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**4005**

# Revision of the genus *Melanagromyza* in California, with descriptions of three new species (Diptera: Agromyzidae)

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## Abstract


The 27 Californian species of the genus *Melanagromyza* Hendel (Diptera: Agromyzidae) are reviewed, including descriptions of three new species (*Melanagromyza californiana* **sp. nov.**, *M. chemsaki* **sp. nov.** and *M. gonzalesina* **sp. nov.**) and the first record for one species (*Melanagromyza martini* Spencer) for California and the USA. All species in California are described or redescribed, with illustrations and photographs, and a key to the species is presented. Maps for the species in California, along with host distributions, are provided, with comments on biology and host plants.



**Key words**: Diptera, Agromyzidae, new species, California


## Introduction

The agromyzids are phytophagous flies that can be potential pests of agricultural crops and bioresources. Although most species in the family are leaf miners, the species of the genus *Melanagromyza* Hendel (Diptera: Agromyzidae: Agromyzinae) are internal feeders in roots, stems, pods, seeds and flower heads (Spencer 1990). Most agromyzid research has focused on several other economically important genera such as *Phytomyza* Fallén,

*Phytobia* Lioy and *Liriomyza* Mik rather than *Melanagromyza*, in part because of the comparative difficulty in rearing due to the more cryptic feeding habits in comparison with mostly leaf mining genera. Therefore, relatively few data are available about host plants and their economic impact, and more extensive work on this genus in the Nearctic Region has been lacking. The present work revises this genus for California, with discussion of biology, host plants and their distributions. As a resource for identifying species of this genus in California, this work seeks to improve on the resources provided by Spencer (1981) and Spencer & Steyskal (1986), by describing new species, redescribing the previously described species, recording one species new to California and the USA, providing a key to species, illustrating the male genitalia for all species, and adding clear diagnostic characters to recognize and separate species based on study of the type specimens and additional materials.

The genus *Melanagromyza* is one of the largest genera of the subfamily Agromyzinae, being distributed worldwide with more than 380 species. Of these, about 160 are known from the New World, including 73 in the Nearctic Region. Among the Nearctic species, 37 are known in the USA, 27 of which occur in California (see Appendix for list).

*Melanagromyza* belongs to the *Ophiomyia* genus group (Dempenwolf 2005), which was recently redefined by Lonsdale (2014). In that work, Lonsdale (2014) proposed several generic synonymies and described one new genus, leaving the *Ophiomyia* genus group to include *Euhexomyza* Londsale, *Melanagromyza*, *Ophiomyia* Braschnikow and *Tropicomyia* Spencer. Lonsdale (2014) further discussed the historical context of this group and its consituent genera and synonyms. With very limited sampling of *Melanagromyza* species, Scheffer *et al*. (2007) found the genus to be monophyletic relative to the other genera of Agromyzinae, but there is still much research necessary to assess the monophyly of the whole genus and to establish phylogenetic relationships among species, and among agromyzine genera.

The genus *Melanagromyza* is similar to other Agromyzinae, but can be distinguished based on characteristics presented in Lonsdale (2014). Generally, they can be separated from other agromyzine genera by the following characteristics: the halteres are black (white in *Agromyza*); the mesonotum has two pairs of strong *dc* except for several species with a presutural *dc* or with 3–4 pairs of postsutural *dc* (there are generally at least 3 pairs of *dc* in *Agromyza*); the *prsc* are absent (always present in *Agromyza* and in some *Japanagromyza*); the mesonotum and abdomen are often shiny metallic black, blue, green or coppery (generally dark in *Ophiomyia,* except for a few species); the facial keel is narrow, usually not raised from the base of the antenna, but if raised and widely dividing the antennal bases (Fig. 248), then no spherical bulbous process is present (the facial keel is wide, raised and forms a spherical bulbous process between the bases of the antenna in *Ophiomyia*, except for a few of species having a narrow flattened facial keel that can only be separated from the species of *Melanagromyza* by examination of the male genitalia); the fronto-orbital setulae are in 2–4 rows (usually a single row in *Ophiomyia*, except for a few species with 2–3 rows); the eyes are usually pilose dorsally; the fronto-orbital plate is wide at the middle with a larger distance between the anterior two *ori* than *ors* in some species (usually with the same distance between *ori* and *ors* in *Ophiomyia*); the vibrissal fasciculus is absent and there is rarely (e.g., in *Melanagromyza buccalis* Spencer) a vibrissal angle (most species of *Ophiomyia* have a vibrissal fasciculus and a distinct vibrissal angle); the gena is often highest at the middle (the gena is usually distinctly highest near the anterior angle in *Ophiomyia*); the mid tibia usually has 2 posteromedial setae (often 0–1 posteromedial setae in *Ophiomyia*); in the male genitalia, the basiphallus is short and U- or V-shaped (circular in few species) and the distiphallus is symmetrical (in *Ophiomyiza*, the basiphallus is elongate and asymmetrically U- or V-shaped, and the distiphallus is usually asymmetrical (except symmetrical in five species of the *Ophiomyia jacintensis* species group)).

Although much about their host plants is unknown, host plant use for many species appears to be generally restricted to a single plant family or tribe, rather than displaying polyphagy, so data regarding host plants may be important for assessing sister-species relationships and lineages (Boucher 2010; Braun *et al*. 2009; Gaimari *et al*. 2004; Spencer 1966a, 1973a, 1981, 1990), although Londsdale (2014) suggested that among Agromyzinae, particular feeding categories (e.g., leaf mining, stem mining/boring, gall forming) likely occurred independently multiple times. Across the species of *Melanagromyza* in California, the majority of reported host plants are members of the Asteraceae, although some species also attack Apiaceae, Boraginaceae, Cucurbitaceae, Fabaceae, Salicaceae, Scrophulariaceae, and/or Urticaceae. Some species have been collected in association with (but not reared from) plant species in the Hydrangeaceae, Rosaceae and/or Rutaceae, so their statuses as host plants are not known.

The 27 Californian species of *Melanagromyza* are described or redescribed, illustrated and photographed, and

a key to separate the species is presented. Distribution maps are provided for each species, along with the distributions of the host plant or potential host plant species. Three species, *M. californiana* **sp. nov.**, *M. chemsaki* **sp. nov.** and *M. gonzalesina* **sp. nov.** from California are described as new to science, and *M. martini* Spencer, is recorded from California (and the USA) for the first time.

Although a few species have particular external characteristics that easily separate them from other species, most species require study of male genitalia (Spencer 1966a, 1981; Spencer & Steyskal, 1986). Components of the phallic complex are sometimes weakly sclerotized, and the the connection points of different structures are not always clear. It is also sometimes difficult to interpret which structure is upper or lower, and structures illustrated by different authors are sometimes labeled and interpreted differently. Some external characteristics are slightly variable among specimens of a given species. For example, the number and position of *dc* on the mesonotum can be important characters to separate species of *Melanagromyza*, but this number can occassionally vary among specimens of the same species, and should only be used to diagnose or define species together with other morphological characters. For species with similar male genitalia, and with morphological variation externally in adults, the original descriptions and rough figures of male genitalia are often inadequate without having studied the type specimens, which we are trying to remedy in this publication. Regarding identification of females, for species that are externally very similar, more diagnostic characters of the female terminalia need to be studied, possibly including the length and structures of the ovipositor sheath.

## Material and methods

General terminology follows Cumming & Wood (2009), Spencer & Steyskal (1986) and Lonsdale (2011). Genitalia preparations (except those type specimens described by Spencer) were made by removing and macerating the abdomen in hot potassium hydroxide (10% solution) for 5–10 min, then washing in deionized water with a few drops of glacial acetic acid. After examination, they were transferred to glycerin and stored in a microvial on the pin below the specimen. Specimens were examined or deposited in the following collections:

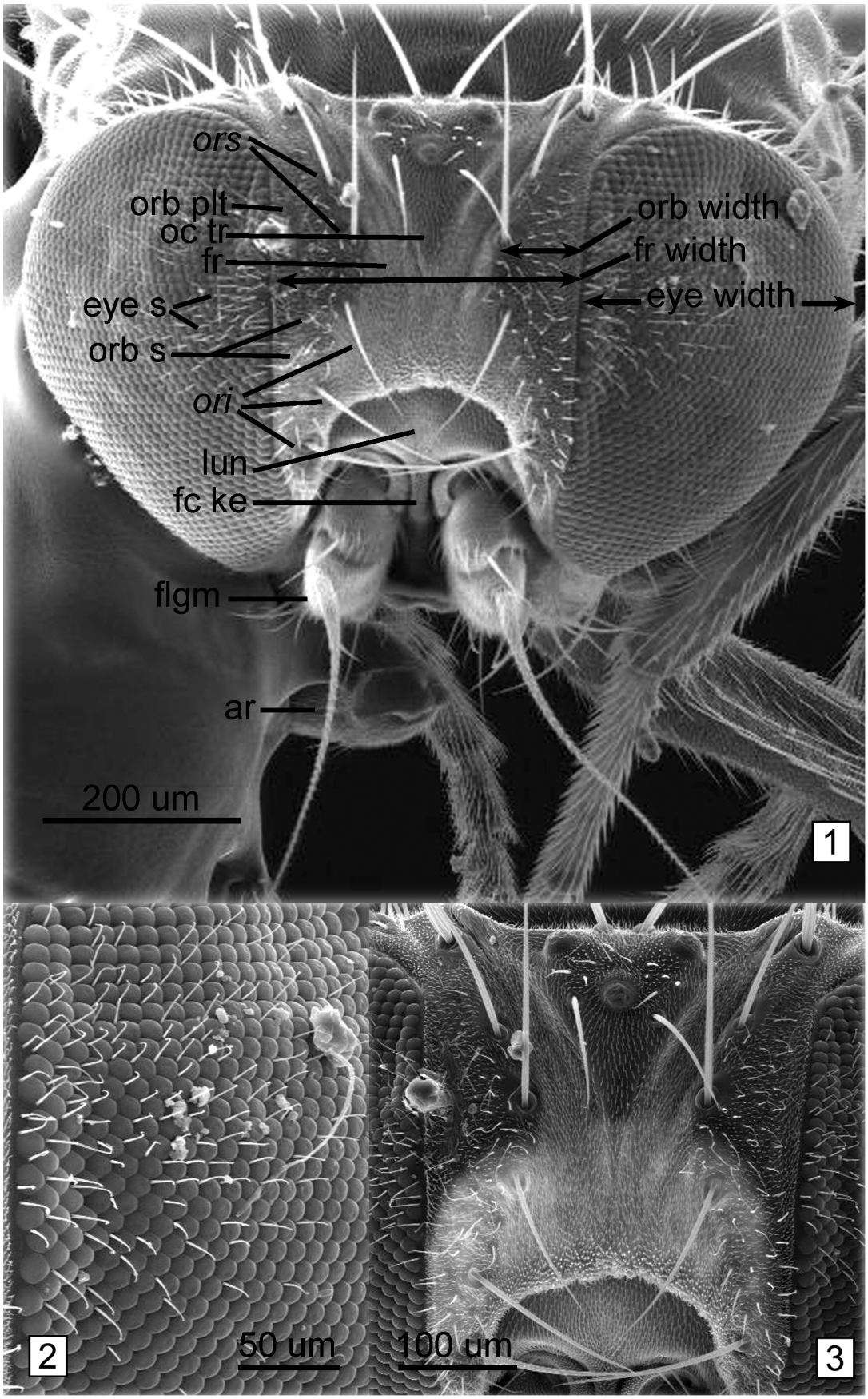
Natural History Museum, London, United Kingdom (BMNH)
California Academy of Sciences, San Francisco, California, USA (CAS)
Canadian National Collection of Insects, Arachnids & Nematodes, Ottawa, Ontario, Canada (CNC)
California State Collection of Arthropods, California Department of Food and Agriculture, Sacramento, California, USA (CSCA)
Essig Museum of Entomology, University of California, Berkeley, California, USA (EMEC)
Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA (MCZ)
Bohart Museum of Entomology, University of California, Davis, California, USA (UCD)
National Museum of Natural History, Washington, D.C., USA (USNM).

The following abbreviations for setae are used: *anepst*—anepisternal, *acr*—acrostichal, *dc*—dorsocentral, *kepst*—katepisternal, *ori*—inferior fronto-orbital, *ors*—superior fronto-orbital.

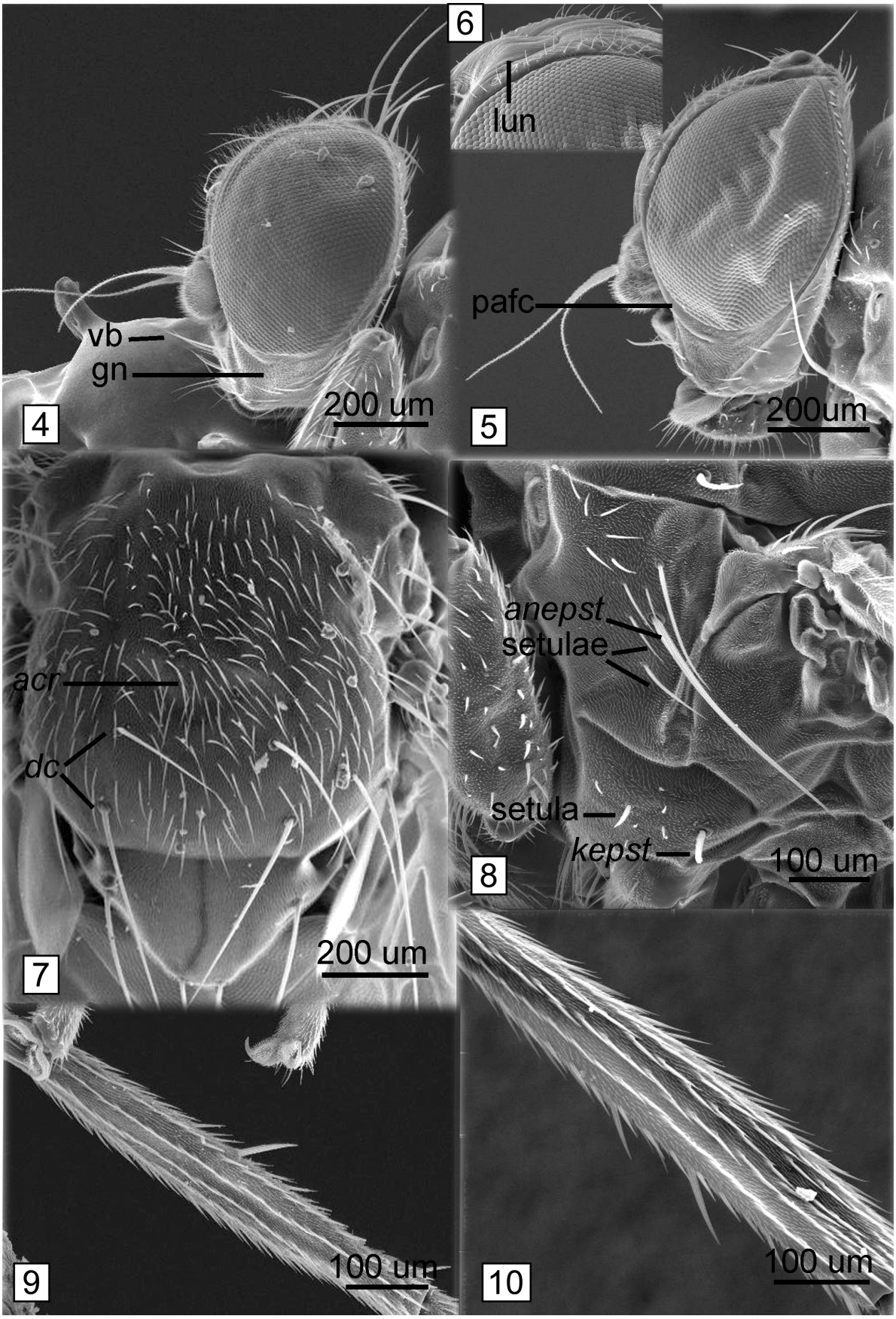
The measurements of length are as follows (Fig. 1). Height of frons: distance from anterior margin of frons to vertex. Width of frons: distance between the inner eye margins. Width of eye: distance from inner margin of frons to the furthest lateral point. Width of fronto-orbital plate: the largest distance between dorsal margin of eye and inner margin of fronto-orbital plate. Width of lunule: the largest distance along ventral margin in anterior view. Height of gena: distance from the ventral margin of eye to ventral margin of gena. Highest point of gena: the greatest height.

The following ratio is used. Costal ratio: proportion of distances along the costa from the 2nd (between $R_1$ and $R_{2+3}$), 3rd (between $R_{2+3}$ and $R_{4+5}$) and 4th (between $R_{4+5}$ and $M_{1+2}$) sections.

New illustrations were made from holotypes and paratypes that were dissected and fixed on hard cards by Spencer, or from our own dissections of type and non-type materials. New illustrations were made whenever possible, but parts of the phallus and sperm pumps were sometimes fixed in bad postures, so the illustrations from Spencer (1981) and Spencer & Steyskal (1986) were used. Several illustrations were also provided by Owen Lonsdale (CNC).




**FIGURES 1–3.** *Melanagromyza splendida* Frick, 1953. Male. 1. Head, anterior view; 2. Eye, anterodorsal view (enlargement); 3. Frons, anterodorsal view (enlargement). Abbreviations: ar—arista, eye s—eye setulae, fc ke—facial keel, flgm—1st flagellomere, fr—frons, lun—lunule, oc tr—ocellar triangle, orb plt—fronto-orbital plate, orb s—fronto-orbital setulae, *ori*—inferior fronto-orbital setae, *ors*—superior fronto-orbital setae.




**FIGURES 4–10.** Head, thorax and mid tibia. *Melanagromyza splendida* Frick, 1953. Male. 4. head, lateral view; 7. thorax, dorsal view; 8. thorax, lateral view; 10. mid tibia, dorsal view. *Melanagromyza viridis* (Frost, 1931). Male. 5. head, lateral view; 6. lunule, lateral view; 9. mid tibia, ventral view. Abbreviations: *anepst*—anepisternal seta, *acr*—acrostichal setulae, *dc*—dorsocentral setae, *kepst*—katepisternal seta, gn—gena, lun—lunule, pafc—parafacial, vb—vibrissa.

Maps of species distributions include the distributions for their putative or known host-plants, with data provided by the participants of the Consortium of California Herbaria (http://ucjeps.berkeley.edu/consortium/). These data represent databased specimens of the Consortium, and may not reflect comprehensive distributional information for cultivated plants. Most plant species that are cultivated (e.g., carrots) are mostly recorded in the database by specimens of their wild counterparts (e.g., Queen Anne's lace). The Consortium of California Herbaria, the Jepson eFlora (http://ucjeps.berkeley.edu/IJM.html, which parallels the Jepson Manual, Second Edition), and CalFlora (2011) were the sources for all information about these host plants in California, and is summarized in the "Biology/Host plants" section for each species. The inclusion of host-plant distributions on the maps, and further information about these plants, are provided as a guide for the potential distribution of these agromyzids in California with respect to the range and habitats of their known or potential host plants, recognizing the fact that many of these species may have additional plant species in their host range, and that many of the agromyzid species do not necessarily follow the entire range of their host plant. This information may also be useful with respect to the potential distributions of these *Melanagromyza* species outside of California. Note, multiple common names are listed for individual plant species (separated by a backslash, "/") when they are so indicated in the resources above. Information about host plants for all species was taken from the label data of the specimens, as well as from the literature (primarily Spencer's works). All new distributional records are indicated by an asterisk (*).

## Key to the California species of *Melanagromyza*

1. Wing with costa terminating between $R_{4+5}$ and $M_{1+2}$ (Fig. 251) ..... *M. trispinosa* Spencer
– Wing with costa extending to $M_{1+2}$ ..... 2
2. Mesonotum with presutural *dc* ..... 3
– Mesonotum without presutural *dc* ..... 4
3. Mesonotum with 1+3–4 *dc* (Fig. 199); *r-m* at or close to apical 1/3 of discal cell (Fig. 201); frons with 6–7 *ori* inclinate (Fig. 197); basiphallus U-shaped with arms diverging apically (Fig. 202); distiphallus broad basally and narrow at apical 1/3 point without subapical concavity or pointed tips (Figs 204, 205) ..... *M. quadrisetosa* Spencer
– Mesonotum with 1+2 *dc* (Fig. 239); *r-m* at middle of discal cell (Fig. 240); frons with 4–5 *ori* inclinate (Fig. 237); basiphallus V-shaped; distiphallus broad at apical 1/3, narrowing subapically with two pointed tips (Figs 243, 244) ..... *M. trispinella* Spencer
4. Mesonotum with 0+3–4 *dc* ..... 5
– Mesonotum with 0+2 *dc* ..... 7
5. Calypter margin and fringe blackish brown (Fig. 207) ..... *M. sagehenensis* Spencer
– Calypter margin and fringe white to pale yellow ..... 6
6. Frons not projecting above eye (Fig. 95); fronto-orbital plate with 2 *ori* (Fig. 94); facial keel not raised (Fig. 94); basiphallus trapezoid-shaped (minus the longer base) with lateral arms diverging apically (Fig. 101); distiphallus with two pairs of triangular dorsal processes (Fig. 102) ..... *M. gonzalesina* sp. nov.
– Frons distinctly projecting above eye (Fig. 215); fronto-orbital plate with 4–5 *ori* (Fig. 216); facial keel raised, separating bases of antennae; basiphallus U-shaped and with tips of lateral arms slightly curved inward; distiphallus without dorsal processes (Figs 221, 222) ..... *M. scrophulariae* Spencer
7. Lunule extending posteriorly to ocellar triangle (Fig. 6); frons, lunule, ocellar triangle, fronto-orbital plate entirely brilliantly shining (Fig. 291); basiphallus V-shaped, broadly triangular (Fig. 297) with 1–2 concavities and teeth (Fig. 298); distiphallus very long, broad basally and narrow apically with pointed apex (Fig. 298) ..... *M. viridis* (Frost)
– Lunule not extending posteriorly to ocellar triangle; frons, lunule, ocellar triangle, fronto-orbital plate not brilliantly shining simultaneously, often only one of them brilliantly shining, or slightly shining or dark; basiphallus U-shaped or with flattened base; distiphallus various, but not as above ..... 8
8. Frons distinctly projecting above eye (e.g., Fig. 125); parafacial broad and rounded under lowest margin of eye (e.g., Fig. 261) ..... 9
– Frons not projecting above eye (e.g., Fig. 44), if slightly projecting above eye, then parafacial thin, or indistinguishable ... 16
9. Calypter with margin and fringe white or pale yellow ..... 10
– Calypter with margin and fringe gray, brown or black ..... 12
10. Gena about 1/3 height of eye (Fig. 134); mesonotum weakly shining, *acr* in 6 rows; mid tibia with 1 strong posterior seta ..... *M. martini* Spencer
– Gena about 1/5–1/4 height of eye; mesonotum with brilliantly greenish sheen, *acr* in 8–10 rows; mid tibia with 2 strong posterior setae ..... 11
11. Ocellar triangle extending to anterior *ors* (Fig. 260); eye bare; *r-m* at middle of discal cell (Fig. 263); basiphallus subcircular, distiphallus broadened from base to apex (Fig. 267) ..... *M. urticella* Spencer
– Ocellar triangle extending to second *ori* (Fig. 55); eye pilose; *r-m* slightly or distinctly beyond middle of discal cell (Fig. 58); basiphallus nearly U-shaped, distiphallus constricted subbasally and narrowing apically (Figs 60, 61). . *M. cirsiophila* Spencer

12. Facial keel broad and raised, separating antennal bases (Fig. 124) . . . . . 13
– Facial keel thin, not raised . . . . . 14
13. Gena about 1/3 height of eye (Fig. 125); fronto-orbital plate with 6 *ori* (Figs 124, 125); fronto-orbital setulae in 3–4 rows, erect or reclinate except for several irregularly inclinate or proclinate; mid tibia with 1–2 posterior setae; distiphallus with a pair of narrow apically-tapering processes with undulating lateral margins (Fig. 130) . . . . . *M. marinensis* Spencer
– Gena about 1/6 height of eye (Fig. 187); fronto-orbital plate with 4–5 *ori* (Fig. 188); fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate; mid tibia without posterior setae; distiphallus blunt and rounded apically, with processes thick and bluntly rounded (Fig. 193) . . . . . *M. palaensis* Spencer
14. Fronto-orbital setulae sparse, in 2 rows, inner row inclinate and outer row reclinate except on anterior margin; ocellar triangle extending to anterior margin of frons (close to third *ori*) (Fig. 116); distiphallus with large posterodorsal extension (Fig. 122) . . . . . *M. maligna* Spencer
– Fronto-orbital setulae dense, in 3 rows, mostly reclinate or proclinate; ocellar triangle extending to posterior *ori* or anterior *ors*; distiphallus without a large posterodorsal extension . . . . . 15
15. Fronto-orbital plate dark, with 3 *ori* (Fig. 105); eye pilose; highest point of gena at middle (Fig. 106); basiphallus U-shaped; distiphallus with a small subbasal tooth present and apical membranous section slightly curved (Figs 112, 113) . . . . . *M. malevola* Spencer
– Fronto-orbital plate shining, with 4–6 *ori* (Fig. 24); eye bare; highest point of gena slightly behind middle of eye (Figs 22, 23); basiphallus subcircular, and with narrow upper margin; distiphallus narrow on apical 1/2 with two pairs of small pointed processes (Fig. 29) . . . . . *M. burgessi* (Malloch)
16. Calypter with margin and fringe gray, brown or black . . . . . 17
– Calypter with margin and fringe white or pale yellow . . . . . 19
17. Fronto-orbital plate nearly 1/4 width of frons and distinctly wider at middle, with 3–4 *ori* (Fig. 43); wing with *r-m* at middle of discal cell (Fig. 47); distiphallus laterally with a medially-directed pair of pointed triangular processes (Fig. 51), and membranous apex turned down (Fig. 52) . . . . . *M. chemsaki* sp. nov.
– Fronto-orbital plate narrow and not widened at middle, with 2 *ori* (Fig. 145); wing with *r-m* beyond middle of discal cell; distiphallus lacking medially-directed processes, and apex not turned down . . . . . 18
18. Mid tibia with 2 strong posterior setae; phallus with a long gap between basiphallus and distiphallus (Figs 152, 153); female ovipositor sheath distinctly elongated, slender columnar (Fig. 149) . . . . . *M. minima* (Malloch)
– Mid tibia with 1 strong posterior seta; phallus with a short gap between basiphallus and distiphallus (Figs 163, 164); female ovipositor sheath elongated, moderately, trapeziform . . . . . *M. minimoides* Spencer
19. Facial keel slightly broadened, raised and separating antennal bases (Fig. 168) . . . . . 20
– Facial keel thin, not raised . . . . . 21
20. Fronto-orbital plate with 2 *ori*, anterior *ori* widely separated from posterior *ori*; fronto-orbital plate narrow on anterior 1/2 without dense setulae (Fig. 168); distiphallus broad (Figs 173, 174) . . . . . *M. muguensis* Spencer
– Fronto-orbital plate with 3 *ori* (Fig. 176), equally spaced; fronto-orbital plate with anterior margin broad and with dense setulae (Figs 176, 177); distiphallus slender (Figs 183, 184) . . . . . *M. osoflacensis* Spencer
21. Frons along dorsal eye margin distinctly rounded (Fig. 274); fronto-orbital setulae in 3–4 dense rows; fronto-orbital plate distinctly broad at middle, about 1/4–1/3 width of frons (Figs 272, 273) . . . . . 22
– Frons along dorsal eye margin sloping distinctly or slightly (Figs 12, 14); fronto-orbital setulae in 2–3 rows; fronto-orbital plate slightly or not widened at middle, at most 1/4 width of frons . . . . . 23
22. Arista entirely bare; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 4.5:1.5:1 (Figs 225–228); surstylus without distinctly long and rough apical spines (Fig. 231); distiphallus with a pointed triangular process subapically (Figs 233, 234) . . . . . *M. splendida* Frick
– Arista with microscopic setulae; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 2.9:1.7:1 (Fig. 272, 273, 278); surstylus with several distinctly elongated and rough apical spines in addition to other dense short spines (Fig. 284); distiphallus without triangular process subapically (Figs 287, 288) . . . . . *M. virens* (Loew)
23. Gena protruding forward on anterior margin, hightest point of gena near anterior margin (Figs 12, 14); distiphallus with a pair of triangular dorsal processes (Fig. 20, arrow) and a pair of tiny median teeth (Fig. 19, arrow) . . . . . *M. buccalis* Spencer
– Gena not protruding forward on anterior margin, highest point of gena at middle or slightly behind middle; distiphallus lacking triangular dorsal processes and tiny median teeth . . . . . 24
24. Fronto-orbital plate not wide at middle (Fig. 74); highest point of gena at or slightly behind middle, about 1/4–1/3 height of eye (Figs 72, 73); distiphallus short, subequal in length and width, with medial section broadest and apical section short and semicircular (Fig. 82) . . . . . *M. gibsoni* (Malloch)
– Fronto-orbital plate slightly widened at middle (Fig. 87); highest point of gena at middle, about 1/7–1/4 height of eye; distiphallus longer than wide, with medial and apical sections longer than wide . . . . . 25
25. Gena about 1/7–1/6 height of eye (Fig. 86); distiphallus with medial section broad and parallel-sided (Fig. 90) . . . . . *M. gnaphalii* Spencer
– Gena broad, about 1/5–1/4 height of eye (Fig. 33); distiphallus tapering distally (Figs 39, 68) . . . . . 26
26. Mid tibia with 1 strong posterior seta; surstylus with short rough spines in more than 3 rows (Fig. 37); hypandrium with a pair of triangular processes on inner margin of lateral arms (Fig. 38); distiphallus truncate apically with a small pointed process near upper middle section (Figs 39, 40) . . . . . *M. californiana* sp. nov.
– Mid tibia with 2 strong posterior setae; surstylus with 2 strong apical spines and thinner setulae in 2 rows (Fig. 67); hypandrium without pointed triangular processes; distiphallus rounded apically, with two slender spinule-like projections (Figs 68, 69) . . . . . *M. corralensis* Spencer

### *Melanagromyza* Hendel

*Melanagromyza* Hendel, 1920: 120. Type species: *Agromyza aeneoventris* Fallén, 1823, by original designation. Frick, 1952: 375; Frick, 1965: 794; Spencer, 1969: 64; Spencer & Stegmaier, 1973: 30; Spencer, 1981: 35; Spencer & Steyskal, 1986: 18; Lonsdale, 2014: 495.

*Limnoagromyza* Malloch, 1920: 147. Type species *Limnoagromyza diantherae* Malloch, 1920, by original designation. Frick, 1952: 376 (syn.)

**California species:**

### *Melanagromyza buccalis* Spencer, 1969

(Figs 11–21, Map 4)

*Melanagromyza buccalis* Spencer, 1969: 67. Type locality: Canada. Québec: Lake Bernard. HT ♂, CNC. Spencer, 1981: 38; Spencer & Steyskal, 1986: 25, 243.

**Diagnosis.** Frons not projecting above eye, about 1.8 times as wide as eye; 2–3 *ori* inclinate; fronto-orbital plate very slightly shining, about 1/4 width of frons; fronto-orbital setulae in 2–3 irregular rows, single inner row inclinate and two outer rows reclinate. Gena about 1/5 height of eye, protruding forward on anterior margin. Mesonotum and scutellum shiny green or bluish green. Calypter white, margin pale yellow and fringe white. Mid tibia with 1 strong posterior seta. Abdomen with brilliant greenish sheen, to slightly coppery.

**Redescription.** MALE. Body length 1.9–2.0 mm, wing length 2.1–2.2 mm. FEMALE. Body length 1.9–2.4 mm, wing length 2.0–2.5 mm.

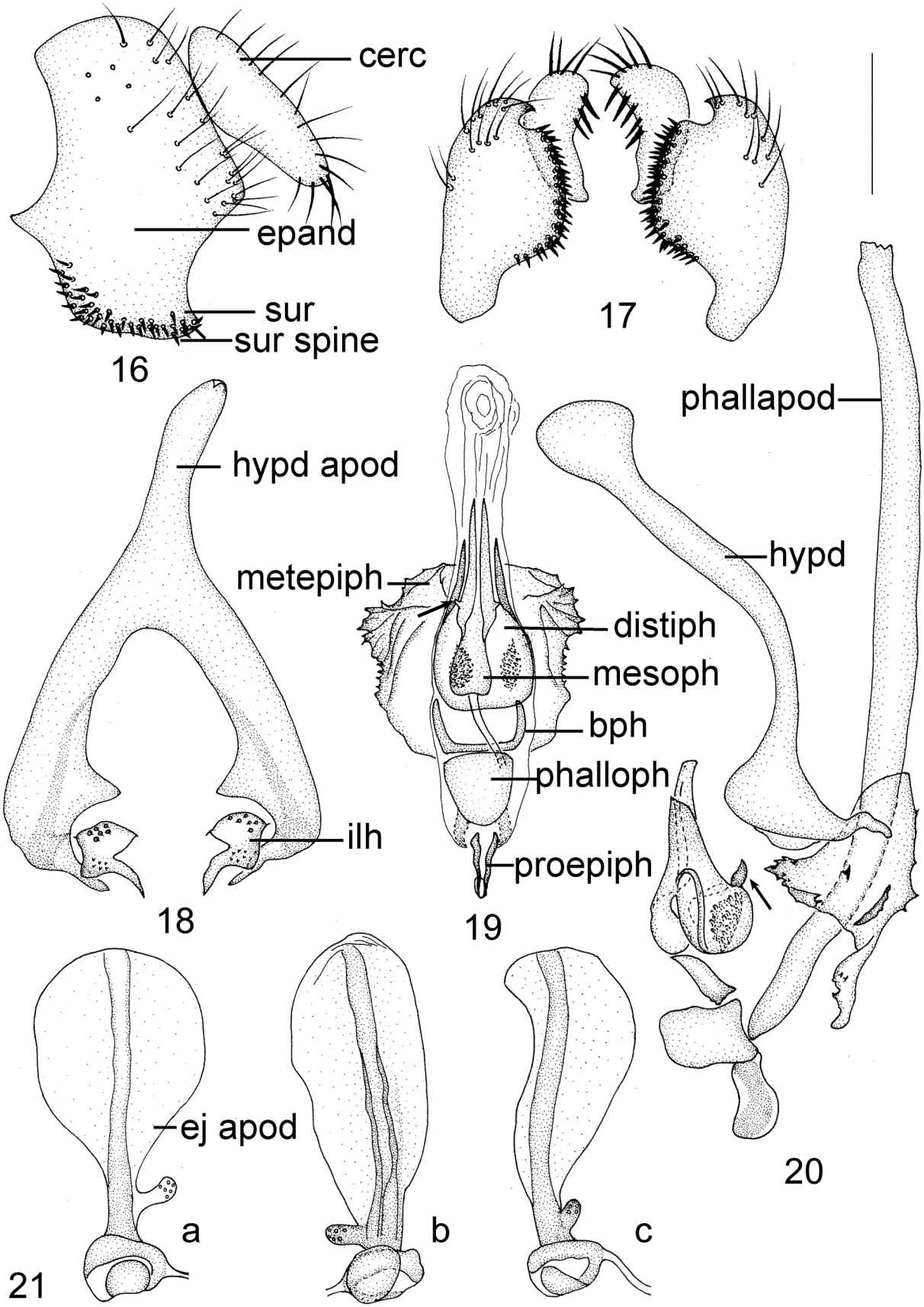
Head (Figs 12–14) black. Frons dark, not projecting above eye, 1.25 times as wide as long, about 1.8 times as wide as eye; 2–3 *ori* inclinate, 2 *ors* reclinate, *ori* and *ors* strong, proportional distance between setae in the *ori*-*ors* series from anterior to posterior 2:2:1:1; fronto-orbital plate very slightly shining, blackish brown and anterior margin brown, about 1/4 width of frons; fronto-orbital setulae in 2–3 irregular rows, single inner row inclinate and two outer rows reclinate; ocellar triangle slightly broad and shining, extending to posteriormost *ori*; *oc* strong, as long as *ors*; postocellar setae strong. Lunule grayish brown, 1.4 times as wide as high. Gena brown to blackish brown, about 1/5 height of eye, protruding forward on anterior margin (Figs 12, 14). Eye pilose. Antenna blackish brown, 1st flagellomere short ovate with long setulae, and arista bare. Proboscis pale brown, palpus black.

Thorax (Fig. 11) black. Mesonotum and scutellum with brownish pruinosity, with greenish or bluish green sheen. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* with 2 long setulae and sparse short setulae, 1 *kepst* with 2 short setulae. Calypter white, margin pale yellow and fringe white. Fore tibia without posterior setae and mid tibia with 1 strong posterior seta. Wing (Fig. 15) with costa extending to $M_{1+2}$; costal ratio 4.3:1.3:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.7:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.4. Halter blackish brown.

Abdomen (Fig. 11) black with brilliant greenish sheen, slightly coppery. Male genitalia (Figs 16–21): epandrium with a wide posterodistal concavity and small inner posteromedial spines; surstylus short and broad, with dense short spines in more than 2 rows; hypandrium slender Y-shaped with long hypandrial apodeme; basiphallus U-shaped with ends pointed; distiphallus with a pair of triangular dorsal processes (Fig. 20, arrow) and a pair of tiny median teeth (Fig. 19) and two pairs of pointed processes; ejaculatory apodeme variably fan-shaped, asymmetrical or symmetrical, with stem long.

**Non-type material. CALIFORNIA: Alpine Co.**, 1 female (CSCA), Woodfords, 38°46′39.66″N 119°49′18.64″W, 28.VII.1930, H.H. Keifer; **Humboldt Co.**, 1 female (CSCA), Korbel, 40°52′14.00″N 123°57′26.00″W, 17.VI.1960, T.R. Haig; **Imperial Co.**, 1 male (EMEC), 17 mi. NW Glamis, 32°59′36.64″N 115°03′55.08″W, 1.IV.1978, J. Powell (No. 7803, reared from Legume); **Inyo Co.**, 1 female (EMEC), 3 mi. N Lone Pine, 36°37.104′N 118°04.129′W, 8.VII.1961, G.I. Stage; 1 male (EMEC, male genitalia No. 4696), Ruby Lake, 37°24′53.22″N 118°46′14.93″W, 13.VIII.1957, J. Powell; 2 males (UCD), Deep Springs, 37°13′27.60″N 117°37′40.82″W, 16.VII.1953, E.I. Schlinger; **Lassen Co.**, 2 males, 1 female (EMEC), S. Ravendale, Secret Cr. 13 mi., 40°35′59.32″N 120°14′40.72″W, ex. *Salix*, 5.VI.1970, P.A. Rude; **Marin Co.**, 2 males, 1 female (CSCA), San Rafael, 37°58′24.73″N 122°31′51.91″W, 5.X.1941, ex. on leaf of *Hydrangea*, B. Fehlman; 4 males (CSCA), Santa


**FIGURES 11–15.** *Melanagromyza buccalis* Spencer, 1969. Male (Non-type, EMEC). 11. habitus, lateral view; 12–14. head, dorsal and lateral view; 15. wing.




**FIGURES 16–21.** *Melanagromyza buccalis* Spencer, 1969. Male (Non-type, CSCA). 16, 17. epandrial complex, lateral and ventral view; 18. hypandrium and postgonite, ventral view; 19, 20. phallic complex, ventral and lateral view; 21. sperm pump (a, b, c: variable shapes of ejaculatory apodeme). Scale 0.1 mm. Abbreviations: bph—basiphallus, cerc—cercus, distiph—distiphallus, epand—epandrium, ej apod—ejaculatory apodeme, hypd—hypandrium, hypd apod—hypandrial apodeme, ilh—inner lobe of hypandrium, mesoph—mesophallus, metepiph—metepiphallus, phallapod—phallapodeme, phalloph—phallophorus, proepiph—proepiphallus, sur—surstylus.

Venetia, 37°59′54.72″N 122°31′30.91″W, 5.X.1941, ex. *Citrus*, B. Wiard; **Mendocino Co.**, 1 male (EMEC, No. 215549, male genitalia No. 4815), Inglenook Fen area, 39°30′41.40″N 123°46′24.32″W, 2.VIII.1972, el. 30–50', E.I. Schlinger; 1 male (EMEC, No. 220541), Inglenook Fen, 4 mi. N. Fort. Bragg, 39°26′06.54″N 123°48′28.49″W, 27.VII.1975, M.E. Buegler and E.I. Schlinger; 1 male (UCD), Ukiah, 39°09′00.62″N 123°12′28.02″W, ex. Lawn grass, 7.IX.1941, R.M. Bohart; **Mono Co.**, 1 male (EMEC, male genitalia No. 4723), Cottonwood Creek 9300', 40°22′46.36″N 122°16′45.51″W, 10.VII.1961, H.V. Daly; 1 male (EMEC, male genitalia No. 4698), White Mts., Crooked Creek, 9000 ft, 40°28′46.44″N 122°19′19.83″W, 20.VI.1953, J.W. MacSwain; 1 male (EMEC), Sonora Pass, 37°58′32.98″N 120°20′38.53″W, 13.VIII.1960, W.A. Steffan; **Monterey Co.**, 1 female (CSCA), Salinas, 36°40′39.85″N 121°39′19.80″W, 27.VII.1962, ex. *Dahlia* [collector not given]; **Orange Co.**, 1 male (EMEC, male genitalia No. 4699), Anaheim, 33°50′07.05″N 117°54′52.24″W, 28.VI.1957, C.A. Toschi; 1 female (CSCA), Anaheim, 33°50′07.05″N 117°54′52.24″W, ex. Japanese Beetle trap, 4.VIII.1938, C.E. Norland; **Sacramento Co.**, 1 female (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 30.IX.1968, in swimming pool, F.L. Blanc; 1 male, 2 females (CSCA), American River, 38°35′56.35″N 121°21′51.03″W, 20.IX.1966, R.A. Belmont; 1 female (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 17.VIII.1930, H.H. Keifer; 1 female (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 8.VI.1930, H.H. Keifer; 3 females (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 16.IX.1933, H.H. Keifer; 2 females (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 14.VII.1930, H.H. Keifer; 1 male, 1 female (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 17.VI.1935, Wilson; **San Diego Co.**, 2 females (CSCA), Borrego St. Park, 33°15′28.01″N 116°24′24.32″W, 28.III.1977, M. Wasbauer and J. Slansky; **San Luis Obispo Co.**, 2 males, Montana de Oro St. Pk. Dunes 3 mi. SW Los Osos, 35°19′21.08″N 120°49′52.97″W,16–17.VIII.1983, Malaise trap 10A-4P, M. Wasbauer & P. Adams; **Solano Co.**, 1 female (CSCA), L. Berryessa, 0.85 mi., SW Monticello Dam, 500m, 38°30′47.79″N 122°06′16.25″W, ex. vegetation along shoreline, 4.VI.2002, S.D. Gaimari; 1 male (CSCA), Col. Vallejo, 38°06′14.71″N 122°15′23.89″W, 28.XI.1941, H. Wiard; **Sonoma Co.**, 3 males, 3 females (CSCA), Santa Rosa, 38°26′25.68″N 122°42′51.95″W, 9.VIII.1962, ex. Rose, W. Wiard collector; **Stanislaus Co.**, 1 male (UCD), Modesto, 37°38′20.75″N 120°59′48.76″W, ex. resting on *Chrysanthemum*, 30.X.1948, W.H. Lange; **Trinity Co.**, 2 males (EMEC), Mountain Meadow Ranch, head Coffee Creek, 5100', 41°05′20.55″N 122°42′27.83″W, 8–10.VII.1969, J. Powell; **Yolo Co.**, 8 males, 6 females (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 14.VI.1953, E.I. Schlinger; 2 males (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 27.V.1966, R.O. Schuster; 1 female (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 4.VII.1953, A.T. McClay; 1 female (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 11.VIII.1955, E.A. Kurtz; 1 female (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 19.VII.1939 [collector not given]; 1 female (UCD), Davis, 11.VI.1964, C.R. Kovacic; 1 male (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 15.VII.1962, R.O. Schuster. **MISSOURI: Boone Co.,** 1 male (CSCA), Columbia, ex. Malaise trap, 20.VII.1970, F.D. Parker collector; 1 female (CSCA), Columbia, 10.VI.1949, [collector not given].

