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New and interesting Agromyzidae (Diptera) from Florida

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With 54 Figures

This paper is based almost entirely on material collected since 1963 mainly in the Miami area of southern Florida by Mr. Carl E. Stegmaier Jr. Thirteen new species are described, two new synonomies are established, new host records are given for six species and six species are recorded for the first time in North America. All the species discussed have been bred from known hosts and the availability of puparia together with the host information has been of the greatest value in clarifying many of the difficult species.

It has been found that the distribution of the known species in this area is essentially neotropical. A number of the species now recorded have hitherto only been known from the Caribbean area or from Central America. The northern limits of the range of these neotropical species is not known with any accuracy. To facilitate future identification additional couplets have, therefore, been prepared, wherever practicable, for all new species both for Frick's (1959) key to north American species and for the author's (1963) key to neotropical species.

Mr. Stegmaier's assiduous collecting has added significantly to our knowledge of the North American Agromyzidae, and I would like to take this opportunity of thanking Mr. Stegmaier for allowing me to study his valuable material and also for the great assistance he has given me over the past three years in extensive correspondence; without this active co-operation the preparation of this paper would not have been possible. I also wish to thank Mr. George Steyskal of the Entomology Research Division, U. S. Department of Agriculture, Washington, for providing information on types in the U. S. National Museum and for arranging for the loan of much other material. Finally, I wish to thank my wife for the preparation of all text figures in this paper. The scale line in all cases represents 0.1 mm.

The holotypes of the 13 new species described are being presented to the U. S. National Museum, Washington, but will be retained in my collection while I continue actively to work on the Agromyzidae.

Genus *Agromyza* Fallén

This genus is not well represented in southern Florida and only two species were discovered by Stegmaier in three years of intensive collecting. These species are discussed below; in one case, *A. varifrons* Coq., the host has been established for the first time and in the other, *A. parvicornis* Lw., new hosts have been discovered.

Agromyza parvicornis Loew

Florida: Sweetwater, Tamiami Canal, 3 ♂♂, 3 ♀♀, ex leaf-mines on *Echinochloa walteri* (Purch.) Heller.

This series agrees well with the essential characters of *parvicornis* (Melander, 1913: 254; Shewell, 1953: 463; Frick, 1959: 356), although the only recorded host hitherto is *Zea mays* L.

The aedeagus of a specimen from Florida is shown in Fig. 1.

Leaf-mines containing dead larvae found by the author at Kennedy Airport, New York, 23. X. 1965 on *Panicum dichotomiflorum* Michx. also appear to represent this species. The larval characters agree closely with those reared from *Echinochloa*.

Agromyza varifrons Coquillett

Florida: Hialeah, 4 ♂♂, 6 ♀♀, emerged 5. X. 1963 from leaf-mines on *Celtis laevigata* Willd. (Ulmaceae), leg. 22. IX. 1963 (C. E. S.).

I am satisfied that this series represents the first reared specimens of *A. varifrons*, of which the single female type was caught in District of Columbia.

It is interesting to note that Hendel (1931–1936: 154) considered *A. varifrons* as a synonym of *A. trebinjensis* Strobl from the Adriatic coast of Yugoslavia. It has recently been established by Spencer (1966 b: 293) that *A. trebinjensis* is a leaf-miner on *Celtis australis* L., which is widespread in the Mediterranean area; this species was subsequently described as *A. celtidis* by Nowakowski (1960).

The aedeagus and cerci of a male of *A. varifrons* from Florida are illustrated in Figs. 2, 3; the genitalia of this specimen closely resemble those of *A. trebinjensis*, illustrated by Nowakowski (as *A. celtidis* Now.) but the distiphallus is more distinctly U-shaped and the cerci are more elongate, with a distinctive patch of stout bristles on the lower, inner corner.

Although *A. trebinjensis* has not been recorded outside the Mediterranean area, the food-plant occurs widely across eastern Europe and Asia to China and there is little reason to believe the leaf-miner will not be found to have a similar distribution. However, the population in Florida has presumably been isolated from the main Palaearctic stock since the last severance of the Bering Straits land connection and the differences in genitalia suggest a sufficient degree of reproductive isolation to justify treating the two populations as distinct species rather than allopatric sub-species.

A. aristata Malloch (1915 b) is also a leaf-miner on the family Ulmaceae, feeding on the genus *Ulmus* which is closely related to *Celtis*. This species is readily distinguishable from *A. varifrons* by the ash-grey mesonotum and entirely yellow legs. Frick (1959: 354) mentions seeing a leaf-mine of *A. aristata* on *Celtis;* it is now reasonable to assume that this mine was of *A. varifrons* and that *A. aristata* is host-specific on *Ulmus*.

Genus *Japanagromyza* Sasakawa

Two new species from Florida are described below and *J. inaequalis* (Mall.) is also discussed, representing the first record of this species in America. I have also recently examined 30 specimens from Antigua, the Bahamas, Barbados and Dominica, among which six further species are represented, which will be described elsewhere. The study of this additional material and also of further specimens from the Pacific area confirms that this genus includes many very closely related species, which in some cases can only satisfactorily be identified by the male genitalia.

The genitalia of a paratype of *J. inaequalis* (Mall.) have now been examined by G. Steyskal, and I have examined a male bred from *Vigna repens* in Florida. These studies have shown that the specimen from Puerto Rico, San Juan, illustrated as *J. inaequalis* (Mall.) [Spencer, 1963: Figs. 11 a, b] in fact represents a distinct species; I have seen further specimens from Dominica and the Bahamas.

Frick (1959) included five species belonging to this genus in his *Agromyza* key, in couplets 11 to 13. I now give below a new key of known North American species. A further key will be published later to include both American and neotropical species.

1 Pre-scutellars lacking . . . . . *desmodivora* n. sp.
— Well-developed pre-scutellars present 2
2 Frons brown, orbits shining black . . . . . *aequalis* n. sp.
— Frons mat black 3
3 Dorsal upper orbital bristle shorter than ventral; arista distinctly pubescent; mesonotum distinctly greenish . . . . . *inaequalis* (Mall.)
— Two upper orbitals equal; arista appearing bare; mesonotum largely mat blackish . . . . . *viridula* (Coq.)

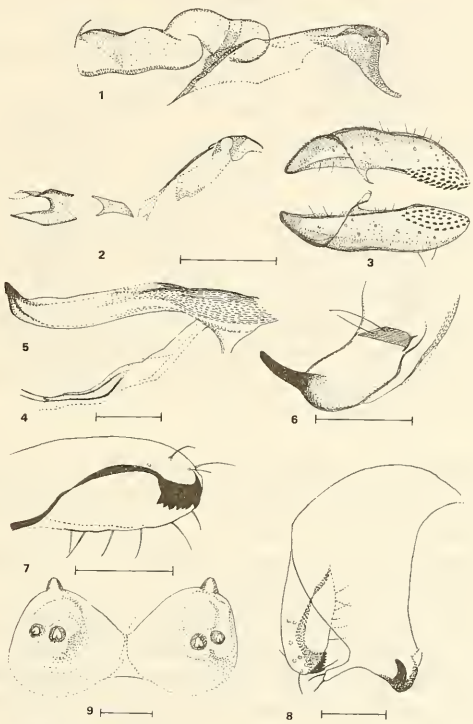


Fig. 1. *Agromyza parvicornis* Lw.: aedeagus.
Figs. 2—3. *Agromyza varifrons* Coq.: 2, aedeagus; 3, cerci.
Figs. 4—9. *Japanagromyza aequalis* n. sp.: 4, aedeagus; 5, ninth sternite; 6, surstylus; 7, cercus; 8, epandrium; 9, posterior spiracles of puparium.

