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The *Agromyza rufipes* Mg. group of leaf-miners on Boraginaceae (Diptera)*

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Among material recently received for identification from Professor E. M. HERING from Addis Ababa (Ethiopia) were five specimens of *Agromyza rufipes* Mg. s. lat. bred from leaf-mines on *Cynoglossum hochstetteri* Vatke. In this series the frons is black, similar to specimens bred by G. C. D. GRIFFITHS from *Myosotis* sp. at East Barnet, nr. London. Examination of genitalia showed that these specimens were identical but certainly distinct from the species in this group with the frons orange-red and the orbits shining black. Further investigation showed that yet another species occurs as a leaf-miner on *Lithospermum officinale* L. Finally, through the kindness of Professor Dr. BEIER in Vienna it has been possible to examine MEIGEN's type series and it has been found that *rufipes* Mg. s. str. is distinct from these three other species.

The four species are discussed in more detail below and at the end of this paper keys are given both for adults and for male genitalia.

Agromyza rufipes Meigen

Agromyza rufipes Mg., 1830; Hendel (part), 1931—1936: 147.

MEIGEN includes this species in his section A a) dealing with species "with entirely black frons". His description is brief: "Shining black, with white halteres; tibiae and tarsi reddish-yellow."

BECKER (1902) in his investigation of MEIGEN's types referred to four specimens of *rufipes* in the coll. WINTHEM in Vienna. I have seen these four specimens labelled "*rufipes*, coll. WINTHEM" and I herewith designate and have labelled one male of the four types as lectotype and have labelled the three other specimens, all males, as paralectotypes. These specimens are all in the Naturhistorisches Museum, Vienna.

The essential characters of this species are as follows: Head: two equal, reclinate ors, two similar or slightly shorter ori, normally somewhat incurved; orbital setulae sparse, rather long, in single row; arista distinctly pubescent, rather long, equal to maximum width of eye. Mesonotum: 4 + 1 well-developed dorso-centrals. Wing: length in male 3.7 mm, last section of m4 in ratio 25 : 42 with penultimate. Colour: frons matt brownish-black; antennae uniformly black, second segment not appreciably paler; mesonotum largely shining black but not brilliantly so and less so when viewed from front; legs: femora black but distinctly yellowish at knees, tibiae and tarsi yellowish-brown; wings pale, veins yellowish, particularly towards base; squamae and fringe yellowish. Male genitalia (slide No. 565): Distiphallus (Fig. 1 a, b) greatly enlarged, elongated, twice length of mesophallus, with two distinct tubules which are united within a unifying membrane, ending in a ring shaped process, open above; ninth sternite (Fig. 1 c) with broad side-pieces, apex broadly truncate, without extended hypandrial apodeme but with distinctive cup-shaped depression open ventrally; aedeagal apodeme entirely pale, translucent; ejaculatory apodeme very large (Fig. 1 d), pale, whitish, with central dark area.

* Herrn Professor Dr. ERWIN LINDNER zum 75. Geburtstag.