**Biology/Host plants.** This species has been reared from an unknown legume in California. It has also been collected in association with Sierra willow / mountain willow, *Salix eastwoodiae* A. Heller (Salicaceae), and other *Salix* species, and seems to be a likely host, although Spencer (1981) and Spencer & Steyskal (1986) speculated that it could attack species of *Arnica* (Asteraceae) or other asters found nearby to willows. See Map 4 for the California distribution of *M. buccalis* and the potential host *Salix eastwoodiae*. This plant species is native to California, being found in alpine and subalpine meadows, along streams and talus at elevations between 1600–3800 m through much of northern California, to western Canada, Montana, Wyoming and New Mexico. The plant is known from the Klamath, North Coast and High Sierra Ranges, the High Sierra Nevada, Modoc Plateau, and White and Inyo Mountains. In addition, *M. buccalis* has been collected in association with species of *Chrysanthemum* (Asteraceae), *Citrus* (Rutaceae), *Dahlia* (Asteraceae), *Hydrangea* (Hydrangeaceae) and *Rosa* (Rosaceae).

**Distribution.** USA (California (Map 4) [Alpine Co.*, Humboldt Co.*, Imperial Co.*, Inyo Co., Lassen Co.*, Marin Co.*, Mendocino Co., Mono Co., Monterey Co.*, Orange Co., Sacramento Co.*, San Diego Co., San Mateo Co., Solano Co., Sonoma Co.*, Stanislaus Co.*, Trinity Co.*, Tuolumne Co., Yolo Co.], Arizona*, Colorado, Maryland, Missouri*, New York, Virginia), Canada (Ontario, Quebec).

**Remarks.** The male genitalia of the species has two distinct characters to separate it from other species of the genus: distiphallus with a pair of triangular dorsal processes in lateral view, and a pair of tiny median teeth in ventral view.

Another important characteristic is the gena protruding forward on the anterior margin, but occasionally this

can be confused with some species of the genus *Ophiomyia* which have 1 strong vibrissa and a narrow, but not raised, facial keel. However, in most of cases, the *Ophiomyia* species have a narrower orbital plate, orbital setulae in a single row, and the frons along the dorsal eye margin sloping sharply in lateral view. Also, in *Ophiomyia*, the clypeus is truncate apically and is often narrow and parallel-sided (Lonsdale, 2014).

### *Melangaromyza burgessi* (Malloch, 1913)

(Figs 22–31, Map 1)

*Agromyza burgessi* Malloch, 1913: 323. Type locality: USA. Massachusetts: Essex Co., Beverly. HT ♀, USNM.

*Melangaromyza burgessi*: Frick, 1952: 378 (as synonym of *M. lappae* (Loew)); Frick, 1953b: 69 (comb.); Shewell, 1953: 463; Frick, 1959: 363; Frick, 1965: 796; Spencer 1966b: 10; Spencer & Steyskal, 1986: 31, 244.

*Melanagromyza malefica* Spencer, 1981: 46. Type locality: USA. California: San Diego Co., La Mesa. HT ♂, CAS. Spencer & Steyskal, 1986: 244 (syn.).

**Diagnosis.** Frons about 1.5 times as wide as eye, and slightly projecting forward; 4–6 *ori* inclinate and 2 *ors* reclinate; fronto-orbital plate shining, about 1/4–1/6 width of frons, anterior margin broad with dense setulae; fronto-orbital setulae in 3 rows, reclinate; ocellar triangle slightly shining on posterior 2/3 and extending between posteriormost *ori* and anterior *ors*. Parafacial broad. Gena about 2/5 eye height, highest point located slightly beyond middle. Eye and arista bare. Mesonotum with slightly greenish or bluish greenish sheen in posterior view. Calypter whitish gray, margin blackish brown and fringe brown. Mid tibia with 2 strong posterior setae. Abdomen slightly greenish, sometimes bluish green or with coppery sheen.

**Redescription.** MALE. Body length 2.7–2.8 mm, wing length 2.7–2.8 mm. FEMALE. Body length 2.9 mm, wing length 3.3 mm (Holotype).

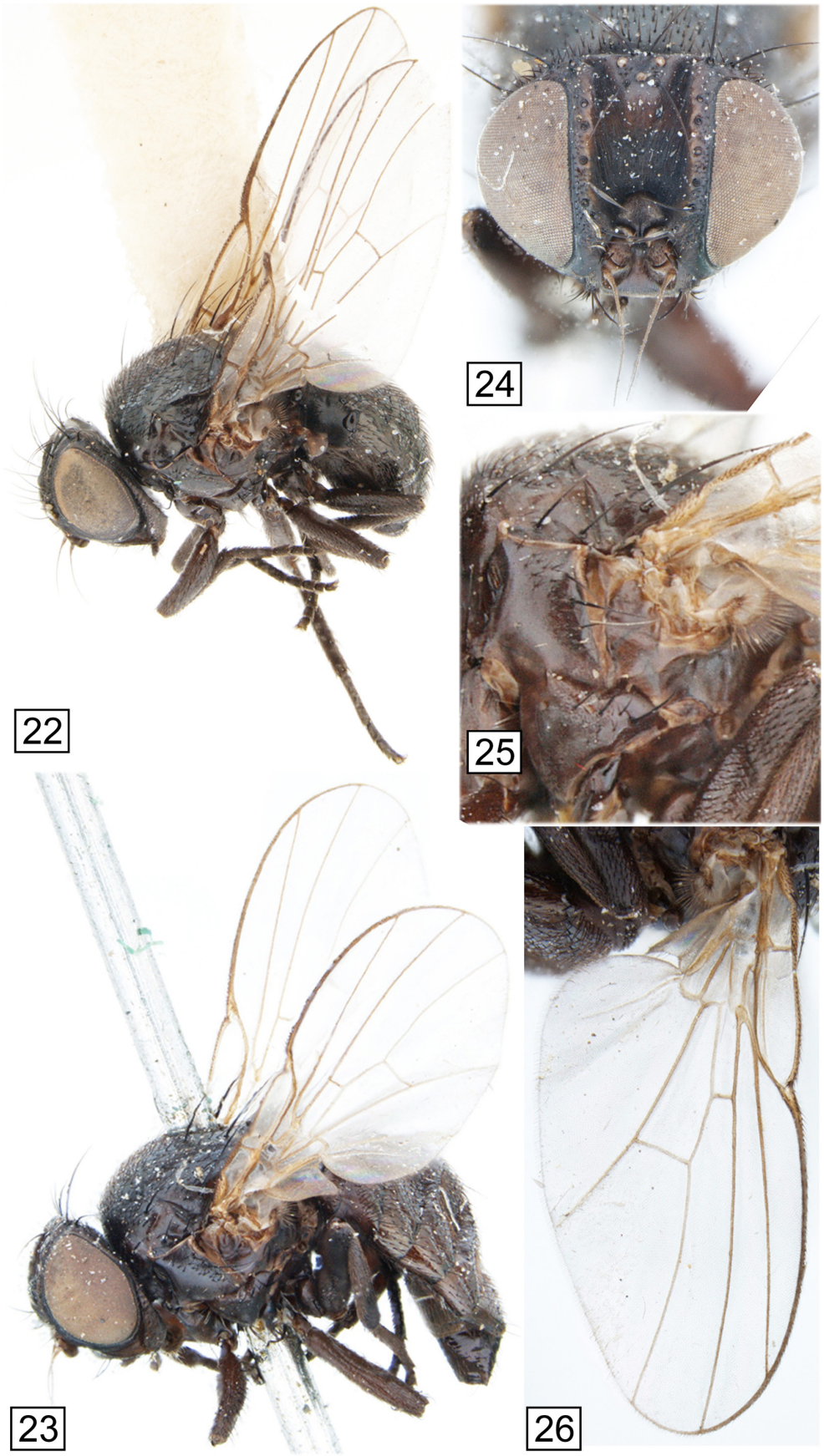
Head (Fig. 24) brown. Frons dark, nearly as wide as long, 1.5 times as wide as eye, and slightly projecting forward beyond eye margin; 4–6 *ori* and 2 *ors*, strong, subequal in length; proportional distance between setae in the *ori-ors* series from anterior to posterior subequal; fronto-orbital plate blackish brown (Holotype female: black before third *ori* and reddish brown after third *ori*), shining, about 1/4–1/6 height of frons, and anterior margin slightly widened; fronto-orbital setulae in 3 rows, reclinate except anterior margin with few inclinate or proclinate, and anterior margin broad with dense setulae; ocellar triangle brown, slightly shining on posterior 2/3, and extending between posteriormost *ori* and anterior *ors*; *oc* strong, shorter than *ori* and *ors*; postocellar setae strong. Lunule brownish gray, 1.6 times as wide as high, semicircular. Parafacial black, about 1/7 eye height, broad. Gena brown to blackish brown, about 2/5 height of eye, and highest point located slightly posterior to middle of eye. Eye bare. Antenna brown, 1st flagellomere short ovate, and arista bare. Proboscis yellowish brown, palpus brown or black.

Thorax (Figs 22, 23, 25) black. Mesonotum and scutellum with brownish pruinosity and slightly greenish or bluish green sheen in posterior view. Mesonotum with 0+2 *dc*, *acr* in 10 irregular rows. 1 strong *anepst* with 2 long setulae and 4–5 short setulae, 1 strong *kepst* with 1 long setula and 1–2 short setulae. Calypter whitish gray, margin blackish brown and fringe brown. Mid tibia with 2 strong posterior setae. Wing (Fig. 26) with costa extending to $M_{1+2}$; costal ratio 3.7:1.2:1; *r-m* slightly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.1:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.3. Halter blackish brown.

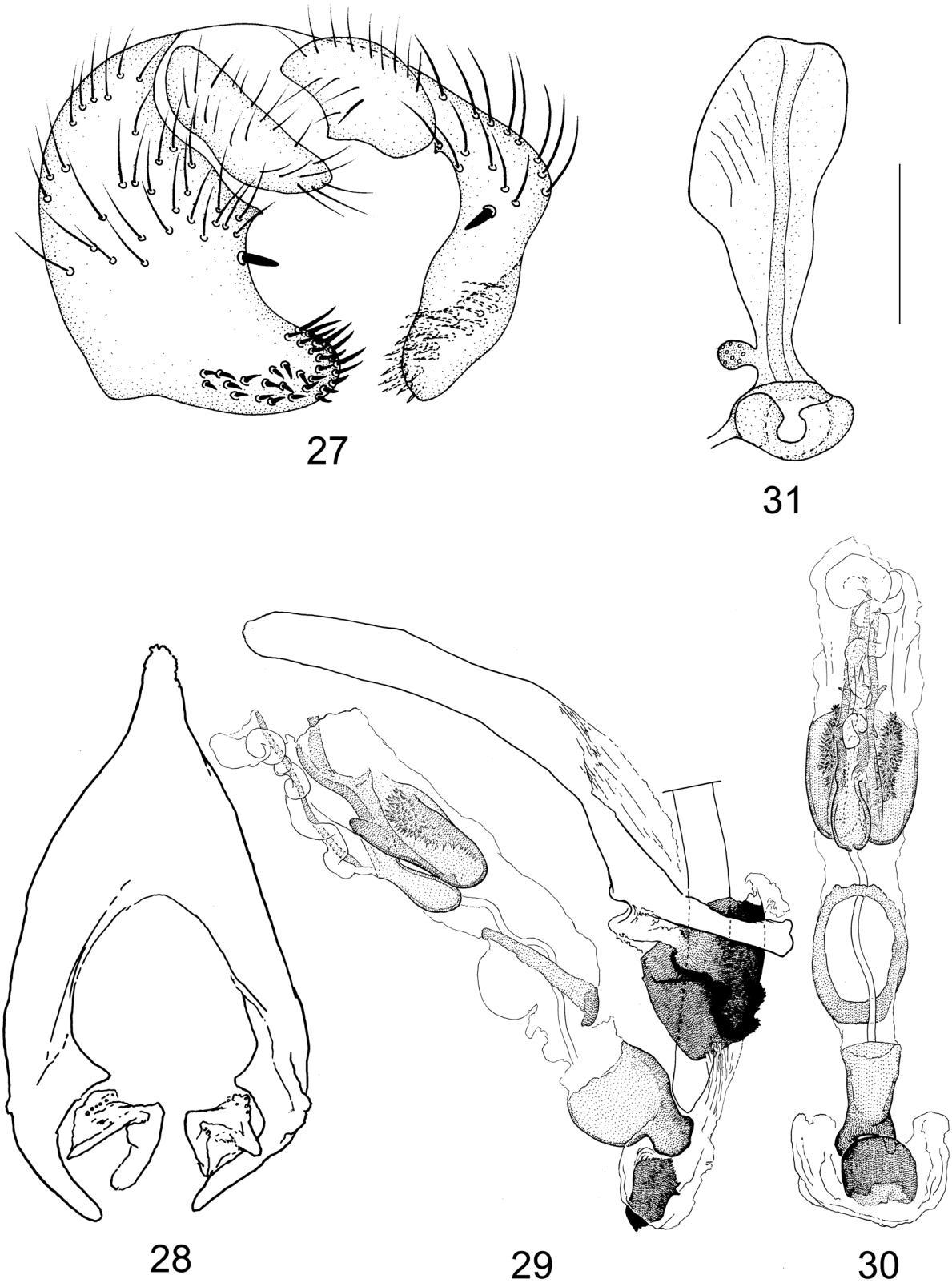
Abdomen (Figs 22, 23) black (Holotype female: reddish brown) with slightly greenish, bluish green or coppery sheen. Male genitalia (Figs 27–31): epandrium with a pair of large triangular subapical spines; surstylus with a wide apical concavity, long apical setae and sparse short spines; hypandriumY-shaped with short and blunt hypandrial apodeme; basiphallus subcircular, ventral margin narrower; distiphallus narrow on apical 1/2 with two pairs of small pointed processes; ejaculatory apodeme asymmetrical with long stem.

**Type material.** Holotype female of *Melangaromyza burgessi* (USNM, No. 15585): **MASSACHUSETTS: Essex Co.**, Beverly, 2.VI.1876, Burgess. Holotype male of *Melanagromyza malefica* (CAS, No. 14066, male genitalia No. 4713): **CALIFORNIA: San Diego Co.**, La Mesa, 32°46′04.18″N 117°01′23.10″W, 23.III.1962, P.A. Rude. Paratypes of *Melanagromyza malefica*: **CALIFORNIA: San Diego Co.**, 1 male (EMEC), same data as holotype; **San Luis Obispo Co.**, 1 male (EMEC, male genitalia No. 4714), 9 miles S.W. of Atascadero, 35°29′21.90″N 120°40′14.61″W, 26.IV.1968, D. Veirs (with male genitalia slide).

**Biology/Host plants:** Unknown.




**FIGURES 22–26.** *Melanagromyza burgessi* (Malloch, 1913). 22. Habitus, lateral view (Holotype male of synonym *Melanagromyza malefica*, CAS); Holotype female of *M burgessi*, USNM. 23. habitus, lateral view; 24. head, dorsal view; 25. thorax, lateral view; 26.wing.




**FIGURES 27–31.** *Melanagromyza burgessi* (Malloch, 1913). Male (Holotype of synonym *Melanagromyza malefica*, CAS). 27. epandrial complex, posterolateral view; 28. hypandrium and postgonite, ventral view; 29, 30. phallic complex, lateral and ventral view; 31. sperm pump. Scale 0.1 mm. (Figures 28–30 provided by Owen Lonsdale, CNC, from a non-type specimen).

**Distribution.** USA (California (Map 1) [San Diego Co., San Luis Obispo Co., Santa Clara Co., Ventura Co.], Colorado, Illinois, Indiana, Kansas, Massachusetts, Michigan, New York, North Dakota).

**Remarks.** The species is one of two species of the genus *Melanagromyza* in California with a subcircular basiphallus, the other being *M. urticella*. While *M. urticella* has a brilliant green sheen on the mesonotum and a

brilliant greenish, bluish, bluish green or coppery green sheen on the abdomen, the sheen is considerably more subdued in *M. burgessi*. In addition, the calypter is gray, brown or black on the margin and fringe in *M. burgessi*, while white or pale yellow in *M. urticella*.

***Melanagromyza californiana* sp. nov.**
(Figs 32–41, Map 2)

**Diagnosis.** Male. Frons with 2 *ori* inclinate and 2 *ors* reclinate, with large distance between 2 *ori*, about 4–5 times wider than distance between posterior *ori* and anterior *ors*; fronto-orbital plate slightly widened at middle and moderately shining, about 1/5–1/4 width of frons; fronto-orbital setulae in 2 rows on anterior 1/3, and 3 rows on posterior 2/3, single inner row inclinate or proclinate and 1–2 outer rows reclinate; ocellar triangle shining, extending to anterior *ors*. Gena about 1/5–1/4 height of eye, highest point located at middle of eye. Mesonotum and scutellum with bluish green sheen, with gray pruinosity. Calypter white, margin and fringe pale brownish yellow. Mid tibia with 1 strong posterior seta. Abdomen with bluish green to coppery sheen.

**Description.** MALE. Body length 2.0 mm, wing length 2.2 mm.

Head (Figs 33, 34) black. Frons dark with fronto-orbital plate and ocellar triangle shining, with anterior margin narrow, pale orange yellow, and slightly projecting forward beyond eye margin (Fig. 33); 1.1–1.3 times wider than long, as wide as eye; 2 *ori* inclinate, far apart, about 4–5 times farther than distance between posterior *ori* and anterior *ors*; 2 *ors*, with anterior *ors* slightly inclinate, posterior *ors* reclinate, erect; fronto-orbital plate slightly widened at middle and moderately shining, about 1/5–1/4 width of frons; fronto-orbital setulae in 2 rows on anterior 1/3 and 3 rows on posterior 2/3, inner single row inclinate or proclinate and outer 1–2 rows reclinate; ocellar triangle shining, extending to anterior *ors*. Facial keel narrow and not raised. Lunule with whitish gray pruinosity, 1.2 times as wide as high. Gena brown, about 1/5–1/4 height of eye, highest point located at middle. Eye pilose on dorsal margin. Antenna black, arista brown and bare. Proboscis yellowish brown, palpus brown to black.

Thorax (Figs 32, 35) black. Mesonotum and scutellum with sparse gray pruinosity and a weak greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 10 rows. 1 strong *anepst* with 2 long setulae, 1 strong *kepst* with 4–5 short setulae. Calypter white, margin and fringe pale brownish yellow. Mid tibia with 1 strong posterior seta. Wing (Fig. 36) with costa extending to $M_{1+2}$; costal ratio 4.9:1.6:1; *r-m* slightly beyond middle of discal cell; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.6. Halter blackish brown.

Abdomen black, with slightly bluish green to coppery sheen. Male genitalia (Figs 37–41): epandrium with a wide posterodistal concavity; surstylus with short spines in more than 3 rows; hypandrium Y-shaped with long curved hypandrial apodeme and a pair of triangular processes on inner margin (Fig. 38); basiphallus short U-shaped with two small basal processes; distiphallus widest subbasally with a slight constriction before a shallow bulge; ejaculatory apodeme broad and fan-shaped with short stem.

FEMALE. Unknown.

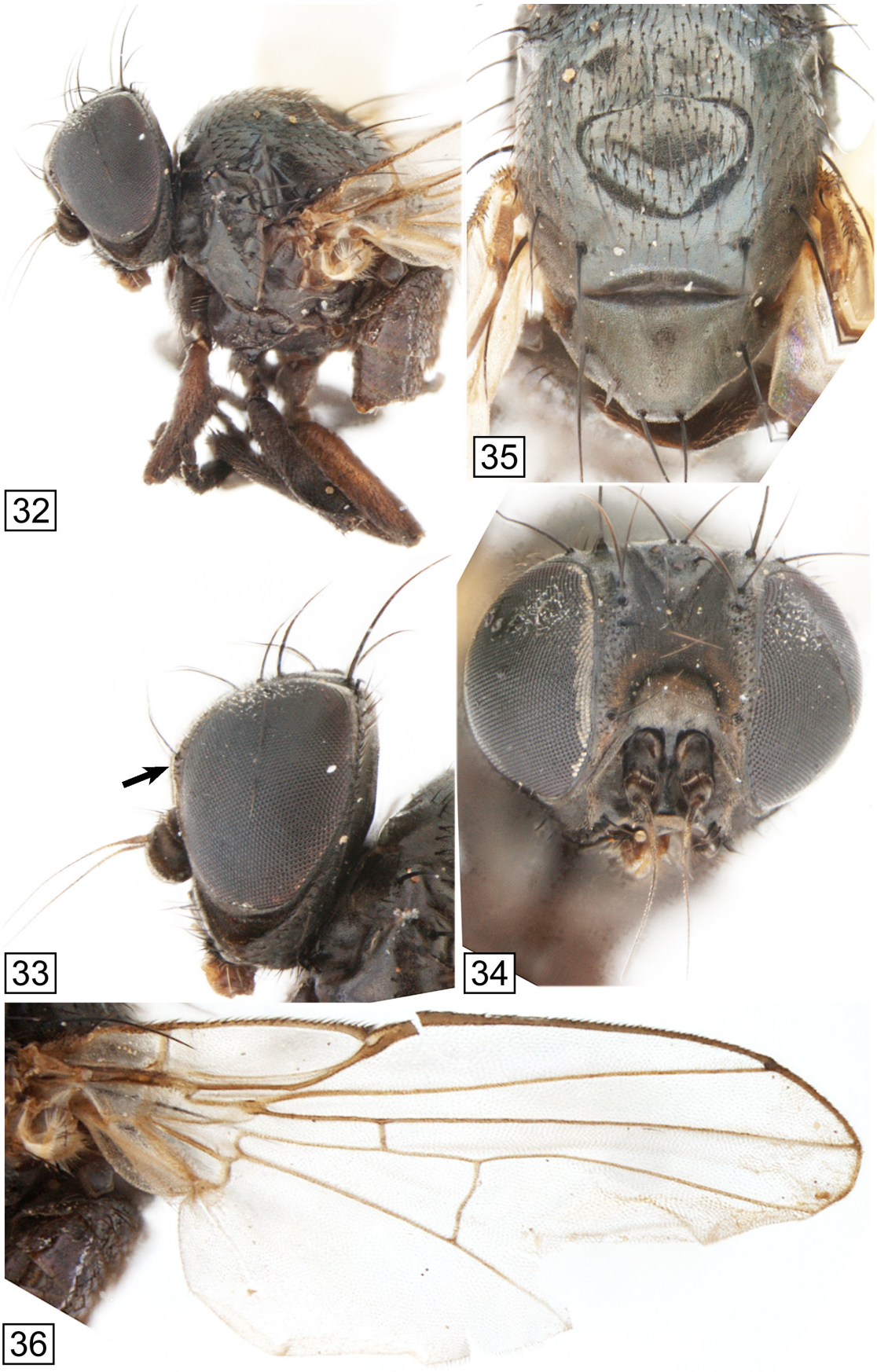
**Type material.** Holotype male (CSCA): **CALIFORNIA: Modoc Co.**, Adin Pass, 41°20′47.61″N 120°55′16.88″W, 26.VI.1978, T.R. Haig.

**Biology/Host plants:** Unknown.

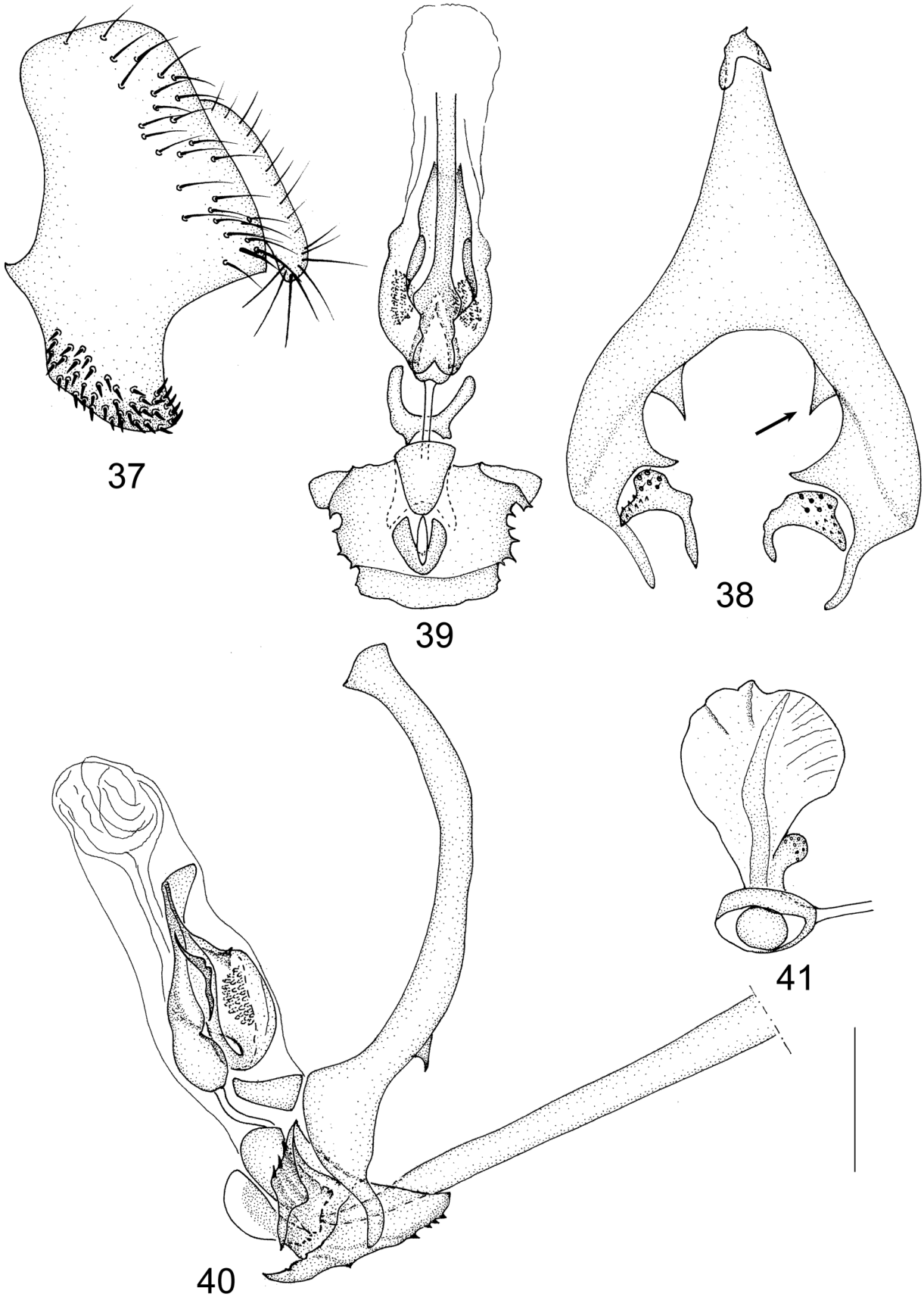
**Distribution.** USA (California (Map 2) [Modoc Co.]).

**Remarks.** The new species is similar to *Melanagromyza corralensis* Spencer in the following characters: the frons has a large distance between the anterior and posterior *ori*, the fronto-orbital plate is slightly widened medially, being about 1/5–1/4 the width of the frons; the facial keel is narrow and not raised; the gena is about 1/5–1/4 the height of the eye; the calypter is white; the distiphallus has a lateral concavity. But it can be separated from *M. corralensis* by the following characters: the mid tibia has 1 strong posterior seta, the surstylus has short spines in more than 3 rows; the hypandrium has a pair of triangular processes on the inner surface of the arms; the basiphallus is short and U-shaped with small apical teeth; the distiphallus has a small triangular dorsolateral process; the ejaculatory apodeme is broad and fan-shaped with a short stem. In *M. corralensis*, the mid tibia has 2 strong posterior setae; the surstylus has 2 strong apical spines and thinner setulae in 2 rows; the hypandrium has no pointed triangular processes; the basiphallus is long and U-shaped; the distiphallus has two pointed spines; the ejaculatory apodeme is narrowly fan-shaped with long stem.

**Etymology.** The new species is named after the type locality California.




**FIGURES 32–36.** *Melanagromyza californiana* **sp.nov.** Holotype male (CSCA). 32. habitus, lateral view; 33, 34. head, lateral and anterior view; 35. thorax, dorsal view; 36. wing.




**FIGURES 37–41.** *Melanagromyza californiana* **sp.nov.** Holotype male (CSCA). 37. epandrial complex, lateral view; 38. hypandrium and postgonite, ventral view; 39. phallic complex, ventral view; 40. phallic complex, lateral view; 41. sperm pump. Scale 0.1 mm.

***Melanagromyza chemsaki* sp. nov.**
(Figs 42–53, Map 1)

**Diagnosis.** Frons not projecting above eye, with 3–4 *ori* inclinate and 2 *ors* reclinate; fronto-orbital plate about 1/4 width of frons, not broad at middle, slightly shining; fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate; ocellar triangle weakly shining. Gena about 1/5 height of eye, highest point located at middle. Mesonotum and scutellum with slightly bluish sheen. Calypter gray, margin and fringe blackish brown. Mid tibia with 2–3 strong posterior setae. Wing with *r-m* at middle of discal cell. Abdomen blackish brown with slightly greenish sheen.

**Description.** MALE. Body length 2.0 mm, wing length 2.4 mm.

Head (Figs 43–45) mostly blackish brown. Frons dark brown, not projecting above eye, as wide as eye; 3–4 *ori* inclinate and 2 *ors* reclinate; proportional distance between setae in the *ori-ors* series from anterior to posterior subequal; *ori* subequal in length, slightly shorter than *ors*; fronto-orbital plate about 1/4 width of frons, not broad at middle, slightly shining; fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate; ocellar triangle slightly shining, extending to posteriormost *ori*. Facial keel not raised. Lunule as high as wide, grayish brown. Gena yellowish brown, about 1/5 height of eye, highest point located at middle of eye. Eye pilose. Antenna black, 1st flagellomere short ovate; arista brown, with microscopic setulae. Proboscis yellowish brown, and palpus black.

Thorax (Figs 42, 46) blackish brown. Mesonotum and scutellum with brown pruinosity and slightly bluish sheen. Mesonotum with 0+2 *dc*, with an additional long seta near posterior *dc* (Fig. 46), *acr* in 8 irregular rows. 1 strong *anepst* with 2 long setulae, 1 strong *kepst* with 2 short setulae. Calypter gray, margin and fringe blackish brown. Mid tibia with 2–3 strong posterior setae. Wing (Fig. 47) with costa extending to $M_{1+2}$; costal ratio 4.7:1.3:1; *r-m* at middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.7:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.6. Halter blackish brown.

Abdomen blackish brown with slightly greenish sheen. Male genitalia (Figs 48–53): epandrium broad apically with two pairs of pointed triangular processes; surstylus with small spines in 2–3 rows; hypandrium Y-shaped with long hypandrial apodeme, narrow apically; basiphallus U-shaped, with apices convergent, slender; basiphallus and distiphallus overlapping; distiphallus with a small basal incision, a pair of slight medial constrictions and pointed triangular lateral processes medially, and triangular apically with membranous apical section turned ventrally; ejaculatory apodeme narrow fan-shaped with a round apical process, and with stem long.

FEMALE. Unknown.

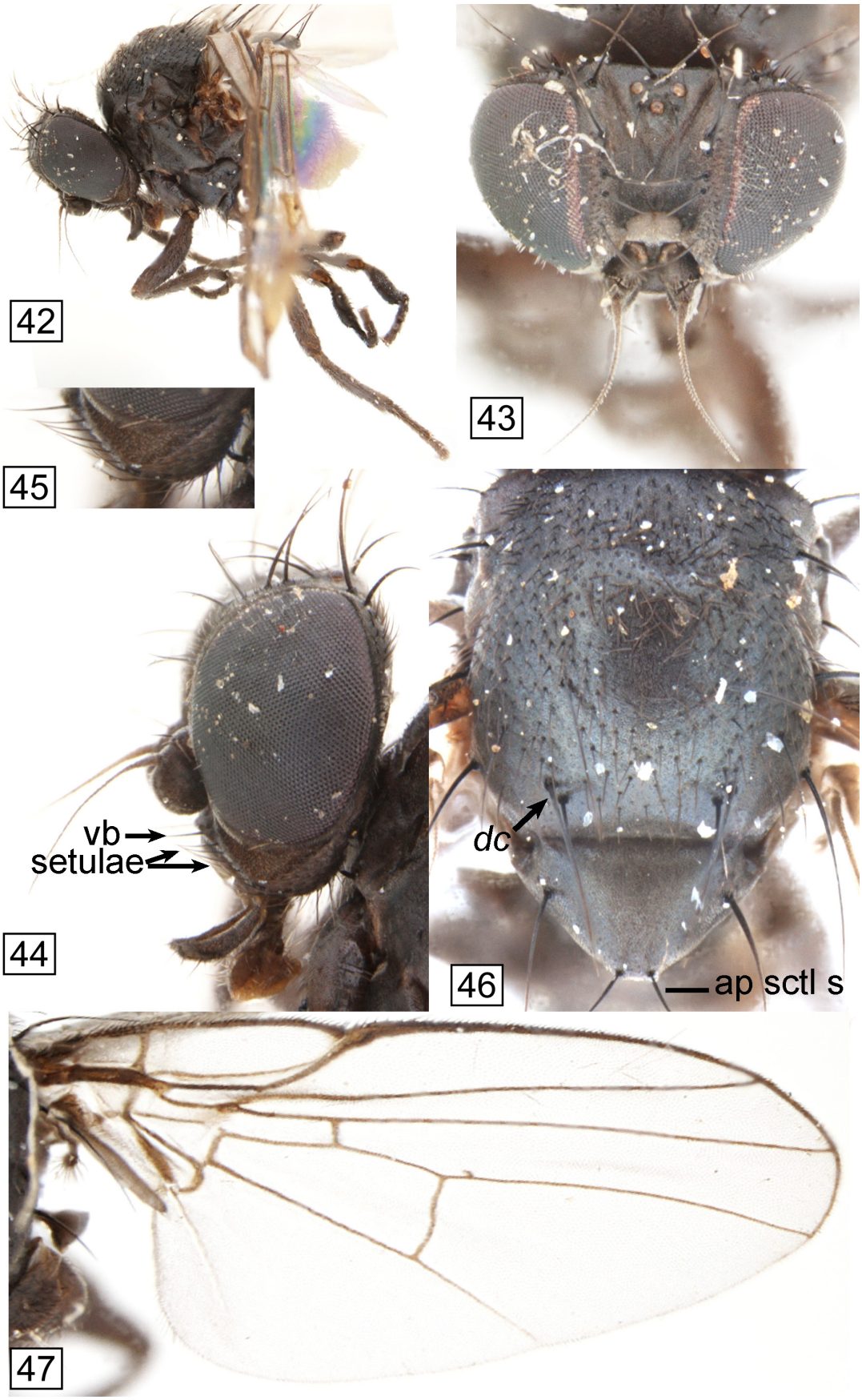
**Type material.** Holotype male (EMEC): **CALIFORNIA: Mendocino Co.**, 1 mi. N. Piercy, 39°58′25.86″N 123°47′49.55″W, 20–23.V.1976, J.A. Chemsak.

**Biology/Host plants:** Unknown.

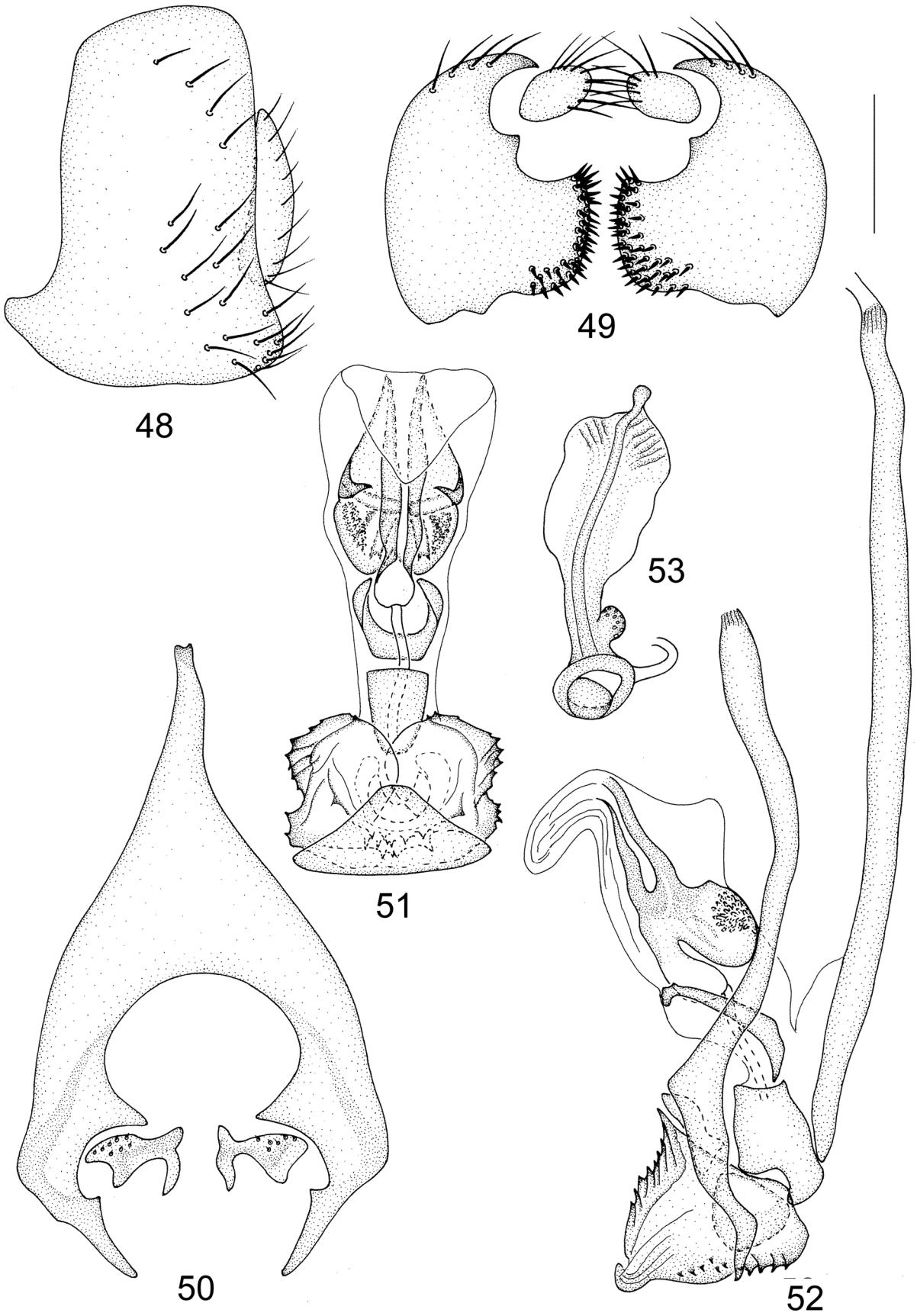
**Distribution.** USA (California (Map 1) [Mendocino Co.]).

**Remarks.** The new species is similar to *Melanagromyza erechtitidis* Spencer, 1966b from Florida, in the following characters: frons not projecting above the eye; fronto-orbital setulae are in 2 rows; the fronto-orbital plate, ocellar triangle, and mesonotum are weakly shining; the gena is about 1/5 the height of the eye, with the highest point located at middle of the eye; the calypter is gray, with the margin and fringe blackish brown or black. But it can be separated from the latter by the frons having 3–4 strong *ori* and the *r-m* crossvein being at the middle of the discal cell. In *Melanagromyza erechtitidis*, the frons has 2 weak *ori* and the *r-m* crossvein is beyond the middle of the discal cell (Spencer, 1966b).

**Etymology.** The new species is named after the collector of the type specimen, the late John A. Chemsak.




**FIGURES 42–47.** *Melanagromyza chemsaki* **sp. nov.** Holotype male (EMEC). 42. habitus, lateral view; 43, 44. head, dorsal and lateral view; 45. gena with long marginal setulae, lateral view; 46. thorax, dorsal view; 47. wing. Abbreviations: *ap sctl s*—apical scutellar setae, *dc*—dorsocentral setae, vb—vibrissa.




**FIGURES 48–53.** *Melanagromyza chemsaki* **sp. nov.** Holotype male (EMEC). 48, 49. epandrial complex, lateral and ventral view; 50. hypandrium and postgonite, ventral view; 51, 52. phallic complex, ventral and lateral view; 53. sperm pump. Scale 0.1 mm.

### *Melanagromyza cirsiophila* Spencer, 1981
(Figs 54–61, Map 5)

*Melanagromyza cirsiophila* Spencer, 1981: 41. Type locality: USA. California: Los Angeles Co., Glendale. HT ♂, UCD. Spencer, 1983: 45; Spencer & Steyskal, 1986: 24; Benavent-Corai *et al.*, 2005: 28.

**Diagnosis.** Frons distinctly projecting above eye, 1.6 times as wide as eye; 2–3 *ori* inclinate and 2 *ors* reclinate; fronto-orbital plate slightly shining, about 1/6 width of frons; fronto-orbital setulae erect or reclinate in 2 rows; ocellar triangle moderately shining, nearly extending to prosterior *ori*. Gena about 1/5 height of eye, highest point located at middle. Mesonotum and scutellum with brownish pruinosity and very slight greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 rows. Calypter white, margin and fringe white or pale yellow. Mid tibia with 2 strong posterior setae. Abdomen black with greenish and coppery sheen.

**Redescription.** MALE. Wing length 2.5 mm. FEMALE. Body length 2.5 mm, wing length 2.7–2.8 mm.

Head (Figs 55, 56) mostly blackish brown. Frons distinctly projecting above eye (Fig. 56), 1.2 times as wide as long, 1.6 times as wide as eye; 2–3 *ori* inclinate and 2 *ors* reclinate, *ors* slightly longer than *ori*, both of *ori* and *ors* strong; proportional distance between setae in the *ori-ors* series from anterior to posterior subequal, except 2 *ors* closer together; fronto-orbital plate slightly shining (anterior margin in female broader than that in male), about 1/6 width of frons; fronto-orbital setulae erect or reclinate in 2 rows; ocellar triangle black, slightly or distinctly shining medially and nearly extending to prosterior *ori* (close to anterior margin); *oc* strong, shorter than *ori* and *ors*; postocellar setae strong. Lunule grayish brown, 1.3 times as wide as high. Parafacial black, thin under eye (in female). Gena blackish brown, about 1/5 height of eye, highest point located at middle. Eye pilose. Antenna black, 1st flagellomere short ovate, arista bare. Proboscis yellowish brown, palpus black.

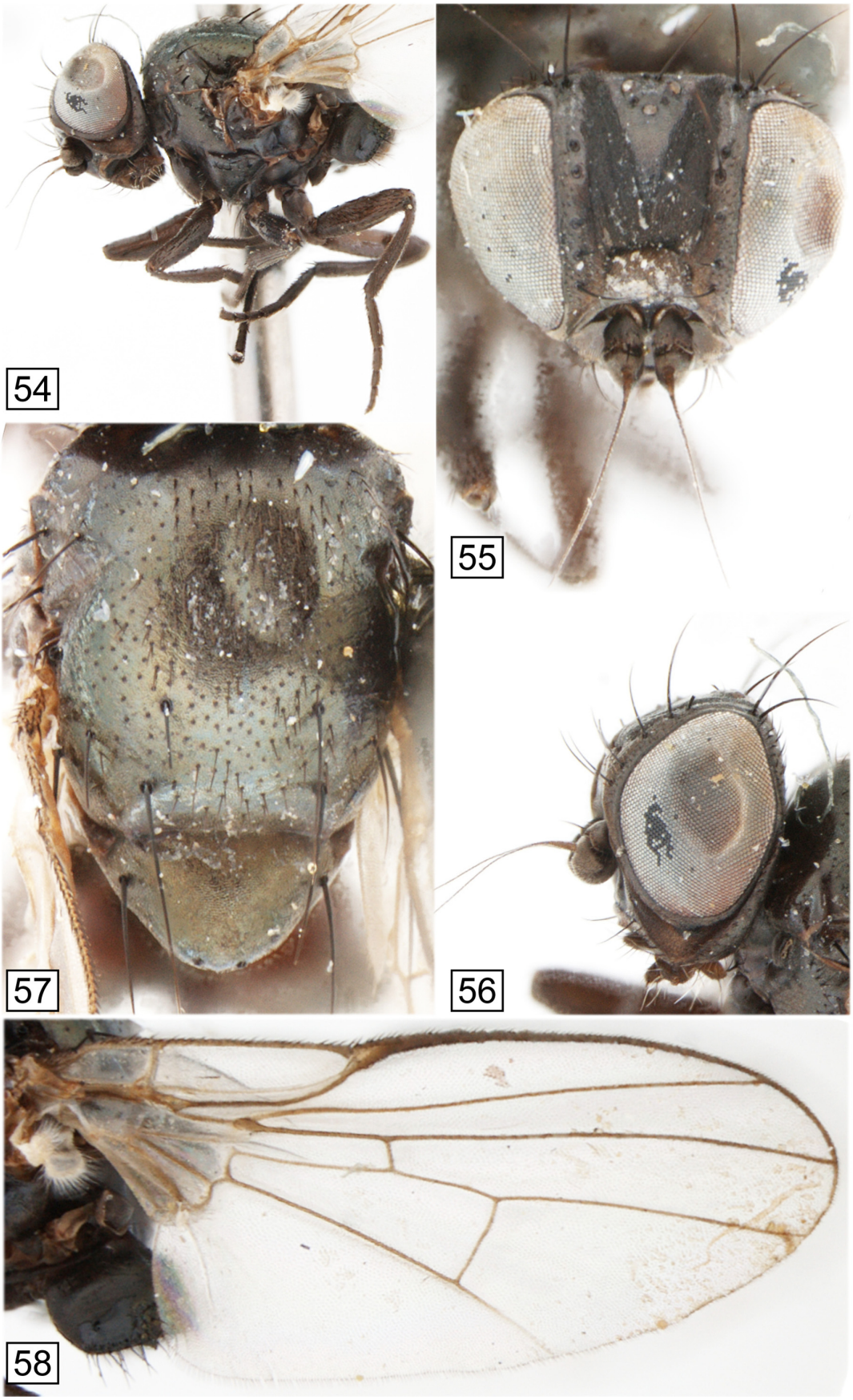
Thorax (Figs 54, 57) black. Mesonotum and scutellum with brownish pruinosity and very slight greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 rows. 1 strong *anepst* with 2 long setulae and 1 strong *kepst* with 2 long setulae. Calypter white, margin and fringe white or pale yellow. Fore tibia without strong posterior seta and mid tibia with 2 strong posterior setae. Wing (Fig. 58) with costa extending to $M_{1+2}$; costal ratio 4:1:1; *r-m* slightly or distinctly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.2:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.6. Halter with stem pale brown and knob brownish black.