Japanagromyza aequalis n. sp.

Head: frons equal to width of eye, not projecting above eye in profile; two strong equal ors, two equal ori only slightly weaker than ors; orbital setulae fine, sparse, reclinate; jowls one-twelfth vertical height of eye; third antennal segment distinctly covered with short, white pilosity, arista only slightly pubescent.

Mesonotum: two strong dorso-centrals, frequently a third present which is normally short and sometimes developed on one side only; pre-scutellars present, acrostichals relatively sparse, in six rows.

Wing: length 2 to 2.4 mm, costa extending strongly to vein m 1 + 2, last section of m 4 two-thirds penultimate, first cross-vein distinctly before midpoint of discal cell.

Legs: fore-tibia with one, mid-tibia with two lateral bristles.

Colour: frons uniformly brown, ocellar triangle and orbits distinctly shining black, mesonotum greenish- or coppery-black, moderately shining, abdomen more distinctly shining; wings somewhat darkened by coarse microtrichia, veins brownish-black; squamae and fringe, also halteres entirely white.

Male genitalia: aedeagus membranous basally, chitinized at sides towards distiphallus, this short, extending only slightly beyond end of chitinization (Fig. 4); ninth sternite rounded, without apodeme, as in *J. desmodivora* (Fig. 11), side-arms unusually broad, upcurved at end (Fig. 5), surstyli curving inwards, not downwards, without bristles (Fig. 6); cerci without internal bristles but with 5 or 6 short black teeth grouped at end (Fig. 7); epandrium with distinctive narrow extension towards cerci (Fig. 8); sperm sac very small, blade linear.

Puparium: pale, straw-coloured, posterior spiracles each with three bulbs on widely-separated, well-defined protuberances (Fig. 9).

Holotype ♂, Florida: Hialeah, emerged 10. X. 1963 ex leaf-mine on *Vigna repens* Baker, collected 30. IX. 1963; paratypes: 1 ♂, 1 ♀, same data as holotype; 4 ♂♂, 4 ♀♀, 12. XI. 1963 ex leaf-mines collected 25. X. 1963, otherwise same data (all C. E. Stegmaier); Bahamas: Berry Is., Little Harbour Cay, 1 ♀, 1. V. 1953; Darby Is., Exuma Cay, 1 ♀, 18. I. 1953 (leg. Haydon & Giovannoli); West Indies: Dominica, Layou R. mouth, 1 ♂, 6. II. 1965; 1 ♀, 9. I. 1965 (W. W. Wirth). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

This species is readily distinguishable from *J. inaequalis*, which occurs on the same food-plant, by the stronger dorsal orbital bristle, the paler brown frons, the distinctive pilosity on the third antennal segment and the sparser acrostichals; the male genitalia and pupal characters are also entirely distinct.

Japanagromyza desmodivora n. sp.

Head: frons narrow, equal to width of eye, not projecting above eye in profile; two strong ors, two equal, weaker ori, the lower incurved; orbital setulae slight, sparse, reclinate; jowls narrow, one-tenth vertical height of eye; third antennal segment rounded above, flatter below, arista largely bare.

Mesonotum: two dc, pre-scutellars lacking (in one specimen out of 20 examined a single bristle present), acrostichals in some 10 rows.

Wing: length from 1.9 mm in male to 2.2 mm in female, costa extending strongly to vein m 1 + 2, last section of m 4 three-fifths penultimate, first cross-vein well before mid-point of discal cell.

Legs: fore-tibia with one, mid-tibia with two lateral bristles.

Colour: frons mat, brownish-black, orbits darker, black, slightly shining; lunule silvery-greyish; mesonotum largely mat, greyish-black, occasionally faintly greenish, abdomen more obviously grey-green; legs entirely black; wings pale, veins yellowish-white; squamae and fringe silvery-white, halteres white.

Male genitalia: aedeagus as in Fig. 10, basiphallus and base of distiphallus chitinized but area between entirely membranous, distal tubule short, also membranous; ninth sternite as in Fig. 11, without apodeme; surstyli (Fig. 12) short but stout, with some 12 spines; cerci (Fig. 13) with some 20—25 strong spines and unusually long hairs at end; sperm sac as in Fig. 14.

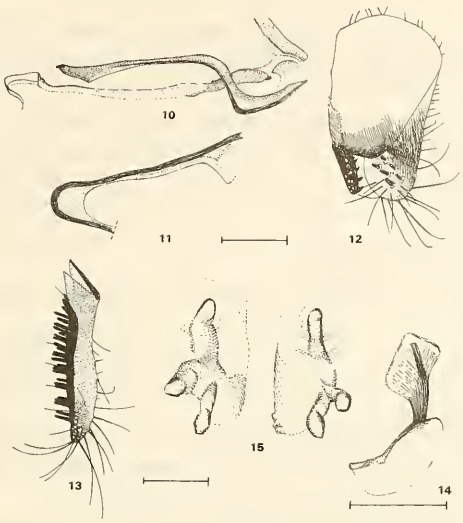
Puparium: orange-brown, deeply segmented, posterior spiracles each with 3 slightly raised bulbs (Fig. 15) lying immediately adjacent to the anal depression.

Leaf-mine: a somewhat irregular blotch, greenish when fresh, becoming brownish to white with age.

Holotype ♂, Florida: Miami, emerged early Nov. 1963 from leaf-mines on *Desmodium tortuosum* (Sw.) Dc. collected 17. X. 1963; paratypes: 3 ♂♂, 8 ♀♀, same

data as holotype; 5 ♂♂, 3 ♀♀, emerged 13. X. 1963 from leaf-mines collected 26. IX. 1963, otherwise same data (all C. E. Stegmaier). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

Empty leaf-mines found on *Desmodium campylocladus* Hemsyl., nr. Bogotá, Colombia, 10. XII. 1958 (Spencer, 1963, Fig. 103 i) very probably represent this species.



Figs. 10—15. *Japanagromyza desmodivora* n. sp.: 10, aedeagus; 11, ninth sternite; 12, epandrium, showing surstylus and cercus; 13, cercus; 14, sperm sac; 15, posterior spiracles of puparium.

Japanagromyza inaequalis (Malloch)

Florida: Hialeah, 1 ♂, Nov. 1965; 1 ♀, 17. IV. 1963; 1 ♀, 8. XII. 1963, all ex leaf-mines on *Vigna repens* (C. E. S.).

The genitalia of the holotype have recently been examined by G. Steyskal and it is clear that the illustrations given by Spencer (1963: Figs. 11 a, b) represent a different, though closely-related species.

The aedeagus of the male from Florida is shown in Fig. 16.

The puparium is also distinctive, somewhat oval, dark brown (as opposed to yellowish in *J. aequalis* on the same host) and the posterior spiracles are shown in Fig. 17.

I have recently seen two females from Dominica, 18.–24. III. 1965 (W. W. Wirth) clearly representing this species, which is no doubt widespread in the Caribbean.