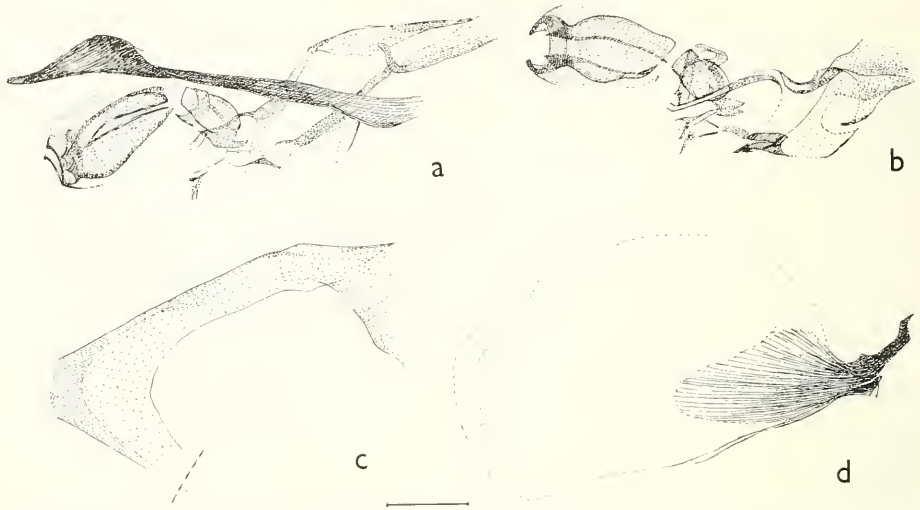


Fig. 1 (lectotype). *Agromyza rufipes* Mg., (a) aedeagus and ninth sternite, side view (b) aedeagus, ventral view (c) ninth sternite (d) ejaculatory apodeme. (Scale line = 0.1 mm.)

There are no known bred specimens of this species but in view of its close similarity to the three species discussed below, which are all leaf-miners on Boraginaceae, it can safely be assumed that *rufipes* Mg. also has this family as host.

It seems possible that the species illustrated by SASAKAWA (1961: Fig. 13) as *rufipes* Mg., bred from *Trigonotis brevipes* Maxim. may well represent a new species.

Agromyza myosotidis Kaltenbach

Agromyza myosotidis Kalt., 1864: 250; 1874: 449.

Agromyza rufipes Mg., Hendel (part), 1931—1936: 147.

Agromyza hirtella Becker, 1908, *syn. nov.*

This species was not bred by KALTENBACH but was named after leaf-mines on *Myosotis intermedia*. KALTENBACH describes the species as follows: „*Agromyza myosotidis* m. ob *Agrom. Echii* Kalt.? Die Larven minieren im Juli und wieder im September die Blätter der *Myosotis intermedia*, besonders häufig an schattigen und geschützten Plätzen. Die braunen Minen nehmen gewöhnlich die Blattspitzen, doch auch nicht selten das ganze Blatt ein. Es finden sich dann Pflanzen vor, woran kein grünes Blatt mehr zu finden ist. Die Verwandlung geht in der Erde, die Entwicklung gewöhnlich im nächsten Frühlinge vor sich. Die Zucht mir wiederholt mißlungen.“ HENDEL (1931—1936: 147) synonymized the species with *rufipes* Mg.

On the basis of the specimens bred by GRIFFITHS from *Myosotis* sp. (cultivated) it is now possible to revive this species and for the first time describe the adult. It is only necessary to give the points of difference from *rufipes* Mg.: Head: normally two ocelli and two ocelli but all bristles shorter (in neotype three ocelli on one side); arista appearing bare. Wing: length 3.3—3.5 mm, last section of vein m4 tending to be shorter, in ratio 40:25 (neotype), 35:18 (Addis) with penultimate. Colour: generally darker; frons sooty black, all antennal segments deep black; legs either entirely black or tibiae and tarsi slightly paler but not so yellow as in *rufipes*; wing less yellow, veins darker, blacker, wing base brown, not yellow. Male genitalia (slide No. 567): distiphallus significantly smaller (Figs. 2 a, b), not appreciably longer than mesophallus, paired tubules less obviously divided; ninth sternite (Fig. 2 c) with elongated hypanthial apodeme which is consistently whitish at end; aedeagal apodeme dark, brownish-black, ejaculatory apodeme smaller (Fig. 2 d).