Abdomen black with greenish and coppery sheen. Male genitalia (Figs 59–61): enpandrium broad with a wide subapical triangular process and wide concavity below; surstylus with long apical setulae and sparse short spines in a triangular patch; basiphallus nearly U-shaped, with lateral arms straight, pointed and diverging; distiphallus broad and incised basally and tapering apically, with a pair of large subbasal constrictions (Fig. 60).

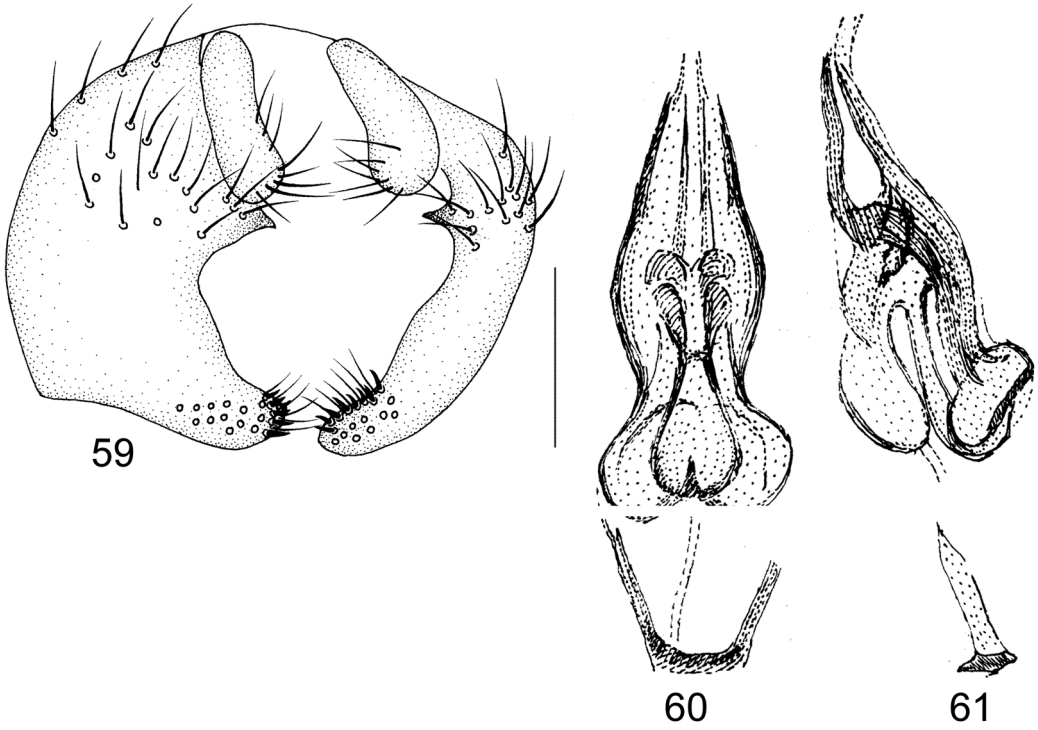
**Type material.** Paratype: **CALIFORNIA: Los Angeles Co.**, 1 female (UCD, No. 1199), Glendale, 34°08′33.03″N 118°15′18.27″W, ex. reared Thistle (with pupa), VI.1953, E.I. Schlinger.

**Non-type material. CALIFORNIA: Modoc Co.**, 1 female (EMEC), Buck Creek Ranger Station, 41°52′18.84″N 120°17′26.88″W, 5150 ft., ex. *Cirsium cymosum*, 5–7.VI.1970, J.T. Doyen. **COLORADO: Boulder Co.**, 1 female, 1 male (CNC, male genitalia No. 4847), Boulder, 5 mi. S. 5800′, 16.VI.1961, C.H. Mann.

**Biology/Host plants.** Larvae of this species are internal stem borers on *Cirsium* (Spencer, 1981) and *Carduus* (Spencer, 1990). In California, this species has been reared from "thistle". It has also been collected in association with Cirsium thistle / peregrine thistle, *Cirsium cymosum* (Greene) J. T. Howell (Asteraceae) and Musk thistle / nodding plumeless thistle, *Carduus nutans* L. (Asteraceae). See Map 5 for the California distribution of *M. cirsiophila* and the potential host plants *Carduus nutans* and *Cirsium cymosum*. The plant *Carduus nutans* L., which is native to Europe, is naturalized in California, being found in pasture lands, disturbed areas, and along roadsides at elevations below 2100 m throughout much of California. The plant is known from the Klamath Ranges, Cascade Range, northern Sierra Nevada, South Coast, San Bernardino Mountains, Modoc Plateau and Mojave Desert. The plant *Cirsium cymosum* (Greene) J. T. Howell is native to California, including two varieties. The Gray-green thistle, *C. cymosum* var. *canovirens* (Rydb.) D. J. Keil, is found in Sagebrush scrubland, grassland, woodland and open forest at elevations between 1350–2300 m throughout northern California, including the Modoc Plateau, and to Oregon, Montana and Wyoming. The Peregrine thistle, *C. cymosum* var. *cymosum* (Greene) J. T. Howell, is found in scrubland, woodland, open forest, meadows, and occasionally on serpentine, at elevations between 100–2100 m throughout northern California, to southern Oregon and northern Nevada, and from the Klamath Ranges, North Coast Ranges, Cascade Range, North and South of Sierra Nevada, San Francisco Bay Area and North of the Inner South Coast Ranges.




**FIGURES 54–58.** *Melanagromyza cirsiophila* Spencer, 1981. Male (Non-type, CNC). 54. habitus, lateral view; 55, 56. head, dorsal and lateral view; 57. thorax, dorsal view; 58. wing.




**FIGURES 59–61.** *Melanagromyza cirsiophila* Spencer, 1981. Male. 59. epandrial complex, posterolateral view (Non-type, CNC); 60, 61. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986). Scale 0.1 mm.

**Distribution.** USA (California (Map 5) [Los Angeles Co., Modoc Co.], Colorado, Nebraska), Costa Rica.

### *Melanagromyza corralensis* Spencer, 1981

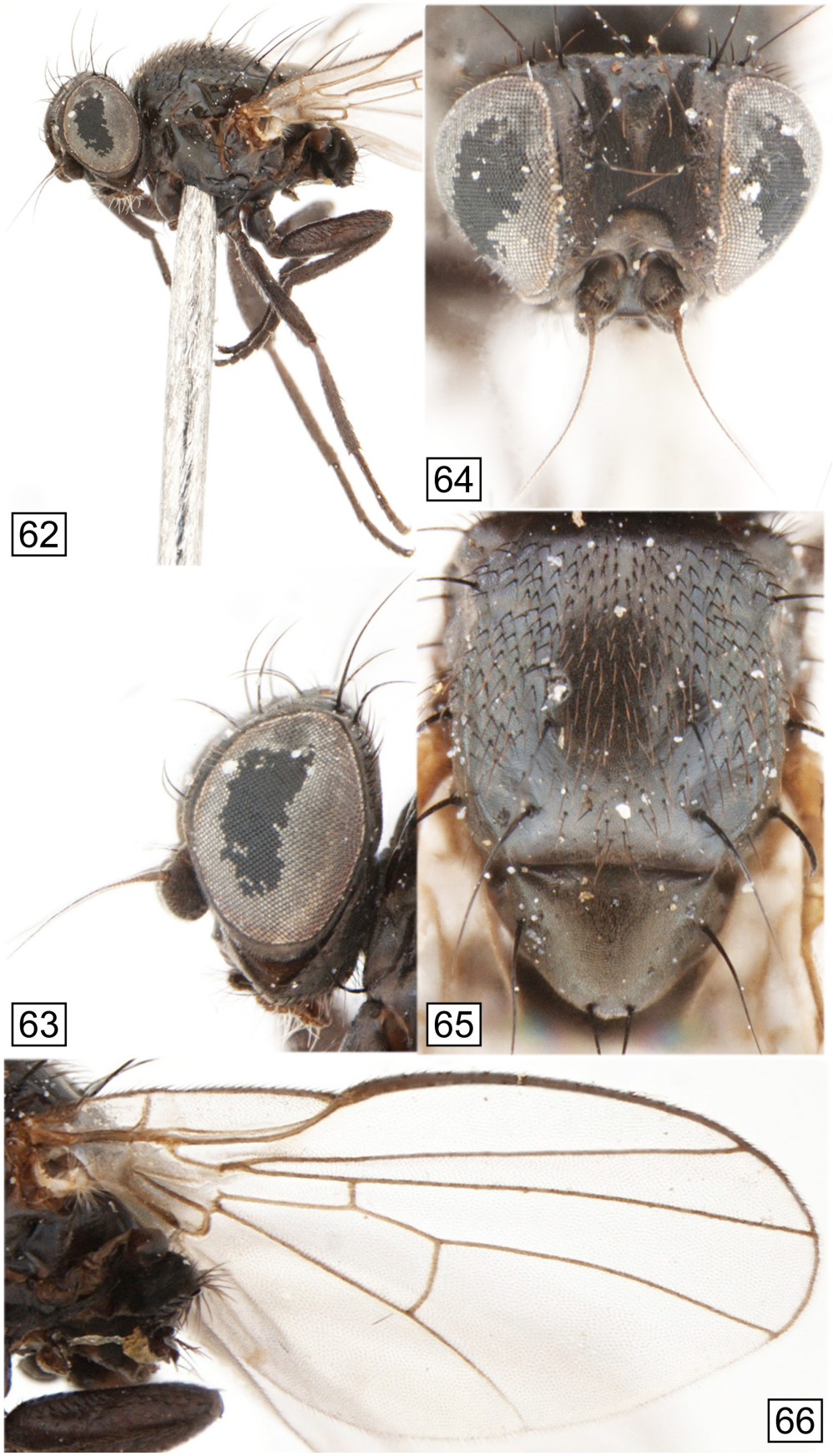
(Figs 62–70, Map 6)

*Melanagromyza corralensis* Spencer, 1981: 42. Type locality: USA. California: Los Angeles Co., Corral Canyon. HT ♂, USNM (see Lonsdale, 2011: 5). Spencer & Steyskal, 1986: 28.

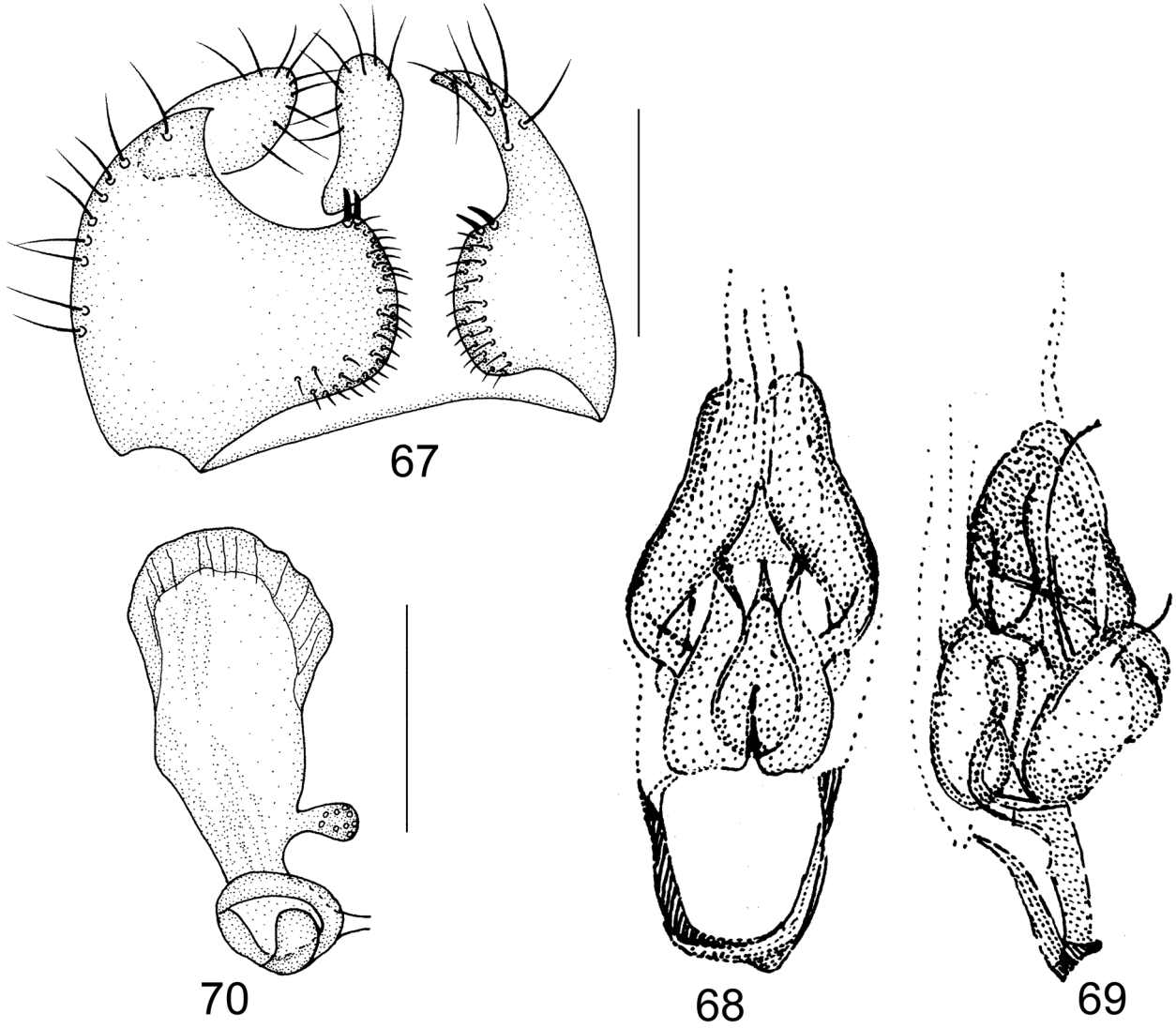
**Diagnosis.** Frons not projecting above eye, 1.6 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate, a large distance between 2 *ori*, fronto-orbital plate slightly wide at middle, moderately shining, about1/4 width of frons; fronto-orbital setulae in 2 rows, outer row erect or reclinate and inner row proclinate; ocellar triangle moderately greenish shining, extending to posterior *ori*. Gena about 1/5–1/4 height of eye, highest point located at middle. Eye pilose. Arista with microscopic setulae. Mesonotum with slightly greenish sheen, 0+2 *dc*. Calypter white, margin pale yellow and fringe white. Mid tibia with 2 strong posterior setae. Wing with costa extending to $M_{1+2}$. Abdomen blackish brown, with greenish sheen.

**Redescription.** MALE. Wing length 2.4 mm (Holotype).

Head (Figs. 63, 64) blackish brown. Frons not projecting above eye (Fig. 63), 1.1 times as wide as long, and 1.6 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate, anterior *ori* shorter than posterior *ori*, posterior *ori* slightly shorter than *ors*; a large distance between 2 *ori*, proportional distance between setae in the *ori-ors* series from anterior to posterior 3.3:1.3:1; fronto-orbital plate slightly widened at middle, moderately shining, about 1/4 width of frons; fronto-orbital setulae in 2 rows, outer row erect or reclinate and inner row proclinate; ocellar triangle moderately greenish shining, extending to posterior *ori*; *oc* strong, shorter than *ors*; postocellar setae strong. Lunule 0.13 mm high, 1.3 times as wide as high. Facial keel narrow, not raised. Gena about 1/5–1/4 height of eye, highest point located at middle. Eye pilose. Antennal 1st flagellomere short ovate, arista with microscopic setulae. Proboscis pale brown, palpus blackish brown.




**FIGURES 62–66.** *Melanagromyza corralensis* Spencer, 1981. Holotype male (USNM). 62. habitus, lateral view; 63, 64. head, lateral and dorsal view; 65. thorax, dorsal view; 66. wing.




**FIGURES 67–70.** *Melanagromyza corralensis* Spencer, 1981. Holotype male (USNM): 67. epandrial complex, posterolateral view; 68, 69. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 70. sperm pump. Scale 0.1 mm.

Thorax (Figs 62, 65) black. Mesonotum and scutellum with brownish pruinosity and slightly greenish seen. Mesonotum with 0+2 *dc*, *acr* in 8–10 irregular rows. 1 strong *anepst* with 2 long setulae; 1 strong *kepst* with 1 long setula. Calypter white, margin pale yellow and fringe white. Fore tibia without posterior setae, mid tibia with 2 strong posterior setae. Wing (Fig. 66) with costa extending to $M_{1+2}$; costal ratio 4:1:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.4:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.7. Halter blackish brown.

Abdomen blackish brown, with greenish sheen (greenish sheen more intense than on mesonotum (Spencer, 1981)). Male genitalia (Figs 67–70): enpandrium broad with a wide subapical triangular process and wide concavity below; surstylus with 2 strong apical spines and thinner setulae in 2 distal rows; basiphallus U-shaped, arms narrow, slightly diverging and curved ventrally; distiphallus with narrow basal sections and slightly truncate basal margin (Fig. 68), and with a pair of slender spinule-like projections (Fig. 69); ejaculatory apodeme slender, fan-shaped and asymmetrical.

FEMALE. Unknown.

**Type material.** Holotype male (USNM, male genitalia No. 4879): **CALIFORNIA, Los Angeles Co.**, Corral Canyon, 32°43′09.20″N 116°37′43.07″W, ex. caught in copula, on *Artemisia douglasii* [sic], 13.IV.1977, [collector not given].

**Biology/Host plants.** The only known potential host for this species is Mugwort / Douglas' sagewort, *Artemisia douglasiana* Besser (Asteraceae), from which adults have been collected. See Map 6 for the California distribution of *M. corralensis* and potential host plant *Artemisia douglasiana*. This plant species is native to California, common in open to shady areas, often being found in drainages at elevations lower than 2200 m throughout California, to Washington, Idaho, and to Mexico (Baja California). The plant is known from the California Floristic Province, Modoc Plateau and Northeast of Sierra Nevada.

**Distribution.** USA (California (Map 6) [Los Angeles Co.]).

### *Melanagromyza gibsoni* (Malloch, 1915)

(Figs 71–84, Map 7)

*Agromyza gibsoni* Malloch, 1915: 106. Type locality: USA. Arizona: Maricopa Co., Tempe. HT ♀, USNM.
*Melanagromyza gibsoni*: Frick, 1952: 378 (comb.); Shewell, 1953: 464; Frick, 1959: 364; Frick, 1965: 796; Spencer, 1981: 43 Spencer, 1982: 7; Spencer & Steyskal, 1986: 27; Benavent-Corai *et al.*, 2005: 29.

**Diagnosis.** Frons about 1.3 times as wide as eye, 2–3 *ori* inclinate and 2 *ors* reclinate; proportional distance between setae in the *ori-ors* series from anterior to posterior 2:3:2:1 (3:3:1 if only 2 *ori*); fronto-orbital plate moderately shining, about 1/5 frons width, not broader at middle; fronto-orbital setulae in 2 rows, reclinate; ocellar triangle moderately shining, reaching level of 2nd *ori* or between 2 *ori*. Gena broad, about 1/4–1/3 height of eye, highest point located at middle or slightly before middle. Eye densely pilose on dorsal margin. Arista bare. Mesonotum with greenish or bluish green sheen. Calypter white, margin and fringe white. Mid tibia with 1 strong posterior seta. Abdomen with blackish brown, greenish or bluish green sheen.

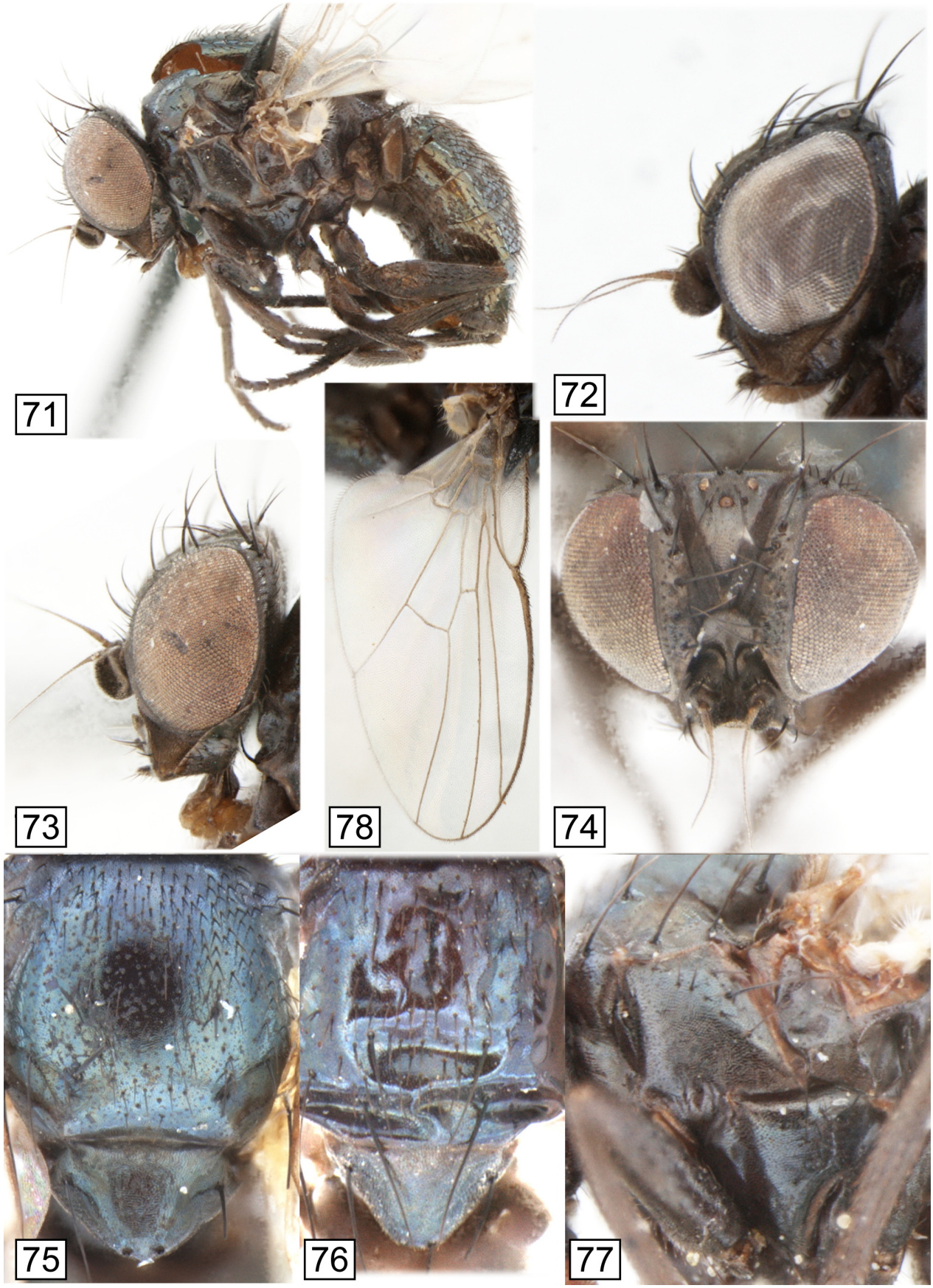
**Redescription.** MALE. Body length 1.4–1.8 mm, wing length 1.9–2.2 mm. FEMALE. Body length 1.7–2.0 mm, wing length 2.1–2.3 mm.

Head (Figs 72–74) blackish brown. Frons as long as wide, 1.3 times as wide as eye; 2–3 *ori* inclinate and 2 *ors* reclinate, *ori* shorter than *ors* and proportional distance between setae in the *ori-ors* series from anterior to posterior 2:3:2:1 (3:3:1 if only 2 *ori*); fronto-orbital plate moderatly shining, about 1/5 frons width, not broader at middle; fronto-orbital setulae in 2 rows, reclinate; ocellar triangle blackish brown, moderately shining, extending to 2nd *ori* or between 2 *ori*; *oc* strong, shorter than posterior *ors*; postocellar setae strong. Lunule brownish gray, 0.12 mm high, semicircular. Facial keel not raised. Gena broad, about 1/4–1/3 height of eye, highest point located at middle or slightly before middle. Eye densely pilose on dorsal margin. Antenna blackish brown, 1st flagellomere short ovate, arista brown, bare. Proboscis yellowish brown and palpus blackish brown.

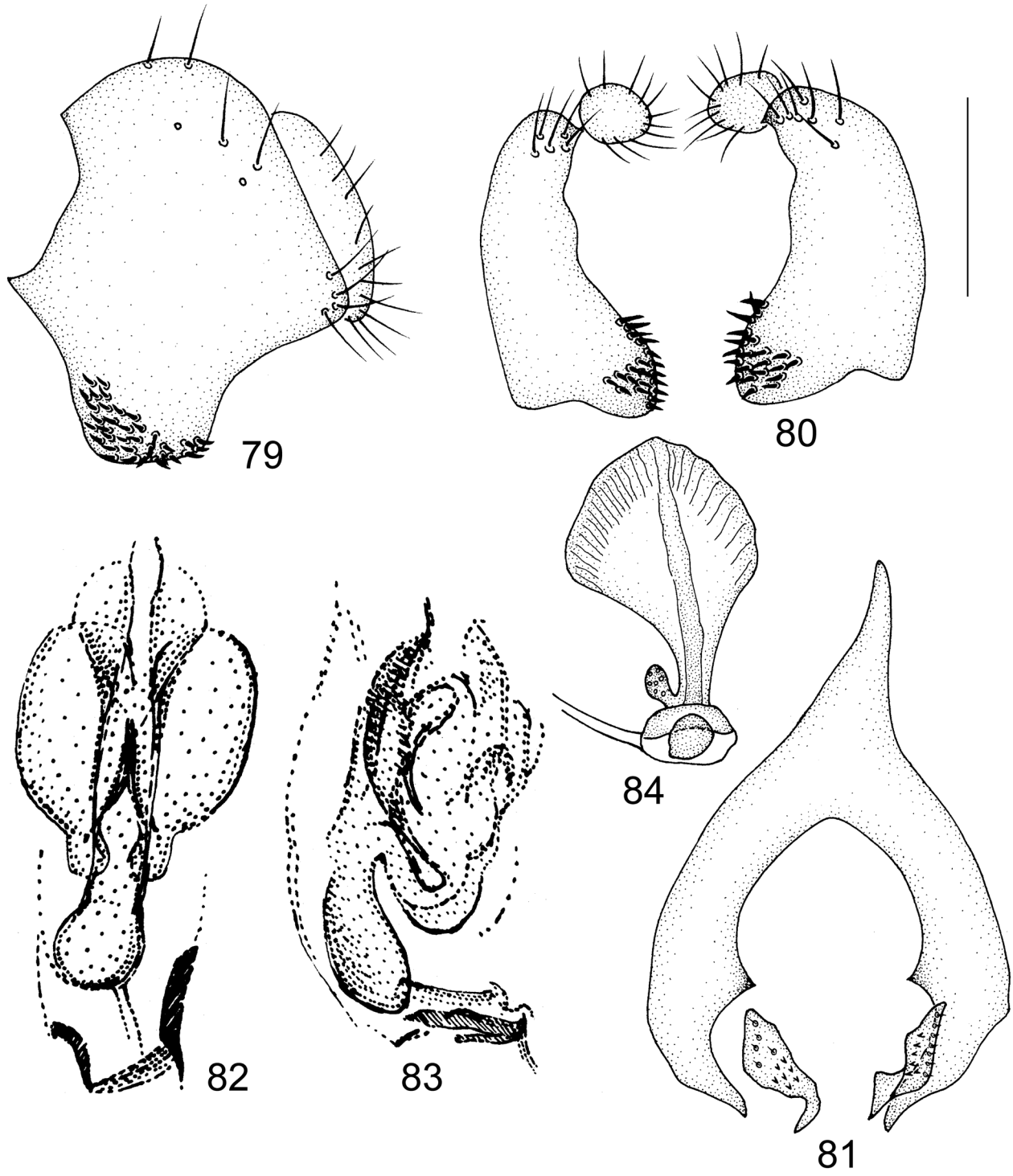
Thorax (Figs 71, 75–77) black. Mesonotum and scutellum with greenish or bluish green sheen (Figs 75, 76), with sparse brownish gray puinosity. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* and 1 strong *kepst* each with 1 long setula and sparse short setulae. Calypter white, margin and fringe white. Fore tibia without strong posterior setae, mid tibia with 1 strong posterior seta. Wing (Fig. 78) with costa extending to $M_{1+2}$; costal ratio 5:1:1; *r-m* nearly at apical 1/3 point of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.8:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.2. Halter blackish brown.

Abdomen (Fig. 71) blackish brown, with greenish or bluish green sheen. Male genitalia (Figs 79–84): epandrium with a distinct posterodistal concavity; surstylus with sparse short spines; hypandrium Y-shaped with pointed hypandrial apodeme; basiphallus U-shaped with arms curved outwards; distiphallus broad medially, semicircular apically; ejaculatory apodeme wide and fan-shaped with long stem.

**Non-type material. CALIFORNIA: Colusa Co.**, 1 male (UCD), Grimes, W. 3 mi., 39°04′27.62″N 121°46′23.87″W, 6.IX.1971, W.R. Cothran; **Fresno Co.**, 1 male (EMEC), Parker ranch, 8 mi SW Selma, 36°34′14.82″N 119°36′43.47″W, 3.V.1951, K.S. Hagen; **Imperial Co.**, 2 males (EMEC), 17 mi. NW Glamis, 32°59′36.64″N 115°03′55.08″W, 1.IV.1978, J. Powell (No. 7803, emerged 3.V., reared from legume); 1 female (UCD), Algodones Dunes, Coachella Canal Rd., 11.3 km NW Hwy 78, 18.1 km NW Glamis, 32°51′37.22″N 115°06′59.30″W, 30.V–3.VI.2008, Museum survey team bowl in dunes, Malaise 2008AL61; 3 males (CSCA), 3 mi. NW. Glamis, 32°59′36.64″N 115°03′55.08″W, ex. Malaise trap 8A-7P, 8–13.IV.1973, M.S. & J.S.Wasbauer; **Kings Co.**, 1 female (EMEC), 3 mi. W. Hardwick, Marshall Rch., 36°24′05.65″N 119°43′06.10″W, ex. sweeping from Alfalfa (*Medicago sativa*), 11.IX.1957, R.E. Smith & K.S. Hagen; **Merced Co.**, 1 male (EMEC), 2.5 mi. N. Ballico, Jones' ranch, 37°27′39.79″N 120°45′58.81″W, 1.III.1951, K.S. Hagen; **Sacramento Co.**, 1 female (UCD),




**FIGURES 71–78.** *Melanagromyza gibsoni* (Malloch, 1915). Male (Non-type, EMEC and CSCA). 71. habitus, lateral view; 72–74. head, lateral and dorsal view; 75–77. thorax, dorsal and lateral view; 78. wing.




**FIGURES 79–84.** *Melanagromyza gibsoni* (Malloch, 1915). Male (79–81, 84: Non-type, EMEC). 79, 80. epandrial complex, lateral and ventral view; 81. hypandrium and postgonite, ventral view; 82, 83. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 84. sperm pump. Scale 0.1 mm.

Sacramento, 38°34′53.66″N 121°29′39.84″W, 28.VII.1955, T.R. Haig; **San Bernardino Co.**, 1 male (UCD), Kramer Jct., S. 3 mi., 34°59′33.00″N 117°32′27.00″W, 6.IV.1966, R.O. Schuster; 1 male (UCD), Mountain Home, 34°14′32.76″N 117°15′34.29″W, 12.IX.1953, E.I. Schlinger; **San Diego Co.**, 1 female (UCD), Warner Springs Agua Caliente Creek, 33°17′00.65″N 116°38′04.47″W, elevation 3100 ft, ex. Malaise trap 8A-5P, 23–25.VIII.1980, M. Wasbauer & P. Adams; 1 female (UCD), La Jolla, 32°50′26.44″N 117°15′31.66″W, ex. Malaise trap 8A-5P, 18–19.VII.1979, K. Corwin & P. Adams; **Stanislaus Co.**, 1 female (EMEC), 2 mi. NW Westley, Cox Bros. Rch.,

37°32′57.75″N 121°11′56.77″W, 12.XII.1957, ex. sweeping from Alfalfa (*Medicago sativa*), 11.IX.1957, R.E. Smith & K.S. Hagen; **Tulare Co.**, 1 male, 7 females (CSCA), Tulare, 37°32′57.75″N 121°11′56.77″W, ex. swept from Alfalfa (*Medicago sativa*), 28.IX.1973, Thomas; **Yolo Co.**, 1 male (UCD), Woodland, W. 3 mi., 38°40′42.66″N 121°46′23.87″W, 30.VI.1972, W.R. Cothran & S.R. Sims; 1 male, 2 females (UCD), Woodland, S. W. 1 mi., 38°40′42.66″N 121°46′23.87″W, 30.VI.1972, W.R. Cothran & S.R. Sims; 2 males, 2 females (UCD), Woodland, 38°40′42.66″N 121°46′23.87″W, 28–30.VIII.1953, A.T. McClay; 1 female (UCD), Woodland, 38°40′42.66″N 121°46′23.87″W, 1.IX.1953, A.T. McClay; 1 female (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 26.VII.1970, [collector not given].

**Biology/Host plants.** Larvae of this species are internal stem borers on alfalfa, *Medicago sativa* L. (Fabaceae) (Spencer & Steyskal, 1986; Spencer, 1990). In California, it has been reared from alfalfa and from an unknown legume. See Map 7 for the California distribution of *M. gibsoni* and host plant *Medicago sativa*. This plant species, which is native to Eurasia, is naturalized in California, being found in the disturbed and agricultural areas at elevations lower than 2450 m throughout California, and is widely cultivated in the United States. The plant is known from the California Floristic Province, Great Basin Floristic Province, and Desert Mountains (Panamint Range).

**Distribution.** USA (California (Map 7) [Colusa Co.*, Fresno Co.*, Imperial Co., Kings Co., Merced Co.*, Sacramento Co.*, San Bernardino Co.*, San Diego Co.*, Stanislaus Co., Tulare Co., Yolo Co.], Arizona, Colorado, Texas), Chile.

### *Melanagromyza gnaphalii* Spencer, 1981

(Figs 85–91, Map 8)

*Melanagromyza gnaphalii* Spencer, 1981: 45. Type locality: USA. California: Santa Cruz Co., Aptos. HT ♂, CAS. Spencer & Steyskal, 1986: 28; Benavent-Corai, 2005: 29.

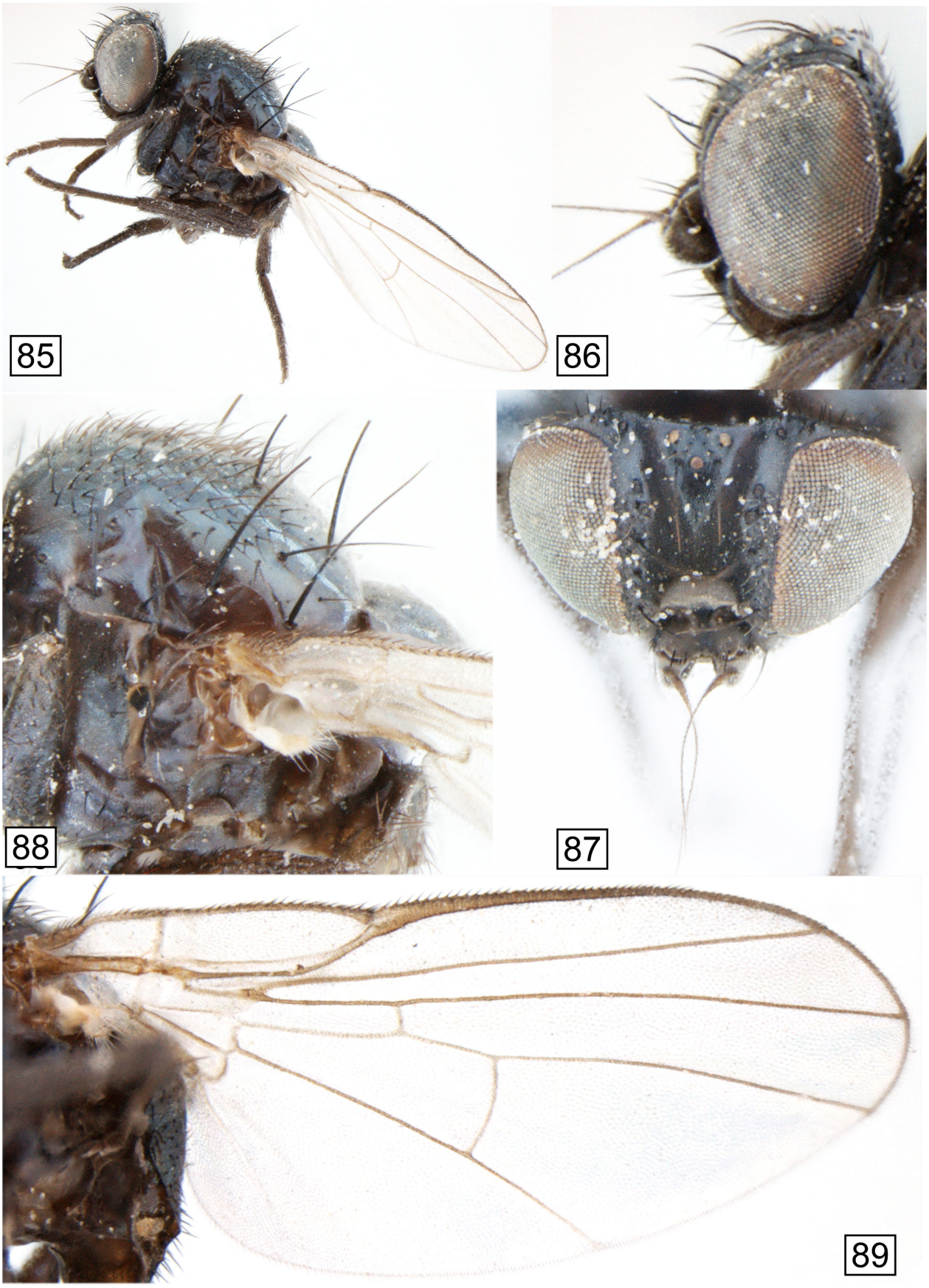
**Diagnosis.** Frons not projecting above eye, 1.4 times as wide as eye; 2–3 *ori* inclinate, and 2 *ors* (likely reclinate); fronto-orbital plate weakly shining, slightly broader at middle, about 1/4 width of frons; fronto-orbital setulae in 2 rows, inner row proclinate or inclinate and outer row reclinate; ocellar triangle slender, extending to posteriormost *ori*, slightly bluish green shining. Gena about 1/6 height of eye, highest point located at middle. Eye pilose. Arista bare. Mesonotum with slightly greenish sheen, 0+2 *dc*. Calypter white, margin pale yellow and fringe white. Mid tibia with 2 strong posterior setae. Abdomen blackish brown, with greenish sheen.

**Redescription.** MALE. Wing length 2.1 mm (Holotype).

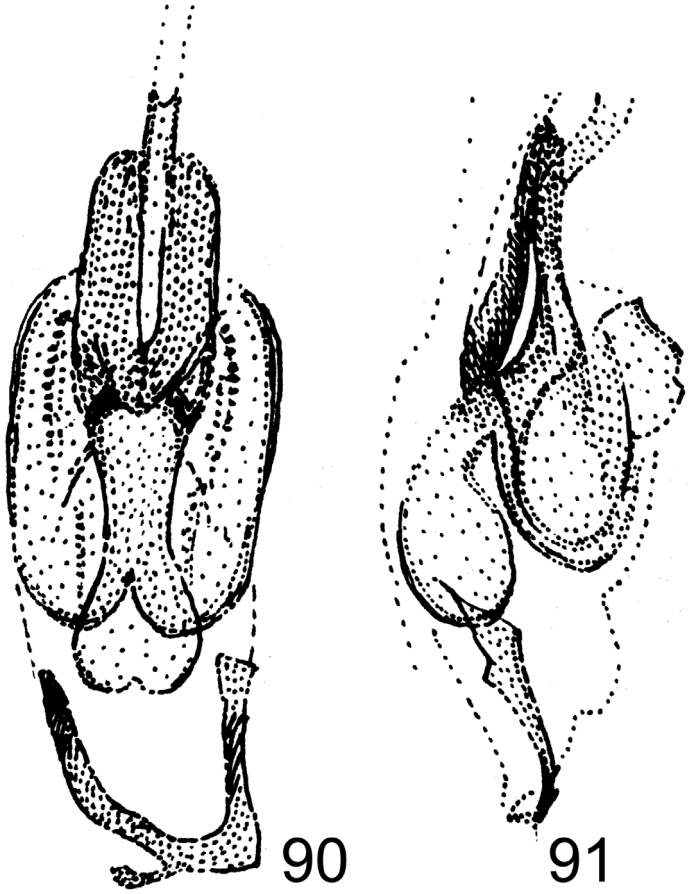
Head (Figs 86, 87) blackish brown. Frons dark, not projecting above eye (Fig. 86), slightly wider than long, 1.4 times as wide as eye; 2–3 *ori* inclinate and 2 *ors* (likely reclinate, but all broken off); proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal, except 2 *ors* closer together; fronto-orbital plate weakly shining, slightly broader at middle, about 1/4 width of frons; fronto-orbital setulae in 2 rows, inner row proclinate or inclinate and outer row reclinate; ocellar triangle slender, extending to posteriormost *ori*, slightly bluish green shining; *oc* strong, nearly as long as anterior *ori*; postocellar setae missing. Lunule brownish gray, 0.18 mm high, 1.3 times as wide as high. Gena narrow, about 1/6 height of eye, highest point located at middle. Eye pilose. Antenna brownish gray, 1st flagellomere short ovate with long setulae, and arista bare. Proboscis yellowish brown, palpus black.

Thorax (Figs 85, 88) blackish brown. Mesonotum and scutellum with brownish pruinosity and slight greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* with 1 long setula, 1 *kepst* with 2–3 short setulae. Calypter white, margin pale yellow and fringe white. Fore tibia without posterior setae and mid tibia with 2 strong posterior setae. Wing (Fig. 89) with costa extending to $M_{1+2}$; costal ratio 5:1.5:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.5:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.5. Halter brown.

Abdomen blackish brown, with greenish sheen. Male genitalia (90, 91): basiphallus U-shaped with lateral arms slightly extending outward; distiphallus with a tiny basal incision, median section broad, apical section narrow with curved apex.




**FIGURES 85–89.** *Melanagromyza gnaphalii* Spencer, 1981. Holotype male (CAS). 85. habitus, lateral view; 86, 87. head, lateral and dorsal view; 88. thorax, lateral view; 89. wing.