Frick (1957: 199) synonymised *A. iridescens* Frost from Puerto Rico with *inaequalis*. I have now examined the holotype from Barro Colorado Is., Panama and can confirm that this is a distinct, substantially larger species than *inaequalis*.

Genus *Ophiomyia* Braschnikov

One new species, entirely typical of the genus, is described below.

I have also seen a number of caught specimens from the Miami area which clearly represent undescribed species. The species in this genus are extremely difficult to recognise from individual caught specimens and it therefore seems preferable not to describe further species from this material, until longer series, preferably reared, are available.

Ophiomyia camarae Spencer

Florida: Hialeah, 2 ♂♂, 8 ♀♀, 17. IV. 1963 ex leaf-mines collected 5. IV. 1963 on *Lantana camara* (C. E. S.).

This is the first United States record of this species, which was described from Trinidad (Spencer, 1963: 326).

Ophiomyia lippiae n. sp.

Head: frons slightly wider than eye, not projecting above eye in profile; two equal ors, two ori also equal but slightly weaker than ors; orbital setulae fine, sparse, reclinate; apex of ocellar triangle extending to level of lower ors; jowls broad, one-fifth vertical height of eye, lower margin straight, vibrissal corner scarcely projecting forwards, forming an angle of approximately 90°; cheeks broad, extending downwards almost to margin of jowls; vibrissal fasciculus in male long, slender, uniformly curving (Fig. 18); facial keel distinctly bulbous between base of antennae, narrowing below.

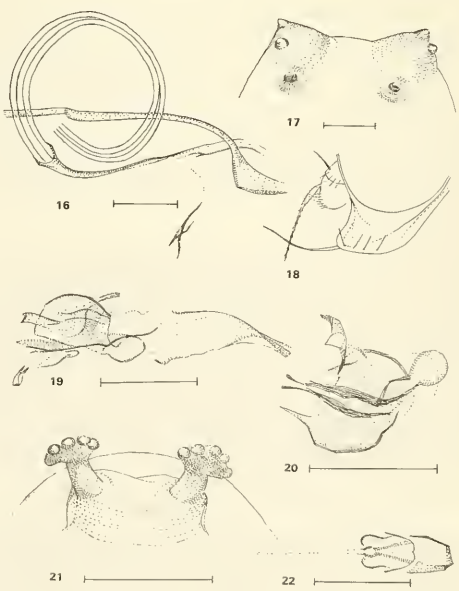
Mesonotum: acrostichals in some 8 to 10 rows in front, only a few scattered hairs extending beyond first dorso-central.

Legs: mid-tibiae with normally a single lateral bristle, occasionally apparently lacking.

Wing: length from 1.5 to 1.9 mm; costa extending strongly to vein m 1 + 2, first cross-vein well beyond midpoint of discal cell, last section of m 4 only slightly shorter than penultimate, in ratio 12 : 15.

Colour: entirely black, ocellar triangle and orbits only weakly shining; mesonotum conspicuously, abdomen brilliantly shining black; squamae white, margin slightly darker, pale-brownish; fringe whitish or pale ochrous; halteres black.

Male genitalia: aedeagus highly asymmetrical, as in Figs. 19, 20; surstyli projecting inwards, narrow, with about 6 short, stout teeth at end.



Figs. 16—17. *Japanagromyza inaequalis* (Mall.): 16, aedeagus; 17, posterior spiracles of puparium.
Figs. 18—21. *Ophiomyia lippiae* n. sp.: 18, head; 19, aedeagus, side view; 20, same, ventral view; 21, posterior spiracles of puparium.
Fig. 22. *Melanagromyza bidentis* n. sp.: aedeagus, ventral view.

Puparium: pale, yellowish-white; posterior spiracles on short, raised stalks, each process with five bulbs (Fig. 21).

Holotype ♂, Florida: Miami, 26. VIII. 1963, ex seed *Lippia nodiflora* Michx. collected 24. VIII. 1963; paratypes: 3 ♂♂, 9 ♀♀, same data as holotype; 2 ♀♀, 18.–24. VII. 1963, collected 13. VII. 1963, all C. E. S. Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

O. lippiae can be included as follows in the author's (1963) key to neotropical Ophiomyia species:

Couplet 3, second alternative, for *buscki* (Frost) read 3a; add new couplet:

3a Jowls narrow, one-eighth eye height; last m 4 section short, two-thirds penultimate; wing length over 2 mm . . . . . *buscki* (Frost)

— Jowls broader, one-fifth eye height; last section of m 4 only slightly shorter than penultimate; smaller species, wing length 1.5 to 1.9 mm . . . *lippiae* n. sp.

Frick's (1959) key to North American species, couplet 6, can be amended as follows to include *O. lippiae:*

Couplet 6, second alternative, for *buscki,* read 6a; add new couplet:

6a Jowls narrow, one-eighth eye height; last m 4 section short, two-thirds penultimate; wing length over 2 mm . . . . . *buscki* (Frost)

— Jowls broader, one-fifth eye height; last section of m 4 only slightly shorter than penultimate; smaller species, wing length 1.5 to 1.9 mm . . . *lippiae* n. sp.

Examination of the type series shows that this species has a distinctly white squamal fringe, not "brownish-ochrous" as previously believed from the specimens ex alcohol available at that time (Spencer, 1963: 327).

Genus *Melanagromyza* Hendel

The material I have been able to study shows this genus to be particularly well represented in southern Florida. Species known hitherto have been in the main internal stem-borers; two new species in this group are now described and four further new species have been identified and are briefly discussed but the formal description is left until additional material becomes available.

Of particular interest has been the discovery of five new species feeding in seed-heads, four of these in Compositae and one in Acanthaceae. Three species, *M. floris* Spencer, *M. minima* (Malloch) and *M. viridis* (Frost) have been further clarified and two new synonymies have been established.

Melanagromyza bidentis n. sp.

A very small species, closely resembling *M. minima,* with following essential characters:

Wing: length normally 1.6 mm, maximum size observed in one of ten specimens 1.7 mm.

Colour: mesonotum shining bluish-green, abdomen shining green; squamae grey, margin and fringe dark, blackish.

Male genitalia: aedeagus in ventral view as in Fig. 22; in side view as illustrated (as *minima*) by Spencer, 1963: Fig. 33c; ovipositor of female normal, scarcely elongated.

Holotype ♂, Florida: Miami, City Docks, 18. IX. 1964, ex seeds Bidens; Miami, Marine Acoustical, 4 ♂♂, 2 ♀♀, 22. IX. 1964, ex seeds Bidens; 2 ♀♀, 28. VIII. 1963, ex seeds Bidens; Hialeah, 1 ♂, 2 ♀♀, 28. IX. 1963, ex seeds *Verbesina virginica* L. var. *lacinata* A. Gray, leg. 20. IX. 1963 (all C. E. S.); British Guiana, Mazaruni, clearing, 1 ♂, 14. VIII., 1 ♂, 15. IX. 1937 (Richards & Smart); Costa Rica, San José, 1 ♂, 5. VII. 1915 (H. Schmidt). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

This species is distinguishable from *M. minima* by the somewhat more greenish, rather than bluish coloration of the mesonotum and from *M. minimoides* by its smaller size. The male genitalia are distinctive, exactly agreeing in four specimens examined, with the U-shaped basiphallus always adjoining the chitinized distiphallus complex. The most common host is *Bidens* and there is so far only a single record of *Verbesina* as an alternate host. *M. bidentis* is frequently reared from Bidens together with *M. floris* Spencer, which is immediately distinguishable by its white squamal fringe.

