synonymise *rydeniana* with *albiceps*. However, when further material can be examined, I fully expect to find a specimen corresponding more exactly with *albiceps*, which would justify this synonymy being formally established.

5. The male genitalia of two further species

Phytomyza lappivora HENDEL

Phytomyza lappivora HENDEL, 1927: 268. Holotype ♂ from Vienna in Naturhistorisches Museum.

The aedeagus of this species, which is only known from the holotype, is entirely distinctive and is shown in Fig. 27.

Phytomyza montana GROSCHKE

Phytomyza montana GROSCHKE, 1957: 130. Holotype ♀ ex *Centaurea montana* LINN. in Museum für Naturkunde, Stuttgart.

This species was described from Bavaria but GROSCHKE commented that it was common around Stuttgart. The distinctive aedeagus of a specimen from Stuttgart (leg. GROSCHKE) is shown in Fig. 28.

Summary

Recent study of the British Agromyzidae (SPENCER, in press) has led to the clarification of a number of European species, which are discussed in this paper. The previous paper in this series was published by SPENCER (1969b).

Four species, previously incorrectly identified, are described below as new; three new synonyms are established; two species, previously synonymised, are now resurrected; and the male genitalia of 17 further species are illustrated. In addition, revised keys are provided for the genera *Phytobia* LIOU and *Amauromyza* HENDEL.

Zusammenfassung

Eine neue Untersuchung der britischen Agromyzidae (SPENCER, im Druck) hat zur Klärung einer Anzahl europäischer Arten geführt, die in diesem Artikel besprochen werden. Der frühere Artikel in dieser Reihe wurde von SPENCER (1969b) veröffentlicht. Vier früher falsch bestimmte Arten werden nachstehend als neu beschrieben, drei neue Synonyme werden festgestellt, zwei früher als Synonyme bezeichnete Arten werden neu aufgestellt, und die männlichen Genitalien von 17 weiteren Arten werden abgebildet. Außerdem werden überarbeitete Bestimmungstabellen für die Gattungen *Phytobia* LIOU und *Amauromyza* HENDEL gegeben.

Резюме

Новое исследование британских Agromyzidae (SPENCER, в печати) довело к выяснению некоторого количества европейский видов, которые обсуждаются в этой статье. Пренная статья этого ряда опубликована SPENCER-ом (1969b). Четыре раньше неправильно определенные виды описываются здесь как новые, отмечаются три новых синонимов, два раньше как синонимы обозначенные виды устанавливаются как самостоятельные виды и изображаются половые аппараты самцов 17 видов. Даются кроме этого обработанные определительные таблицы родов *Phytobia* LIOU и *Amauromyza* HENDEL.

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