**FIGURES 90–91.** *Melanagromyza gnaphalii* Spencer, 1981. Holotype male (CAS): 90, 91. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986).

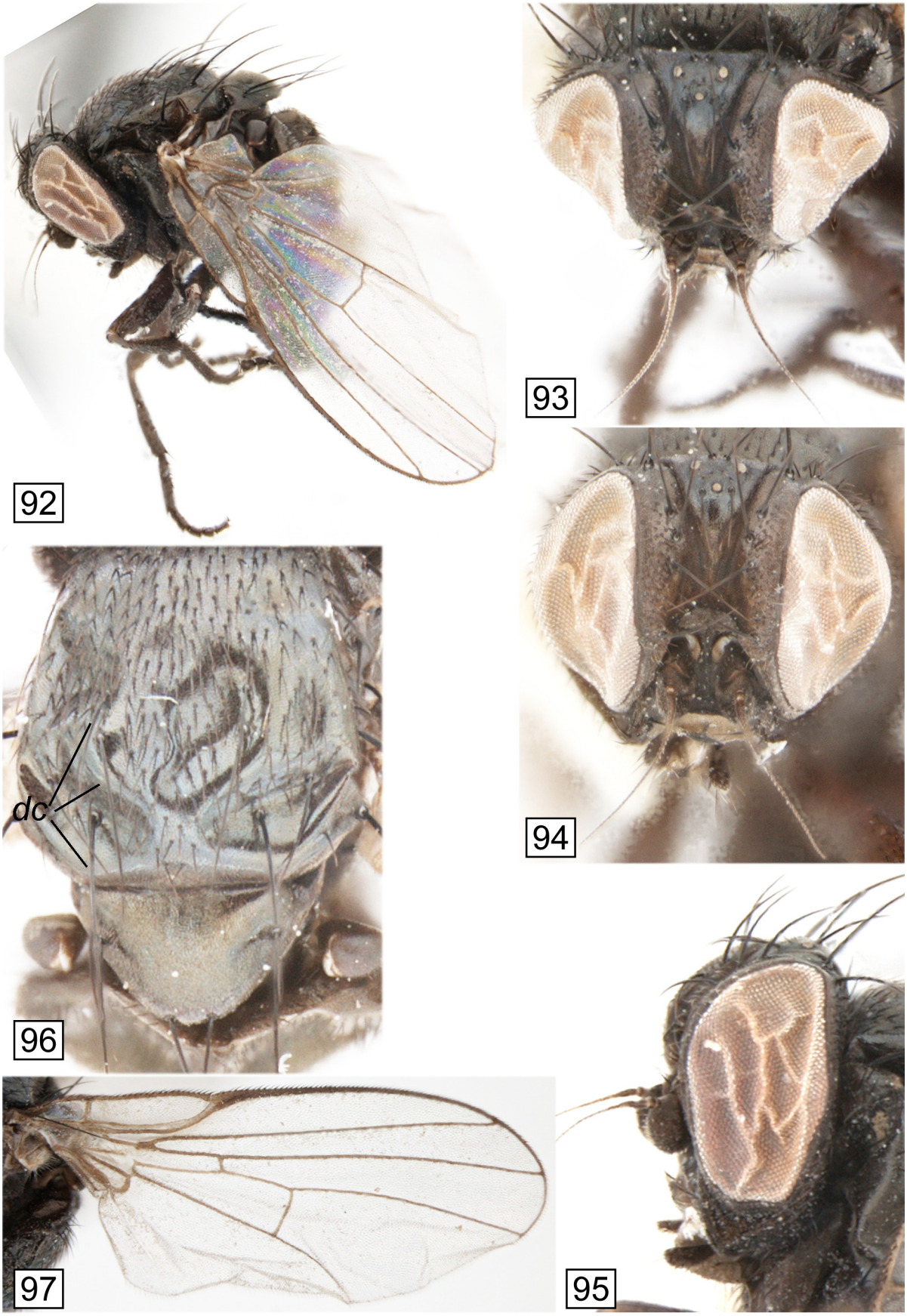
**Type material.** Holotype male (CAS Type No. 13945, male genitalia No. 4701, damaged): **CALIFORNIA: Santa Cruz Co.**, Aptos, 36°58′36.19″N 121°53′54.00″W, ex. larva, *Gnaphalium leucocephalum* Nutt. Lot No. 146-224, IX.1948, K.E. Frick.

**Biology/Host plants.** Larvae of this species are internal stem borers on White rabbit-tobacco / white cudweed, *Pseudognaphalium leucocephalum* (A. Gray) Anderb. (Asteraceae) and Canadian horseweed, *Erigeron canadensis* L. (Asteraceae) (Spencer, 1981; Spencer & Steyskal, 1986; Spencer, 1990), both of which are native to California. See Map 8 for the California distribution of *M. gnaphalii* and host plants *Erigeron canadensis* and *Pseudognaphalium leucocephalum*. The plant *Erigeron canadensis* L. is found in disturbed places at elevations lower than 2300 m throughout California, north to British Columbia, through much of North America, Central America and is introduced elsewhere. The plant *Pseudognaphalium leucocephalum* (A. Gray) Anderb. is found in the sandy or gravelly benches, and dry stream and canyon bottoms at elevations below 500 m throughout California, to Arizona, New Mexico, and Mexico, and is known from the South Coast, San Bernardino Mountains and Peninsular Ranges.

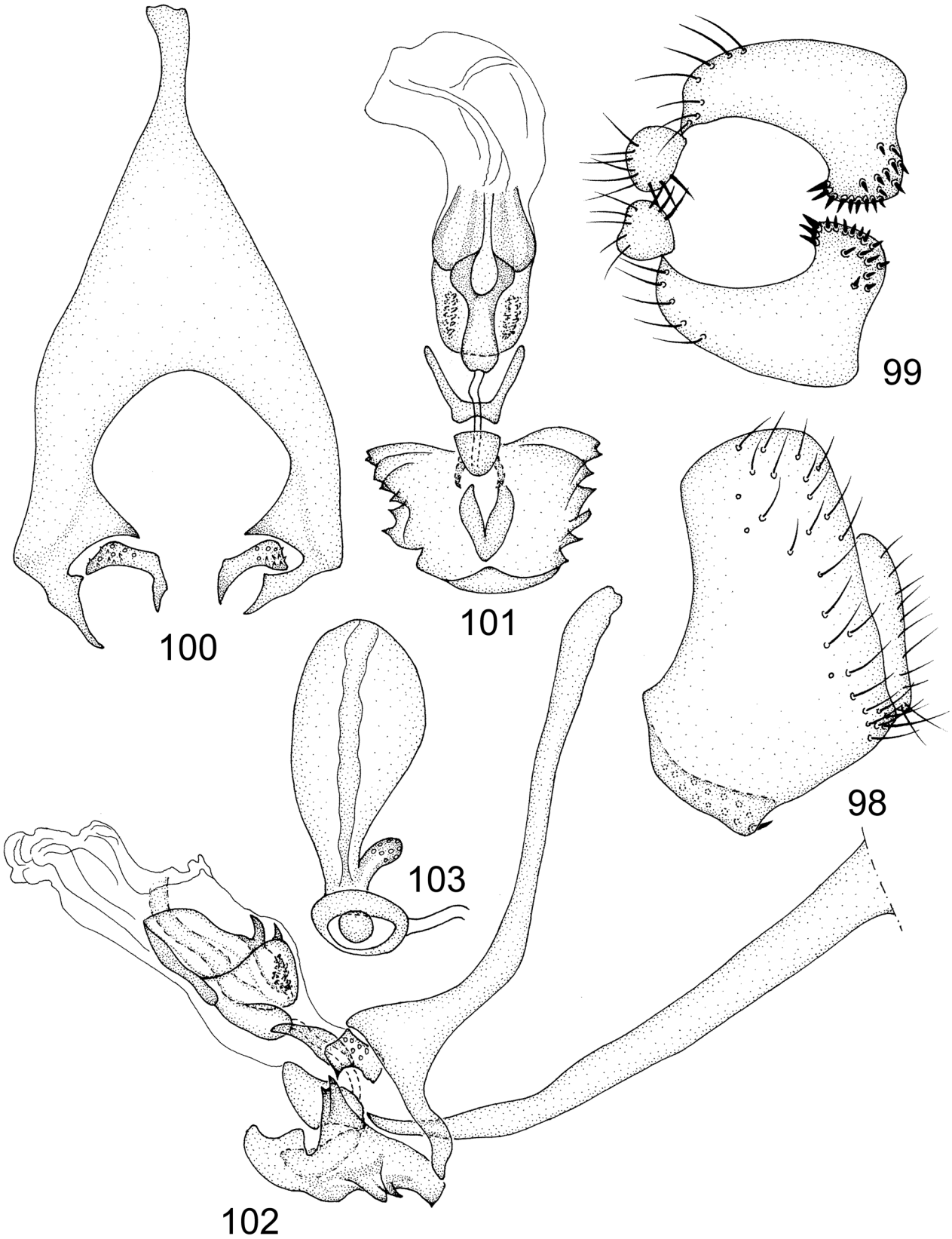
**Distribution.** USA (California (Map 8) [Riverside Co., Santa Cruz Co.]).

***Melanagromyza gonzalesina* sp. nov.**
(Figs 92–103, Map 3)

**Diagnosis.** Frons with 2 *ori* inclinate and crossed, and 2 *ors* reclinate; proportional distance between setae in the *ori-ors* series from anterior to posterior 5:1.5:1; fronto-orbital plate slightly shining, about 1/4–1/3 width of frons, broader at middle; fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate. Gena about 1/5 –1/4 height of eye, highest point located near anterior margin. Eye pilose. Mesonotum and scutellum with slightly greenish sheen. Mesonotum with 0+3 *dc*. Calypter white to pale yellow, mid tibiae with 2 strong posterior setae. Abdomen blackish brown with distinct greenish sheen.




**FIGURES 92–97.** *Melanagromyza gonzalesina* **sp. nov.** Holotype male (CSCA). 92. habitus, lateral view; 93–95. head, dorsal and lateral view; 96. thorax, dorsal view; 97. wing. Abbreviation: *dc*—dorsocentral setae.




**FIGURES 98–103.** *Melanagromyza gonzalesina* **sp. nov.** Holotype male (CSCA). 98, 99. epandrial complex, lateral and ventral view; 100. hypandrium and postgonite, ventral view; 101, 102. phallic complex, ventral and lateral view; 103. sperm pump. Scale 0.1 mm.

**Redescription.** MALE. Body length 1.9–2.1 mm, wing length 2.3–2.4 mm. FEMALE. Body length 2.0 mm, wing length 2.5 mm.

Head (Figs 93–95) black. Frons brown to blackish brown, 1.2 times longer than wide, about 1.5 times as wide as eye; 2 *ori* inclinate and crossed, 2 *ors* reclinate; proportional distance between setae in the *ori-ors* series from anterior to posterior 5:1.5:1; fronto-orbital plate slightly shining, about 1/4–1/3 width of frons, slightly broader at middle (Figs 93, 94); fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate; ocellar triangle slightly bluish shining, extending to posterior *ori*. Lunule grayish brown, 0.08 mm high, 1.5 times as wide as high. Gena brown, about 1/5–1/4 height of eye, highest point located near anterior margin. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate, arista brown, bare. Proboscis brownish yellow and palpus black.

Thorax (Figs 92, 96) black. Mesonotum and scutellum with brown pruinosity and slight greenish sheen. Mesonotum with 0+3 *dc* (distance between transverse suture and anteriormost *dc*, and transverse suture and scutoscutellar suture in proportion of 1:4) (Fig. 96), *acr* in 8 irregular rows. 1 strong *anepst* with 2 long setulae, 1 *kepst* with 1 long setulae. Calypter white, margin and fringe white to pale yellow. Mid tibia with 2 strong posterior setae. Wing (Fig. 97) with costa extending to $M_{1+2}$; costal ratio 3.7:1:1; *r-m* at middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.3:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.8. Halter blackish brown.

Abdomen blackish brown, with greenish sheen. Male genitalia (Figs 98–103): epandrium broad with straight apical margin and a distinct posterodistal concavity; surstylus with sparse short spines along apical margin, several posterior spines stronger; hypandrium with short hypandrial apodeme; basiphallus U-shaped, arms divergent, with ends tapered; distiphallus curved apically with two pairs of triangular dorsal processes (Fig. 102); ejaculatory apodeme narrow and fan-shaped with long stem.

**Type material.** Holotype male (CSCA): **CALIFORNIA: Monterey Co.**, Gonzales, 36°30′23.86″N 121°26′39.77″W,, ex swept vegetation, 12.III.1980, L. Oliver. Paratypes: **Alameda Co.**, 1 male (CSCA), Dublin, 37°42′07.75″N 121°56′08.85″W, 30.X.1954, J.C. Downey; **Monterey Co.**, 2 males, 1 female (CSCA), same data as holotype

**Biology/Host plants:** Unknown.

**Distribution.** USA (California (Map 3) [Alameda Co., Monterey Co.]).

**Remarks.** The new species is easily separated from other Nearctic *Malanagromyza*, with the following combination of characters: frons not projecting above eye, fronto-orbital plate with 2 *ori* and 2 *ors*, with proportional distance between setae in the *ori-ors* series from anterior to posterior 5:1.5:1; mesonotum with 0+3 *dc* (distance between transverse suture and anteriormost *dc*, and transverse suture and scutoscutellar suture in proportion of 1:4); basiphallus U-shaped with arms strongly diverging; distiphallus curved apically, and with two pairs of triangular dorsal processes.

**Etymology.** The new species is named after the type locality Gonzales, in Monterey County, California.

### *Melanagromyza malevola* Spencer, 1981

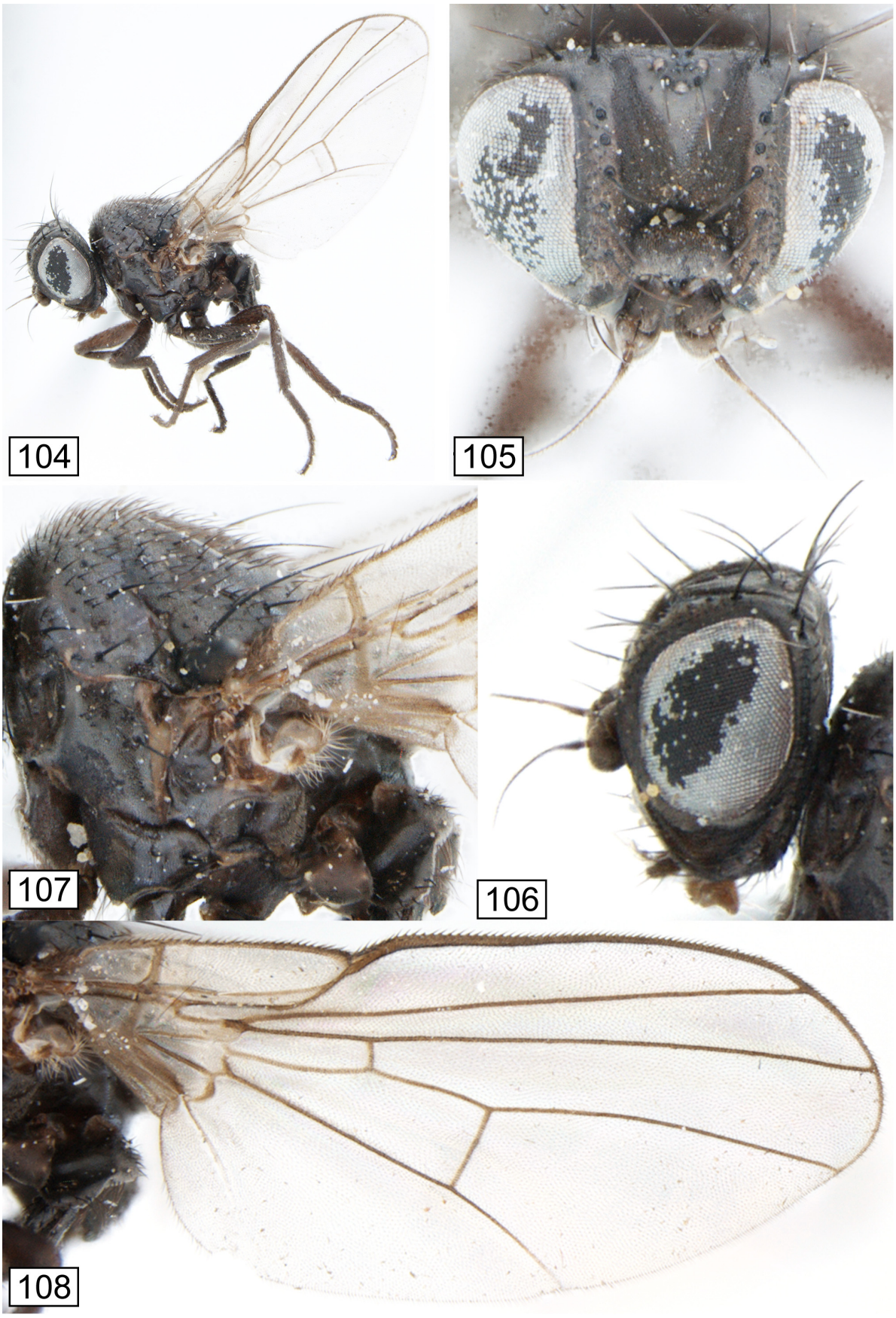
(Figs 104–114, Map 2)

*Melanagromyza malevola* Spencer, 1981: 47. Type locality: USA. California: Ventura Co., mouth of Ventura River. HT ♂, CAS. Spencer & Steyskal, 1986: 31.

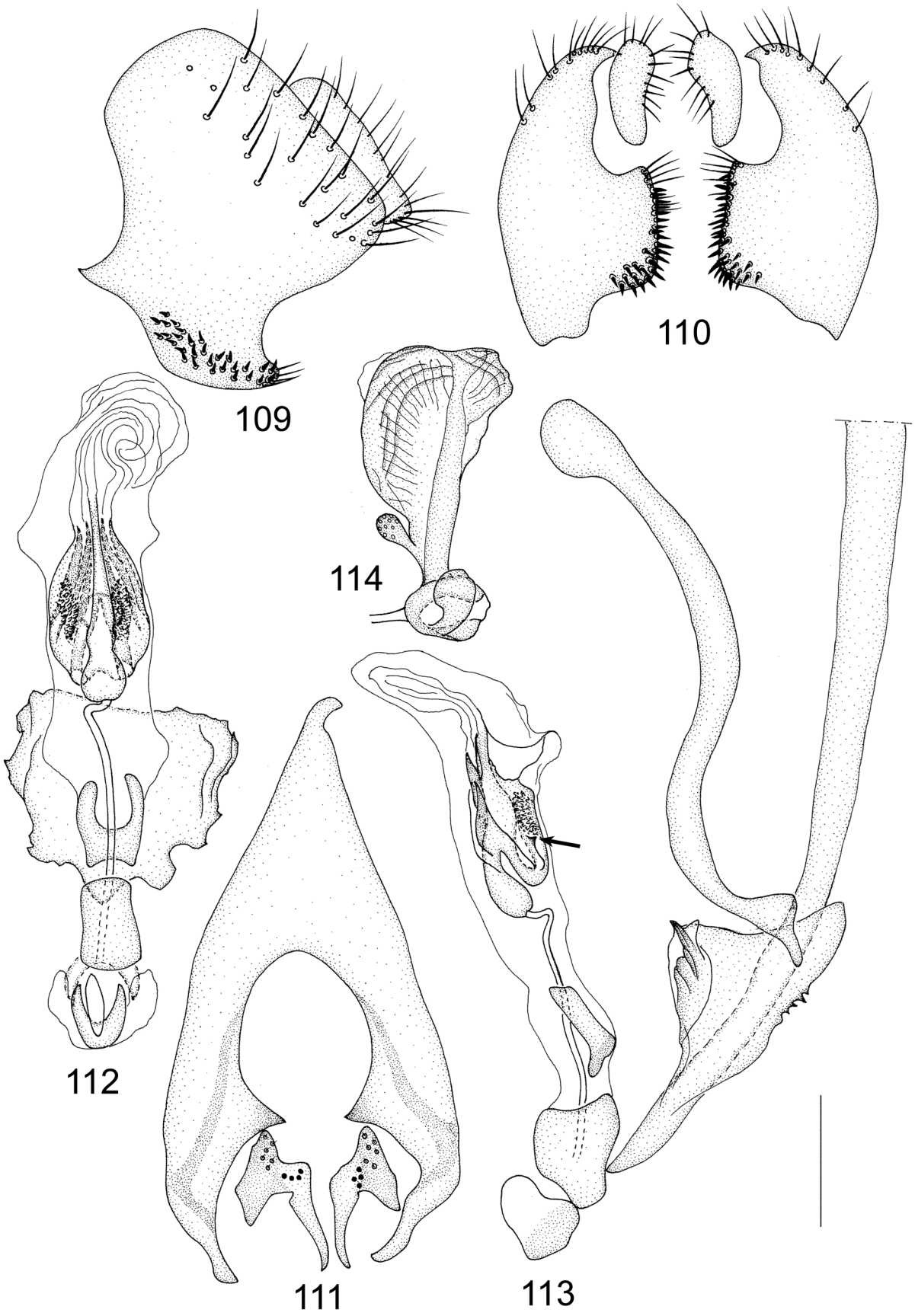
**Diagnosis.** Frons about 1.75 times as wide as eye; 3 *ori* inclinate with anteriormost *ori* crossed, and 2 *ors* reclinate, proportional distance between setae in the *ori-ors* series subequal; fronto-orbital plate not shining, about 1/5 width of frons, anterior margin broad with dense setulae; fronto-orbital setulae in 3 rows; ocellar triangle slightly shining and extending to anterior *ors*. Gena about 1/3 height of eye, highest point located at middle. Mesonotum with very slight greenish sheen, 0+2 *dc*. Calypter gray, margin and fringe brown. Mid tibia with 2 strong posterior setae. Abdomen black with slight greenish sheen.

**Redescription.** MALE. Wing length 2.6 mm (Holotype).

Head (Figs 105, 106) mostly blackish brown. Frons dark brown with anterior margin black, projecting above eye (Fig. 106), 1.2 times as wide as long, 1.75 times as wide as eye; 3 *ori* inclinate and 2 *ors* reclinate, *ori* and *ors* strong with anterior *ors* slightly longer than posterior *ors* and other *ori*; proportional distance between setae in the *ori-ors* series subequal; fronto-orbital plate dark, not shining and brownish yellow along inner margin, about 1/5 width of frons; fronto-orbital setulae in 3 rows, proclinate except anterior margin with a few inclinate, and anterior margin of frons with dense setulae; ocellar triangle slightly shining and only extending to anterior *ors*; *oc* strong, as




**FIGURES 104–108.** *Melanagromyza malevola* Spencer, 1981. Holotype male (CAS). 104. habitus, lateral view; 105, 106. head, dorsal and lateral view; 107. thorax, dorsal view; 108. wing.




**FIGURES 109–114.** *Melanagromyza malevola* Spencer, 1981. Holotype male (CAS). 109,110. epandrial complex, lateral and ventral view; 111. hypandrium and postgonite, ventral view; 112, 113. phallic complex, ventral and lateral view; 114. sperm pump. Scale 0.1 mm.

long as *ori* and posterior *ors*; postocellar setae strong. Lunule grayish brown, 0.15 mm high, slightly higher than wide. Parafacial black, thin under eye. Gena yellowish brown, about 1/3 height of eye, highest point located at middle. 1 strong vibrissa. Eye pilose. Antenna black, 1st flagellomere short ovate and arista bare. Proboscis yellowish brown, palpus black.

Thorax (Figs 104, 107) black. Mesonotum and scutellum with brownish pruinosity and slight greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* and 1 strong *kepst*, each with 1 long setula. Calypter gray, margin and fringe brown. Fore tibia without strong posterior seta and mid tibia with 2 strong posterior setae. Wing (Fig. 108) with costa extending to $M_{1+2}$; costal ratio 3:1:1; *r-m* at or slightly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.6:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.4. Halter blackish brown.

Abdomen black with slightly greenish sheen. Male genitalia (Figs 109–114): epandrium with a small apical concavity; surstylus with short spines in 2–3 rows and 4–5 long setulae anteriorly; hypandrium V-shaped, with very short hypandrial apodeme; basiphallus U-shaped, basal section thick and lateral arms short, slightly incurved; distiphallus with a small subbasal tooth present, and apical membranous section slightly curved; ejaculatory apodeme broad and asymmetrical with long stem.

FEMALE. Unknown.

**Type material.** Holotype male (CAS, No. 14067, male genitalia No. 4716): **CALIFORNIA: Ventura Co.**, mouth of Ventura River, 34°22′38.81″N 119°18′28.03″W, 24.IV.1966, J.A. Powell. Paratype: **CALIFORNIA: Tulare Co.**, 1 male (EMEC, male genitalia No. 4717), 2 mi E. of Johnson Dale, 36°08′08.03″N 118°51′34.85″W, 2.V.1964, J.A. Powell.

**Non-type material. CALIFORNIA: Siskiyou Co.**, 1 male (EMEC), Ash Creek Rar. Sta., 9 mi E McCloud, 41°15′32.08″N 122°05′08.13″W, elevation 3500 ft, ex. flight trap, 7–9.VI.1974, L. Green.

**Biology/Host plants:** Unknown.

**Distribution.** USA (California (Map 2) [Alameda Co., Siskiyou Co., Tulare Co., Ventura Co.]).

### *Melanagromyza maligna* Spencer, 1981

(Figs 115–122, Map 1)

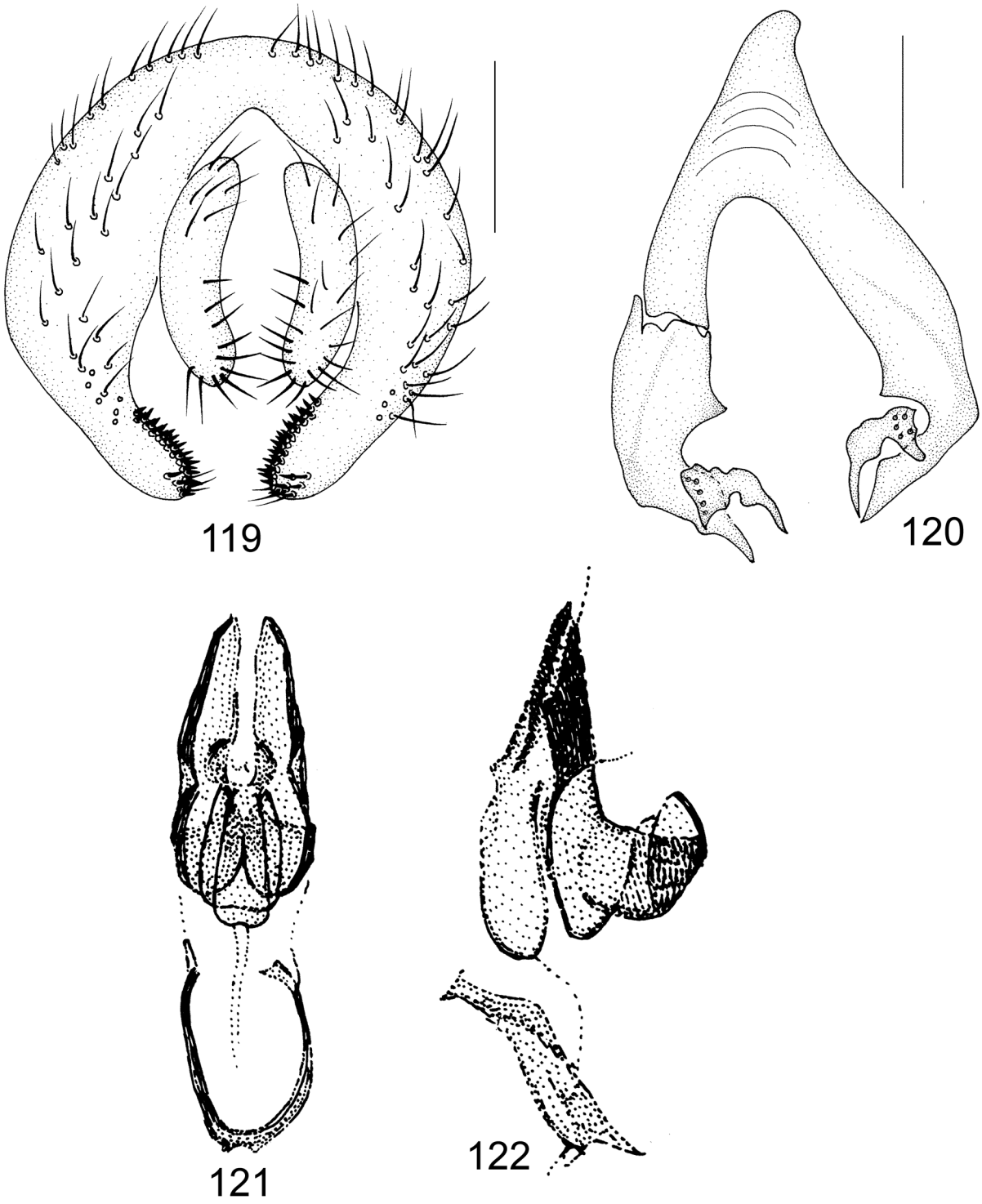
*Melanagromyza maligna* Spencer, 1981: 49. Type locality: USA. California: Marin Co., Fort Cronchite. HT ♂, CAS. Spencer & Steyskal, 1986: 30.

**Diagnosis.** Frons distinctly projecting above eye, about 1.9 times as wide as eye; 3 *ori* inclinate and 2 *ors* reclinate (anterior one slightly inclinate); fronto-orbital plate slightly shining, about 1/4 width of frons; fronto-orbital setulae in 2 rows, inner row inclinate and outer row erect or reclinate; ocellar triangle broad, weakly shining, extending to anterior margin of frons. Gena broad, about 1/3 height of eye, highest point located at middle. Eye pilose. Arista microscopic pubescent. Mesonotum with brownish pruinosity, scarcely shining; 0+2 *dc*. Calypter gray, margin black and fringe blackish brown. Mid tibia with 2 weak posterior setae. Abdomen blackish brown with slight greenish sheen.

**Redescription.** MALE. Wing length 2.2 mm (Holotype).

Head (Figs 115, 116) blackish brown. Frons distinctly projecting above eye (Fig. 115), with 1.3 times as wide as long, 1.9 times as wide as eye; 3 *ori* inclinate and 2 *ors* reclinate (anterior one slightly inclinate), anterior *ori* very short (about 1/2 length of third *ori*), fourth *ori* slightly shorter than anterior *ors*; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 2.5:1.3:1.3:1; fronto-orbital plate slightly shining, about 1/4 width of frons; fronto-orbital setulae in 2 rows, inner row inclinate (reclinate in Spencer, 1981) and outer row reclinate except anterior margin with a few erect; ocellar triangle broad, sides parallel on posterior half, almost extending to anterior margin of frons, at most very slightly shining on median area; *oc* strong, nearly as long as anterior *ors*; postocellar setae strong. Lunule brownish gray, broad and slightly bulging, and 0.18 mm high, 1.2 times as wide as high. Parafacial brownish black, about 1/6 height of eye. Gena broad, about 1/3 eye height, highest point located at middle. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate, and arista microscopic pubescent. Proboscis yellowish brown, palpus blackish brown.


**FIGURES 115–118.** *Melanagromyza maligna* Spencer, 1981. Holotype male (CAS). 115. habitus, lateral view; 116. head, dorsal view; 117. thorax, lateral view; 118. wing.




**FIGURES 119–122.** *Melanagromyza maligna* Spencer, 1981. Holotype male (CAS): 119. epandrial complex, posterior view; 120. hypandrium and postgonite, ventral view; 121, 122. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986). Scale 0.1 mm.

Thorax (Figs 115, 117) blackish brown. Mesonotum and scutellum with brownish pruinosity, scarcely shining. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* and 1 strong *kepst* each with 1 long setula. Calypter gray, margin black and fringe blackish brown. Fore tibia without posterior setae and mid tibia with 2 weak posterior setae. Wing (Fig. 118) with costa extending to $M_{1+2}$; costal ratio 5:1.5:1; *r-m* nearly at apical 1/3 of distal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.7:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.2. Halter blackish brown.

Abdomen blackish brown with slight greenish sheen. Male genitalia (Figs 119–122): surstylus with dense short spines and 3 long apical setulae; hypandrium nearly V-shaped, with short broad hypandrial apodeme; basiphallus U-shaped with lateral arms narrower apically and slightly curved; distiphallus with a large posterodorsal extension.

**Type material.** Holotype male (CAS Type No. 14068, male genitalia No. 4719): **CALIFORNIA: Marin Co.**, Fort Cronchite, 37°49′57.13″N 122°31°57.59″W, 3.III.1962, C.A. Toschi.

**Biology/Host plants:** Unknown.

**Distribution.** USA (California (Map 1) [Marin Co.]).

### *Melanagromyza marinensis* Spencer, 1981

(Figs 123–132, Map 9)

*Melanagromyza marinensis* Spencer, 1981: 49. Type locality: USA. California: Marin Co., Mill Valley. HT ♂, CAS. Spencer & Steyskal, 1986: 29; Benavent-Corai, 2005: 29.

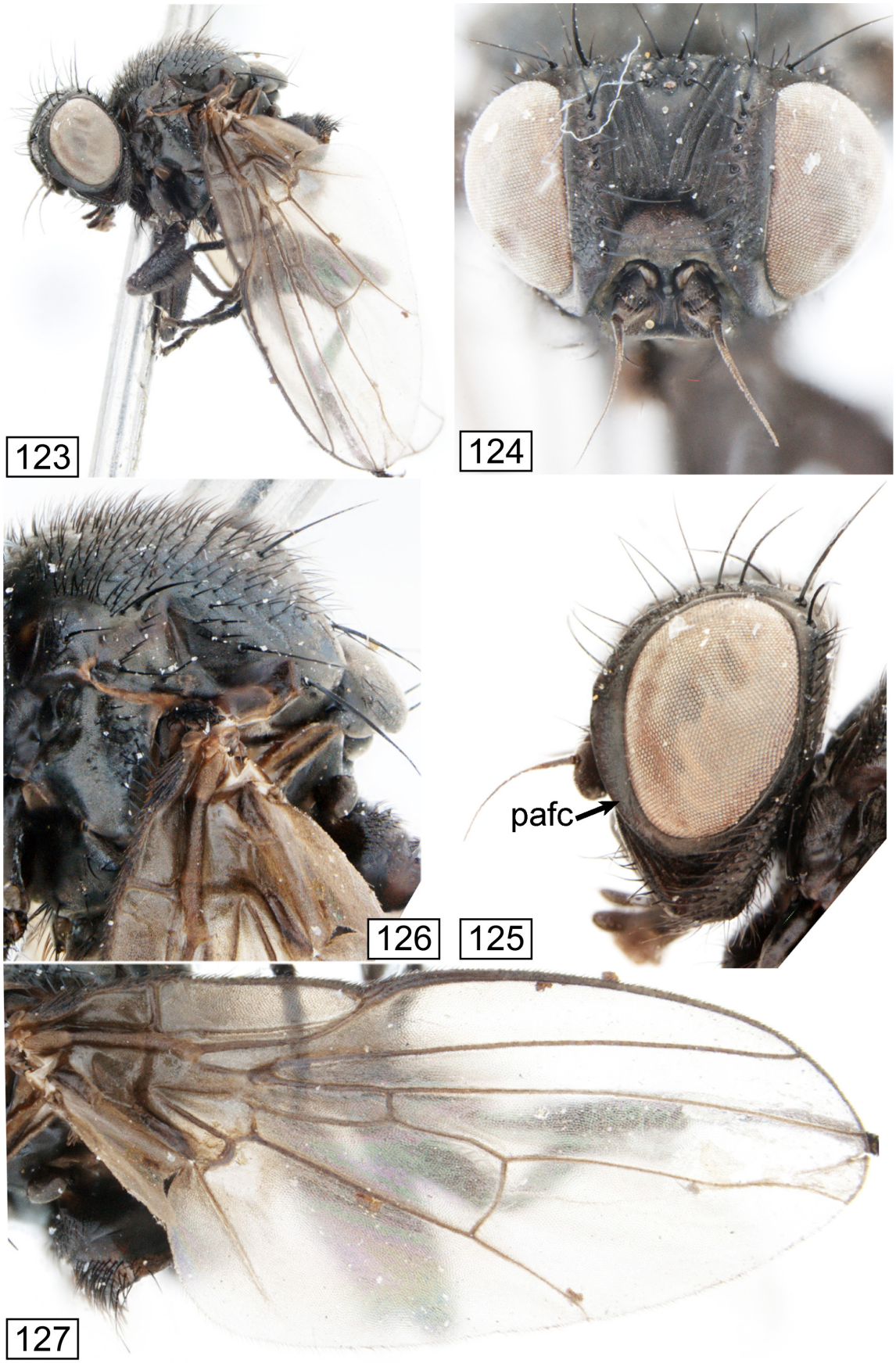
**Diagnosis.** Frons distinctly projecting above eye, about 1.9 times as wide as eye; 6 *ori* inclinate and 2 *ors* reclinate; fronto-orbital plate dark in male, yellowish or blackish brown and slightly shining in female, and anterior margin with dense setulae, about 1/5 width of frons; fronto-orbital setulae in 3–4 rows, erect or reclinate except for several irregular inclinate or proclinate; ocellar triangle dark and broad, extending to anterior margin of frons in male, while slightly shining and small in female. Facial keel slightly raised, dividing bases of antennae; parafacial black with sparse white pruinosity on upper margin in male and yellowish brown in female. Gena about 1/3 height of eye, highest point located at middle. Eye pilose. Arista bare. Mesonotum with slightly greenish sheen in male and more coppery sheen in female. Mesonotum with 0+2 *dc*. Calypter gray, margin black and fringe blackish brown. Mid tibia with 1 strong posterior seta in male and 1–2 strong posterior setae in female. Abdomen black with slightly greenish sheen in male.

**Redescription.** MALE. Body length 3.2–3.4 mm, wing length 3.4–3.7 mm (body length 2.5 mm and wing length 2.7 mm from one specimen in CSCA). FEMALE. Body length 3.4–4.3 mm, wing length 3.8–4.3 mm.

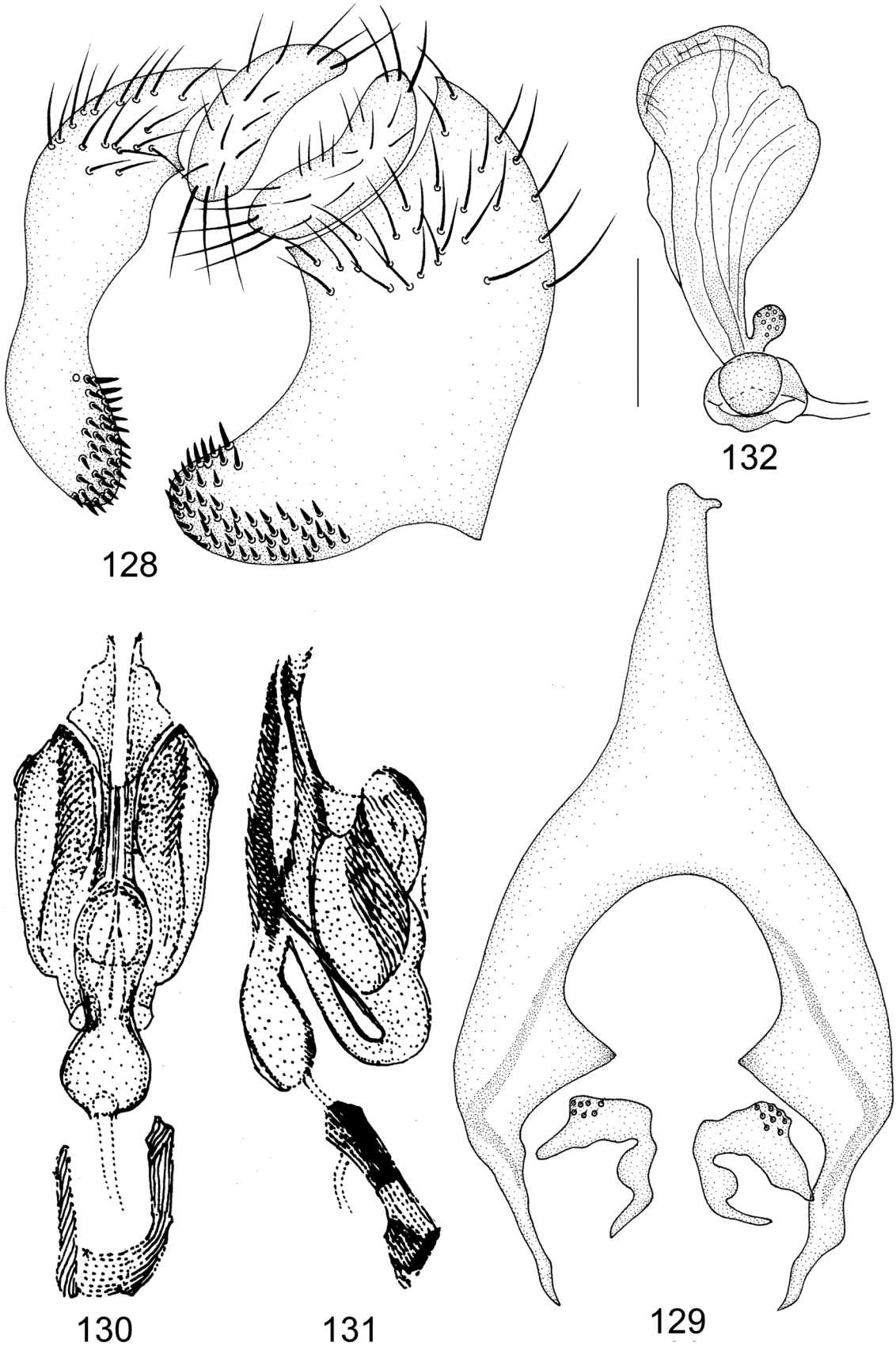
Head (Figs 124, 125) black. Frons distinctly projecting above eye, 1.25 times as wide as long, 1.9 times as wide as eye, and dark in male and brown except black anterior margin in female; 6 *ori* inclinate (posteriormost *ori* slightly erect) and 2 *ors* reclinate, *ori* and *ors* with almost same length; fronto-orbital plate dark in male, yellowish or blackish brown and slightly shining in female, anterior margin with dense setulae, about 1/5 width of frons; fronto-orbital setulae in 3–4 rows, erect or reclinate except for several irregular inclinate or proclinate; ocellar triangle dark, broad, extending to anterior margin of frons in male, while slightly shining and small in female; *oc* strong, slightly shorter than anterior *ors*; postocellar setae strong. Lunule brown, 0.2 mm high, 1.4 times as wide as high. Facial keel slightly raised (Fig. 124), dividing bases of antennae; parafacial (Fig. 125) black with sparse white pruinosity on upper margin in male and yellowish brown in female, about 1/8 eye height. Gena blackish brown in male and brown in female, broad with marginal setulae, about 1/3 height of eye, highest point located at middle. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate, and arista bare. Proboscis yellowish brown, palpus blackish brown.

Thorax (Figs 123, 126) black. Mesonotum and scutellum with brownish pruinosity, and with slightly greenish sheen in male and more coppery sheen in female. Mesonotum with 0+2 *dc*, *acr* in 10 irregular rows. 1 strong *anepst* with several short setulae in 3 rows and 1 *kepst* with 2 long setulae and 2–3 short setulae in female and 2 long setulae and a few of short setulae in male. Calypter gray, margin black and fringe blackish brown. Fore tibia without posterior setae and mid tibia with one strong posterior seta in male and 1–2 strong posterior setae in female. Wing (Fig. 127) with costa extending to $M_{1+2}$; costal ratio 6:1.3:1; *r-m* at or slightly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.4:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.7. Halter black.

Abdomen black with slight greenish sheen in male. Male genitalia (Figs 128–132): surstylus with dense short spines in 3–4 rows; hypandrium Y-shaped with narrow hypandrial apodeme; basiphallus U-shaped, arms relatively broad; distiphallus with middle section broad, apical section narrow and tapering with an undulating lateral margin; ejaculatory apodeme narrow and fan-shaped, slightly curved, with long stem.




**FIGURES 123–127.** *Melanagromyza marinensis* Spencer, 1981. Holotype male (CAS). 123. habitus, lateral view; 124, 125. head, dorsal and lateral view; 126. thorax, lateral view; 127. wing.