In Frick's (1959) key this species runs to *minima* in the second alternative of couplet 16 which should now be extended as follows, to include also *minimoides:*

— Mesonotum with a greenish or bluish sheen 16a
16a Very small species, wing length not more than 1.9 mm 16b
— Slightly larger species, wing length up to 2.2 mm; mesonotum more mat, greenish; aedeagus with slight gap between basiphallus and distiphallus complex (Fig. 38); ovipositor slightly elongated . . . . . *minimoides* n. sp.
16b Mesonotum predominantly bluish-black; long gap between basiphallus and distiphallus (Fig. 37); ovipositor greatly elongated . . . . . *minima* (Mall.)
— Mesonotum predominantly greenish-black; basiphallus and distiphallus adjoining (Fig. 22); ovipositor not elongated . . . . . *bidentis* n. sp.

In the author's (1963) key to neotropical species *M. bidentis* can be included in amended couplets 17 to 19, together with *M. erechtitidis*, *M. minima* and *M. minimoides* as follows: couplet 17, second alternative should now read:

— Smaller species, wing length at most 2.3 mm 18
18 Orbital setulae in 2 rows, inner row proclinate, outer reclinate; eye slightly pilose in male; wing length 2.3 mm . . . . . *erechtitidis* n. sp.
— Orbital setulae in single row, reclinate 19
19 Very small species, wing length not more than 1.9 mm 19a
— Slightly larger species, wing length up to 2.2 mm; mesonotum more mat, greenish; aedeagus with slight gap between basiphallus and distiphallus complex (Fig. 38); ovipositor slightly elongated . . . . . *minimoides* n. sp.
19a Mesonotum predominantly bluish-black; long gap between basiphallus and distiphallus (Fig. 37); ovipositor greatly elongated (Spencer, 1963: Fig. 30) *minima* (Mall.)
— Mesonotum predominantly greenish-black; basiphallus and distiphallus adjoining (Fig. 22); ovipositor not elongated . . . . . *bidentis* n. sp.

Melanagromyza chaptaliae n. sp.

Head: frons equal to width of eye, not projecting above eye in profile; 4 orbital bristles, the lower slightly weaker; orbital setulae well developed, mainly reclinate, but a partial, second, inner row present in front, incurved or proclinate; lunule small but slightly higher than semicircle; jowls narrow, about one-tenth vertical height of eye, deepest in centre; eye distinctly pilose in male; third antennal segment small, round, with distinct whitish pubescence, arista appearing almost bare.

Mesonotum: two dorso-centrals, acrostichals rather sparse, in only six rows.

Legs: mid-tibiae normally with two strong lateral bristles.

Wing: length 2.2 mm, costa extending strongly to vein m 1 + 2, first cross-vein slightly beyond centre of discal cell, last section of m 3 + 4 three-fifths penultimate.

Colour: frons mat black, ocellar triangle only faintly shining, orbits slightly more so; mesonotum shining, greenish-coppery, abdomen more mat; squamae and fringe silvery-white, margin slightly differentiated, yellowish-brown.

Male genitalia: aedeagus entirely typical of genus, as in Figs. 23, 24; ninth sternite essentially triangular, hypandrial apodeme slightly extended; surstyli rounded at end, with a fringe of short hairs; spermal sac unusually large, as long as ninth sternite.

Puparium: pale orange-yellow, not deeply segmented, with relatively broad bands of minute black tubercles at segment borders; posterior spiracles (Fig. 25) on long projections, each with a strongly chitinized ellipse of nine regular bulbs around the stout but short, black central horn.

Holotype ♂, Florida: Homestead Sub-Tropical Agricultural Experiment Station, emerged 3. XI. 1964 from seed-heads of *Chaptalia dentata* (L.) Cass. leg. 22. I. 1964 (C. E. S.); paratypes: 5 ♂♂, 2 ♀♀, same data. Holotype and 3 paratypes in U. S. National Museum, 4 paratypes in author's collection.

M. chaptaliae runs to couplet 3 in Frick's (1959) key, which can now be extended as follows: for *diantherae,* read 3a; add new couplet:

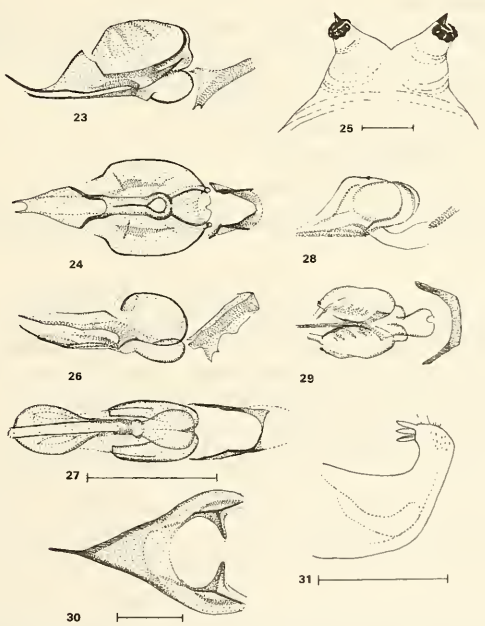
3a Large species, wing length 3 to 3.75 mm . . . . . *diantherae* (Malloch)
— Smaller species, wing length 2.2 mm . . . . . *chaptaliae* n. sp.

If the orbital setulae are considered as all reclinate, this species would run to *approximata* (Frost). The exact status of *approximata* can only be established when the male genitalia of the holotype from Guatemala can be examined.

In the author's (1963) key to neotropical species, *M. chaptaliae* runs to couplet 8, which can be extended as follows:

For *floris* Spencer, read 8a; add new couplet:

8a Orbital setulae entirely reclinate; eye bare in both sexes . . . *floris* Spencer
— Orbital setulae proclinate on inner row; eye pilose in male . . *chaptaliae* n. sp.



Figs. 23—25. *Melanagromyza chaptaliae* n. sp.: 23, aedeagus, side view; 24, same, ventral view; 25, posterior spiracles of puparium.

Figs. 26—27. *Melanagromyza erechtitidis* n. sp.: 26, aedeagus, side view; 27, same, ventral view.

Figs. 28—31. *Melanagromyza heterothecae* n. sp.: 28, aedeagus, side view; 29, same, ventral view; 30, ninth sternite; 31, surstylus.

Melanagromyza erechtitidis n. sp.

Head: frons equal to width of eye, not projecting above eye in profile; two equal ors, upper ori slightly weaker, lower ori slightly weaker than upper; orbital setulae essentially in two rows, outer entirely reclinate, inner largely proclinate (inner row may be reduced to a few hairs in front); lunule normally semicircular, less frequently distinctly higher; jowls broad, one-fifth vertical height of eye, deepest in centre; eye in male with slight pilosity at level of ors; third antennal segment small, normal, arista scarcely pubescent.

Mesonotum: two dc, second behind level of supra-alar; acrostichals in some 10 rows, 4 rows extending to level of first dc.

Legs: mid-tibiae normally with two lateral bristles, occasionally only one.

Wing: length 2.1 to 2.3 mm, costa extending to vein m 1 + 2, first cross-vein slightly beyond midpoint of discal cell, last section of vein m 4 three-eighths penultimate.