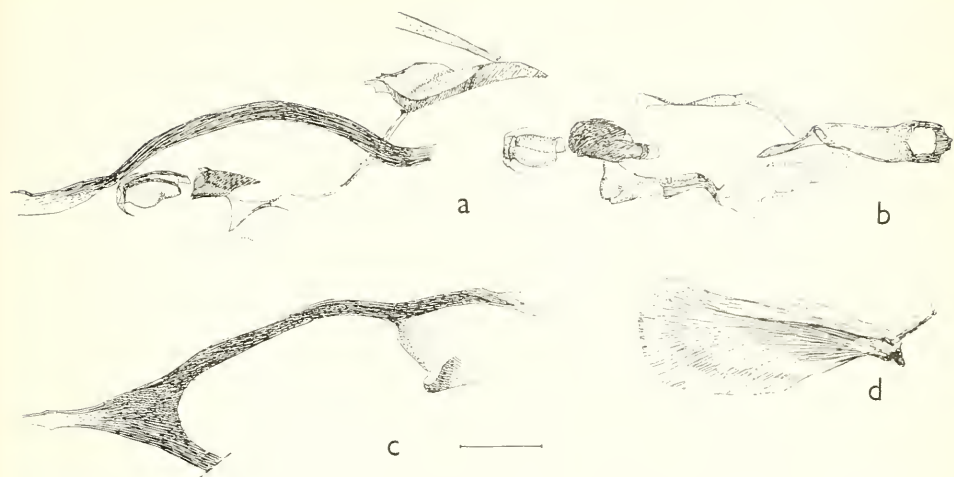


Fig. 2 (neotype). *Agromyza myosotidis* Kalt., (a) aedeagus and ninth sternite, side view (b) aedeagus, ventral view (c) ninth sternite (d) ejaculatory apodeme. (Scale line = 0.1 mm.)

Neotype ♂, England, East Barnet, nr. London, emerged 7. X. 1962 from leaf-mine on *Myosotis* sp. (cult.) found 11. VI. 1962, deposited by G. C. D. GRIFFITHS in Naturhistorisches Museum, Vienna.

Additional material of this species can be recorded as follows:

England: Woodwalton Fen, Hunts., 1 ♀ emerged 15. IX. 1960 from leaf-mine on *M. palustris* L. found 18. VIII. 1960 (G. C. D. GRIFFITHS).

Austria: 1 ♂ in coll. WINTHEM, Naturhistorisches Museum, Vienna (Slide No. 574).

Two ♂♂ in coll. HENDEL, Naturhistorisches Museum, Vienna, one bred from *Symphytum* sp. (Genitalia Slides Nos. 562, 568).

Germany: Güntersberg/Oder and Berlin (Finkenbergl), bred from *Symphytum officinale* L. (E. M. HERING). Rostock, Botanical Gardens, bred from *Borago officinalis* L. (BUHR).

Poland: Galicia, bred from *Symphytum* sp. (M. NOWICKI), genitalia illustrated by NOWAKOWSKI (1962: Fig. 9) as *A. rufipes* Mg. s. l.

Sweden: 1 ♂ in type series of *Agromyza reptans* FALLÉN (Genitalia Slide No. 575).

Ethiopia: Addis Ababa, little Akaki River, 2300 m, 9. XII. 1959, bred from leaf-mines on *Cynoglossum hochstetteri* Vatke (Genitalia Slide No. 561).

Canary Islands: Tenerife, as *A. hirtella* Becker (Genitalia Slide No. 578). I have examined the single type specimen in the coll. BECKER in the Zoologisches Museum, Berlin and the male genitalia show that this species is in fact *myosotidis*, with which it is now synonymized.

Agromyza abiens Zetterstedt

Agromyza abiens Zetterstedt, 1848: 2747.

Agromyza echii Kaltenbach, 1860: 217; 1874: 449, syn. nov.

Agromyza rufipes Mg., Hendel (part), 1931—1936: 147.

This species was synonymized with *rufipes* Mg. by HENDEL (1931—1936: 147). I have now examined four males from ZETTERSTEDT's type series in the University Lund and the genitalia confirm that this represents a distinct species. One specimen has been labelled as lectotype and the other three as paralectotypes.