**FIGURES 128–132.** *Melanagromyza marinensis* Spencer, 1981. Holotype male (CAS). 128. epandrial complex, posterolateral view; 129. hypandrium and postgonite, ventral view (non-type male, UCD); 130, 131. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 132. sperm pump (non-type male, UCD). Scale 0.1 mm.

**Type material.** Holotype male (CAS, Type No. 13946): **CALIFORNIA: Marin Co.**, Mill Valley, 37°54′21.73″N 122°32′41.91″W, 360 ft, 17.III.1966, P.H. Arnaud, Jr. Paratypes: **CALIFORNIA: Marin Co.**, 1 male, 1 female (CAS), Mill Valley, 110 m, 37°54′21.73″N 122°32′41.91″W, ex. flight trap, 7–11.III.1966, P.H. Arnaud, Jr.; **Monterey Co.**, 1 female (EMEC), Pacific Grove, 36°37′03.85″N 121°54′59.84″W, 31.V.1954, [collector not given]; **Santa Cruz Co.**, 1 female (UCD), Nr. Ano Nuevo, 37°06′46.81″N 122°19′48.90″W, 12.III.1989, W.H. Lange; **Trinity Co.**, 1 male (EMEC, male genitalia No. 4717), Butter Creek Meadows, 40°33′45.40″N 123°22′31.41″W, ex. fight trap, 21.V.1973, J.A. Chemsak (no head).

**Non-type material. UTAH: Salt Lake Co.**, 1 male (UCD), Lambs Cyn., 11.VI.1955, J.C. Downey.

**Biology/Host plants.** Larvae of this species are internal stem borers on *Cirsium occidentale* and likely other *Cirsium* species (Spencer, 1981; Spencer & Steyskal, 1986; Spencer, 1990). In California, it has been collected in association with the thistle *Cirsium occidentale* (Nutt.) Jeps. See Map 9 for the California distribution of *M. marinensis* and host plant *Cirsium occidentale*. This plant species is native to California, including 7 varieties as follows. California thistle, *C. occidentale* var. *californicum* (A. Gray) D. J. Keil & C. E. Turner, is found in the open forest and in disturbed sites at elevations lower than 2300 m, and is known from Sierra Nevada, and the central and southern South Coast Ranges and Southwestern California. Snowy thistle, *C. occidentale* var. *candidissimum* (Greene) J.F. Macbr., is found in disturbed places, scrublands and open woodlands at elevations lower than 1900 m throughout California, to southern Oregon, southwestern Idaho, western Nevada, and is known from the Klamath Ranges, North Coast Ranges, Cascade Range, northern Sierra Nevada, central part of the Central Coast (Carmel Highlands), and Modoc Plateau. Compact cobwebby thistle, *C. occidentale* var. *compactum* Hoover, is found in the bluffs at elevations lower than 50 m, and is known from the Central Coast (northern San Luis Obispo and Monterey Counties). Coulter's thistle, *C. occidentale* var. *coulteri* (Harv. & A. Gray) Jeps., is found in the grasslands, dunes, oak woodlands and scrub at elevations lower than 700 m, and is known from the Central Coast, South Coast and Channel Islands. Cuesta ridge thistle, *C. occidentale* var. *lucianum* D. J. Keil, is found in the chaparral, woodlands or forest openings, and often on serpentine, at elevations between 500–750 m, and is known from the southern Outer South Coast Ranges (southern Santa Lucia Range, San Luis Obispo Co.). Cobwebby thistle, *C. occidentale* var. *occidentale* is found in the grasslands, coastal dunes, oak woodlands and scrublands, often in disturbed areas at elevations lower than 200 m, and is known from the southern North Coast, western Central Western California, and western Southwestern California regions. Venus thistle, *C. occidentale* var. *venustum* (Greene) Jeps., is found in disturbed areas, grasslands, and woodlands at elevations lower than 3600 m, and is known from the North Coast Ranges, northern High Sierra Nevada, southern Sierra Nevada, Sacramento Valley, San Francisco Bay Area, South Coast Ranges, western Transverse Ranges, White and Inyo Mountains and western Mojave Desert.

**Distribution.** USA (California (Map 9) [Marin Co., Monterey Co., Santa Cruz Co., Trinity Co.], Utah*).

### *Melanagromyza martini* Spencer, 1969

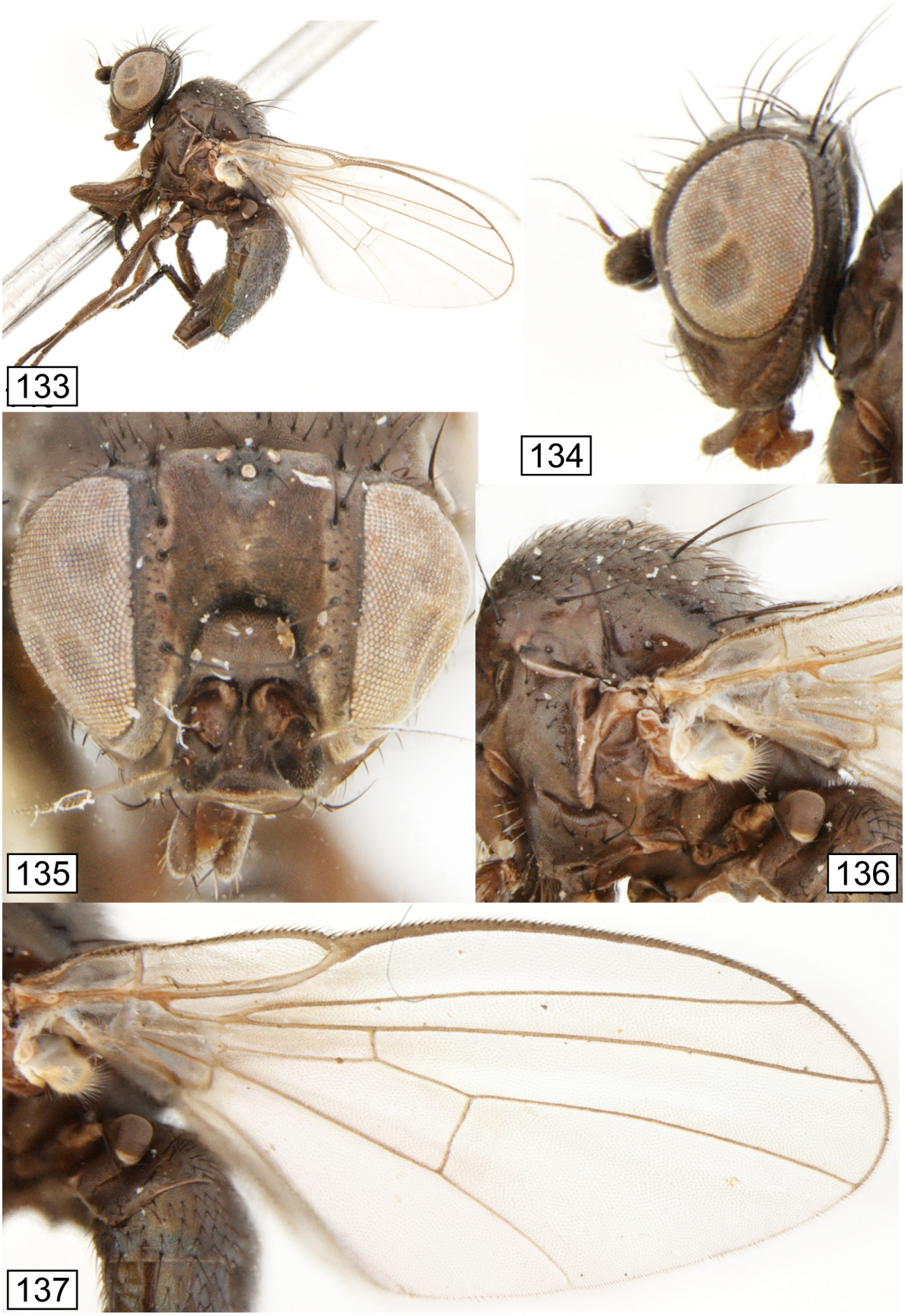
(Figs 133–143, Map 10)

*Melanagromyza martini* Spencer, 1969: 70. Type locality: Canada. Ontario: Ancaster. HT ♂, CNC. Sehgal, 1971: 308; Benavent-Corai, 2005: 29.

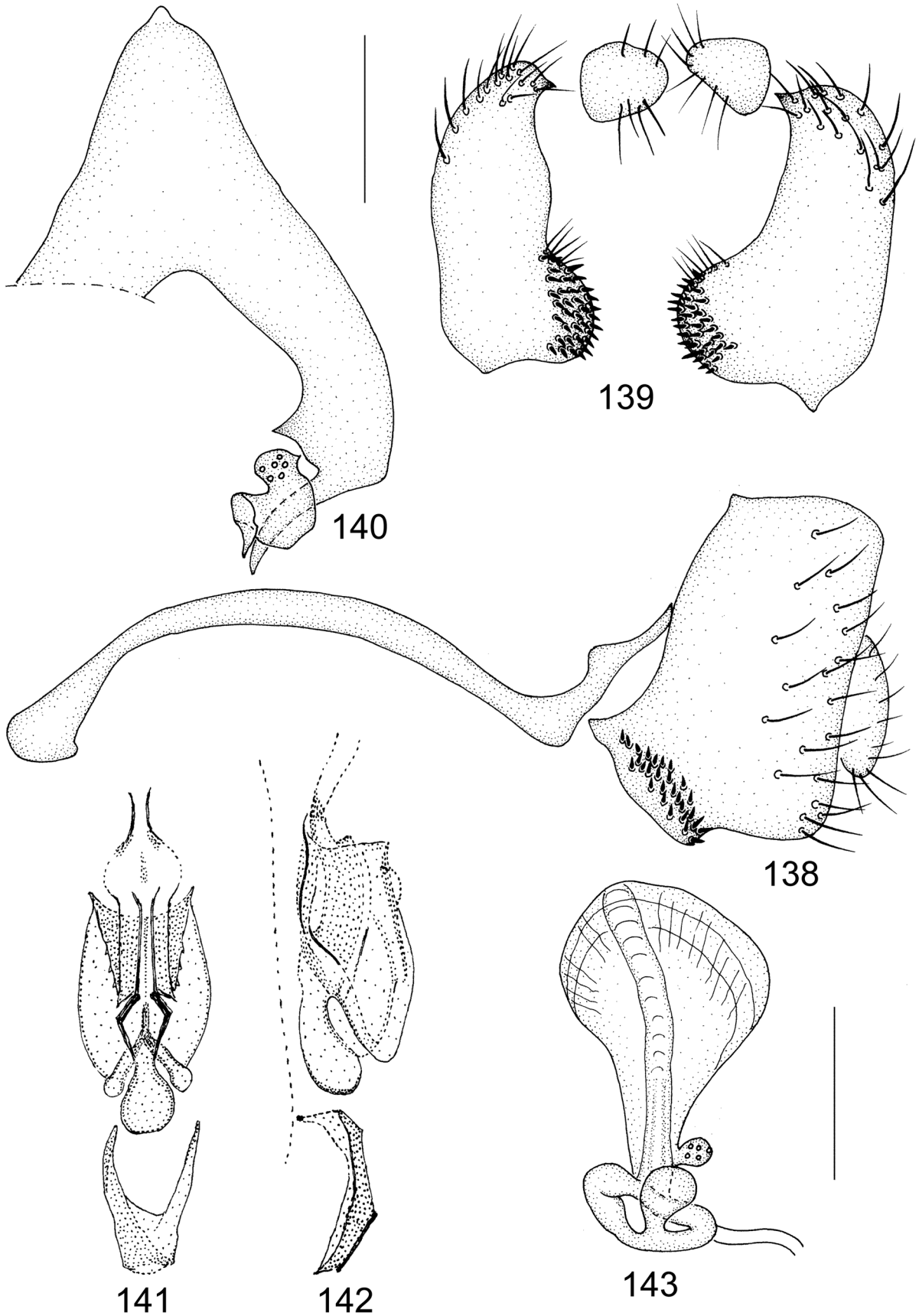
**Diagnosis.** Frons slightly projecting above eye, 1.7 times as wide as eye; 3 *ori* inclinate and 2 *ors* reclinate; fronto-orbital plate slightly shining, about 1/5 width of frons; fronto-orbital setulae in 2 rows, erect or reclinate; ocellar triangle broad, extending to anterior margin of frons, weakly shining. Gena about 1/3 eye height, highest point located at middle. Eye pilose. Arista microscopic pubescent. Mesonotum with weakly greenish sheen, 0+2 *dc*. Calypter and fringe white, margin pale yellow. Mid tibia with 1 strong posterior seta. Abdomen brownish black with coppery and greenish sheen.

**Redescription.** MALE. Body length 2.4–2.5 mm, wing length 2.5–2.7 mm. FEMALE. Body length 2.7 mm, wing length 2.8 mm.

Head (Figs 134, 135) brownish black (yellowish brown in female). Frons slightly projecting above eye, 1.25 times as wide as long, 1.7 times as wide as eye; 3 *ori* inclinate and 2 *ors* reclinate, *ors* slightly longer than *ori*; proportional distance between setae in the *ori-ors* series from anterior to posterior 2.2:2:1.5:1; fronto-orbital plate slightly shining, about 1/5 width of frons; fronto-orbital setulae erect or reclinate in 2 rows and inner margin slightly brownish yellow; ocellar triangle plate broad, extending to anterior margin of frons, only shining at middle;




**FIGURES 133–137.** *Melanagromyza martini* Spencer, 1969. Paratype female (CNC). 133. habitus, lateral view; 134, 135. head, lateral and dorsal view; 136. thorax, lateral view; 137. wing.




**FIGURES 138–143.** *Melanagromyza martini* Spencer, 1969. Paratype male (CNC). 138. epandrium, surstylus and hypandrium, lateral view; 139. epandrial complex, ventral view; 140. hypandrium and postgonite, ventral view (partly broken); 141, 142. phallic complex, ventral and lateral view, from original figures in Spencer (1969), reproduced in Spencer & Steyskal (1986); 143. sperm pump (Non-type male, CNC). Scale 0.1 mm.

*oc* strong, slightly shorter than *ori*; postocellar setae strong. Lunule grayish brown, 0.12 mm high, 2.3 times as wide as high, semicircular. Parafacial about 1/12 eye height. Gena yellowish brown, about 1/3 height of eye, highest point located at middle. Eye pilose. Antenna black, 1st flagellomere short ovate, and arista microscopic pubescent. Proboscis yellowish brown, palpus black.

Thorax (Figs 133, 136) blackish brown (yellowish brown in female). Mesonotum and scutellum with brownish pruinosity and very weak greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 6 irregular rows. 1 *anepst* with a few of short setulae and 1 *kepst* with 1 long setula. Calypter and fringe white, margin pale yellow. Fore tibia without strong posterior seta and mid tibia with 1 strong posterior seta. Wing (Fig. 137) with costa extending to $M_{1+2}$; costal ratio 4.5:1:1; *r-m* nearly at apical 1/3 of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.3:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.7. Halter with stem pale brown and knob brown.

Abdomen (Fig 133) brownish black (yellowish brown in female) with coppery and greenish sheen. Male genitalia (Figs 138–143): surstylus with dense short spines apically and several long apical setulae anteriorly; hypandrium V-shaped; basiphallus U-shaped, basal and lateral arms narrow with ventral curve at apex; distiphallus with middle section broad, ovate subapically; ejaculatory apodeme fan-shaped, with long stem.

**Type material.** Paratypes: **Canada: ONTARIO:** 1 female (CNC No. 10365), Ancaster, ex. pith of *Urtica dioica* stems, IV.1965, J.E.H. Martin; **QUEBEC:** 1 male, (CNC No.10365, male genitalia No.1472), Harrington Lk., Gatineau Pk., 31.V.1954, E.E. Sterns; **SASKATHCHEWAN:** 1 male (CNC No. 10365, male genitalia No.1509), Val Marie, 49°15′N 107°44′W, 9.VI.1955, J.R. Vockeroth.

**Non-type material. CALIFORNIA: Siskiyou Co.**, 1 male (EMEC), McBride Springs, elevation 5200 ft, 41°21′12.55″N 122°16′54.04″W, ex. flight trap, 10–14.VI.1974, D. Green. **Canada: ONTARIO:** 1 male (CNC), Ottawa, I.VI.1951, J.F. McAlpine; **QUEBEC:** 1 male (CNC), Hull, 20.VI.1954, J.R. Vockeroth.

**Biology/Host plants.** Larvae are internal stem borers on at least two subspecies of *Urtica dioica* L. (Urticaceae) (Spencer, 1969; Spencer, 1990). In California, this species has been reared from Hoary nettle / stinging nettle, *Urtica dioica* subsp. *holosericea* (Nutt.) Thorne and from American stinging nettle, *Urtica dioica* subsp. *gracilis* (Aiton) Seland. In Alberta, Canada, it was collected while ovipositing on the latter subspecies (Spencer, 1969). See Map 10 for the California distribution of *M. martini* and host plant *Urtica dioica* subsp. *holosericea*. This plant species is native to California, being found in the meadows, seeps, springs, margins of marshes, streams, lakes, moist areas in chaparral and coastal scrub at elevations lower than 3370 m throughout California, and in other parts of the western United States and in northern Mexico. The plant is known from the California Floristic Province (except but expected in the North Coast and Sierra Nevada Foothills), Great Basin Floristic Province, and Mojave Desert (uncommon). The other subspecies, *gracilis*, is known from evergreen forests and moist or riparian areas below 2200 m elevation (most records from lower elevations), in a strip along the west coast of California, within the North Coast and northern Central Coast regions, the San Joaquin Valley delta, and the Klamath Ranges.

**Distribution.** USA (California (Map 10) [Siskiyou Co.*]), Canada (Alberta, British Columbia, Ontario, Saskatchewan). This represents the first record for the USA and California.

**Remarks.** One of the male paratypes (male genitalia No. 1509) has a few of characters which are different from other examined specimens: body color deep black; only 2 *ori* and 2 *ors*, and a large distance between 2 *ori*; fronto-orbital plate becoming broad on posterior 1/2, about 1/4 width of frons; fronto-orbital setulae in 2 rows, with inner row inclinate or proclinate and outer row reclinate. These seem to represent variation in this species, although currently known only from this paratype.

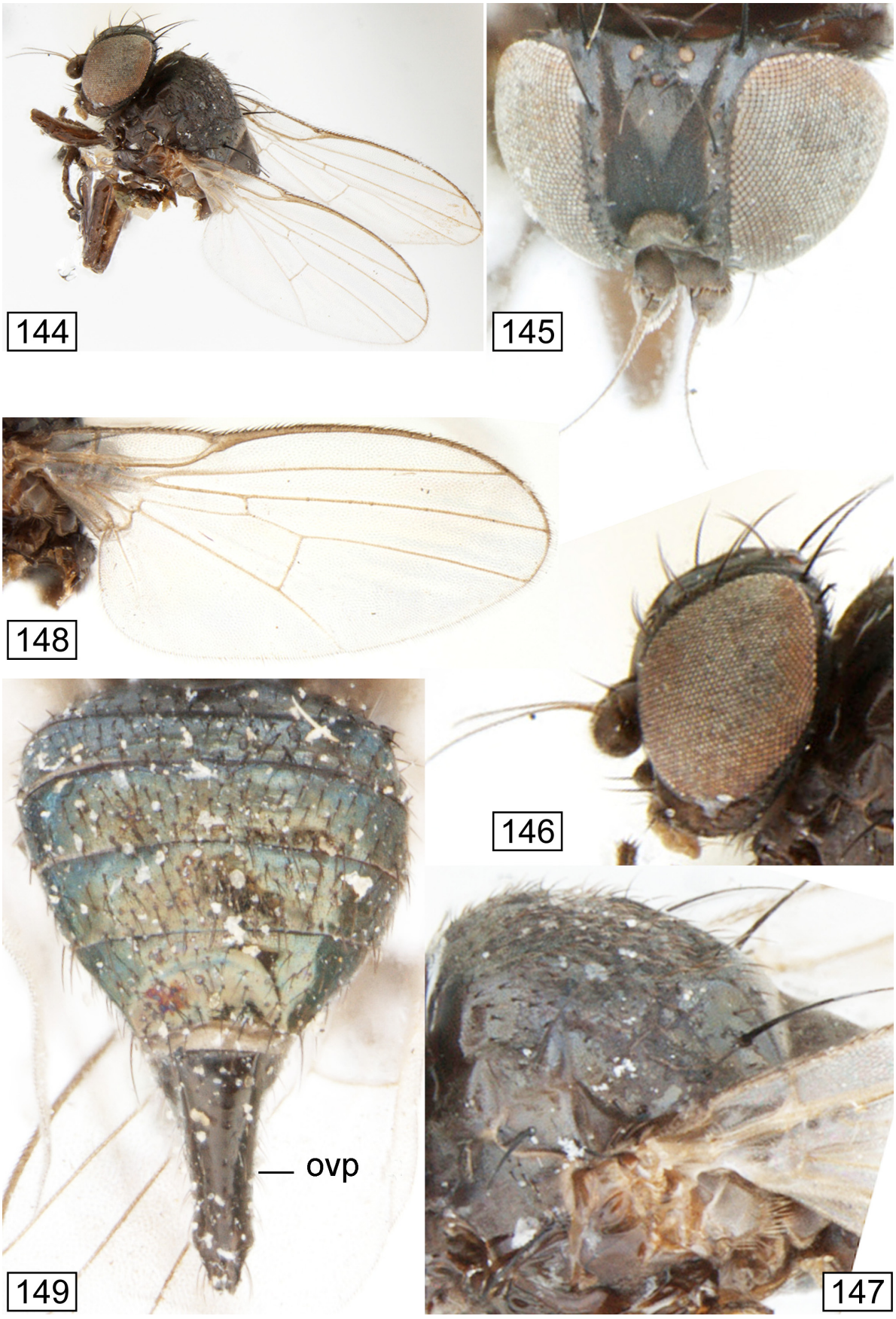
### *Melanagromyza minima* (Malloch, 1913)

(Figs 144–155, Map 2)

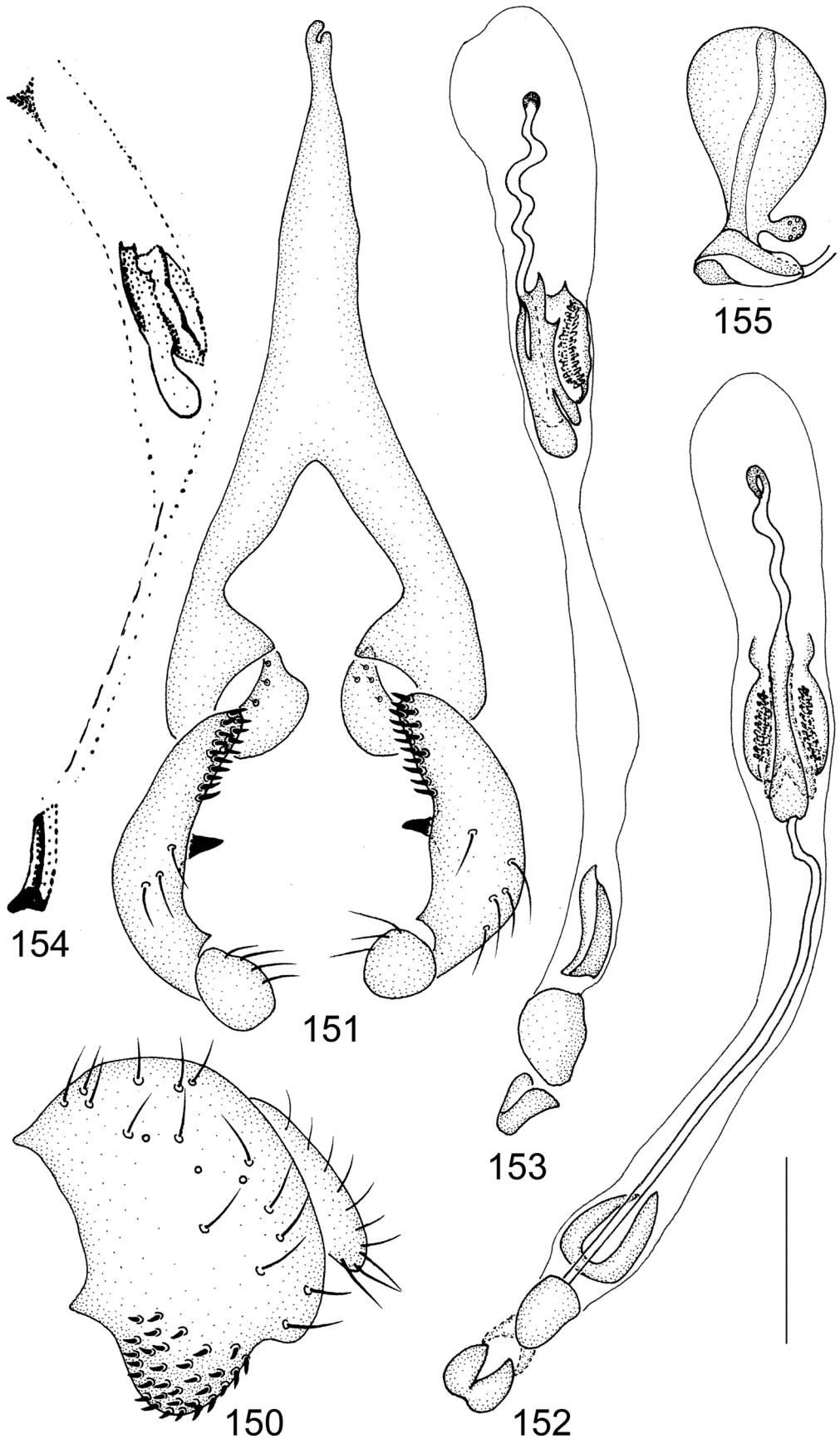
*Agromyza minima* Malloch, 1913: 328. Type locality: Trinidad. HT ♂, USNM.

*Melanagromyza minima*: Shewell, 1953: 468 (comb.); Frick, 1957: 200; Frick, 1959: 364; Spencer, 1963: 317; Frick, 1965: 796; Spencer 1966b: 12; Spencer, 1973a: 370; Spencer, 1973b: 20; Spencer & Stegmaier, 1973: 44; Spencer, 1981: 50; Spencer, 1983: 43; Spencer & Steyskal, 1986: 32; Spencer, 1990: 314; Spencer *et al.*, 1992: 258; Benavent-Corai, 2005: 29; Braun *et al.*, 2008: 98; Palacios-Torres *et al*. 2010: 61.

*Melanagromyza longicaudalis* Spencer, 1963: 316. Type locality: Jamaica. HT ♀, BMNH. Spencer, 1966b: 12 (syn.).




**FIGURES 144–149.** *Melanagromyza minima* (Malloch, 1913). Holotype male (USNM). 144. habitus, lateral view; 145, 146. head, dorsal and lateral view; 147. thorax, dorsal view; 148. wing; 149. female abdomen, dorsal view (Non-type, EMEC). wing. Abbreviation: ovp—ovipositor.




**FIGURES 150–155.** *Melanagromyza minima* (Malloch, 1913). Holotype male (USNM). 150. epandrial complex, lateral view; 151. epandrial complex, posterior view, and hypandrium, ventral view; 152–154. phallic complex, ventral and lateral view, 154 from original figure in Spencer (1986); 155. sperm pump. Scale 0.1 mm.

**Diagnosis.** Frons not projecting above eye, anterior margin narrow and posterior margin broad; 2 *ori* weak, inclinate and 2 *ors* reclinate, proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal; fronto-orbital plate slightly shining, about 1/6 width of frons; fronto-orbital setulae in 2 sparse rows, reclinate except for a few proclinate on anterior margin; ocellar triangle slightly shining, extending between *ori*. Facial keel very thin and not raised. Gena about 1/8–1/7 height of eye, highest point located at middle. Eye pilose. Arista bare. Mesonotum with greenish sheen in posterior view, 0+2 *dc*. Calypter gray, margin and fringe blackish brown. Mid tibia with 2 strong posterior setae. Abdomen blackish brown with greenish sheen.

**Redescription.** MALE. Wing length 1.75 mm (Holotype).

Head (Figs 145, 146) blackish brown. Frons not projecting above eye (Fig. 146), anterior margin slightly narrower than posterior margin; 1.25 times as long as wide, and slightly wider than eye; 2 *ori* weak, inclinate and 2 *ors* reclinate, *ori* shorter than *ors*, proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal; fronto-orbital plate pale brown, slightly shining and not projecting forward, about 1/6 width of frons; fronto-orbital setulae in 2 sparse rows, reclinate except for a few proclinate on anterior margin; ocellar triangle slightly shining, extending between *ori*; *oc* strong, slightly longer than *ori*; postocellar setae strong. Lunule with narrow anterior margin and broad posterior margin, 0.16 mm high, 1.25 times as wide as high. Facial keel very thin and not raised. Gena brown, about 1/7 height of eye, highest point located at middle. Eye pilose (bare in Spencer, 1981). Antennal 1st flagellomere short ovate and arista bare. Proboscis brownish yellow, palpus black.

Thorax (Figs 144, 147) blackish brown. Mesonotum and scutellum with brownish pruinosity and greenish sheen. Mesonotum 0+2 *dc*, *acr* in 8 rows. 1 strong *anepst* and 1 *kepst*. Calypter gray, margin and fringe blackish brown. Fore tibia without posterior setae and mid tibia with 2 strong posterior setae. Wing (Fig. 148) with costa extending to $M_{1+2}$; costal ratio 4:1:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.4:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.7. Halter blackish brown.

Abdomen (Fig. 149) blackish brown with greenish sheen. Female (Fig. 149) with long bar-like ovipositor. Male genitalia (Figs 150–155): epandrium broad, with pair of large inner teeth posteromedially; surstylus with broad cluster of short spines on much of inner surface; hypandrium slender Y-shaped with long hypandrial apodeme; basiphallus U-shaped with lateral arms incurved and pointed apically, a very large gap between basiphallus and distiphallus; distiphallus with a pair of subapical constrictions and medial section undulating and curved apically; ejaculatory apodeme fan-shaped.

**Type material.** Holotype male (USNM, No. 65590): West Indies: **Trinidad**, 20.VI, 191?, Aug. Busck.

**Non-type material. CALIFORNIA: San Diego Co.**, 1 female (EMEC), 6 mi. E., Banner, 33°04′06.91″N 116°32′47.68″W, 26.VI.1963, H.L. Griffin (identified by Spencer, 1978).

**Biology/Host plants:** Larvae of this species feed and pupariate within seed heads of the Asteraceae species *Wedelia frticosa* Jacq., *Wedelia trilobata* (L.) Pruski, *Wedelia paludosa* DC, and *Chromolaena odorata* (L.) R.M. King & H. Rob. (Spencer & Stegmaier, 1973; Spencer, 1981; Spencer, 1990), as well as *Bidens gardneri* Baker, *Viguiera arenaria* Baker, and *Viguiera robusta* Gardn. (Braun *et al*., 2008), and likely other asters (Spencer & Steyskal, 1986). None of these plant species occurs in California. Spencer (1973a) comments that the female ovipositor is specially elongated for oviposition deep within the immature seed heads.

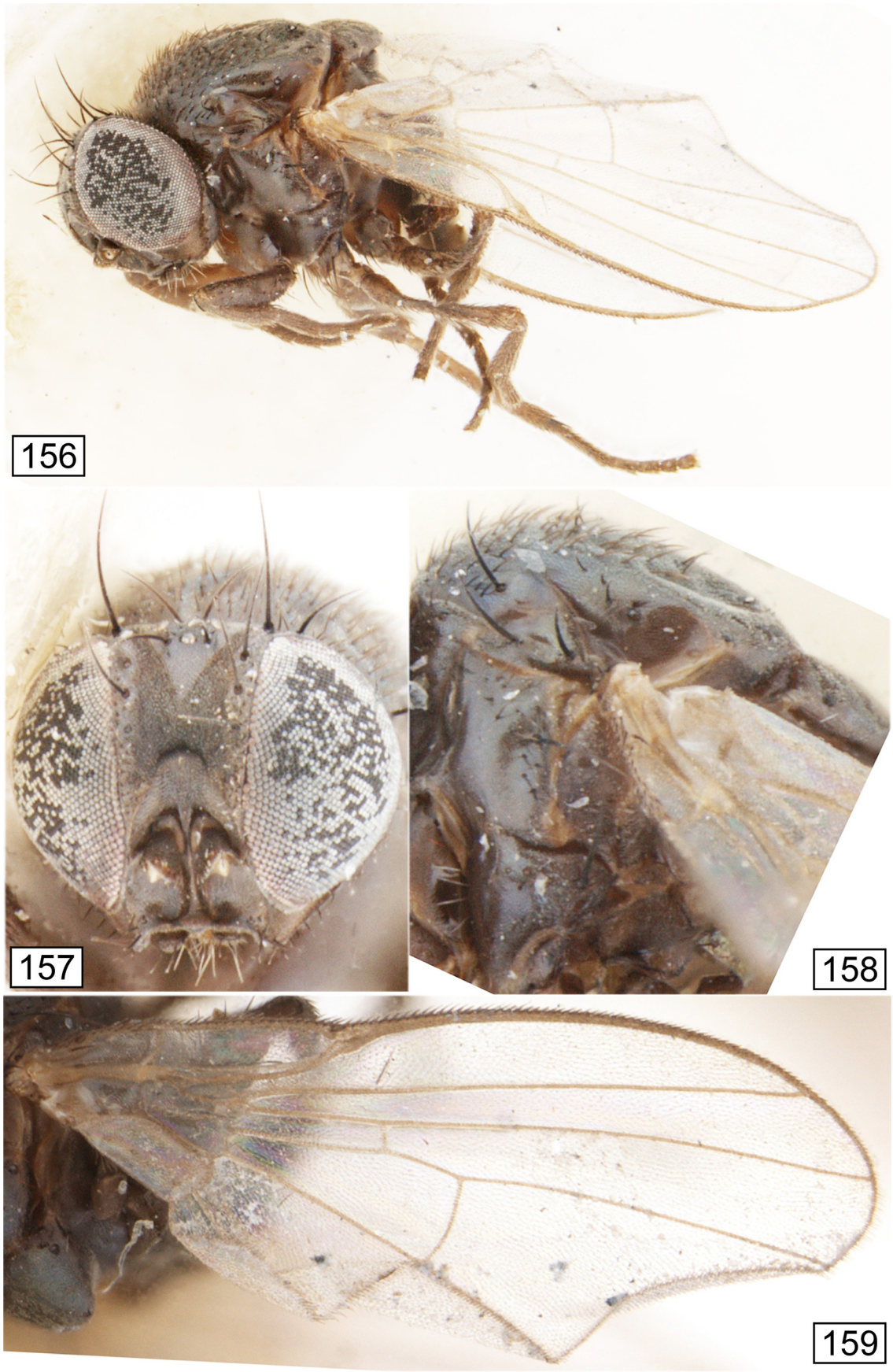
**Distribution.** USA (California (Map 2) [Los Angeles Co., San Diego Co.], Florida, Mississippi), Antigua, Costa Rica, Dominica, Dominican Republic, Guadalupe, Guatemala, Jamaica, Mexico, Puerto Rico, Panama, Peru, Trinidad, Venezuela.

### *Melanagromyza minimoides* Spencer, 1966

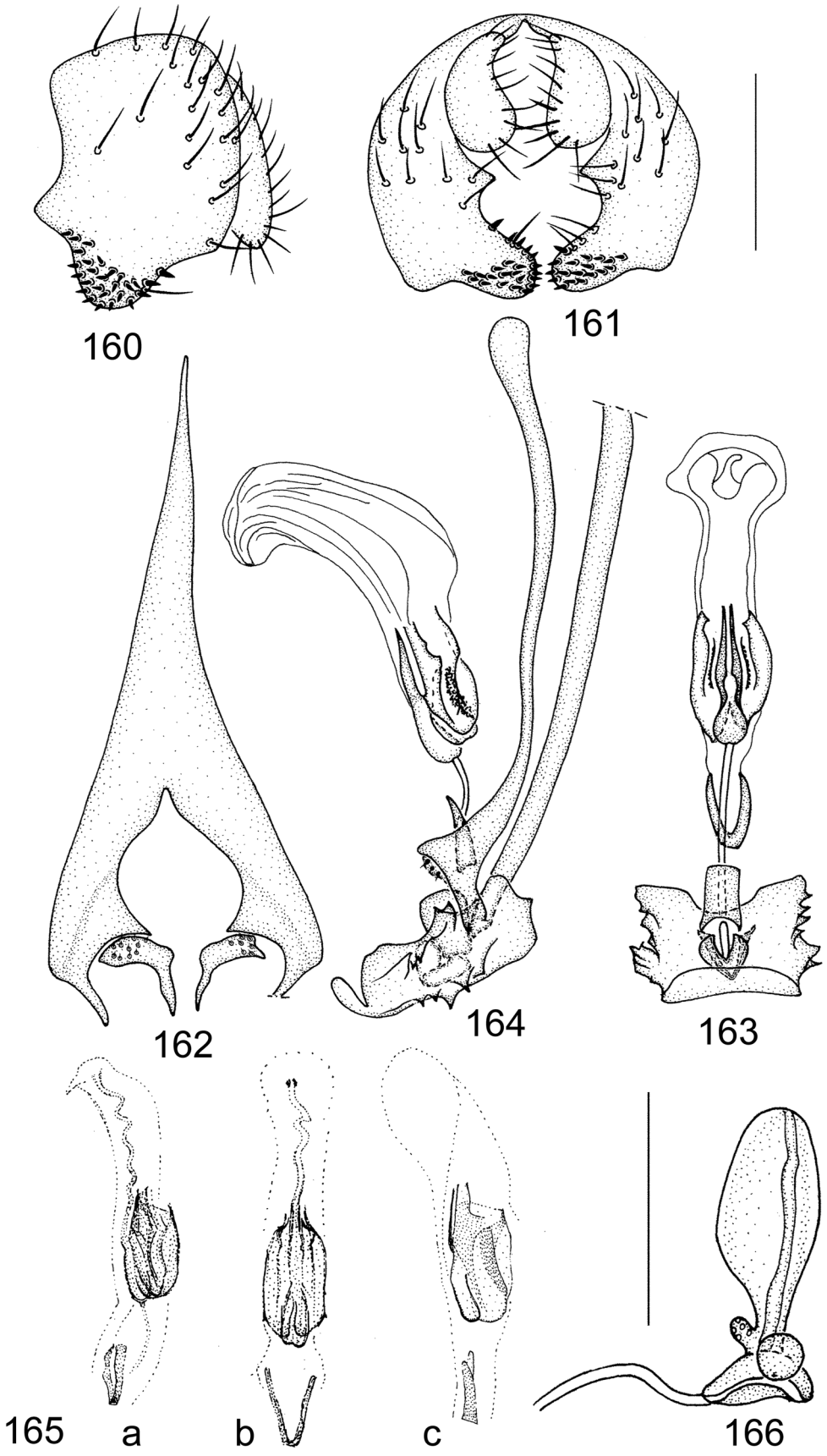
(Figs 156–166, Maps 10, 11)

*Melanagromyza minimoides* Spencer, 1966b: 13. Type locality: USA. Florida: Dade Co. HT ♂, USNM. Spencer, 1973b; Spencer & Stegmaier, 1973: 45; Valladares *et al*., 1982; Spencer & Steyskal, 1986: 32; Spencer *et al.*, 1992: 258; Pruett, 1999; Zerbino, 2001: 90; Benavent-Corai, 2005: 29; Braun *et al.*, 2008: 98; Palacios-Torres *et al.* 2008: 17; Palacios-Torres *et al*. 2010: 61; Valladares *et al*., 2011: 184.

*Melanagromyza radicicola* Steyskal, 1980: 40. Type locality: USA. Maryland. HT ♂, USNM. Spencer & Steyskal, 1986: 246; Spencer, 1990: 397 (syn.).




**FIGURES 156–159.** *Melanagromyza minimoides* Spencer, 1966b. Holotype male (USNM). 156. habitus, lateral view; 157. head, anterior view; 158. thorax, lateral view; 159. wing.




**FIGURES 160–166.** *Melanagromyza minimoides* Spencer, 1966b. Non-type male (CSCA). 160, 161. epandrial complex, lateral and ventral view; 162. hypandrium and postgonite, ventral view; 163–165. phallic complex, ventral and lateral view, 165 a,b,c from orginal figures in Spencer (1986) for comparison; 166. sperm pump. Scale 0.1 mm.

**Diagnosis.** Frons not projecting above eye, as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate, proportional distance between setae in the *ori-ors* series from anterior to posterior subequal; fronto-orbital plate slightly shining, about 1/7 width of frons; fronto-orbital setulae in 2 sparse rows, inner row inclinate and outer row reclinate; ocellar triangle slightly shining, extending between 2 *or*. Facial keel very thin and not raised. Gena about 1/6 height of eye, highest point located beyond middle. Mesonotum with greenish sheen, 0+2 *dc*, *acr* in 8 rows. Calypter gray, margin and fringe blackish brown. Mid tibia with 2 strong posterior setae. Abdomen blackish brown with greenish or coppery sheen.

**Redescription.** MALE. Body length 1.5–1.7 mm, wing length 1.6–1.9 mm. FEMALE. Body length 1.4–1.9 mm, wing length 1.6–2.0 mm.

Head (Figs 156, 157) blackish brown. Frons dark, not projecting above eye, nearly as wide as long, as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate, *ori* shorter than *ors*, proportional distance between setae in the *ori-ors* series from anterior to posterior subequal (or slightly larger distance between 2 *ori* in some specimens, see Steyskal, 1980: fig. 7D) (Fig. 157); fronto-orbital plate slightly shining and not projecting forward, about 1/7 width of frons; fronto-orbital setulae in 2 sparse rows, inner row inclinate and outer row reclinate, but a few proclinate on anterior margin; ocellar triangle slightly shining, extending between anterior *ori* and posterior *ori*; *oc* strong, slightly longer than *ori*; postocellar setae strong. Lunule 0.12 mm high, 1.2 times as wide as high. Facial keel very thin and not raised. Gena brown, about 1/6 height of eye, highest point located beyond middle. Eye bare. Antennal 1st flagellomere short ovate and arista bare. Proboscis brown, palpus black.

Thorax (Figs 156, 158) black. Mesonotum and scutellum with brownish pruinosity and greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 rows. 1 strong *anepst*, 1 strong *kepst*. Calypter gray, margin and fringe blackish brown. Fore tibia without posterior setae and mid tibia with 2 strong posterior setae. Wing (Fig. 159) with costa extending to $M_{1+2}$; costal ratio 3:1:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.6:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.7. Halter blackish brown.

Abdomen blackish brown with greenish or coppery sheen. Male genitalia (Figs 160–166): surstylus with sparse short spines except apical 1–2 spines stronger and with several long setulae posteriorly; hypandrium slender with hypandrial apodeme tapering apically; basiphallus nearly V-shaped, with lateral arms narrow apically, a small gap between basiphallus and distiphallus; distiphallus with a basal incision and membranous sections curved; ejaculatory apodeme narrow fan-shaped, with long stem.

**Type material.** Holotype male, (USNM, male genitalia No. 1320): **FLORIDA: Miami-Dade Co.**, Hialeah, ex. Seeds of *Verbesina* sp., 2.II, 1964 (C.E. Stegmaier Jr.). Paratype: **FLORIDA: Miami-Dade Co.**, 1 female (USNM), same data as holotype.

**Non-type material. CALIFORNIA: Los Angeles Co.**, 1 female (CSCA), 13km NW Wrightwood, Largo Vista Rd., 34°25′32″N 117°46′06″W, elev. 6516 ft, ex. sweeping, 22–28.V.2008, A.R. Cline & S.L. Winteton; **San Diego Co.**, 1 male (EMEC), Del Mar, 1 mi., 32°57′34.16″N 117°15′55.13″W, ex. *Cucurbita foetidissima* (host plant), 1.VII.1963, P.D. Hurd. **FLORIDA: Miami-Dade Co.**, 1 female (USNM), same data as holotype. **TEXAS: Uvalde Co.**, 1 female (CSCA), Speir Rch. 3 mi., NW Uvalde, ex. Malaise trap 11A-6P, 3.V.1977, T. Eichlin & M. Wasbauer; 1 female (CSCA), Uvalde Co., Speir Rch. 3 mi., NW Uvalde, ex. Malaise trap 10A-6P, 2.V.1977, T. Eichlin & M. Wasbauer. **Mexico: BAJA CALIFORNIA SUR:** 33 males, 14 females (CSCA), Rancho Tablon area, 13 km. S. Guillermo Prieto, ex. Malaise trap, 14–17.IV.1983, M. Wasbauer; 1 male, 4 females (CSCA), Rcho. Tablon, 13km. S. Guillermo Prieto, 16–18.IV.1983, M.S. Wasbauer; 1 female (CSCA), Los Barriles, ex. Malaise trap, 28–29.IV.1979, M.S. Wasbauer; 2 females (CSCA), Los Barriles, ex. Malaise trap 7A-5P, 5–6.V.1979, M.S. Wasbauer; 49 males, 35 females (CSCA), Rancho Tablon area, 13km, S. Guillermo Prieto, 14–17.IV.1983, M.S. Wasbauer; **TAMAULIPAS:** 1 male, 2 females (CSCA), 29 km. SE Manuel-micro. sta., 1.XI.1982, J. Huber. **Dominican Republic: DUARTE:** 1 male (UCD), Pimentel, 30.VII.1978, R.O. Schuster.