Colour: frons mat black, orbits and ocellar triangle only weakly shining; mesonotum faintly greenish-coppery, mat, slightly shining from behind, sometimes appearing almost black; abdomen somewhat more shining, greenish-coppery; squamae grey, fringe brownish-black.

Male genitalia: aedeagus as in Figs. 26, 27; surstyli broad on inner margin, with a row of short teeth and several longer hairs at end.

Puparium: yellowish-orange; posterior spiracles scarcely raised above anal segment, each strongly chitinized process with a ring of 12 bulbs around the rudimentary central horn, the two processes separated by three times their own diameter.

Holotype ♂, Florida: Hialeah, emerged 15. IV. 1964 ex seeds of *Erechtites hieracifolia* (L.) Raf; paratypes: 2 ♂♂, 2 ♀♀, same data; 9 ♂♂, 6 ♀♀, Hialeah, emerged 6.–10. II. 1964, ex same host, leg. 31. I. 1964 (all C. E. S.): Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

M. erechtitidis runs to couplet 3 in Frick's (1959) key to North American *Melanagromyza* species, which can now be extended as follows:

For *burgessi*, read 3b; add new couplet:

3b Large species, wing length 3 mm . . . . . *burgessi* (Malloch)
— Smaller species, wing length 2.3 mm . . . . . *erechtitidis* n. sp.

In the author's (1963) key to neotropical species, *M. erechtitidis* runs to couplet 17, as amended on p. 8 above.

Melanagromyza floris Spencer

Melanagromyza floris Spencer, 1963: 313. Holotype male in U. S. N. M.

This species was described from specimens from Mexico, Costa Rica, Cuba and Puerto Rico. The host-plant has not hitherto been known.

I have now seen numerous specimens reared from seed-heads of Bidens in the Miami area, which represent the first record of this species in the United States.

Melanagromyza heterothecae n. sp.

Very closely resembling *M. virens* (Loew), cf. Spencer, 1963: 322, with following essential characters:

Orbits greatly widened, together two-thirds width of frons, orbital setulae in numerous rows, both proclinate and reclinate; arista largely bare; mesonotum largely black, only faintly greenish, abdomen distinctly green; squamae and fringe white; male genitalia: aedeagus as in Figs. 28, 29; ninth sternite with side-arms broadly fused, as in Fig. 30; surstyli projecting conspicuously inwards, with 3 broad, spine-like processes at end (Fig. 31).

Holotype ♂, Florida: Hialeah, 18. VII. 1962, ex stem of *Heterotheca subaxillaris* (Lam.) Britt. and Rusby (C. E. Stegmaier), in U. S. National Museum.

The only available specimen is in poor condition ex alcohol and when more material becomes available the differences between this species and *M. virens* can no doubt be better defined. The genitalia, however, are distinctive and it is therefore felt justified to describe the species at the present time.

This species runs to couplet 7 in the author's (1963) key to neotropical species, which can now be extended as follows:

First alternative, for *virens* (Loew), read 7a; add new couplet:

7a Mesonotum largely black, with only faintest greenish tinge; small species, wing length 1.75 mm . . . . . *heterothecae* n. sp.

— Mesonotum distinctly greenish; larger species, wing length 2.2 to 3 mm *virens* (Loew)

M. heterothecae may be included in Frick's (1959) key to North American species as follows:

Couplet 4, second alternative, for *virens*, read 4a; add new couplet 4a as above.

Melanagromyza lippivora n. sp.

Frons: slightly wider than eye, not projecting above eye in profile; two equal ors, three equal inclined ori; orbital setulae sparse, rather long, reclinate; orbits pronounced, occasionally slightly raised at level of antennae; apex of ocellar triangle extending to base of upper ori; jowls broad, one-quarter vertical height of eye, cheeks forming conspicuous ring below eye; eyes bare in both sexes; third antennal segment small, without distinctive pubescence, arista appearing bare.

Mesonotum: two strong dc, with 2 or 3 substantially smaller bristles between second dc and suture; acrostichals long, in some 8 rows in front, ending at level of first dc.

Legs: mid-tibiae with one weak bristle.

Wing: length from 1.75 mm in male to 2.2 mm in female; costa extending to vein m 1 + 2, first cross-vein just beyond midpoint of discal cell; last section of vein m 4 variable, either equal to or two-thirds length of penultimate.

Colour: frons mat black; ocellar triangle only weakly, orbits and cheeks more strongly shining; mesonotum largely mat black, only faintly shining; abdomen variable, either entirely black or with very faint greenish or coppery reflections but never obviously shining green; squamae and fringe white.

Male genitalia: aedeagus as in Figs. 32, 33; ninth sternite somewhat square, with short hypandrial apodeme (Fig. 34); surstyli (Fig. 35) with a few short teeth on inner margin.

Puparium: entirely white or faintly reddish, anal segments conspicuously bending ventrally (Fig. 36); posterior spiracular processes separated by own diameter, each with a ring of nine well-defined bulbs, without trace of central horn or scar.

Holotype ♂, Florida: Hialeah, 10. VI. 1963, caught on *Lippia nodiflora;* paratypes: 2 ♂♂, 2 ♀♀, same data; 1 ♀, 18. VI. 1963, leg. 19. VII. 1963, both ex stem of *Lippia nodiflora* (all C. E. S.). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

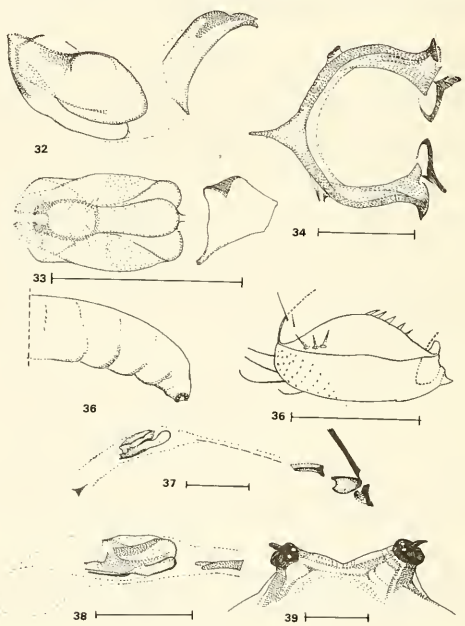
Assuming the abdomen to be entirely black, this species runs to *M. riparella* (Hendel) in couplet 14 of Frick's (1959) key. If the abdomen of *M. lippivora* is considered to be greenish or coppery, it would run to couplet 6 and is included, together with *M. riparella,* in an extension of this couplet as follows: couplet 6, first alternative, for 7, read 6a; add new couplet:

6a Mesonotum and abdomen with bronzy or greenish metallic sheen 7
— Mesonotum black, abdomen green or coppery 6b
6b Abdomen conspicuously shining green; orbits only faintly shining
riparella (Hendel)
— Abdomen at most with very faint greenish or coppery reflections; orbits shining black . . . . . *lippivora* n. sp.

M. lippivora can be included in an extension of couplet 8 of the author's (1963) key to neotropical *Melanagromyza* species: amend second alternative of couplet 8 as follows:

— Jowls broader, one fifth to one-quarter height of eye 8a
8a Mesonotum entirely black, abdomen black or faintly greenish-coppery
lippivora n. sp.
— Mesonotum and abdomen greenish 9

Although *M. lippivora* is extremely close morphologically to *M. riparella* I am satisfied from differences in the male genitalia that the two species are distinct.