The essential characters of the species are as follows: frons normally conspicuously orange-red with black orbits, but the entire frons and orbits may be significantly darker,

distinctly brownish; first and second antennal segments yellowish, third variable, normally pale, yellowish-brown but in darkest specimens almost black; mesonotum distinctly more matt, greyish than in *rufipes* and *myosotidis*; tibiae and tarsi pale, yellowish; wing length varying from 2.8 to 4 mm. Male genitalia: aedeagus as in Figs. 3 a, b, distiphallus paler, smaller, rounder than in preceding two species; ninth sternite (Fig. 3 c) with narrow side-arms but short, broadly truncate hypandrial apodeme; ejaculatory apodeme large (Fig. 3 d).

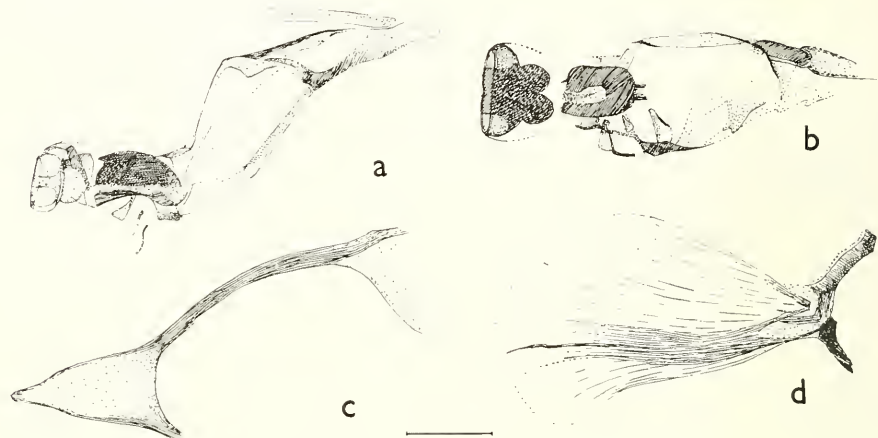


Fig. 3. *Agromyza abiens* Zett., (a) aedeagus, side view (ex *Cynoglossum*) (b) aedeagus, ventral view (ex *Cynoglossum*) (c) ninth sternite (lectotype) (d) ejaculatory apodeme (lectotype). (Scale line = 0.1 mm.)

This is a widespread species and confirmed records based on examination of male genitalia can be given as follows:

Austria: 1 ♂, bred ex *Symphytum*, coll. HENDEL (Slide No. 587); 1 ♂, Wienerwald (Slide No. 589); 1 ♂, "Alte Sammlung", det. SCHINER (Slide No. 588), all in Naturhistorisches Museum, Vienna.

Great Britain: 1 ♂, Weeting, Suffolk, bred ex *Cynoglossum officinale* L. (Slide No. 590); 1 ♂, Gower Peninsula, Wales, ex same host (GRIFFITHS).

Germany: 1 ♂, Kyffhäuser, bred ex *Lappula myosotis* Moench. (Slide No. 591).

Sweden: 1 ♂, lectotype (Slide No. 579).

Switzerland: 1 ♂, Bérisal, Switzerland, bred ex *Echium* sp. (Slide No. 592).

I have seen other specimens, certainly referable to this species from Hungary, Italy and Poland. KALTENBACH's description of *A. echii* (1874: 450) undoubtedly refers to this species, as the frons is referred to as "brownish-yellow" and I therefore synonymize *echii* Kalt. with *abiens* Zett. herewith.

It is important to have established the variation in the colour of the frons which may be encountered in this species. The specimens bred from *Cynoglossum* at Weeting, England have a uniformly dark brown frons but the genitalia agree in all details with those of the lectotype, in which the frons is typically reddish-orange.

Agromyza lithospermi n. sp.

Morphologically essentially as in *A. rufipes* Mg., wing length from 3.5 to 4.2 mm.

Colour: frons uniformly dark, blackish-brown, orbits not differentiated; third antennal segment black, first and second yellowish; mesonotum entirely matt-grey; legs: femora black, tibiae and tarsi yellowish; wings pale, veins distinctly yellowish-brown, base similar.