**Biology/Host plants.** This is one of the apparently few oligophagous species of *Melanagromyza*, feeding on several plant families, and several tribes within Asteraceae. Larvae feed and pupariate within seed heads of numerous asters (Spencer & Stegmaier, 1973; Spencer, 1981; Spencer & Steyskal, 1986; Spencer, 1990; Zerbino, 2001; Braun *et al*., 2008; Vallederes *et al.*, 2011), and possibly as internal root feeders on *Urtica* (Spencer & Steyskal, 1986; Spencer, 1990). In California, this species has been reared from: Buffalo gourd / Calabazilla / Missouri gourd, *Cucurbita foetidissima* Kunth (Cucurbitaceae); common sunflower, *Helianthus annuus* L. (Asteraceae); from seed heads of Golden crownbeard, *Verbesina encelioides* (Cav.) Benth. & Hook. f. ex A. Gray (Asteraceae); and from Hoary nettle, *Urtica dioica* subsp. *holosericea*. See Maps 10 and 11 for the California

distribution of *M. minimoides* and host plants *Cucurbita foetidissima, Helianthus annuus* and *Verbesina encelioides* (Map 11) and *Urtica dioica* subsp. *holosericea* (Map 10). The plant *Cucurbita foetidissima* is native to California, being found in sandy, gravelly habitats at elevations lower than 1300 m throughout California, and to Nebraska, Missouri, Texas and Mexico, and is known from the Great Central Valley, Central Western California, Southwestern California, and Desert regions. The plant *Helianthus annuus* is native to California, being found in the disturbed areas, scrub, grasslands and many other habitats at elevations lower than 2000 m throughout California, and to eastern North America. The plant *Verbesina encelioides* subsp. *exauriculata* (B. L. Rob. & Greenm.) J. R. Coleman, which is native Arizona to Great Plains and Mexico, is naturalized in disturbed areas and fields, and along roadsides, at elevations below 300 m throughout California, to much of western North America, and is known from the San Joaquin Valley, southern Central Coast and South Coast Ranges, and South Coast and Sonoran Desert regions. For details on *Urtica dioica* subsp. *holosericea*, see "Biology/Host plants" section for *M. martini*. In Florida and elsewhere, hosts also include other Asteraceae, such as *Symphyotrichum simmondsii* (Small) G.L. Nesom, *Borrichia frutescens* (L.) DC., *Helenium nudiflorum* Raf., *Melanthera deltoidea* Michx., *Rudbeckia laciniata* L., and *Verbesina virginica* L. var. *laciniata* (Poir.) A. Gray (Spencer & Stegmaier, 1973), as well as *Bidens gardneri* Baker and *Tilesia baccata* (L.) Pruski (Braun *et al*., 2008), and species of the aster genera *Heliopsis* and *Viguiera* (Spencer, 1990).

**Distribution.** USA (California (Maps 10, 11) [Los Angeles Co.*, San Diego Co.*], Arkansas, Florida, Maryland, Ohio, Texas), Argentina, Bolivia, Dominican Republic, Guadalupe, Mexico, Venezuela, Uruguay.

**Remarks.** The species is very similar to *Melanagromyza minima*, but these two species can be separated by the number of posterior setae on the mid tibia, the length of the female ovipositor sheath, and the distance between the basiphallus and distiphallus (see the key).

### ***Melanagromyza muguensis*** **Spencer, 1981**

(Figs 167–174, Map 3)

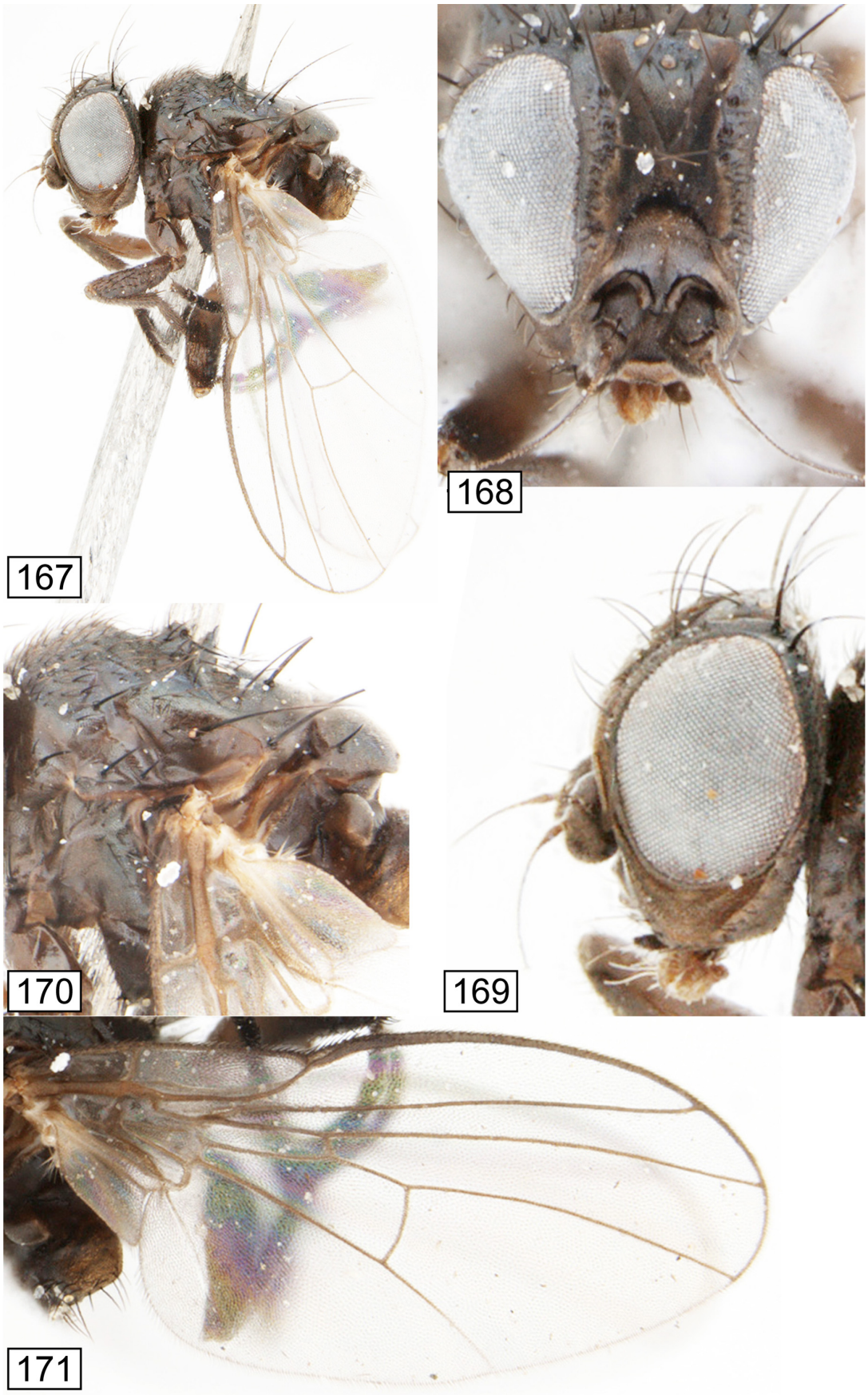
*Melanagromyza muguensis* Spencer, 1981: 52. Type locality: California: USA. Ventura Co., Point Mugu State Park. HT ♂, CAS. Spencer & Steyskal, 1986: 28.

**Diagnosis.** Frons not projecting above eye, 1.3 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate, 2 *ori* widely separated; fronto-orbital plate slightly shining and inner margin brownish yellow on anterior 1/2, and about 1/5 width of frons; fronto-orbital setulae in 2 rows, inner row proclinate or inclinate and outer row erect or reclinate; ocellar triangle slightly bluish green shining at middle, nearly extending to anterior margin of frons. Facial keel slightly raised, dividing bases of antennae. Gena about 1/4 height of eye, highest point located at middle. Eye pilose. Arista bare. Mesonotum with blackish greenish sheen, 0+2 *dc*. Calypter white, margin and fringe pale yellow. Mid tibia with 2 strong posterior setae. Abdomen blackish brown, with greenish sheen.

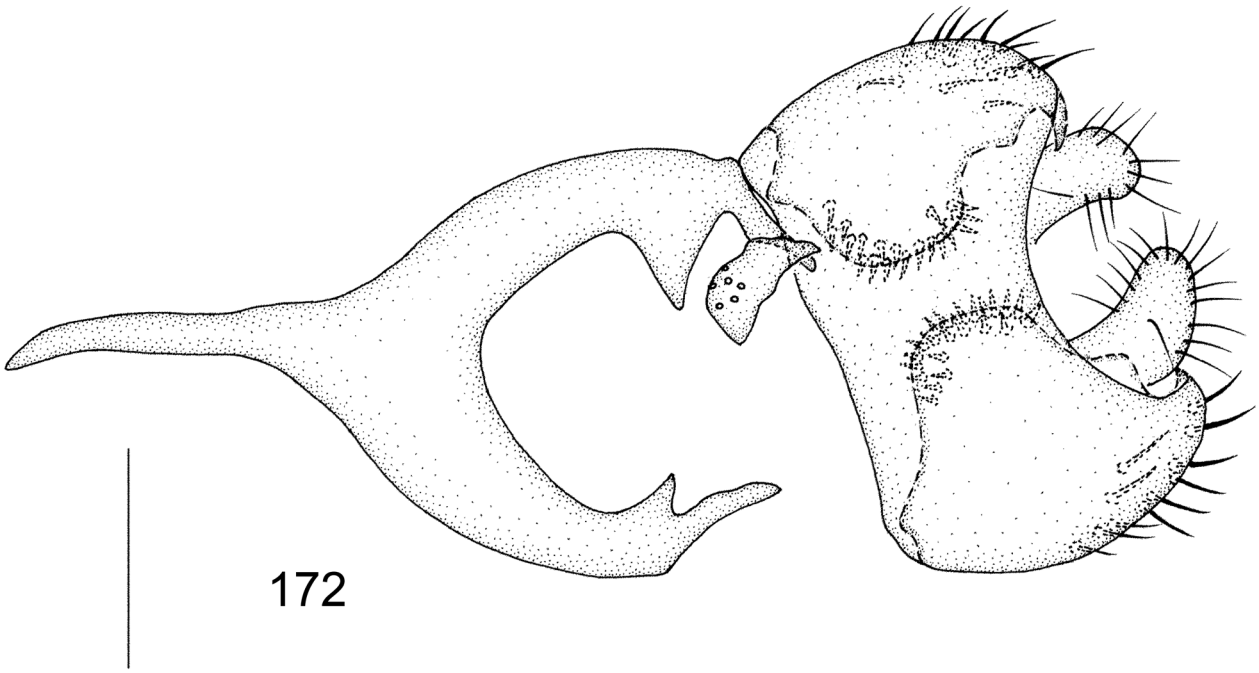
**Redescription.** MALE. Wing length 2.1 mm (Holotype).

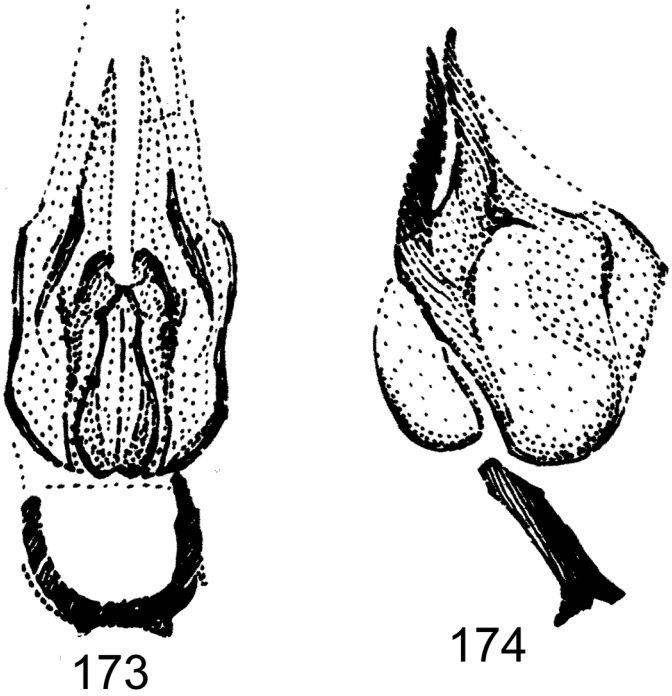
Head (Figs 168, 169) brown. Frons brownish black, not projecting above eye, nearly as wide as long, 1.3 times as wide as eye; 2 *ori* inclinate, widely separated, anterior *ori* shorter than posterior; 2 *ors* reclinate, longer than posterior *ori*; proportional distance between setae in the *ori-ors* series from anterior to posterior 5.3:1:1.7; fronto-orbital plate slightly shining, inner margin brownish yellow and becoming narrower on anterior 1/2 (Fig. 168), about 1/5 width of frons; fronto-orbital setulae in 2 rows, inner row proclinate or inclinate and outer row erect or reclinate; ocellar triangle slightly bluish green shining at middle, nearly extending to anterior margin; *oc* strong, slightly longer than *ori*; postocellar setae strong. Lunule 0.15 mm high, 1.2 times as wide as high. Facial keel slightly raised, dividing bases of antennae. Gena brown, about 1/4 height of eye, highest point located at middle. Eye pilose. Antennal 1st flagellomere short ovate and arista bare. Proboscis brown, palpus black.

Thorax (Figs 167, 170) blackish brown. Mesonotum and scutellum with brownish pruinosity and blackish green sheen. Mesonotum with 0+2 *dc*, *acr* in 6 rows (the pin goes though, so it is not clear to count). 1 strong *anepst* with 2–3 long setulae, 1 strong *kepst* with 1 long setula. Calypter white, margin and fringe pale yellow. Fore tibia without posterior setae and mid tibia with 2 strong posterior setae (not very clear to count). Wing (Fig. 171) with costa extending to $M_{1+2}$; costal ratio 3.3:1:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.7:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.5. Halter blackish brown.




**FIGURES 167–171.** *Melanagromyza muguensis* Spencer, 1981. Holotype male (USNM). 167. habitus, lateral view; 168, 169. head, dorsal and lateral view; 170. thorax, lateral view; 171. wing.




**FIGURES 172–174.** *Melanagromyza muguensis* Spencer, 1981. Holotype male (USNM): 172. epandrium, dorsal view, and hypandrium, ventral view; 173, 174. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986). Scale 0.1 mm.

Abdomen blackish brown with greenish sheen. Male genitalia (Figs 172–174): surstylus with sparse irregular short spines; hypandrium Y-shaped with narrow hypandrial apodeme; basiphallus U-shaped with a pair of basal processes and lateral arms wide, slightly narrow; distiphallus with narrow at apex and two pairs of triangular processes.

**Type material.** Holotype male (USNM, male genitalia No. 4880): **CALIFORNIA: Ventura Co.**, Point Mugu State Park, 34°07′42.69″N 119°00′37.09″W, 2.IV.1977, K.A. Spencer.

**Biology/Host plants:** Unknown.

**Distribution.** USA (California (Map 3) [Ventura Co.], Oregon).

### *Melanagromyza osoflacensis* Spencer, 1981

(Figs 175–185, Map 3)

*Melanagromyza osoflacensis* Spencer, 1981: 53. Type locality: USA: California: San Luis Obispo Co., 5 miles south of Oceano, Oso Flaco Lake. HT ♂, CAS. Spencer & Steyskal, 1986: 28.

**Diagnosis.** Frons slightly projecting above eye, 1.5 times as wide as eye; 3 *ori* inclinate and convergent and 2 *ors* reclinate, proportional distance between setae in the *ori-ors* series from anterior to posterior 1:1.2:2:1.5; fronto-orbital plate brilliantly shining, anterior margin broad, about 1/6 width of frons; fronto-orbital setulae in 2 rows; ocellar triangle broad, slightly greenish or bluish green shining, extending to anterior margin of frons. Gena about 1/5 height of eye, highest point located at middle. Eye pilose. Arista with microscopic setulae. Mesonotum with slightly greenish sheen, 0+2 *dc*. Calypter white, fringe white and margin pale yellow. Mid tibia with 1 strong posterior seta. Abdomen black with slightly greenish sheen.

**Redescription.** MALE. Wing length 2.0 mm (Holotype), 2.5 mm (Non-type).

Head (Figs 177–179) black. Frons dark, slightly projecting above eye, 1.2 times as wide as long, 1.5 times as wide as eye; 3 *ori* inclinate and convergent, 2 *ors* reclinate, *ori* slightly shorter than *ors*, proportional distance between setae in the *ori-ors* series from anterior to posterior 1:1.2:2:1.5; fronto-orbital plate brilliantly shining, anterior margin broad, yellowish brown (broad yellow area on anterior margin in a male specimen from UCD) with dense setulae, about 1/6 width of frons; fronto-orbital setulae in 2 rows, reclinate (inner row sparse, inclinate and outer row slightly dense, proclinate in a male specimen from UCD) except a few proclinate or inclinate on anterior margin; ocellar triangle broad, slightly greenish or bluish green shining, extending to anterior margin of frons; *oc* strong, as long as *ori*; postocellar setae strong. Lunule brownish gray, 0.18 mm high, slightly higher than wide. Gena blackish brown, about 1/5 height of eye, highest point located at middle. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate with long setulae, and arista slightly microscopic pubescent. Proboscis yellowish brown, palpus black.

Thorax (Figs 175, 176) black. Mesonotum and scutellum with brownish pruinosity and slight greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 6 irregular rows. 1 strong *anepst* with 1 long setula, 1 strong *kepst* with 2 long setulae. Calypter white, fringe white and margin pale yellow (Holotype specimen, Fig. 175) to blackish brown (in a male specimen from UCD, Fig. 176). Fore tibia without posterior setae and mid tibia with 1 strong posterior seta. Wing (Fig. 180) with costa extending to $M_{1+2}$; costal ratio 5:1.5:1; *r-m* slightly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.5:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.5. Halter blackish brown.

Abdomen black with slight greenish sheen. Male genitalia (Figs 181–185): epandrium with a large apical concavity; surstylus with dense short spines and 2–3 long apical setulae; hypandrium Y-shaped with short hypandrial apodeme; basiphallus U-shaped; distiphallus broad basally and narrow in apical half with two pairs of triangular processes; ejaculatory apodeme broad and fan-shaped.

FEMALE. Unknown.

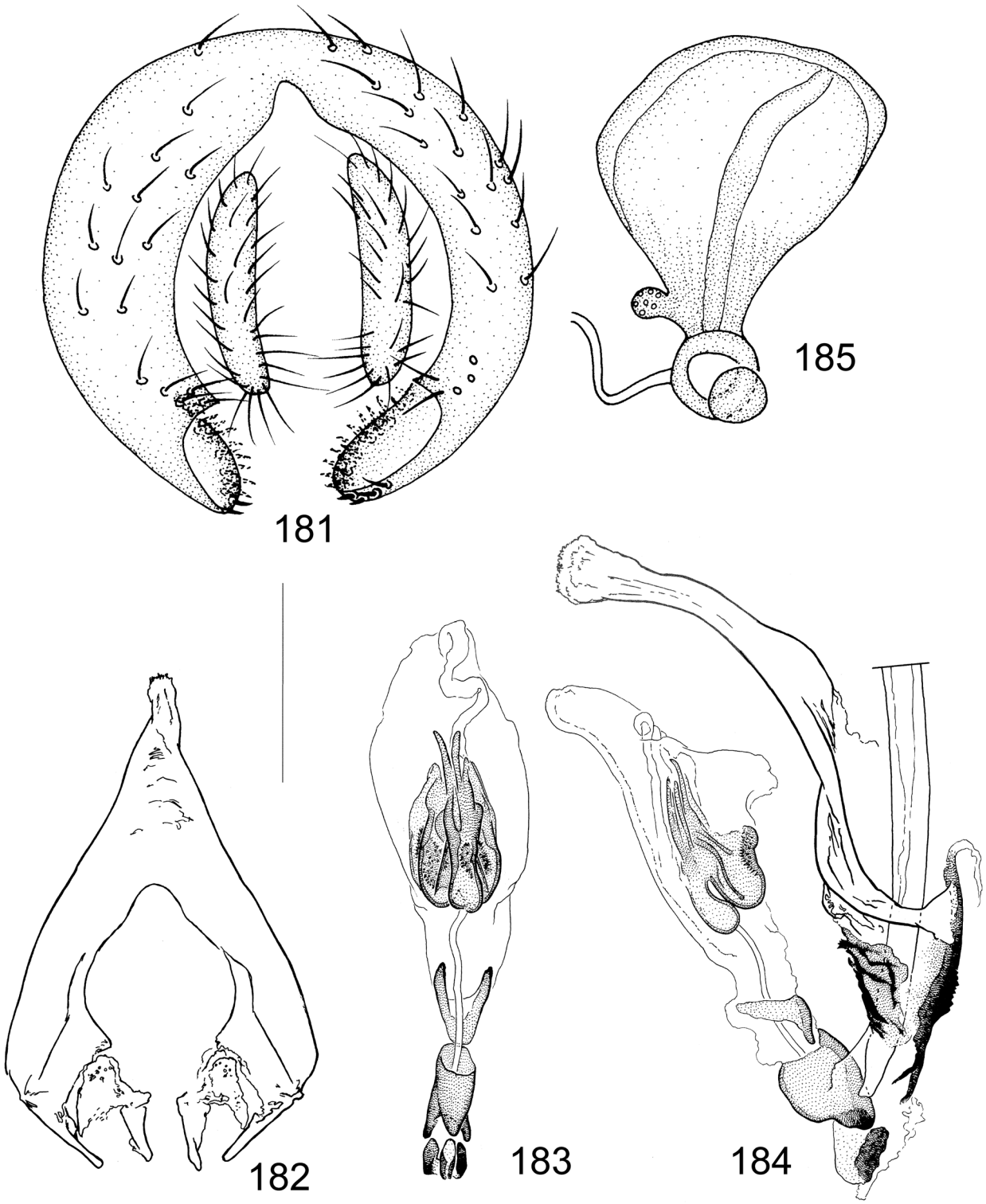
**Type material.** Holotype male (CAS Type No. 14069, male genitalia No. 4708): **CALIFORNIA: San Luis Obispo Co.**, Oso Flaco Lake, 5 miles S. of Oceano, 35°01′46.34″N 120°37′19.22″W, 27.IV.1968, J. Powell.

**Non-type material. CALIFORNIA: Kern Co.**, 1 male (EMEC), Woody, 1 mi E, 35°42′10.02″N 120°49′50.89″W, 3.V.1964, P. Rude.

**Biology/Host plants:** Unknown.

**Distribution.** USA (California (Map 3) [Kern Co., San Luis Obispo Co.]).


**FIGURES 175–180.** *Melanagromyza osoflacensis* Spencer, 1981. Holotype male (CAS): 175. habitus, lateral view; 176. habitus, lateral view (Paratype male, UCD); 177–179. head, dorsal and lateral view (178 Paratype male, UCD); 180. wing.

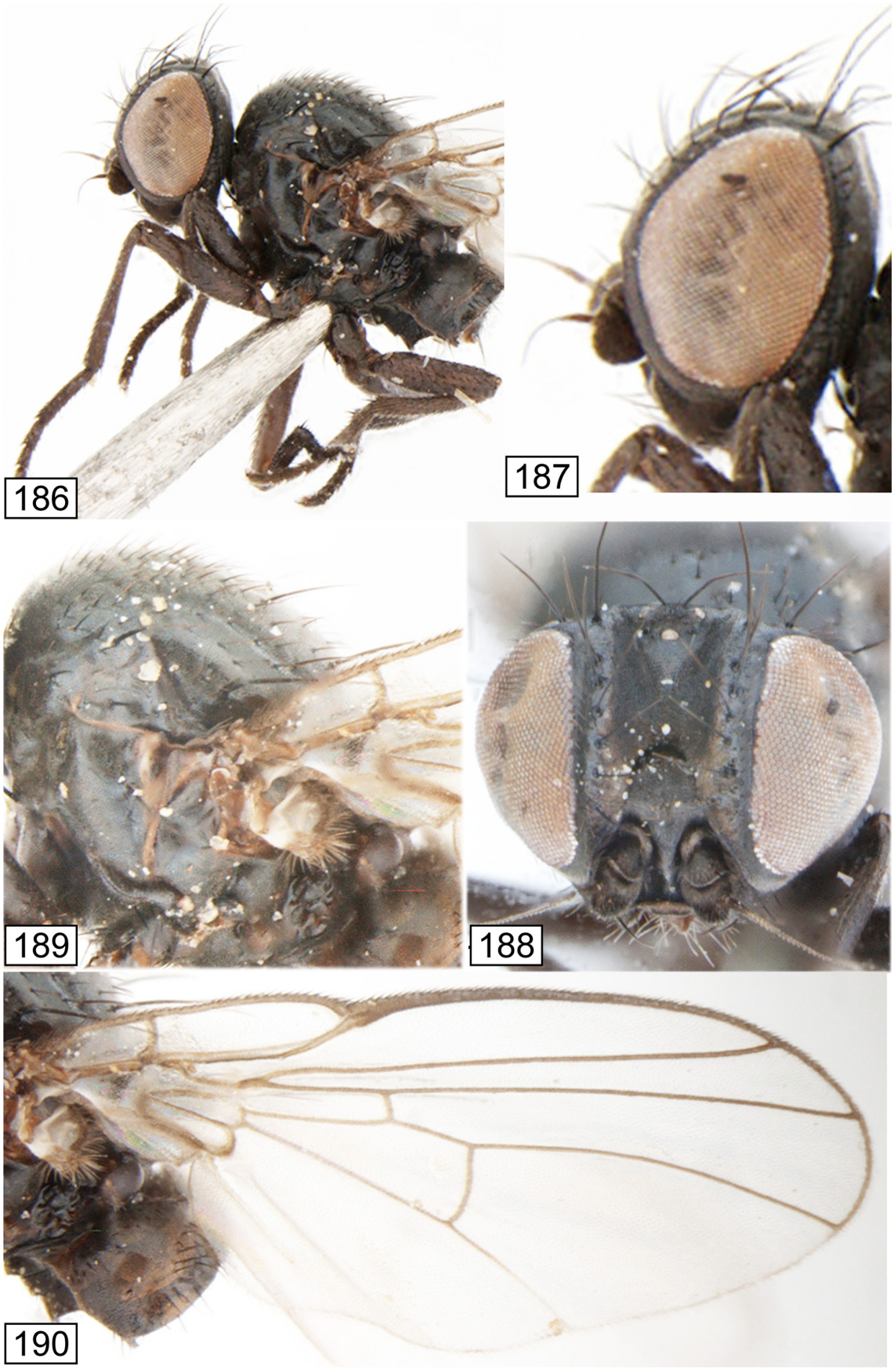



**FIGURES 181–185.** *Melanagromyza osoflacensis* Spencer, 1981. Holotype male (CAS): 181. epandrial complex, posterior view; 182. hypandrium, ventral view; 183, 184. phallic complex, ventral and lateral view; 185. sperm pump. Scale 0.1 mm. (Figures 182–184 provided by Owen Lonsdale, CNC).

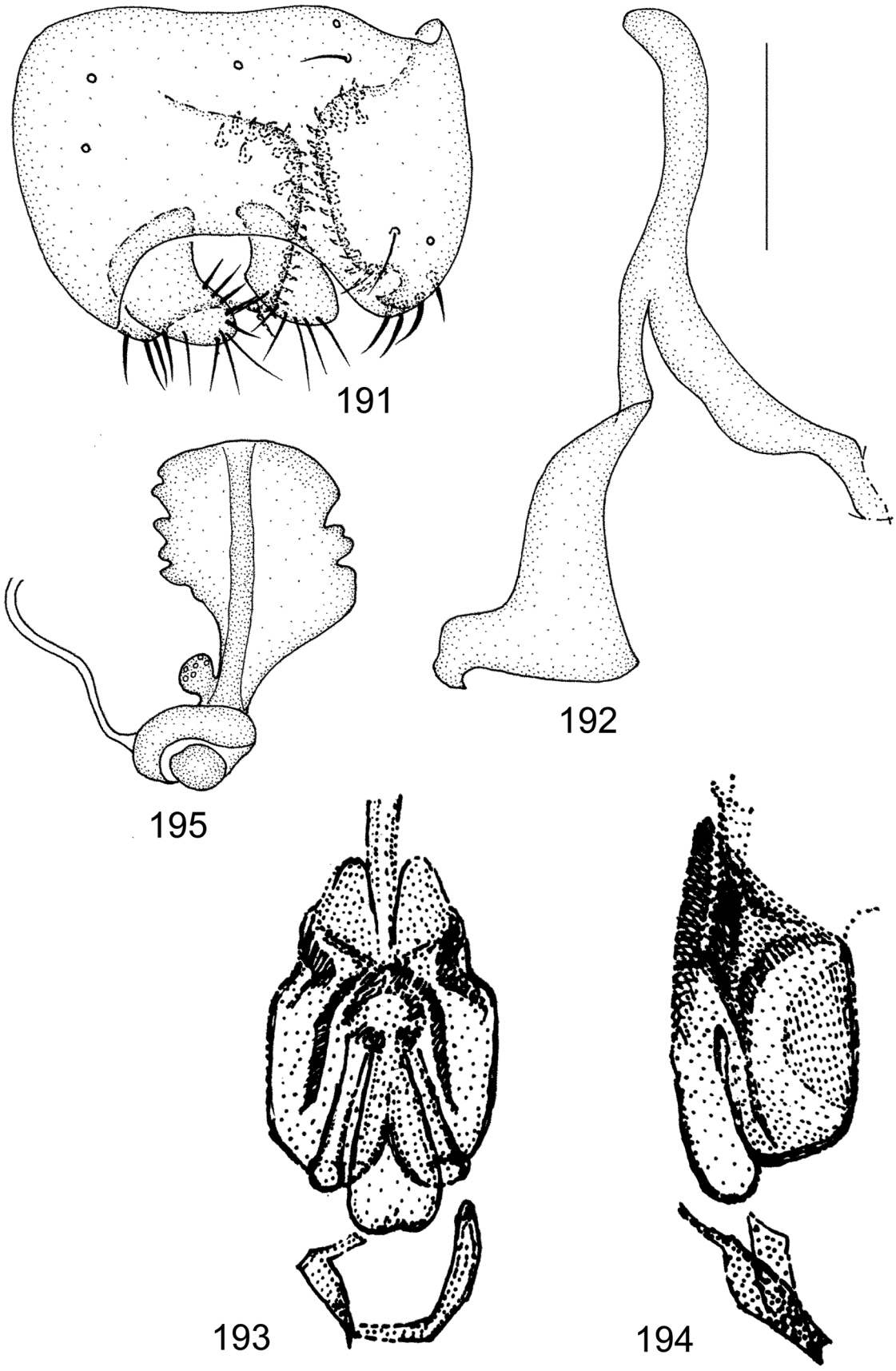
### ***Melanagromyza palaensis*** **Spencer, 1981**

(Figs 186–195, Map 1)

*Melanagromyza palaensis* Spencer, 1981: 54. Type locality: USA. California: San Diego Co., 4 miles north of Pala. HT ♂, USNM. Spencer & Steyskal, 1986: 30.




**FIGURES 186–190.** *Melanagromyza palaensis* Spencer, 1981. Holotype male (USNM). 186. habitus, lateral view; 187, 188. head, lateral and dorsal view; 189. thorax, dorsal view; 190. wing.




**FIGURES 191–195.** *Melanagromyza palaensis* Spencer, 1981. Holotype male (USNM): 191. epandrium, dorsal view; 192. hypandrium, lateral view (partly broken); 193, 194. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 195. sperm pump. Scale 0.1 mm.

**Diagnosis**. Frons distinctly projecting above eye, 1.5 times as wide as eye; 4 *ori* inclinate and 2 *ors* reclinate, proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal; fronto-orbital plate brilliantly shining and not wide at middle, about 1/4 width of frons; fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate; ocellar triangle slightly greenish shining at middle, extending to posteriormost *ori*. Facial keel raised, dividing bases of antennae. Gena about 1/5 height of eye, highest point located at middle. Mesonotum with greenish sheen, 0+2 *dc*, *acr* in 6–8 rows. Calypter gray, margin and fringe blackish brown. Abdomen black with bluish green or greenish sheen.

**Redescription.** MALE. Wing length 1.75 mm.

Head (Figs 187, 188) black. Frons dark, distinctly projecting above eye, nearly as wide as long, and 1.5 times as wide as eye; 4 *ori* inclinate, *ori* shorter than *ors*; 2 *ors* reclinate, longer than posterior *ori*; proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal; fronto-orbital plate brilliantly shining and not wide at middle, about 1/4 width of frons; fronto-orbital setulae in 2 rows, inner row proclinate and outer row reclinate; ocellar triangle slightly greenish shining at middle, extending to posteriormost *ori*; *oc* strong, nearly as long as *ors*; postocellar setae strong. Lunule 0.14 mm high, slightly higher than wide. Facial keel raised, dividing bases of antennae. Gena about 1/5 height of eye, highest point located at middle. Eye pilose. Antennal 1st flagellomere short ovate and arista bare. Proboscis yellowish brown, palpus black.

Thorax (Figs 186, 189) black. Mesonotum and scutellum with grayish pruinosity and greenish sheen. Mesonotum 0+2 *dc*, *acr* in 6–8 rows. 1 strong *anepst* and 1 strong *kepst* with 1 long setula. Calypter gray, margin and fringe blackish brown. Fore and mid tibia without posterior setae. Wing (Fig. 190) with costa extending to $M_{1+2}$; costal ratio 4.5:1:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.6:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.7. Halter black.

Abdomen black with bluish greenish or greenish sheen. Male genitalia (Figs 191–195): epandrium with an apical concavity; surstylus with short spines in 3 irregular rows and 3 long apical setulae; hypandrium Y-shaped with a wide hypandrial apodeme; basiphallus wide U-shaped, with lateral arms incurved and narrow apically; distiphallus blunt and rounded apically, with a short narrow distomedial tube; ejaculatory apodeme broad and fan-shaped, with small lateral concavities.

FEMALE. Unknown.

**Type material.** Holotype male (USNM, male genitalia No. 4726): **CALIFORNIA: San Diego Co.**, 4 miles N. of Pala, 33°21′37.11″N 117°040′9.51″W, 17.IV.1977, K.A. Spencer.

**Biology/Host plants.** Unknown.

**Distribution.** USA (California (Map 1) [San Diego Co.]).

**Remarks.** Adding to the list of types from Spencer (1981) sold to the USNM discussed in Lonsdale (2011), the holotype of this species was noted as deposited in CAS, but is property of USNM.

### *Melanagromyza quadrisetosa* Spencer, 1981

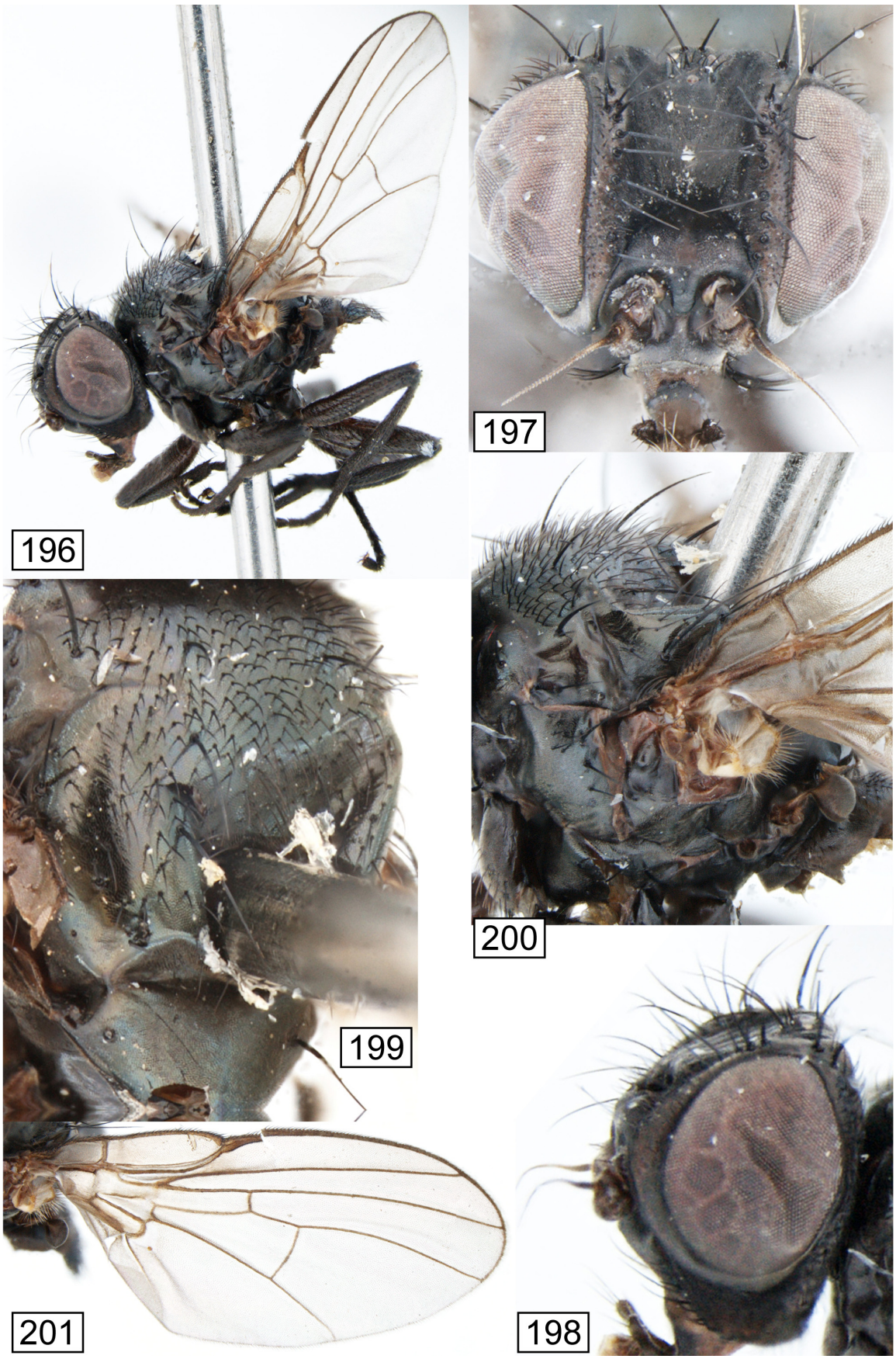
(Figs 196–206, Map 2)

*Melanagromyza quadrisetosa* Spencer, 1981: 54. Type locality: USA. California: Marin Co., Mill Valley. HT ♂, CAS. Spencer & Steyskal, 1986: 19.

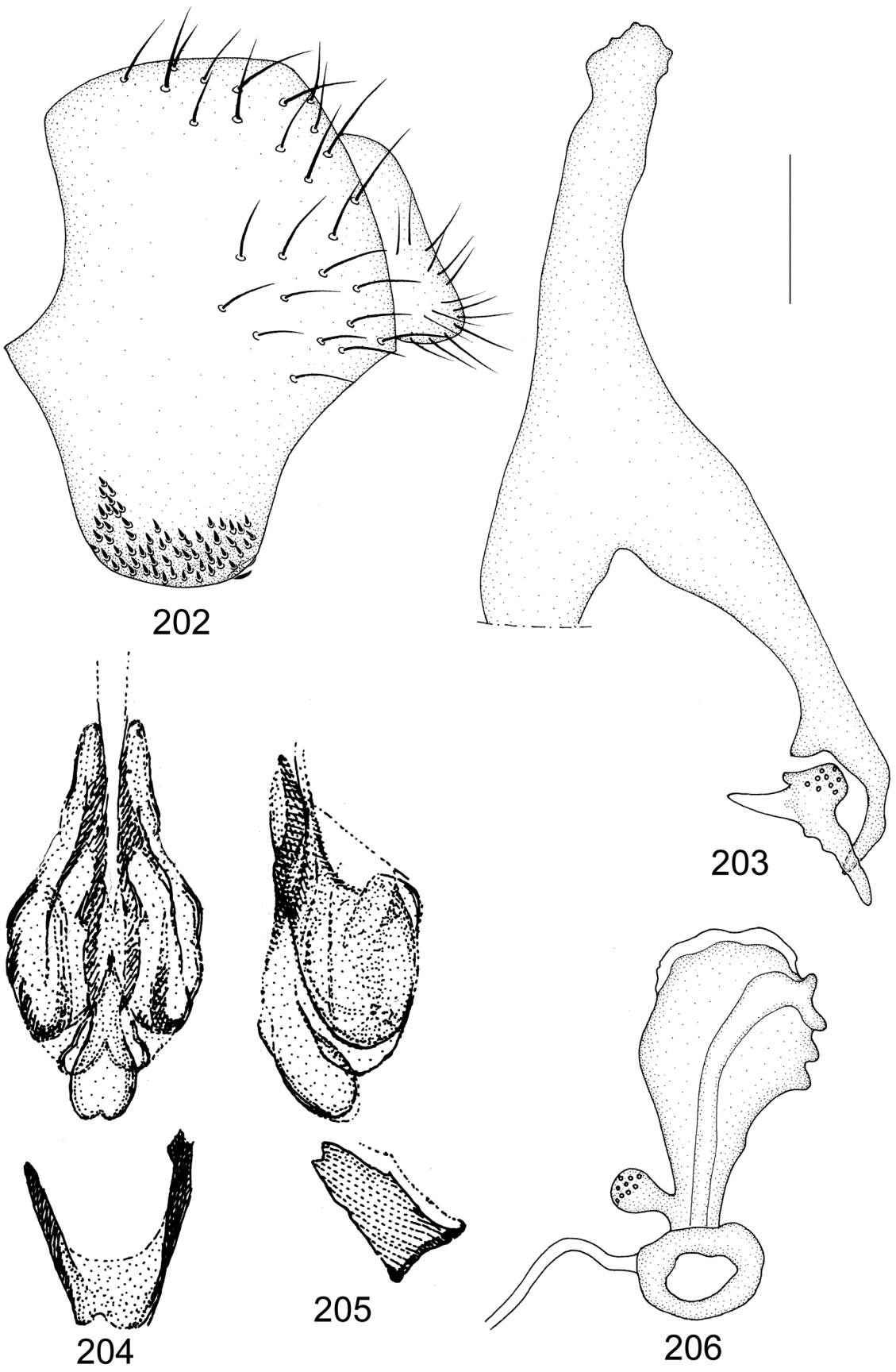
**Diagnosis.** Frons distinctly projecting above eye, 1.9 times as wide as eye; 6–7 *ori* inclinate and 2 *ors* reclinate, *ori* and *ors* long; fronto-orbital plate with broad anterior margin and dense setulae, about 1/4 width of frons; fronto-orbital setulae in 3 rows; ocellar triangle dark, broad, extending to anterior margin of frons. Facial keel raised, dividing bases of antennae; parafacial sparse grayish pruinose. Gena broad, about 1/3 eye height, highest point located at middle. Eye pilose. Arista bare. Mesonotum with slightly coppery sheen. Mesonotum with 1+3–4 *dc*, *acr* in 8 irregular rows. Calypter pale yellow, margin and fringe yellowish brown. Mid tibia with 2 strong posterior setae. Abdomen black with greenish or bluish green sheen in male and brown, coppery or greenish sheen in female.

**Redescription.** MALE. Wing length 3.5 mm (Holotype). FEMALE. Body length 4.2 mm, wing length 3.9 mm.

Head (Figs 197, 198) brownish black. Frons dark black, distinctly projecting above eye (Fig. 198), 1.2 times as wide as long, 1.9 times as wide as eye; 6–7 *ori* inclinate and 2 *ors*, *ori* and *ors* strong, subequal in length; proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal, except




**FIGURES 196–201.** *Melanagromyza quadrisetosa* Spencer, 1981. Holotype male (CAS). 196. habitus, lateral view; 197, 198. head, dorsal and lateral view; 199, 200. thorax, dorsal and lateral view; 201. wing.