Figs. 32—36. *Melanagromyza lippivora* n. sp.: 32, aedeagus, side view; 33, same, ventral view; 34, ninth sternite; 35, surstylus; 36, puparium.
Fig. 37. *Melanagromyza minima* (Mall.): aedeagus.
Figs. 38—39. *Melanagromyza minimoides* n. sp.: 38, aedeagus; 39, posterior spiracles of puparium.

Melanagromyza minima (Malloch)

Agromyza minima Malloch, 1913: 328. Holotype ♂ in U. S. National Museum.
Melanagromyza minima (Malloch), Shewell, 1953: 468; Frick, 1957: 200; 1959: 364; Spencer, 1963: 317.
Melanagromyza longicaudalis Spencer, 1963: 316, **syn. nov.** Holotype ♀ in author's collection.

Florida: Miami, 3 ♂♂, 3 ♀♀, 26. VIII. 1964, ex seed heads of *Wedelia trilobata* Hitch., leg. 18. VIII. 1963, C. E. Stegmaier.

The genitalia of the holotype of *minima* have now been examined by G. Steyskal and it has been found that they are identical to those of specimens reared by Stegmaier from seed-heads of *Wedelia trilobata* and previously identified as *M. longicaudalis* Spencer. *M. longicaudalis* was described from two females caught on flowers of *Eupatorium odoratum* in Jamaica and the unusually long ovipositor was illustrated by Spencer (1963: Fig. 30). This is a very small species, with wing length from 1.6 to 1.9 mm.

The series reared from *Wedelia* has provided the first males to be positively associated with the females having this long ovipositor. The aedeagus of a male from *Wedelia* is shown in Fig. 37. The distinctive feature is the very long gap between the basiphallus and chitinized distiphallus complex. *M. longicaudalis* Spencer can thus now be synonymised with *minima* (Malloch).

Although specimens have been caught on flowers of Bidens and *Eupatorium*, this cannot in itself be taken as evidence that these are hosts. In ten separate rearings carried out by Stegmaier in the Miami area from Bidens and *Eupatorium* no specimens of *minima* have been obtained and the only certain host is thus *Wedelia trilobata*.

Numerous specimens of two further very similar species, but without the long ovipositor, have in the past been incorrectly identified as *minima* both by myself and earlier by Frick and the genitalia of these two species were illustrated as *minima* by Spencer, 1963: Figs. 33c and d. These species are described in this paper as *bidentis* and *minimoides*.

M. minima can be immediately distinguished by the extended aedeagus and unusually long ovipositor from both *bidentis* and *minimoides;* it is also distinguishable from *minimoides* by the smaller size and more shining bluish mesonotum.

Melanagromyza minimoides n. sp.

Head: frons approximately equal to width of eye, not projecting above eye in profile; four orbital bristles, normally equal, orbital setulae reclinate; ocellar triangle large, moderately shining, apex extending slightly beyond level of lower ors; jowls one-sixth vertical height of eye; eyes bare in both sexes; arista only minutely pubescent.

Wing: length from 1.9 to 2.2 mm; costa extending strongly to vein m 1 + 2, last section of m 4 two-thirds penultimate.

Colour: head black, mesonotum blackish-green, slightly shining particularly when viewed from rear, abdomen more brilliantly shining green; squamae grey, margin and fringe blackish-brown.

Genitalia: aedeagus in side view as in Fig. 38, in dorsal view as illustrated by Spencer, 1963: Fig. 33c, with small but distinct gap between U-shaped basiphallus and chitinized distiphallus complex; ovipositor only slightly elongated, cf. Spencer, 1963: Fig. 33a.

Puparium: posterior spiracular processes (Fig. 39) strongly chitinized, black, appreciably projecting beyond anal segment, separated by three times own diameter, each consisting of a ring of nine bulbs around a well-developed horn.

Holotype ♂, Florida: Hialeah, 10.–14. II. 1964, ex seeds of *Verbesina* sp., leg. 2. II. 1964 (C. E. S.); 2 ♂♂, Miami, Watson Is., 21.–24. II. 1963, ex seeds *Melanthera deltoidea* Michx., leg. 18. II. 1964 (E. W. Golsen); 1 ♂, 1 ♀, Rockledge, 29. I. 1964, ex seeds same host (G. Dessin); 15 exx., Miami, Dodge Is., emerged 4.–19. III. 1966 ex seed-heads of *Borrichia frutescens* (L.) DC, leg. 2. III. 1966 (C. E. S.).

Two females from British Guiana, Mazaruni, 14. VIII. 1937 (Richards and Smart) are considered to represent this species but are not placed as paratypes.

Although this species has in the past been confused with *M. minima* it is distinguishable by its larger size, the male genitalia and the shorter ovipositor in the female; the mesonotum is somewhat less shining and more greenish rather than bluish.

Known hosts are *Borrichia*, *Melanthera* and *Verbesina* but it seems probable that it may feed on other genera of the Compositae, particularly in the tribe Heliantheae.

M. minimoides is included in FRICK's (1959) key and the author's (1963) key in extensions including also *M. bidentis* on p. 8.

Melanagromyza riparella (Hendel)

Agromyza riparia Malloch, 1915 a: 105.
Agromyza riparella Hendel, 1923: 145.
Melanagromyza riparella (Hendel), FRICK, 1952: 379; 1959: 365.

I have examined two male paratypes from Urbana, Ill. MALLOCH's description, although detailed and accurate, made no mention of the colour of this species. The mesonotum is uniformly mat black, with no trace of metallic sheen but the abdomen is conspicuously shining green. This coloration is found in *M. cunctans* (Mg.) in Europe feeding on Leguminosae (cf. SPENCER, 1966 a: 17). FRICK assumed the species to be entirely black and it is consequently incorrectly included in his (1959) key in couplet 14. It can now be included in the extension to couplet 6 given on p. 12.

The genitalia show only small differences from *M. lippivora* but the surstyli (Fig. 40) are distinctive in bearing a row of unusually long hairs.

Melanagromyza ruelliae n. sp.

Head: frons not projecting above eye; four orbital bristles, the upper ors slightly weaker than the lower and similar to the two ori; orbital setulae numerous, reclinate, extending from before lower ori to upper ors; ocellar triangle broad, greatly enlarged, apex extending almost to margin of lunule; jowls narrow, slightly variable, but normally about one-twelfth vertical height of eye; arista slightly pubescent.

Legs: mid-tibiae with two weak lateral bristles.

Wing: length variable, normally 2.4 mm in males and females, but males occasionally as small as 1.9 mm; costa extending strongly to vein m 1 + 2, first cross-vein at midpoint of discal cell, last section of m 4 three-fifths penultimate.

Colour: frons mat black, ocellar triangle brilliantly shining green or blue, orbits moderately shining black; mesonotum strongly shining, green, blue or greenish-blue, abdomen more consistently green; squamae and fringe white.

Male genitalia: aedeagus as in Figs. 41, 42; basiphallus strongly chitinized at sides, membranous centrally; ninth sternite (Fig. 43) with greatly elongated hypandrial apodeme; surstyli (Fig. 44) with row of some 20 strong spines.

Puparium: bright orange; posterior spiracles separated by slightly more than own diameter, each with an ellipse of 7 irregular bulbs surrounding a small central scar, distinctly protruding above anal segment (Fig. 45).