Male genitalia (Slide No. 583): aedeagus with distiphallus greatly enlarged (Figs. 4 a, b), consisting of a large terminal ring, divided above, with a smaller tubular process adjoining the black mesophallus; within the ring-shaped distiphallus are two short, broad tubules; the rightangle bend on the right side of the basiphallus (Fig. 4 b) and the angular extension on the left are typical of the species; ninth sternite with broad sidearms and broad, extended hypandrial apodeme (Fig. 4 c); ejaculatory apodeme essentially as in *abiens* Zett.

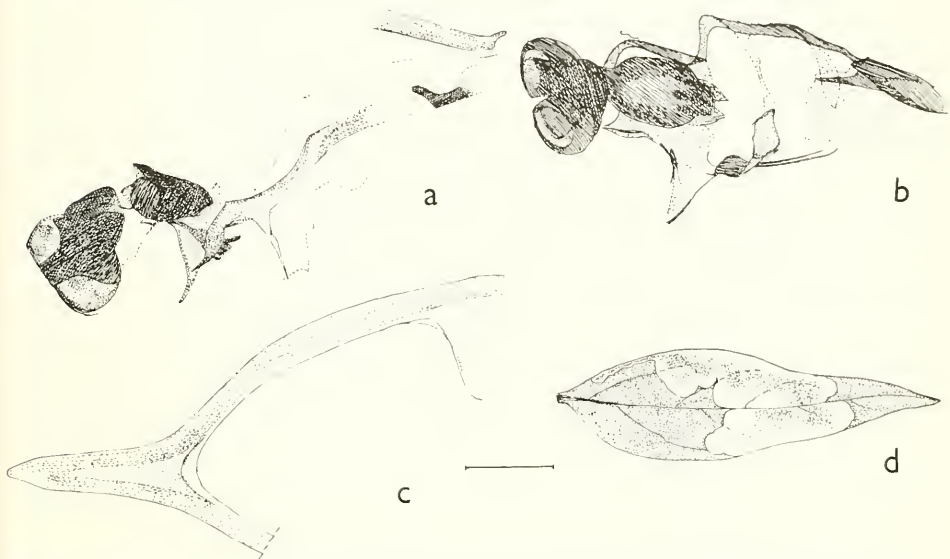


Fig. 4 (holotype). *Agromyza lithospermi* n. sp., (a) aedeagus, side view (b) aedeagus, ventral view (c) ninth sternite (d) leaf-mine on *Lithospermum officinale*. (Scale line = 0.1 mm.)

Leaf-mine: beginning with a narrow channel, then developing into a distinctive blotch, filled centrally with blackish frass; the mine does not occupy the entire leaf (Fig. 4 d).

Holotype ♂, England, Chippenham Fen, emerged 8. VIII. 1954 from leaf-mines on *Lithospermum officinale* L.; paratypes 1 ♀, same data; 1 ♂, Bessarabia, Tighina, 11. IV. 1931, bred from leaf-mine on same host (E. M. HERING), Slide No. 584; 1 ♂, Austria, Vienna, „Alte Sammlung“ (Slide No. 593). Holotype and one paratype in author's collection, one paratype in coll. E. M. HERING, one in Naturhistorisches Museum, Vienna.

I have seen specimens bred from *Cerinthe minor* L. in Austria which closely resemble this species. The distiphallus is similarly large but is more cylindrical rather than ring-shaped. However, I do not feel the differences justify considering this as a distinct species at this stage. The problem should, however, be reviewed when additional material from other localities becomes available.

Key to adults

- 1 Mesonotum distinctly shining, black rather than grey; antennae entirely black
- Mesonotum more matt, greyish; at least second antennal segment pale, more brownish 3
- 2 Arista distinctly pubescent, wing base and veins pale, yellowish-brown *rufipes* Mg.
- Arista bare, wing base dark brown, veins black *myosotidis* Kalt.

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