**FIGURES 202–206.** *Melanagromyza quadrisetosa* Spencer, 1981. Holotype male (CAS). 202. epandrial complex, lateral view; 203. hypandrium, ventral view (partly broken); 204, 205. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 206. sperm pump. Scale 0.1 mm.

slightly wider gap between posterior *ori* and anterior *ors*; fronto-orbital plate dark brown, anterior margin broad with dense setulae, about 1/4 width of frons; fronto-orbital setulae in 3 rows, two inner rows proclinate or inclinate and single outer row near eye margin reclinate except anterior margin with a few erect or proclinate (all rows erect or proclinate in one female specimen, EMEC); ocellar triangle dark, broad, extending to anterior margin of frons; *oc* strong, slightly shorter than anterior *ors*; postocellar setae strong. Lunule brown, slightly bulging, 0.2 mm high, 1.4 times as wide as high. Facial keel raised, dividing bases of antennae; parafacial brownish black with sparse grayish pruinosity, about 1/11 height of eye. Gena blackish brown, broad, about 1/3 height of eye, highest point located at middle. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate, and arista bare. Proboscis yellowish brown, palpus blackish brown.

Thorax (Figs 196, 199, 200) black. Mesonotum and scutellum with slightly coppery sheen and brownish pruinosity. Mesonotum with 1+3–4 *dc* (Figs 199, 200), *acr* in 8 irregular rows. Anepisternum with whitish gray pruinosity. 1 strong *anepst* with 3 long setulae, 1 *kepst* with 2–3 long setulae. Calypter pale yellow, margin and fringe yellowish brown in male, and calypter white, margin yellowish brown and fringe brownish yellow in female. Fore tibia without posterior setae and mid tibia with 2 strong posterior setae. Wing (Fig. 201) with costa extending to $M_{1+2}$; costal ratio 4:1.2:1; *r-m* nearly at basal 2/3 point of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.1:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.5. Halter blackish brown.

Abdomen black, with greenish or bluish green sheen in male, and brown, coppery or greenish sheen in female. Male genitalia (Figs 202–206): epandrium broad, slightly concave on apical margin; surstylus with short dense apical spines; hypandrium Y-shaped with long hypandrial apodeme; basiphallus U-shaped, relatively long, with lateral arms diverging; distiphallus broad medially and gradually tapering; ejaculatory apodeme long and fan-shaped.

**Type material.** Holotype male (CAS, No. 13947, male genitalia No. 1797): **CALIFORNIA: Marin Co.**, Mill Valley, 110 m, 37°54′21.73″N 122°32′41.91″W, ex. flight trap, 7–11.III.1966, P.H. Arnaud, Jr. Paratypes: **CALIFORNIA: Marin Co.**, 1 female (CAS), Mill Valley, 37°54′21.73″N 122°32′41.91″W, 5–6.IV.1965, P.H. Arnaud, Jr.; 1 female (EMEC), Mill Valley, 37°54′21.73″N 122°32′41.91″W, 360 ft., 7–11.III.1966, N.W. Frazier.

**Biology/Host plants.** Unknown.

**Distribution.** USA (California (Map 2) [Marin Co.]).

### *Melanagromyza sagehenensis* Spencer, 1981

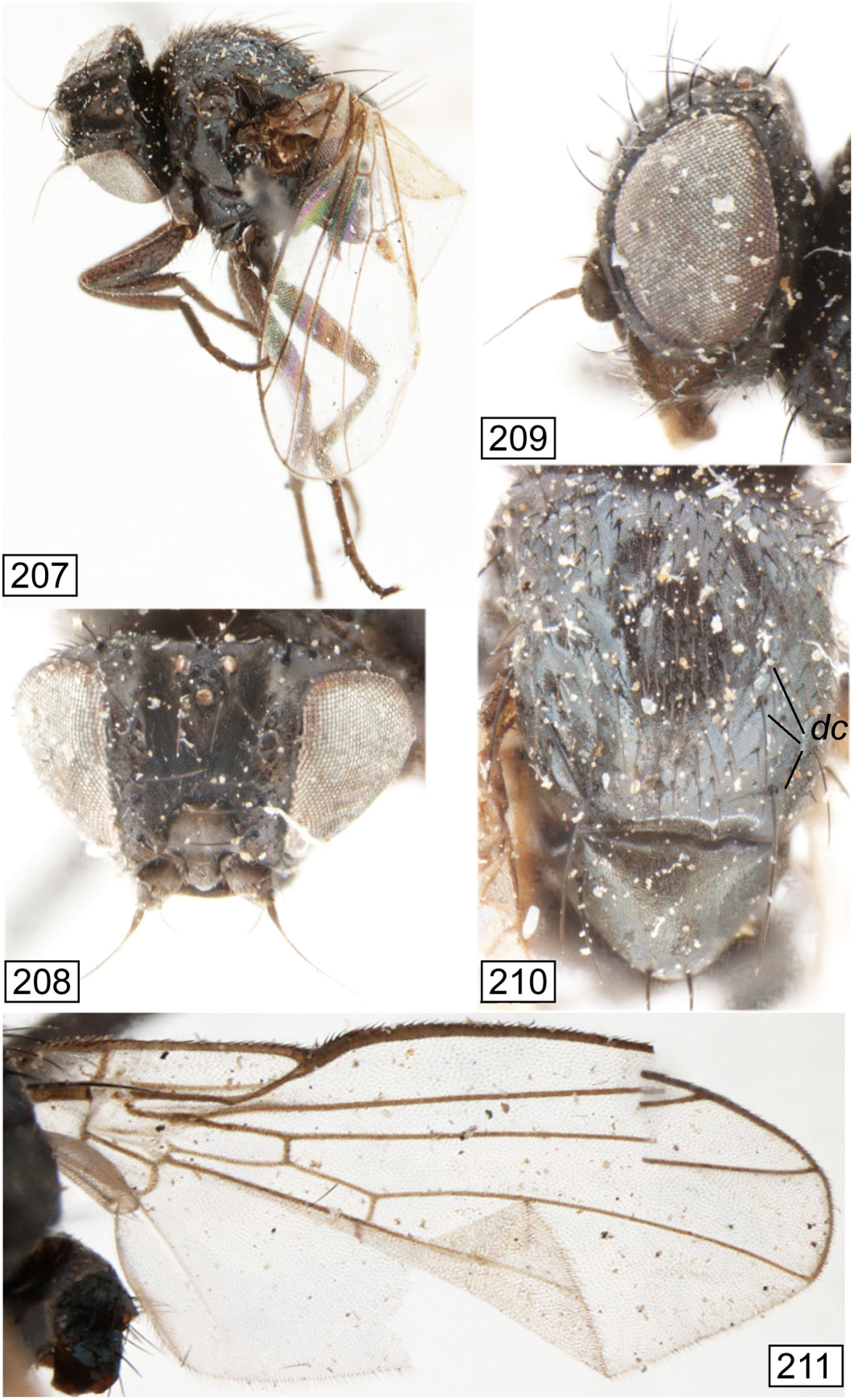
(Figs 207–214, Map 13)

*Melanagromyza sagehenensis* Spencer, 1981: 56. Type locality: USA. California: Nevada Co., Sagehen Creek. HT ♂, UCD. Spencer & Steyskal, 1986: 20, 247; Benavent-Corai, 2005: 30.

**Diagnosis.** Frons slightly projecting above eye, about 1.8 times as wide as eye; 3 *ori*, strong and inclinate; 2 *ors*, reclinate; proportional distance between setae in the *ori-ors* series from anterior to posterior 2.5:1:2:1; fronto-orbital plate slightly shining, about 1/4–1/3 width of frons; fronto-orbital setulae in 2 irregular rows, reclinate except a few proclinate on anterior margin; ocellar triangle small and slightly shining, extending to posterior *ors*. Facial keel raised, dividing bases of antennae. Gena about 1/4–1/3 height of eye, highest point located slightly before middle. Eye and arista bare. Mesonotum with slightly greenish sheen, 0+3–4 *dc* (female with 4 strong *dc* and male with 3 *dc*, anteriormost *dc* weak), *acr* in 6–8 irregular rows (female in 6 rows and male in 8 rows). Calypter gray, margin and fringe blackish brown. Mid tibia with 1 strong posterior seta. Abdomen blackish brown, with coppery and greenish sheen.

**Redescription.** MALE. Body length 1.7 mm, wing length 1.9 mm. FEMALE. Body length 2.0 mm, wing length 2.1 mm.

Head (Figs 208, 209) black. Frons dark, slightly projecting above eye, wider than long, about 1.8 times as wide as eye; 3 *ori*, nearly equal length, strong and inclinate; 2 *ors*, reclinate and anterior *ors* slightly longer than *ori*; proportional distance between setae in the *ori-ors* series from anterior to posterior 2.5:1:2:1; fronto-orbital plate slightly shining, about 1/4 width of frons; fronto-orbital setulae in 2 irregular rows, reclinate except a few proclinate on anterior margin; ocellar triangle small, only extending to posterior *ors*, and slightly shining; *oc* strong, nearly as long as *ori*, postocellar setae strong, divergent. Lunule brown, 0.12 mm high, as long as wide and semicircular. Facial keel raised, dividing bases of antennae. Parafacial black and slightly broad, as long as 1/8

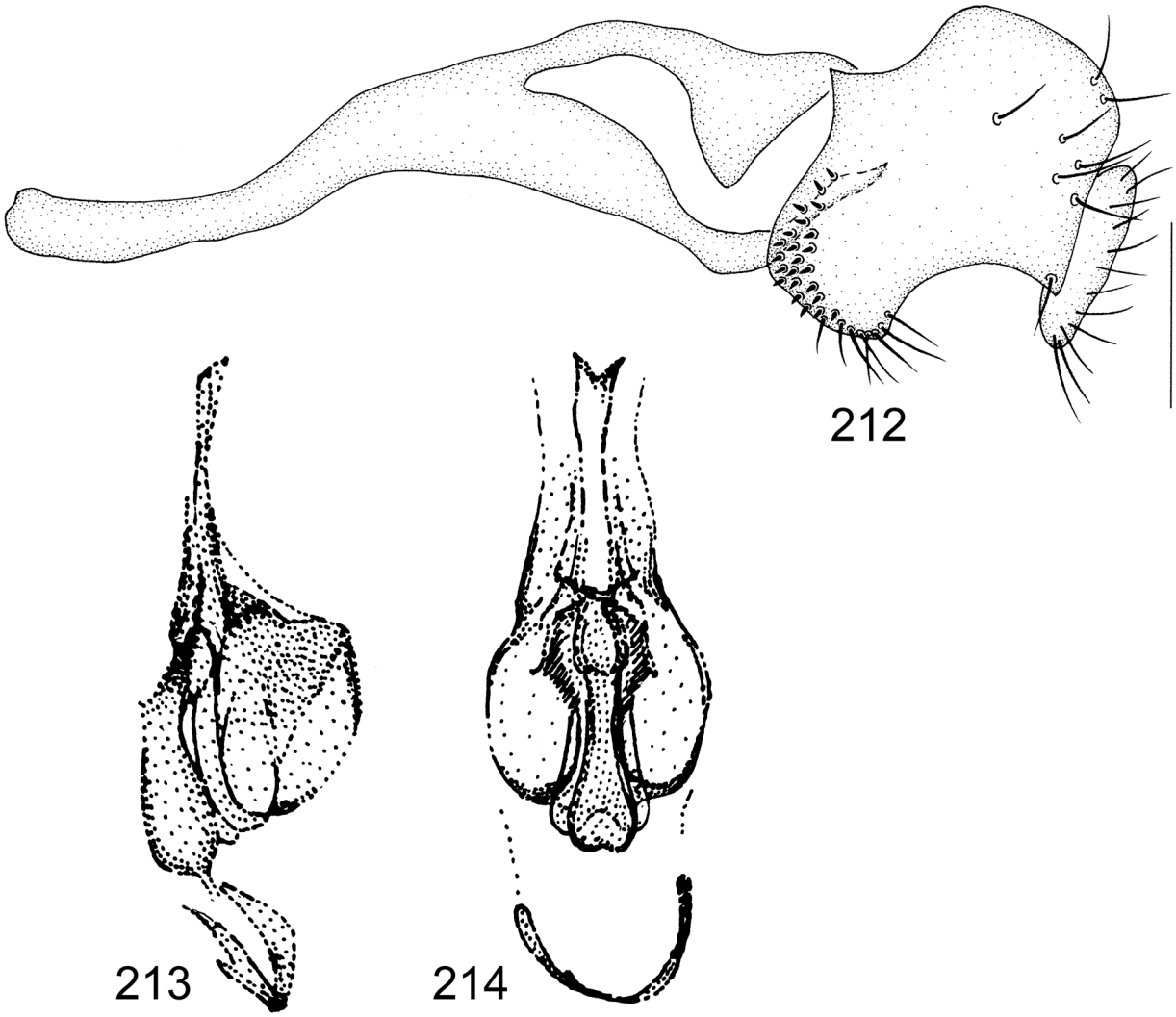



**FIGURES 207–211.** *Melanagromyza sagehenensis* Spencer, 1981. Paratype male (UCD). 207. habitus, lateral view; 208, 209. head, dorsal and lateral view; 210. thorax, dorsal view; 211. wing.

height of eye. Gena yellowish brown, about 1/4–1/3 height of eye, highest point located slightly before middle. Eye bare. Antenna blackish brown, 1st flagellomere short ovate and arista bare. Proboscis brownish yellow, palpus blackish brown.

Thorax (Figs 207, 210) black. Mesonotum and scutellum with slight greenish sheen. Mesonotum with 0+3–4 *dc* (female with 4 strong *dc* and male with 3 *dc*, anteriormost *dc* weak), *acr* in 6–8 irregular rows (female in 6 rows and male in 8 rows). 1 strong *anepst* with 2–3 long setulae, 1 strong *kepst* with 1–2 long setulae. Calypter gray, margin and fringe blackish brown. Fore tibia without strong posterior seta and mid tibia with 1 strong posterior seta (this character is not in good condition in two specimens). Wing (Fig. 211) with costa extending to $M_{1+2}$; costal ratio 2.7:1:1; *r-m* slightly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 2.2:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1. Halter blackish brown.

Abdomen blackish brown, with coppery and greenish sheen. Male genitalia (Figs 212–214): sustylus with sparse short spines, extending in 1–3 rows from distal margin of surstylus to anterodistal margin of epandrium, and with several long setulae; hypandrium Y-shaped, with long hypandrial apodeme; basiphallus semicircular and narrow at apices; distiphallus narrow in apical half, and with central concavity.




**FIGURES 212–214.** *Melanagromyza sagehenensis* Spencer, 1981. Paratype male (UCD): 212. epandrial complex and hypandrium, lateral view; 213, 214. phallic complex, lateral and ventral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986). Scale 0.1 mm.

**Type material.** Paratypes: **CALIFORNIA: Amador Co.**, 1 male (UCD, type number 1198#), 4 miles North of Silver Lake, 38°39′35.00″N 120°06′56.24″W, 25.VII.1955, E.I. Schlinger; **Nevada Co.**, 1 female (UCD), Sagehen Creek, 39°27′09.43″N 120°36′08.11″W, 19.VI.1974, B. Villegas (no head).

**Biology/Host plants.** This is the only species of *Melanagromyza* known to feed on Rosaceae (Spencer, 1990), with larvae feeding as internal stem borers in Sticky cinquefoil, *Drymocallis glandulosa* (Lindl.) Rydb. (Rosaceae)

(Spencer & Steyskal, 1986; Spencer, 1990). See Map 13 for the California distribution of *M. sagehensis* and host plant *Drymocallis glandulosa*. This plant species is native to California, including four varieties, as follows. *Drymocallis glandulosa* var. *glandulosa* is found in shady or moist areas at elevations between 400–2000 m throughout northern California, and to British Columbia, Montana, Arizona, and is known from the Klamath Ranges, North Coast Ranges, Cascade Range, Sierra Nevada, Sacramento Valley (Sutter Buttes), Transverse Ranges, Peninsular Ranges and Modoc Plateau. *Drymocallis glandulosa* var. *reflexa* (Greene) Ertter is found in shady or moist areas at elevations between 450–2600 m throughout California, and to southern Oregon, western Nevada, and Mexico (northern Baja California), and is known from the Klamath Ranges, High North Coast Ranges, High Cascade Range, High Sierra Nevada, San Gabriel Mountains, San Bernardino Mountains and Peninsular Ranges. *Drymocallis glandulosa* var. *viscida* (Parish) Ertter is found in open areas under pines and along streams at elevations between 1100–2500 m in California, being known from the Transverse Ranges and Peninsular Ranges. *Drymocallis glandulosa* var. *wrangelliana* (Fisch. & Avé-Lall.) Ertter is found in openings in coastal scrub areas, and shady or moist areas at elevations below 1000 m throughout California, and to southwestern Oregon, and northern Baja California, and is known from the North Coast, Outer North Coast Ranges, Central Western California and South Coast.

**Distribution.** USA (California (Map 13) [Amador Co., Nevada Co.], Montana).

### *Melanagromyza scrophulariae* Spencer, 1981

(Figs 215–223, Map 14)

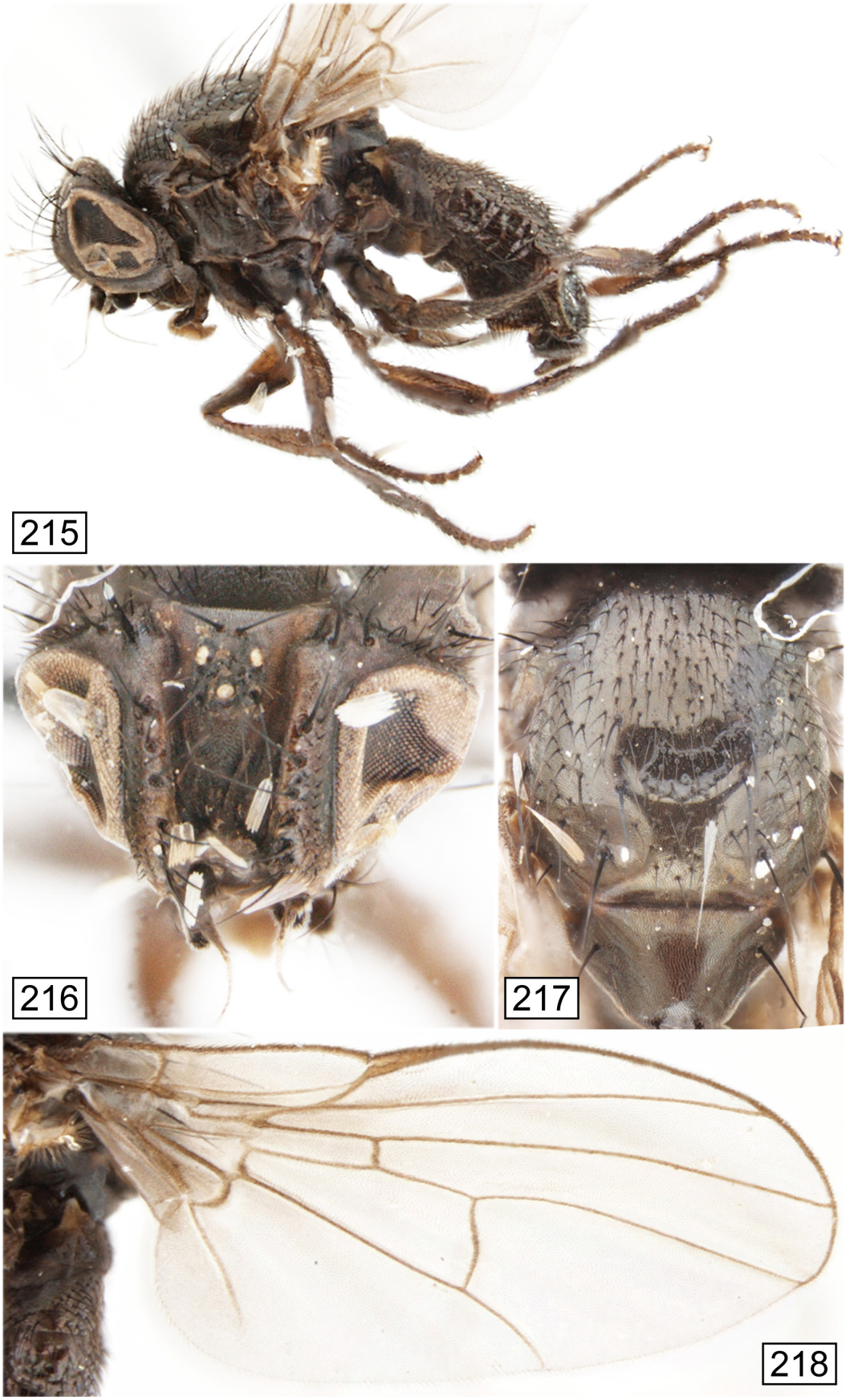
*Melanagromyza scrophulariae* Spencer, 1981: 57. Type locality: USA. California: San Francisco Co., Strawberry Hill. HT ♂, CAS. Spencer & Steyskal, 1986: 20; Benavent-Corai, 2005: 30.

**Diagnosis.** Frons distinctly projecting above eye, 2.3 times as wide as eye, anterior margin slightly narrower; 4–5 *ori*, strong and inclinate; 2 *ors*, reclinate; fronto-orbital plate shining, about 1/4 frons width; fronto-orbital setulae in 2 rows, outer row reclinate and inner row inclinate; ocellar triangle broad, extending to anterior margin of frons, slightly shining. Facial keel raised, dividing bases of antennae. Gena about 1/3–1/2 height of eye, highest point located slightly before middle. 1 strong vibrissa and a row of short setulae along peristomal margin. Mesonotum with slight greenish sheen, 0+3–4 *dc* (if with 4 *dc*, anterior 2 *dc* weaker). Calypter white or pale yellow, margin and fringe yellowish brown. Mid tibia without strong posterior seta. Abdomen blackish brown with distinctly coppery and greenish sheen.

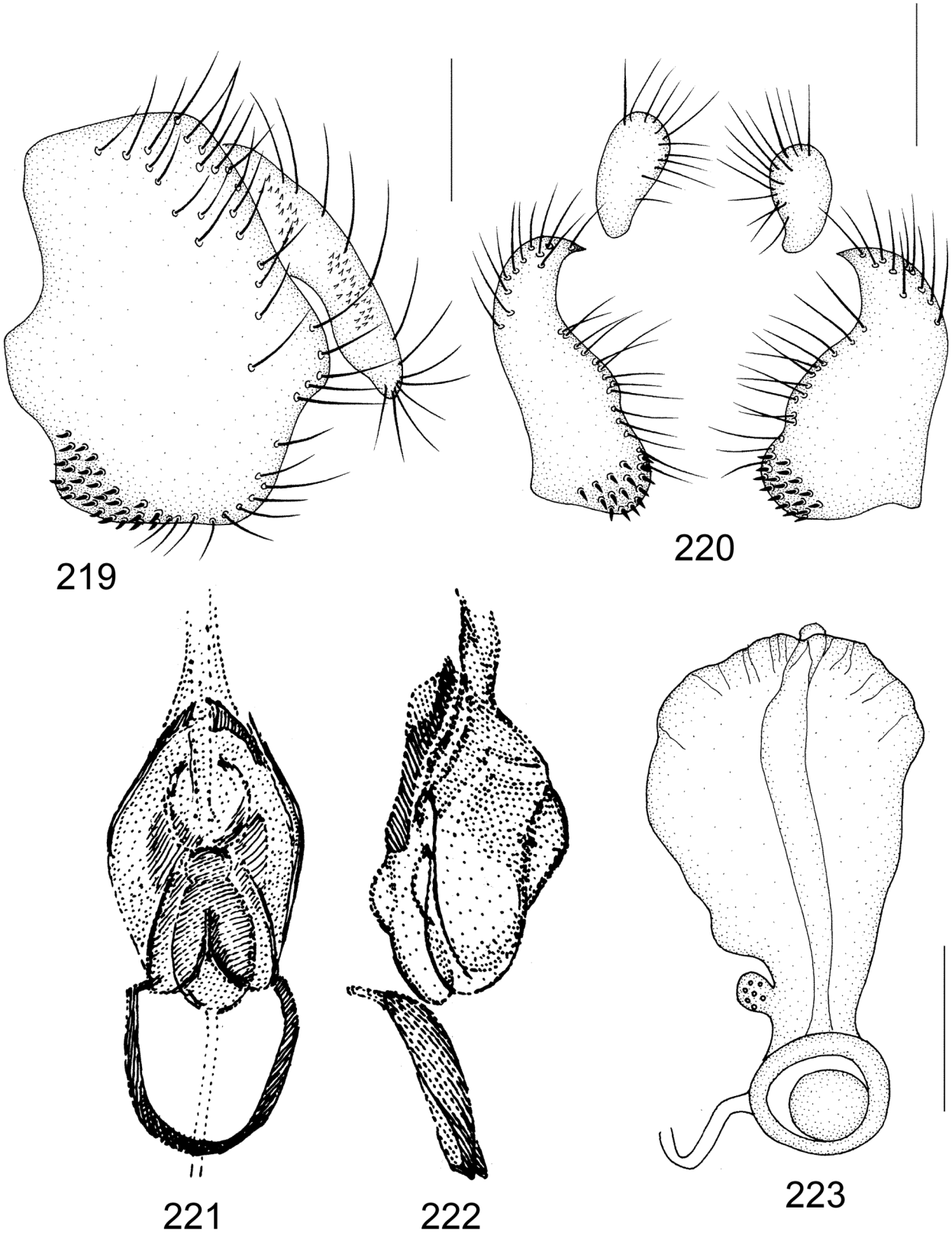
**Redescription.** MALE. Body length 2.0–2.7 mm, wing length 2.3–3.0 mm. FEMALE. Body length 2.5–3.0 mm, wing length 2.8–3.2 mm.

Head (Figs 215, 216) black. Frons dark brown, with distinctly projecting above eye (Fig. 222), slightly wider than long, 2.3 times as wide as eye, anterior margin slightly narrow and black; 4–5 *ori*, subequal in length, strong and inclinate; 2 *ors*, reclinate and slightly longer than *ori*; proportional distance between setae in the *ori*-*ors* series from anterior to posterior subequal; fronto-orbital plate shining, about 1/4 width of frons, and anterior margin broad, yellowish brown, reddish brown or brown, and inner margin distinctly brown; fronto-orbital setulae black in 2 rows, outer row reclinate and inner row inclinate; ocellar triangle broad, extending to anterior margin of frons, black and slightly shining; *oc* strong, nearly as long as *ori*, postocellar setae strong, divergent. Lunule brown, 0.20 mm high, slightly wider than high. Facial keel raised, dividing bases of antennae. Parafacial black and slightly broad, about 1/5 height of eye. Gena brownish yellow to yellowish brown, about 1/3–1/2 height of eye, highest point located slightly before middle. 1 strong vibrissa and a row of short setae on peristomal margin. Eye bare. Antenna blackish brown, 1st flagellomere short ovate and arista with microscopic setulae. Proboscis brownish yellow, palpus black.

Thorax (Figs 215, 217) black. Mesonotum and scutellum with dense brown pruinosity and slight greenish sheen. Mesonotum with 0+3–4 *dc* (if with 4 *dc*, anterior 2 *dc* weaker) (Fig. 217), *acr* in 6–8 irregular rows. 1 *anepst* with 2–3 long setulae, 1 *kepst* with 1 long setula. Calypter white or pale yellow, margin and fringe yellowish brown. Fore and mid tibia without strong posterior seta. Wing (Fig. 218) with costa extending to $M_{1+2}$; costal ratio 4:1.3:1; *r-m* at or slightly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.4:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.6. Halter blackish brown.




**FIGURES 215–218.** *Melanagromyza scrophulariae* Spencer, 1981. Paratype male (EMEC). 215. habitus, lateral view; 216. head, dorsal view; 217. thorax, dorsal view; 218. wing.




**FIGURES 219–223.** *Melanagromyza scrophulariae* Spencer, 1981. Paratype male (EMEC): 219, 220. epandrial complex, lateral and ventral view; 221, 222. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 223. sperm pump. Scale 0.1 mm.

Abdomen (Fig. 215) blackish brown, with distinctly coppery and greenish sheen. Male genitalia (Figs 219–223): epandrium very broad with long setulae along apical margin; surstylus with sparse short spines on anterior

ventral corner, and long apical setulae; basiphallus U-shaped, narrow and slightly curved inward apically; distiphallus broad medially and apical projection; ejaculatory apodeme broad and fan-shaped. Cercus long with tiny teeth.

**Type material.** Paratypes: **CALIFORNIA: Alameda Co.**, 1 male (EMEC), Berkeley Hills, 37°53′32.33″N 122°16′05.61″W, 26.III.1954, R.F. Smith & E.G. Linsley; **Contra Costa Co.**, 2 females (EMEC), Richmond, Pt. Molate, 37°56′47.73″N 122°25′18.90″W, 27.III.1964, J.A. Powell; **Marin Co.**, 1 male (EMEC), Fort Cronchite, 37°49′57.13″N 122°31′57.59″W, 3.III.1962, C.A. Toschi; **San Francisco Co.**, 4 males, 3 females (EMEC), Strawberry Hill, 37°46′07.11″N 122°28′31.14″, 17.III.1961, J. Powell; **San Mateo Co.**, 1 male (EMEC), 37°33′46.77″N 122°19′31.89″, 29.IV.1949, R.S. Beal.

**Non-type material. CALIFORNIA: Mendocino Co.**, 9 males, 6 females (CSCA), Inglenook Fen & dunes, 39°30′41.40″N 123°46′24.32″W, 6.III.1975, J. Powell; **Monterey Co.**, 1 female (CSCA), Big Creek Reserve 7 mi. N. Lucia, 36°22′46.86″N 121°33′44.79″, 21.III.1981, J.B. Whitfield; **San Mateo Co.**, 1 female (CSCA), San Bruno Mts., 37°33′46.77″N 122°19′31.89″, 23.II.1967, W.W. Middlekauff & D.C. Rentz.

**Biology/Host plants.** Larvae of this species are internal stem borers in California figwort, *Scrophularia californica* Cham. & Schltdl. (Scrophulariaceae) (Spencer, 1981; Spencer & Steyskal, 1986; Spencer, 1990). See Map 14 for the California distribution of *M. scrophulariae* and host plant *Scrophularia californica*. This plant species is native to California, being found in damp places, chaparral, and along the roadsides at elevations lower than 2500 m throughout California, and to British Columbia and Arizona. The plant is known from the California Floristic Province.

**Distribution.** USA (California (Map 14) [Alameda Co., Contra Costa Co., Marin Co., Mendocino Co.*, Monterey Co.*, San Francisco Co., San Mateo Co.]).

### *Melanagromyza splendida* Frick, 1953

(Figs 1–3, 4, 7, 8, 10, 224–235, Maps 16, 17)

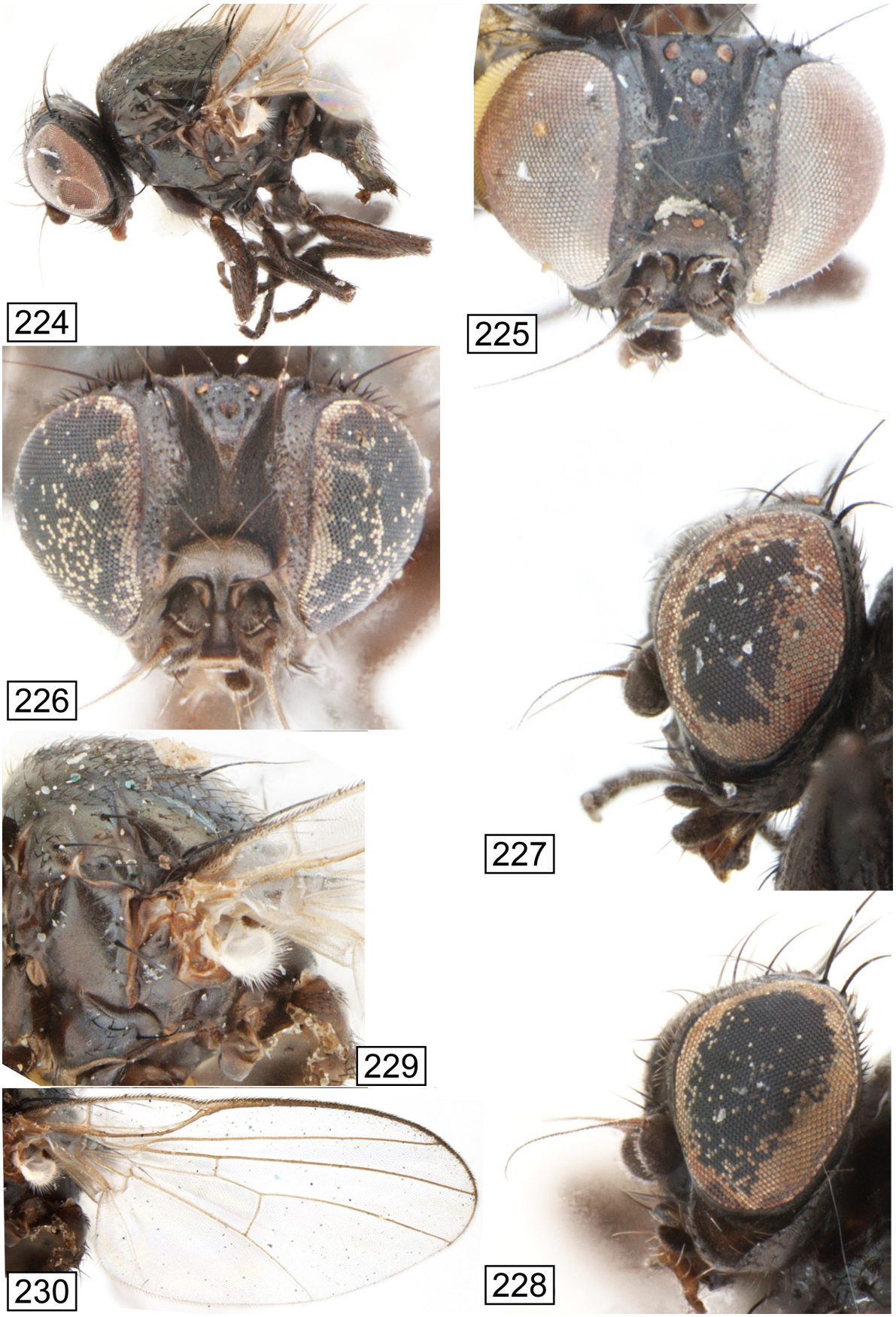
*Melanagromyza splendida* Frick, 1953a: 207. Type locality: USA. Hawai'i: Hawai'i Co.: Kamuela [=Waimea]. HT ♂, USNM. Spencer, 1973a: 123; Spencer & Stegmaier, 1973: 48; Hardy & Delfinado, 1980: 196; Spencer, 1981: 58; Spencer, 1982: 6; Spencer & Steyskal, 1986: 25; Benavent-Corai, 2005: 30; Palacios-Torres *et al*. 2008: 21; Palacios-Torres *et al*. 2010: 61; Mathew *et al.*, 2015: 41.

**Diagnosis.** Frons not projecting above eye, 1.2 times as wide as eye; 2 *ori* inclinate and widely separated, and 2 *ors* reclinate; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 4.5:1.5:1; fronto-orbital plate slightly shining and wider at middle, about 1/4–1/3 width of frons; fronto-orbital setulae in 3 rows, inner row proclinate, and two outer rows reclinate; ocellar triangle slightly shining, extending to posterior *ori*. Gena about 1/6 height of eye, highest point located at middle. Mesonotum and scutellum with greenish sheen, 0+2 *dc*, *acr* in 8 rows. Calypter white, margin and fringe white. Mid tibia with 2 strong posterior setae. Abdomen blackish brown with coppery and greenish sheen.

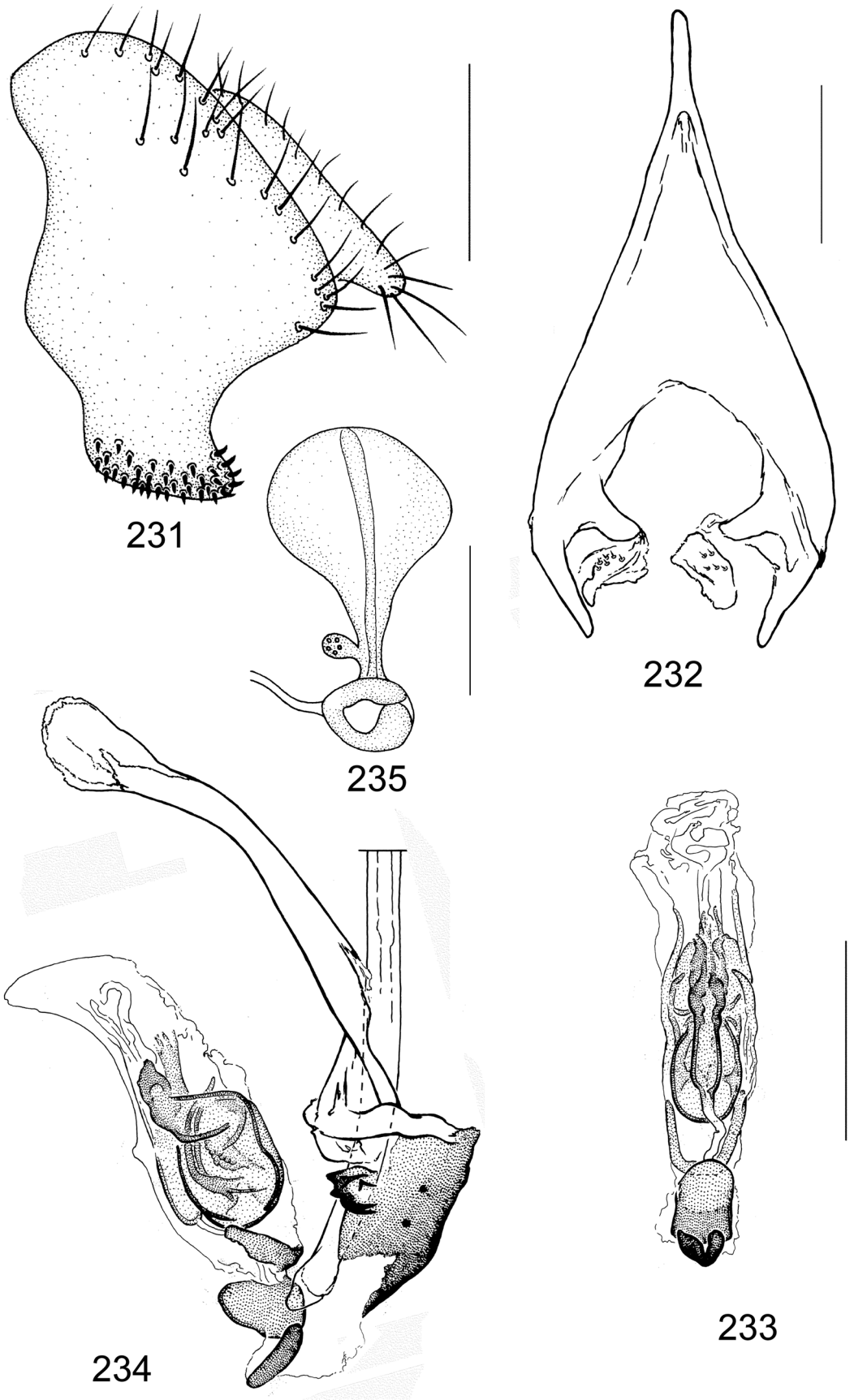
**Redescription.** MALE. Body length 1.7–2.2 mm, wing length 1.8–2.4 mm (Holotype 2.4 mm). FEMALE. Body length 1.9–2.3 mm, wing length 2.3–2.6 mm.

Head (Figs 1–4, 225–228) mostly blackish brown. Frons dark brown, not projecting above eye, nearly as wide as long, 1.2 times as wide as eye; 2 *ori* inclinate and widely separated, and 2 *ors* reclinate; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 4.5:1.5:1; fronto-orbital plate slightly shining, wider at middle, about 1/4–1/3 width of frons; fronto-orbital setulae (Figs 1, 3) in 3 rows, inner single row proclinate, and two outer rows reclinate; ocellar triangle slightly shining, extending to posterior *ori*; *oc* strong, nearly as long as *ors*; postocellar setae strong. Lunule 0.10 mm high, 2.0 times as wide as high. Facial keel narrow and not raised. Gena about 1/6 height of eye, highest point located at middle. Eye pilose (Figs 1, 2), pile as long as fronto-orbital setulae. Antennal 1st flagellomere short ovate and arista bare. Proboscis yellowish brown, palpus black.

Thorax (Figs 7, 8, 224, 229) blackish brown. Mesonotum and scutellum with greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 rows (Fig. 7). 1 *anepst* with 2–4 long setulae and 1 *kepst* with a long setula (Fig. 8). Calypter white, margin and fringe white. Fore tibia without posterior setae, mid tibia with 2 strong posterior setae (Fig. 10). Wing (Fig. 230) with costa extending to $M_{1+2}$; costal ratio 1.1 mm: 0.3 mm: 0.25 mm; *r-m* nearly at apical 1/3 point or just between middle point and apical 1/3 point; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.0 mm: 0.6 mm; ultimate and penultimate sections of $CuA_1$ in proportion of 0.5 mm: 0.6 mm. Halter blackish brown.




**FIGURES 224–230.** *Melanagromyza splendida* Frick, 1953. Non-type male (CSCA): 224. habitus, lateral view; 225–228. head, dorsal and lateral view, 225 Holotype male, USNM; 229. thorax, lateral view (Holotype male, USNM); 230. wing (Holotype male, USNM).




**FIGURES 231–235.** *Melanagromyza splendida* Frick, 1953. Holotype male (USNM). 231. epandrial complex, lateral view; 232. hypandrium, ventral view; 233, 234. phallic complex, ventral and lateral view; 235. sperm pump. Scale 0.1 mm. (Figures 232–234 provided by Owen Lonsdale, CNC).

Abdomen blackish brown, with coppery and greenish sheen. Male genitalia (Figs 231–235): surstylus relatively narrow with dense short spines in 3 rows; hypandrium Y-shaped with short hypandrial apodeme; basiphallus U-shaped, with arms diverging;; distiphallus with broad basal section, middle section with a pair of lateral projections, apical section narrow and with a pointed triangular subapical process; ejaculatory apodeme fan-shaped with long stem.

**Type material.** Holotype male (USNM, male genitalia deposited in microvial), **Hawaii:** Kamuela, ex Celery, 5.XII.1950, [collector not given]. Paratypes: **Hawaii:** 1 male (CAS), Glenwood, VIII.1951, ex: rotten lettuce, K.E. Frick; 1 female (CAS), Kurtistown, ToHo, 23.VII.1941, Celery (*Apium graveolens* L.), S. Takei.

**Non-type material. CALIFORNIA: Glenn Co.**, 1 male, 10 females (CSCA), Willows, 35°19′21.08″N 120°49′52.97″W, ex. stem - *Helianthus annuus*, 21.VIII.1986, V. Burton; **Los Angeles Co.**, 1 male, 1 female (UCD), Glendale, 34°08′33.03″N 118°15′18.27″W, 12.IX.1953, ex. roots in *Zinnia*, E.I. Schlinger; **Monterey Co.**, 1 female (UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, 17.XI.1942, ex. Guayule stem borer, W.H. Lange; 1 male (UCD, male genitalia: No. 4722), Salinas, 36°40′39.85″N 121°39′19.80″W, 3.XI.1942, ex. *Parthenium argentatum* (just the plant cultivated in the garden, not native distribution in California), W.H. Lange (no head); 1 female, 2 males (UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, 17.XI.1942, ex. Guayule, W.H. Lange; 1 male, 9 females (UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, 26.XI.1942, ex. *Parthenium argentatum* Gray, W.H. Lange; 1 male (UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, 17.XI.1942, ex. *Parthenium argentatum* stem borer, W.H. Lange; 3 females (UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, 3–4.XI.1942, ex. reared from *Parthenium argentatum*, W.H. Lange (collected from Quail Creek nursery, 25.X.1942); **San Francisco Co.**, 6 males (CSCA), San Francisco, 37°46′29.75″N 122°25′09.90″W, ex. collected from *Franseria*, 26.VIII.1930, H.H. Keifer; **San Luis Obispo Co.**, 1 male (CSCA), San Miguel, Cuyler Hbr., 35°45′08.88″N 120°41′46.62″W, 11.VII.1970, A.A. Grigerick & R.O. Schuster; 2 males (CSCA), Montana de Oro St. Pk. Dunes, 3 mi. SW. Los Osos, 35°19′21.08″N 120°49′52.97″W, 16–17.VIII.1983, ex. Malaise trap 10A-4P, M. Wasbauer & P. Adams; **Santa Clara Co.**, 1 female (EMEC, No. 1476-2), Stanford University, 37°25′57.94″N 122°10′08.14″W, 12.VIII.1922, C.D. Duncan; 1 male (EMEC, No. 1476-8), Stanford University, 37°25′57.94″N 122°10′08.14″W, 15.VIII.1928, C.D. Duncan (partly damaged); **Yolo Co.**, 1 male (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 22.VII.1956, A.T. McClay; 2 males, 5 females (CSCA), Woodland, Eureka Nursery, 40°46′44.19″N 124°06′13.22″W, 4.VIII.2008, ex. *Helianthus annuus*, E. Blitzer. 1 male (CSCA). **ILLINOIS: DeWitt Co.**, DeWitt, DeWitt Cemetary, 225 m, 18.V.1996, S.D. Gaimari & M.A. Metz.