Holotype ♂, Florida: Miami, emerged 26. VIII. 1963 ex seeds of *Ruellia brittoniana* Leonard, collected 23. VIII. 1963; paratypes: 5 ♂♂, 2 ♀♀, same data as holotype; 3 ♂♂, 1 ♀, emerged 28. IX. 1963, collected 24. IX. 1963, ex same host; 1 ♂, 1 ♀, Hialeah, 15. XI. 1964, ex *R. caroliniensis* (Walt.) Steud.; 3 ♂♂, 5 ♀♀, Hialeah, emerged 28. IV.–7. V. 1964, ex seeds *Blechum pyramidatum* (Lam.) Urban, collected 21. IV. 1964; 2 ♂♂, Hialeah, 8. VII. 1964, ex *Stroebilanthes* sp., collected 2. VII. 1964 (all C. E. S.). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

In FRICK's (1959) key to North American *Melanagromyza* species, *M. ruelliae* runs to couplet 11 which should be extended as follows: for *viridis*, read 11 a; add new couplet:

11 a Ocellar triangle shining black . . . . . *viridis* (Frost)
— Ocellar triangle brilliantly shining greenish-blue . . . . . *ruelliae* n. sp.

M. ruelliae runs to couplet 5 in the author's (1963) key to neotropical *Melanagromyza* species, which can now be extended as follows: for *helianthi*, read 5 a; add new couplet:

5a Ocellar triangle shining black . . . . . *viridis* (Frost)
— Ocellar triangle shining greenish-blue . . . . . *ruelliae* n. sp.

M. ruelliae is remarkably similar to *M. obtusa* (Malloch), a seed-feeder on Leguminosae, which is only known from the Oriental and Ethiopian regions. The two are clearly sister-species, resembling each other in male genitalia, larval characters and general morphology, in particular in having the enlarged, shining-green ocellar triangle.

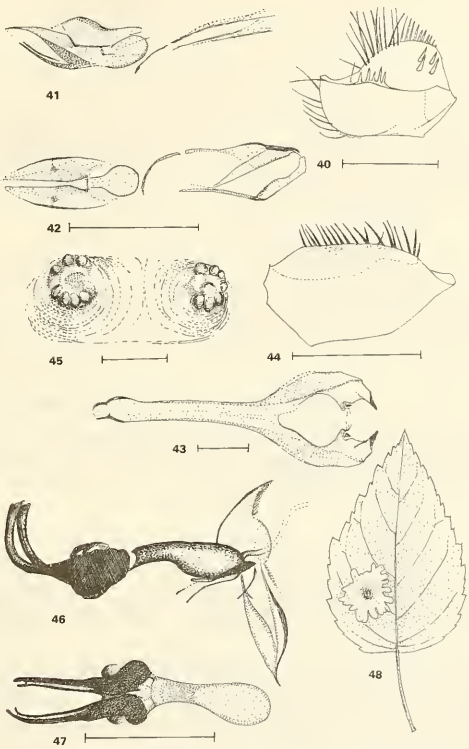


Fig. 40. *Melanagromyza riparella* (Hend.): surstylus.

Figs. 41—45. *Melanagromyza ruelliae* n. sp.: 41, aedeagus, side view; 42, same, ventral view; 43, ninth sternite; 44, surstylus; 45, posterior spiracles of puparium.

Figs. 46—48. *Calycomyza hyptidis* n. sp.: 46, aedeagus, side view; 47, same, ventral view; 48, leaf-mine on *Hyptis pectinata*.

Melanagromyza viridis (Frost)

Agromyza viridis Frost, 1931: 277. Holotype ♂ in U. S. National Museum.

Melanagromyza viridis (Frost), Frick, 1952: 380.

Melanagromyza helianthi Spencer, 1963: 314, **syn. nov.** Holotype ♂ in U. S. National Museum.

The type series of *viridis* was reared from seeds of *Zinnia* sp. in southern California. The holotype of *helianthi* was reared from sunflower heads in Cuba and paratypes were seen from Mexico and Trinidad.

I have now examined the genitalia of a specimen of *viridis* from California, Saticoy, 17. IX. 1947, ex *Zinnia* seeds (M. W. Stone) and have confirmed that *M. helianthi* is synonymous with *M. viridis*.

M. viridis is common in the Miami area and apart from *Zinnia* I have also seen specimens reared from *Calendula, Helianthus* and *Tithonia* (all C. E. Stegmaier).

Melanagromyza sp. *(Heliotropium)*

Florida: Hialeah, 2 ♀♀, Nov. 1964, ex stems *Heliotropium levenworthii* Torr. (C. E. S.). This is a shining greenish species, similar to but slightly larger than, *M. floris* Sp. The posterior spiracles of the puparium confirm that it represents an undescribed species but the formal description should best wait until further material, including males, is available.

Melanagromyza sp. *(Sida)*

Florida: Hialeah, 1 ♂, 4. II. 1963, ex *Sida rhombifolia* L. (C. E. S.). This is a small shining black species, which is undescribed. However, it was not established whether the specimen emerged from the stem or the flower-head and no pupal case is available. I do not therefore propose to describe the species at the present time.

Melanagromyza sp. *(Tagetes)*

Florida: Hialeah, 1 ♀, 13. VI. 1963; 1 ♀, 18. X. 1963, both ex stem *Tagetes* sp. (C. E. S.). This is a brilliantly shining greenish species, with broad orbits and distinctly elongated ocellar triangle. The pupal spiracles are distinctive. I do not however propose to describe the species until the genitalia of a reared male can be illustrated.

Melanagromyza sp. *(Verbena)*

Florida: Hialeah, puparium, 2. IV. 1964, ex stem of *Verbena scabra* Vahl.

Examination of the genitalia of the unemerged male from this puparium confirm that this represents a further undescribed species.

Genus *Calycomyza* Hendel

Frick (1956; 1959) accepted *Calycomyza* as a sub-genus of *Phytobia* Lioy but Nowakowski (1962) rightly split up *Phytobia* s. lat. and raised *Calycomyza* to full generic rank.

Three new species, *C. hyptidis*, *C. melantherae* and *C. stegmaieri* are described below. Stegmaier has found the neotropical species *C. ipomaeae* (Frost) to be common in the Miami area. Also I am now satisfied that Frick (1956: 287) when incorporating *C. verbenae* (Hering) in his key must have had before him specimens of the much paler species, *C. verbenivora* Spencer, 1963. These five species are incorporated below into Frick's (1959) key to North American species and the three new species are incorporated, with further amendments, into the author's (1963) key to neotropical species.

The differences between many species in this genus are externally slight. When examining a series a positive identification will normally be possible but this may not be possible with individual caught specimens. The male genitalia, fortunately, are strikingly distinctive.

Calycomyza hyptidis **n. sp.**

Head: orbits faintly darkened to dorsal upper-orbital; face greyish-yellow in upper half, distinctly yellow below; arista long, equal to vertical height of eye.

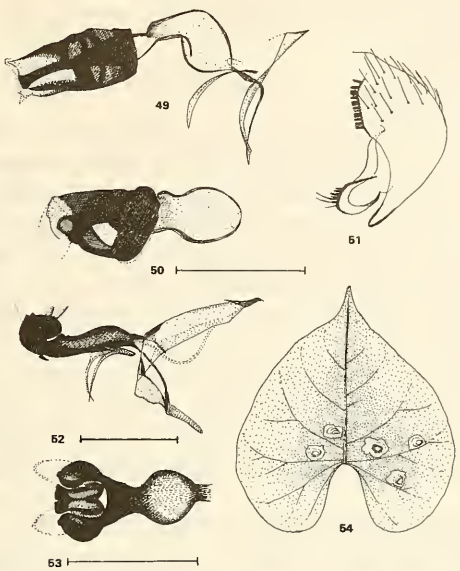
Mesonotum: shining black, acr in 6 rows.

Wing: length about 2 mm, last section of vein m 4 over twice length of penultimate, in ratio 25 : 11.

Legs: black but fore-knees bright yellow.

Male genitalia: aedeagus distinctive, as in Figs. 46, 47.

Leaf-mine: an upper surface, star-shaped blotch, with a mass of black frass accumulated in centre (Fig. 48); pupation externally.



Figs. 49—51. *Calycomyza melantherae* n. sp.: 49, aedeagus, side view; 50, same, ventral view; 51, surstylus.

Figs. 52—54. *Calycomyza stegmaieri* n. sp.: 52, aedeagus, side view; 53, same, ventral view; 54, leaf-mine on *Calonyction aculeatum*.

Holotype ♂, Florida: Hialeah, emerged 17. XII. 1963 ex leaf-mine on *Hyptis pectinata* (L.) Poir., leg. 26. XI. 1963; paratypes: 3 ♂♂, 2 ♀♀, same data as holotype; 3 ♂♂, 5 ♀♀, emerged 27. XI. 1963, leaf-mines leg. 13. XI. 1963; 5 ♂♂, 1 ♀, emerged 15. XI. 1964, leg. 2. XI. 1964 (all C. E. Stegmaier). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

In Frick's (1959) key to North American species *C. hyptidis* and *C. melantherae* run to couplet 13, which may be extended as follows [to include also *C. ipomaeae* (Frost)]:

13 Last section of vein m 4 less than twice length of penultimate *ipomaeae* (Frost)
— Last section of vein m 4 2 to 2 1/2 times length of penultimate 14
14 Fore-knees at most faintly yellowish 15
— Fore-knees bright yellow 16
15 Last section of vein m 4 2 1/2 times length of penultimate; third antennal segment with conspicuous whitish pubescence . . . . . *ambrosiae* Frick
— Last section of vein m 4 twice length of penultimate; third antennal segment with normal pubescence . . . . . *melantherae* n. sp.
16 Face entirely yellow . . . . . *verbenivora* Spencer
— Face greyish-yellow in upper half . . . . . *hyptidis* n. sp.

C. hyptidis and *C. melantherae* can be included in an extension to couplet 15 of the author's key (1963: 338) to neotropical species as follows:

15 Last section of vein m 4 less than double length of penultimate *ipomaeae* (Frost)
— Last section of vein m 4 more than double length of penultimate 15a
15a Fore-knees bright yellow . . . . . *hyptidis* n. sp.
— Fore-knees at most faintly yellow 15b
15b Aedeagus as in Spencer (1963: Fig. 63 a) . . . . . *irreperta* Spencer
— Aedeagus as in Figs. 49, 50 . . . . . *melantherae* n. sp.

Calycomyza melantherae n. sp.

Extremely close to *C. ambrosiae* Frick, with following essential characters:

Orbits black to dorsal upper orbital, face yellow below, somewhat darkened above; third antennal segment round, without conspicuous pubescence (arista missing in only available specimen); mesonotum brilliantly shining black, acr in 6 rows; legs black, only fore-knees faintly yellow; wing length 1.7 mm, last section of vein m 3+4 twice length of penultimate; squamae and fringe black.

Male genitalia: aedeagus highly asymmetrical, as in Figs. 49, 50; surstyli typical of the genus, as in Fig. 51.

Leaf-mine: a regular, primary blotch, appearing brownish with age.

Holotype ♂, Florida: Miami, 24. XI. 1963, ex leaf-mine on *Melanthera deltoidea* Michx., leg. 8. XI. 1963 (C. E. Stegmaier), in U. S. National Museum.

The genitalia of *C. melantherae* and *C. ambrosiae* are entirely distinct.

Calycomyza stegmaieri n. sp.

Closely resembling *C. ipomaeae* (Frost), with following essential characters:

Head: orbits darkened at least to upper, normally to lower ors; arista unusually long, only slightly less than eye height.

Mesonotum: dull-black, acrostichals sparse, in only 4 rows.

Legs: almost entirely black, fore-femur faintly yellowish.

Wing: length 1.6 mm, discal cell small, last section of vein m 3+4 slightly more than twice length of penultimate.

Male genitalia: aedeagus as in Figs. 52, 53.

Leaf-mine: a small, circular blotch, with strips of black frass deposited in an almost regular spiral (Fig. 54).

Holotype ♂, Florida: Hialeah, 29. X. 1963, ex leaf-mine on *Calonyction aculeatum* (L.) House; paratypes: 3 ♂♂, same data as holotype; 5 ♂♂, 7 ♀♀, 6.–10. VI. 1963, ex same host collected May, 1963 (all C. E. S.). Holotype and paratypes in U. S. National Museum, further paratypes in author's collection.

C. stegmaieri runs to *cynoglossi* in Frick's (1959) key; couplet 8 should now be extended as follows:

Couplet 8, second alternative, for *cynoglossi* read 8 a; add new couplet:

8a Mesonotum entirely dull black . . . . . *stegmaieri* n. sp.
— Mesonotum shining . . . . . *cynoglossi* Frick

In the author's (1963) key to neotropical species, *C. stegmaieri* runs to couplet 18 which should be extended as follows:

Couplet 18, for *egregia*, read 18 a; add new couplet:

18a Small species, wing length less than 2 mm; mesonotum dull black *stegmaieri* n. sp.
— Larger species, wing length 2.4 mm . . . . . *egregia* Spencer

C. stegmaieri can occur on the same plant together with *C. ipomaeae* but the two species are readily distinguishable as follows:

	C. stegmaieri	*C. ipomaeae*
Wing length	1.6 mm	2—2.3 mm
Acrostichals	4 rows	6 rows
Mesonotum	dull black	more shining
vein m 3+4	last section more than twice penultimate	last section less than twice penultimate
leaf-mine	primary circular blotch	irregularly linear, sometimes forming secondary blotch

Genus *Liriomyza* Mik

STEGMAIER's work has shown the most common species in Florida to be *L. munda* Frick and *L. trifolii* (Burgess); both are polyphagous and occur on a wide range of host-plants. *L. commelinae* (Frost) and *L. schmidti* (Aldrich) have been reared on several occasions and have not previously been recorded in the United States. *L. sorosis* (Williston) is a further common, variable species, with a wide host range. Full data on the rearing of these species will be published later by STEGMAIER.

Liriomyza pictella (Thomson)

Florida: Gainesville, 1 ♂, 2 ♀♀, 15. IV. 1964, ex leaf-mines on *Trifolium incarnatum* L.; 1 ♂, 24. IV. 1964, ex *T. repens* L.; Quincy, 1 ♀, 13. V. 1964, ex crimson clover (all D. H. HABECK).

These specimens agree closely with the holotype from California; the aedeagus of the holotype was illustrated by SPENCER, 1965: Figs. 5a, b. The host-plant of this species has not hitherto been known and it has not previously been reared.

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