**Biology/Host plants.** This species has a wide host range (Spencer, 1990), and is one of the apparently few oligophagous species of *Melanagromyza*, feeding on several plant families, and several tribes within Asteraceae. Larvae are internal borers in stems and at the bases or midribs of large leaves of various asters (Spencer, 1969; Spencer, 1973a; Spencer & Stegmaier, 1973; Spencer, 1990), pupariating internally (Spencer, 1973a; Spencer, 1981). In California, this species has been reared from: *Helianthus annuus*, and is associated with a *Rhizopus* stem disease in this plant (Mathew *et al.*, 2015); Guayule, *Parthenium argentatum* A. Gray (Asteraceae) (only as the cultivated plants, no general distribution records in California); and cultivated zinnias, *Zinnia* sp. (Asteraceae). It has also been collected in association with Common ragweed / annual ragweed, *Ambrosia artemisiifolia* L. (Asteraceae); Celery / wild celery, *Apium graveolens* L. (Apiaceae); African or French marigold / Aztec marigold, *Tagetes erecta* L. (Asteraceae); Common beggarticks / hairy beggarticks, *Bidens pilosa* L. (Asteraceae); Calabaza / Field pumpkin, *Cucurbita pepo* L.; Carrot / Queen Anne's lace, *Daucus carota* L. (Apiaceae); and Fire wheel / Blanket flower / Indian blanket, *Gaillardia pulchella* Foug. (Asteraceae). Outside of California, this species has been reared from *Flaveria linearis* Lag. (Asteraceae) in Jamaica and *Erechtites hieraciifolia* (L.) DC. var. *hieraciifolia* in Florida (Spencer & Stegmaier, 1973). See Maps 16 and 17 for the California distribution of *M. splendida* and host plants *Ambrosia artemisiifolia, Apium graveolens*, *Tagetes erecta* (Map 16), *Bidens pilosa, Cucurbita pepo, Daucus carota* and *Gaillardia pulchella* (Map 17). The plant *H. annuus* species is native to California (see Map 11 for plant distribution), with details provided in the "Biology/Host plants" section for *M. minimoides*. *Artemesia artemisiifolia*, which is native to the eastern United States, is naturalized in California, being found in disturbed sites at elevations lower than 1050 m throughout California, to Alaska, Canada, and in much of the world, and is known from the Klamath Ranges, Cascade Range Foothills, northern and central Sierra Nevada, Sacramento Valley, Outer South Coast Ranges, South Coast and Peninsular Ranges. The plant *A. graveolens* is native to Eurasia, and is naturalized in California, being found in wet areas at elevations lower than 1000 m throughout California, to many temperate zones worldwide, cultivated and naturalized widely. The plant *T.*

*erecta* which is native to Mexico, is a waif in California, being found in disturbed habitats at elevations below 1000 m, and is known from Central Western California and Southwestern California. The plant *B. pilosa* is naturalized in California, being found in disturbed areas at elevations below 750 m throughout California, and to subtropical and tropical areas worldwide, and is known from the Central Western California and Southwestern California. The plant *C. pepo* var. *pepo* is naturalized in California, being found in sandy areas at elevations below 100 m, and is known from the South Coast (Ventura Co.), and is cultivated worldwide. The plant *D. carota*, which is native to Europe, is naturalized in California, being found in disturbed areas and along roadsides at elevations below 1650 m throughout California, and through to eastern North America, and is known from the California Floristic Province and East of Sierra Nevada. The carrot cultivar is also widely cultivated. The plant *G. pulchella*, which is native to Texas and nearby states, is a waif in California, being found in disturbed sites at elevations lower than 1000 m, and known from the Sierra Nevada Foothills, San Francisco Bay Area, Southwestern California and Modoc Plateau. The host plant *Erechtites hieracifolia* is introduced to California, and inhabits the disturbed coastal areas of the North and Central Coasts. The known host *Flaveria linearis* does not occur in California, but one species of *Flaveria*, the introduced *F. trinervia* (Spreng.) C. Mohr, occurs on the southern coast. In addition, *M. splendida* has been collected in association with the aster genera *Lactuca* and *Xanthium*. Spencer (1973a) considers this species a potential pest, as it has been reported doing serious damage to celery plantings on Hawaii, and feeds on carrots in Mexico (Spencer, 1973a).

**Distribution.** USA (California (Maps 16, 17) [Glenn Co.*, Los Angeles Co.*, Monterey Co., Riverside Co., San Francisco Co.*, San Luis Obispo Co.*, Santa Barbara Co., Santa Clara Co.*, Ventura Co., Yolo Co.], Arizona, Florida, Hawaii, Illinois*, Michigan, New York, South Carolina), Bahamas, Chile, Jamaica, Mexico.

### *Melanagromyza trispinella* Spencer, 1981

(Figs 236–245, Map 3)

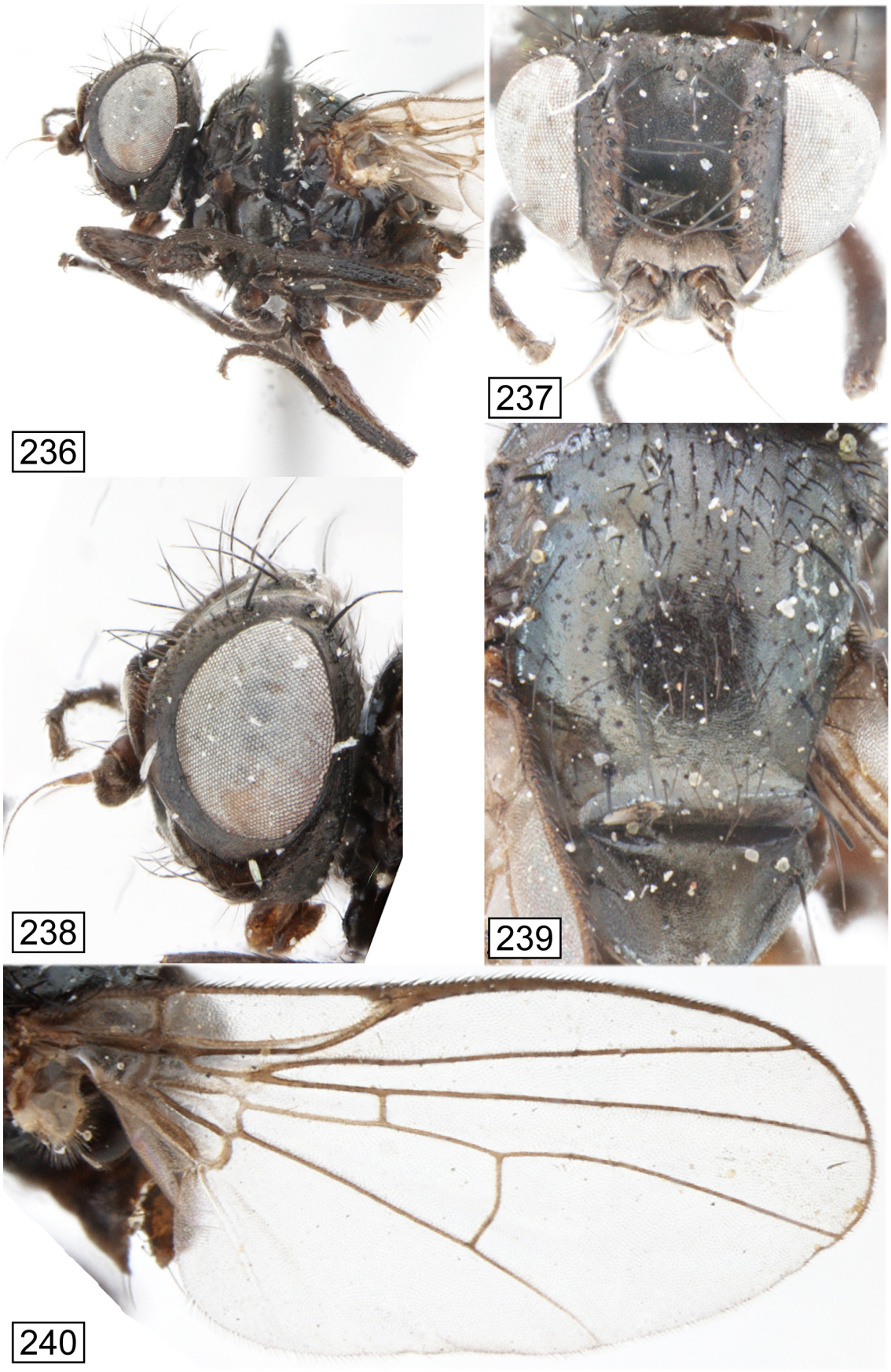
*Melanagromyza trispinella* Spencer, 1981: 59. Type locality: USA. California: Solano Co., Vacaville. HT ♂, UCD. Spencer & Steyskal, 1986: 19.

**Diagnosis.** Frons distinctly projecting above eye, 2.1 times as wide as eye; 4–5 *ori* inclinate and 2 *ors* reclinate, *ori* and *ors* strong and long, closely associated; fronto-orbital plate about 1/4 width of frons; fronto-orbital setulae in 2–3 rows, proclinate; ocellar triangle weakly shining, extending to anterior margin of frons. Facial keel raised, dividing bases of antennae. Gena about 1/3 eye height, highest point located at middle. Mesonotum with slightly coppery and greenish sheen, 1+2 *dc*. Calypter white, margin and fringe brown. Mid tibia with 1 strong posterior seta. Abdomen black with greenish or coppery sheen.

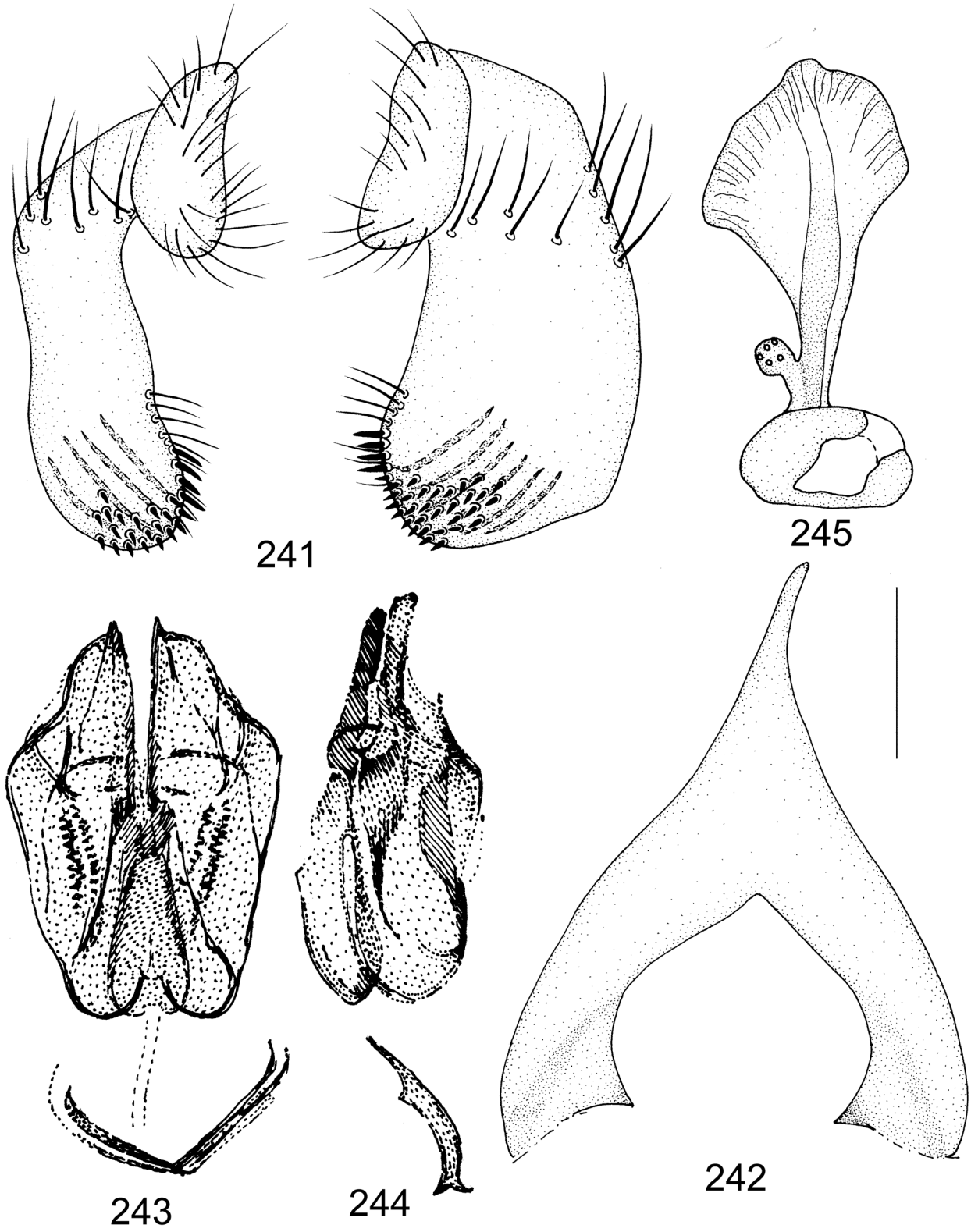
**Redescription.** MALE. Wing length 2.6 mm (Holotype).

Head (Figs 237, 238) blackish brown. Frons dark black, distinctly projecting above eye (Fig. 238), 1.1 times as wide as long, 2.1 times as wide as eye; 4–5 *ori* inclinate and 2 *ors* reclinate, *ori* and *ors* strong and long, length subequal, closely associated; proportional distance between setae in the *ori-ors* series from anterior to posterior 2:2:1.5:1.5:1:1; fronto-orbital plate brown near inner margin, anterior margin slightly yellowish brown, about 1/4 width of frons; fronto-orbital setulae in 2–3 rows proclinate; ocellar triangle dark, weakly shining at middle, extending to anterior margin of frons; *oc* strong, nearly as long as *ors*; postocellar setae strong. Lunule grayish brown and bulging, 0.15 mm high 2.0 times as wide as high. Facial keel raised, dividing bases of antennae (Fig. 237); parafacial brownish black, about 1/10 height of eye. Gena blackish brown, broad, about 1/3 height of eye, highest point located at middle. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate, and arista bare. Proboscis yellowish brown, palpus blackish brown.

Thorax (Figs 236, 239) black. Mesonotum and scutellum with brownish gray pruinosity and slightly coppery and greenish sheen. Mesonotum with 1+2 *dc* (presutural *dc* at anterior edge of suture) (Fig. 239), *acr* in 6 rows. 1 strong *anepst* and 1 strong *kepst* with 1–2 long setulae. Calypter white, margin and fringe brown. Fore tibia without posterior seta, mid tibia with 1 strong posterior seta. Wing (Fig. 240) with costa extending to $M_{1+2}$; costal ratio 4:1.3:1; *r-m* at middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.4:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.6. Halter blackish brown.




**FIGURES 236–240.** *Melanagromyza trispinella* Spencer, 1981. Holotype male (UCD). 236. habitus, lateral view; 237, 238. head, dorsal and lateral view; 239. thorax, dorsal view; 240. wing.




**FIGURES 241–245.** *Melanagromyza trispinella* Spencer, 1981. Holotype male (UCD). 241. epandrial complex, posteroventral view; 242. hypandrium, ventral view; 243, 244. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 245. sperm pump. Scale 0.1 mm.

Abdomen black, with greenish or coppery sheen. Male genitalia (Figs 241–245): surstylus with sparse short spines in a triangular patch, and several long apical spines and setulae; hypandrium Y-shaped, with narrow hypandrial apodeme; basiphallus V-shaped with subapical tooth; distiphallus broad, narrowing subapically, with two pointed tips; ejaculatory apodeme fan-shaped, with long stem.

**Type material.** Holotype male (UCD, No. 1200, male genitalia No. 4683): **CALIFORNIA: Solano Co.**, Vacaville, 38°21′23.68″N 121°59′15.88″W, 26.II.1953, J.C. Hall.

**Biology/Host plants.** Unknown.

**Distribution.** USA (California (Map 3) [Solano Co., Yolo Co.]).

### *Melanagromyza trispinosa* Spencer, 1981

(Figs 246–258, Map 12)

*Melanagromyza trispinosa* Spencer, 1981: 61. Type locality: USA. California: Kern. Co., 3 miles west of Wofford Heights. HT ♂, CAS. Spencer & Steyskal, 1986: 19.

**Diagnosis.** Frons distinctly projecting above eye, 2.3 times as wide as eye; 3–4 *ori*, strong and inclinate; and 2 *ors* reclinate; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 3:3:2:1:1; fronto-orbital plate about 1/5 width of frons, inner margin slightly brown; fronto-orbital setulae in 2 rows, outer row reclinate and inner row proclinate; ocellar triangle dark, extending to anterior *ors*. Facial keel raised, dividing bases of antennae. Gena about 1/3–1/2 height of eye, highest point located at middle. Mesonotum with distinct greenish sheen, 0–1+2–3 *dc*. Calypter white, margin and fringe pale yellow. Mid tibia with 1 strong posterior seta. Abdomen with brilliant coppery and greenish sheen.

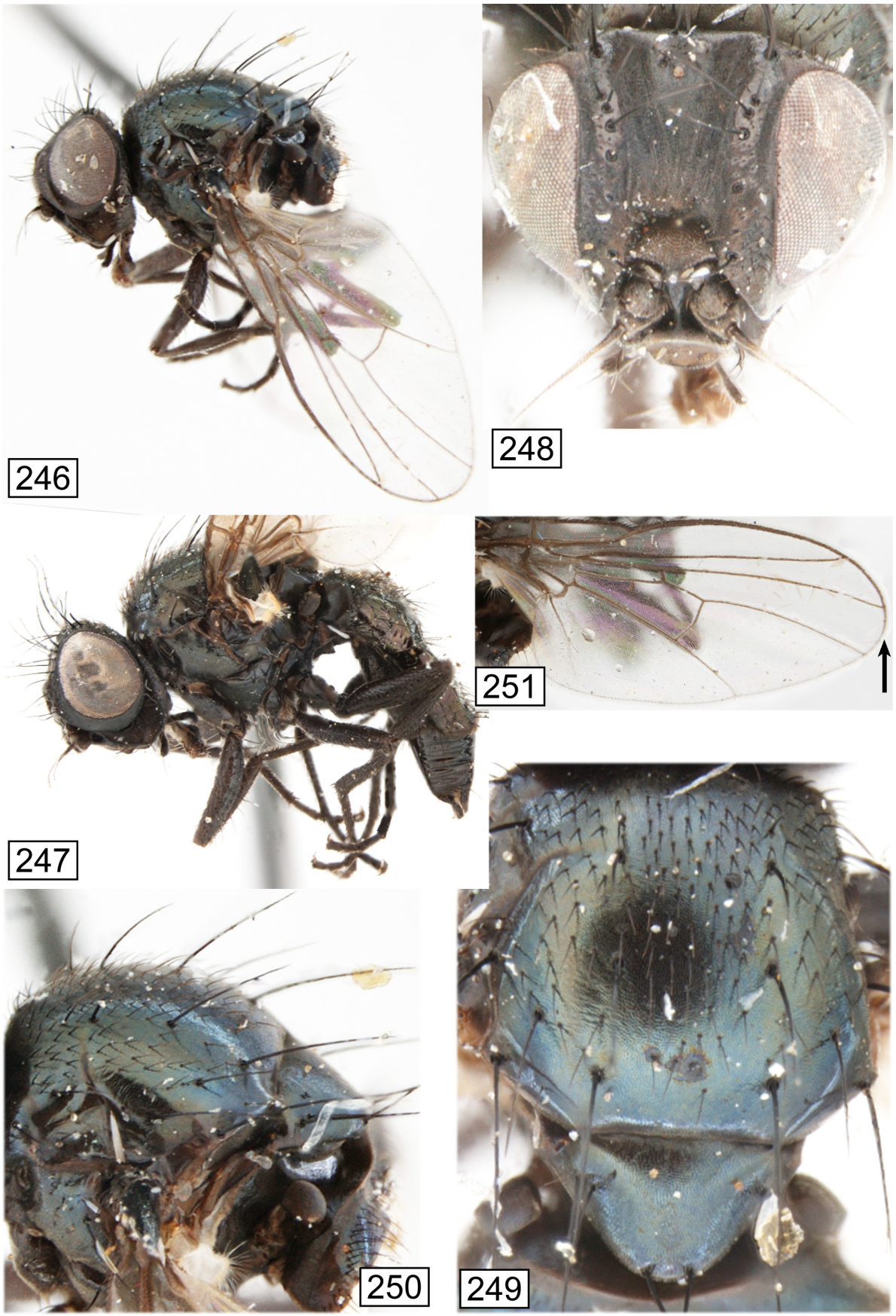
**Redescription.** MALE. Body length 2.4–2.8 mm, wing length 2.5–2.9 mm. FEMALE. Body length 2.6–3.0 mm, wing length 2.7–3.1 mm.

Head (Figs 246–248) black. Frons dark, distinctly projecting above eye, slightly wider than long, 2.3 times as wide as eye; 3–4 *ori* strong and inclinate, subequal in length; 2 *ors* reclinate and nearly as long as *ori*; proportional distance between setae in the *ori*-*ors* series from anterior to posterior 3:3:2:1:1; fronto-orbital plate dark and inner margin slightly brown (two specimens slightly shining on apical half), about 1/5 frons width; fronto-orbital setulae in 2 rows, outer row reclinate (partly proclinate) and inner row proclinate; ocellar triangle dark, only extending to anterior *ors*; *oc* strong, nearly as long as *ori*, postocellar setae strong, divergent. Lunule brown, narrow semicircular, 0.10 mm high, wider than high. Facial keel raised, dividing bases of antennae. Parafacial black and slightly broad, about 1/6 height of eye. Gena brown, about 1/3–1/2 height of eye, highest point located at middle. Epistoma high and raised. 1 strong vibrissa and a row of short setae along peristomal margin. Eye bare. Antenna blackish brown, 1st flagellomere short ovate and slightly narrower apically, arista with microscopic pubescence. Proboscis brown, palpus black with 1–2 long apical setulae.

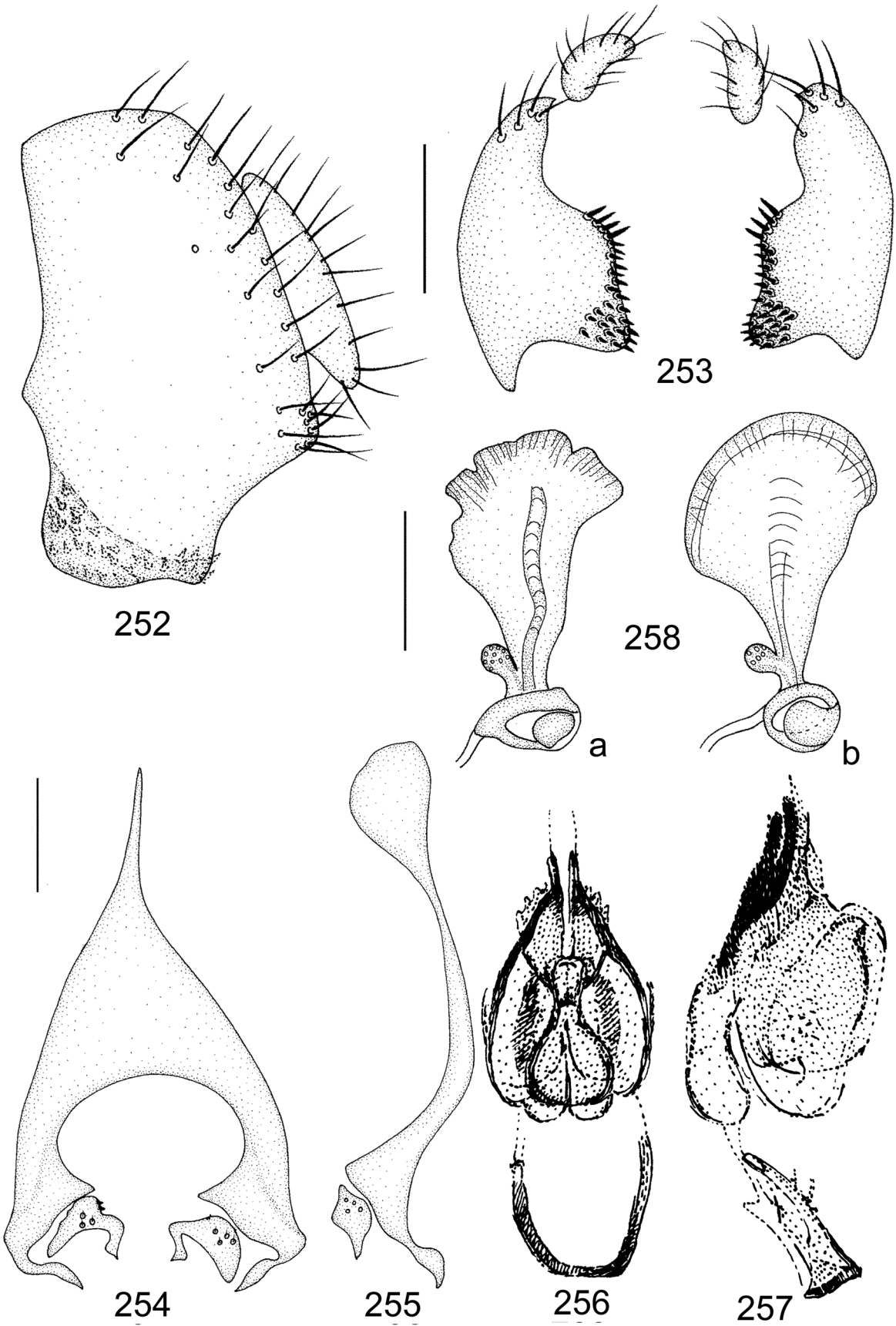
Thorax (Figs 249, 250) black. Mesonotum and scutellum with dense brown pruinosity and distinct greenish sheen. Mesonotum with 0–1+2–3 *dc* (if 1+3 *dc*, presutural *dc* weak), *acr* in 6–8 irregular rows. 1 strong *anepst* with 1–2 long setulae, 1 strong *kepst* with 1 long setula. Calypter white, margin and fringe pale yellow. Fore tibia without strong posterior seta and mid tibia with 1 strong posterior seta. Wing (Fig. 251) with costa extending between $R_{4+5}$ and $M_{1+2}$; costal ratio 3.2:1.2:1; *r-m* slightly or distinctly beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.5:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.3. Halter black.

Abdomen blackish brown, with brilliant coppery and greenish sheen. Male genitalia (Figs 252–258): epandrium with an apical concavity; surstylus with sparse short spines, dense spines on anterior ventral corner and several spines stronger at apex; hypandrium Y-shaped, with thinner hypandrial apodeme; basiphallus U-shaped with arms narrower at apex; distiphallus narrow and tapering gradually, with subbasal undulating margin; ejaculatory apodeme symmetrical, fan-shaped, with smooth margin (Fig. 258b) or with few small marginal incisions (Fig. 258a).

**Type material.** Paratypes: **CALIFORNIA: Contra Costa Co.**, 1 female (EMEC), Mt. Diablo, 37°52′32.82″N 121°59′29.19″W, 20.III.1955, J. Powell; **Kern Co.**, 1 male (EMEC, male genitalia No. 4687), 3 mi W. of Wofford Heights, 35°42′24.83″N 118°27′22.31″W, ex. host plant: *Plagiohothrys nothofulvus*, 2.V.1964, J. Powell; **Monterey Co.**, 1 female (EMEC), Greenfield, 36°19′14.88″N 121°14′37.73″W, 12.III.1967, P.A. Opler; **Yolo Co.**, 1 female (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 3.IV.1953, W.H. Lange.




**FIGURES 246–251.** *Melanagromyza trispinosa* Spencer, 1981. Paratype male (EMEC). 246, 247. habitus, lateral view (247 Paratype female, EMEC); 248. head, dorsal view; 249, 250. thorax, dorsal and lateral view; 251. wing.




**FIGURES 252–258.** *Melanagromyza trispinosa* Spencer, 1981. Paratype male (EMEC). 252, 253. epandrial complex, lateral and ventral view; 254, 255. hypandrium, ventral and lateral view; 256, 257. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 258. sperm pump, a=paratype male (EMEC), b=non-type male (EMEC). Scale 0.1 mm.

**Non-type material. CALIFORNIA: Kern Co.**, 1 female (CSCA), Kern River, 6 air mi, E. Tupman, 35°17′52.86″N 119°21′04.41″W, 21.III.1975, J.T. Doyen; 1 female (UCD), Kern River, 6 air mi E. Tupman, 35°17′52.86″N 119°21′04.41″W, 21.III.1975, J.T. Doyen; **Los Angeles Co.**, 1 male (CSCA), San Clemente Id., E Face, Mt. Thirst 1200–1800 m, 33°25′37.10″N 117°36′43.17″W, 22.III.1972, J. Powell; 1 male (UCD), San Clemente Id., E. Face Mt. Thirst, 33°25′37.10″N 117°36′43.17″W, 1200–1800', 22.III.1972, J. Powell; **San Diego Co.**, 1 male (UCD), Borrego-Clark L. N. End, 33°20′12.13″N 116°16′45.03″W, taken in Malaise trap 8A-5P, 23.III.1978, M. Wasbauer, J. Slansky & P. Adams; 1 male, 1 female (CSCA), Anza-Borrego Springs, Clark Lake N. End, 33°20′12.13″N 116°16′45.03″W, 23.III.1978, M. Wasbauer, J. Slansky & P. Adams; **Yolo Co.**, 1 female (UCD), Davis, 38°32′41.66″N 121°44′25.86″W, 28.III.1977, C.G. Moore; 1 male, 1 female (CSCA), Davis, 38°32′41.66″N 121°44′25.86″W, 28.III.1957, C.G. Moore.

**Biology/Host plants.** This species has been collected in association with Rusty popcornflower / Foothill snowdrops, *Plagiobothrys nothofulvus* (A. Gray) A. Gray (Boraginaceae). See Map 12 for the California distribution of *M. trispinosa* and host plant *Plagiobothrys nothofulvus*. This plant species is native to California, being found in open woodlands and grasslands at elevations lower than 1550 m throughout California, and to Washington and Mexico. The plant is known from the California Floristic Province.

**Distribution.** USA (California (Map 12) [Contra Costa Co., Kern Co., Los Angeles Co., Monterey Co., San Diego Co.*, Santa Barbara Co., Yolo Co.]).

### *Melanagromyza urticella* Spencer, 1981

(Figs 259–269, Map 10)

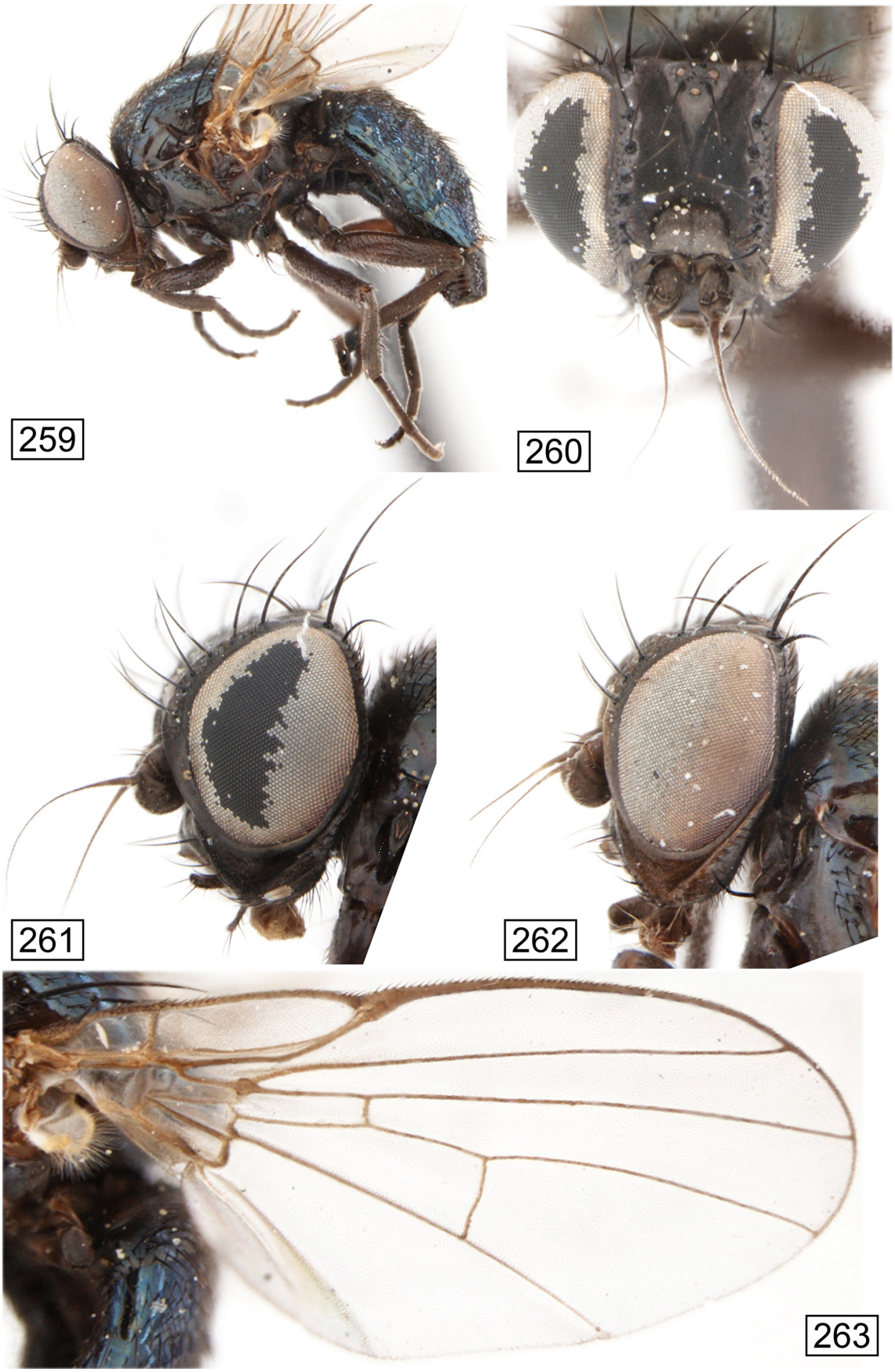
*Melanagromyza urticella* Spencer, 1981: 62. Type locality: USA. California: Riverside Co., Roubidoux County Park. HT ♂, USNM (see Lonsdale, 2011: 5). Spencer & Steyskal, 1986: 24; Benavent-Corai, 2005: 30.

**Diagnosis.** Frons projecting above eye, 1.6 times as wide as eye; 3–4 *ori* (one non-type specimen with 5–6 *ori*) inclinate and 2 *ors* reclinate; proportional distance between setae in the *ori-ors* series from anterior to posterior subequal; fronto-orbital plate with anterior margin slightly broader, brilliantly shining on basal 2/3, about 1/5 width of frons; fronto-orbital setulae in 2–3 irregular rows, reclinate except a few proclinate on anterior margin; ocellar triangle slightly shining, extending to anterior *ors*. Gena about 1/5–1/4 height of eye, highest point located at middle. Mesonotum and scutellum with brilliant greenish sheen. Mesonotum with 0+2 *dc*. Calypter white, margin and fringe pale yellow. Mid tibiae with 2 strong posterior setae. Abdomen with brilliant greenish, bluish, bluish green or coppery green sheen.

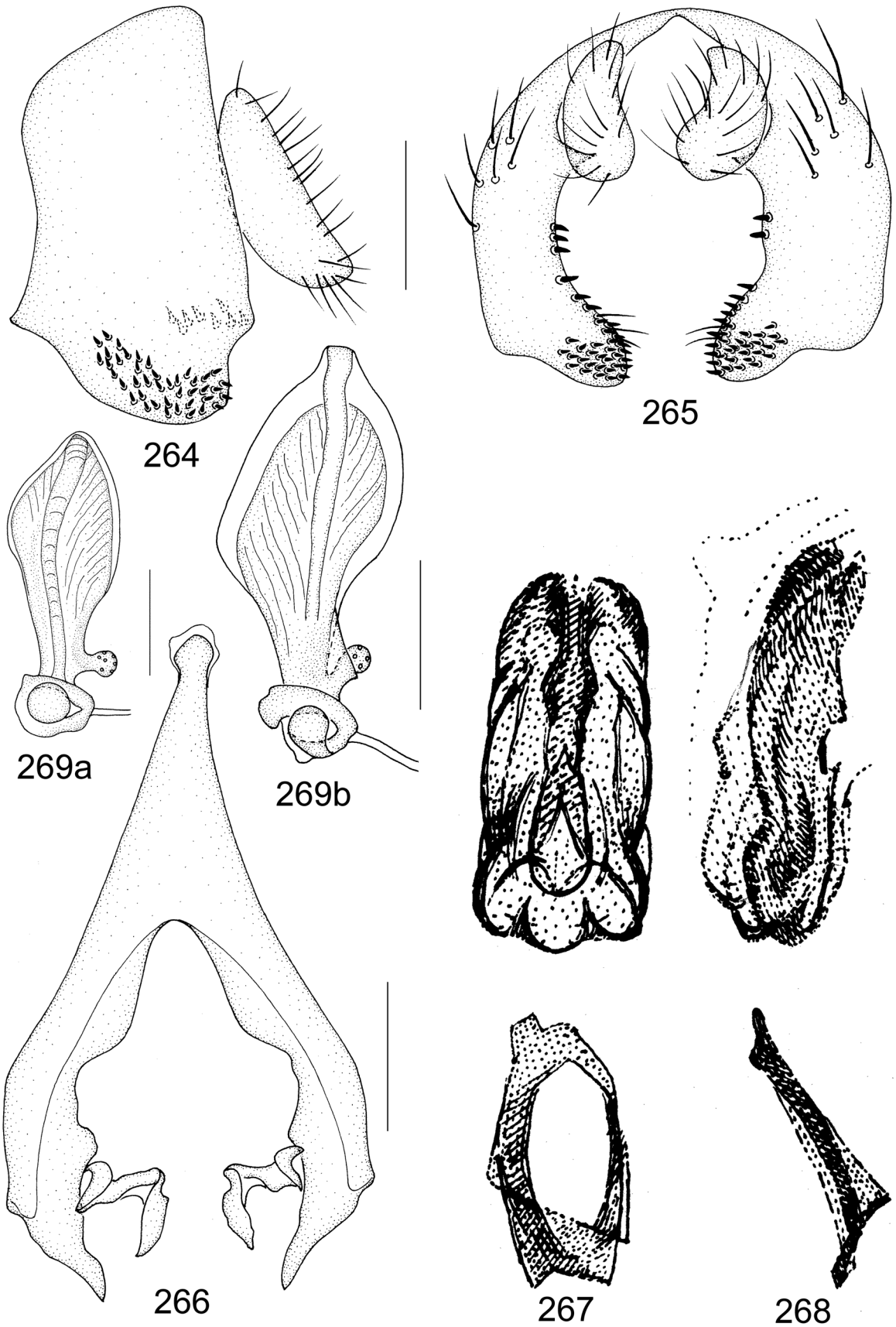
**Redescription.** MALE. Body length 2.5–2.7 mm, wing length 2.7–2.9 mm. FEMALE. Body length 2.6–3.0 mm, wing length 2.7–3.3 mm.

Head (Figs 260–262) black. Frons dark black, projecting above eye, with 1.25 times as wide as long, 1.6 times as wide as eye; 3–4 *ori* (one non-type specimen with 5–6 *ori*, CSCA) inclinate and 2 *ors* reclinate, both *ori* and *ors* strong, with *ors* slightly longer; proportional distance between setae in the *ori-ors* series from anterior to posterior subequal; fronto-orbital plate black or brown, anterior margin slightly broad, brilliantly shining on basal 2/3, about 1/5 width of frons; fronto-orbital setulae in 2–3 irregular rows, reclinate except anterior margin with a few proclinate; ocellar triangle pale brown to blackish brown, slightly shining at midde and only extending to anterior *ors*; *oc* strong, slightly shorter than *ors*; postocellar setae strong. Lunule grayish brown, 0.20 mm high, 1.25 times as wide as high. Parafacial black, 1/14 eye height. Gena yellowish brown to blackish brown, about 1/5–1/4 height of eye, highest point located at middle. Eye bare. Antenna black, 1st flagellomere short ovate and arista bare (one female specimen microscopic pubescent). Proboscis brownish yellow, palpus black.

Thorax (Fig. 259) black. Mesonotum and scutellum with brilliant greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 10 irregular rows. 1 *anepst* with 2 long setulae, 1 strong *kepst* with 1 long setula. Calypter white, margin and fringe pale yellow. Fore tibia without strong posterior seta and mid tibiae with 2 strong posterior setae. Wing (Fig. 263) with costa extending to $M_{1+2}$; costal ratio 4.3:1.3:1; *r-m* at middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.2:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.4. Halter with stem pale brown and knob brownish black.




**FIGURES 259–263.** *Melanagromyza urticella* Spencer, 1981. Paratype male and female (EMEC). 259. female habitus, lateral view; 260, 261. male, head, dorsal and lateral view; 262. female, head, lateral view; 263. wing.




**FIGURES 264–269.** *Melanagromyza urticella* Spencer, 1981. Paratype male (EMEC). 264, 265. epandrial complex, lateral and ventral view; 266. hypandrium, ventral view; 267, 268. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 269. sperm pump (a, b from different specimens). Scale 0.1 mm.

Abdomen (Fig. 259) brown to black with brilliant greenish, bluish, bluish green, or coppery green sheen. Male genitalia (Figs 264–269): epandrium with straight posterior margin and a small concavity, and several strong spines in a transverse line posteroventrally; surstylus with dense short spines apically in a few irregular rows; hypandrium Y-shaped; basiphallus subcircular, and distiphallus broadened from base to apex; ejaculatory apodeme subtriangular, fan-shaped and asymmetrical.

**Type material.** Paratypes: **CALIFORNIA: Fresno Co.**, 3 females (EMEC), Firebaugh, 36°51′31.82″N 120°27′21.63″W, 22.IV.1948, R.F. Smith; **Riverside Co.**, 3 males, 7 females (EMEC), Temecula, 1 mi. S., 33°29′37.10″N 117°08′54.11″W, 11.IV.1965, J. Powell; **Santa Barbara Co.**, 1 male (EMEC), Sta. Cruz, Id., Prisoner's Harbor Creek, 36°58′26.82″N 122°01′50.87″W, 7.VI.1966, R.L. Langston.

**Non-type material. CALIFORNIA: Santa Barbara Co.**, 1 male (CSCA), Santa Cruz. Island, Canada del Puerto, 36°58′26.82″N 122°01′50.87″W, 20.VI.1967, R.O. Schuster; 1 male (UCD), Santa Cruz Island, Canada del Puerto, 34°01′23.54″N 119°45′56.76″W, 20.VI.1967, R.O. Schuster.

**Biology/Host plants.** Larvae of this species are internal stem borers on *Urtica* (Spencer, 1981; Spencer & Steyskal, 1986; Spencer, 1990). In California, this species has been collected in association with Hoary nettle / stinging nettle, *Urtica dioica* subsp. *holosericea*. See Map 10 for the California distribution of *M. urticella* and host plant *Urtica dioica* subsp. *holosericea*. For details on this plant, see "Biology/Host plants" section for *M. martini*).

**Distribution.** USA (California (Map 10) [Alameda Co., Fresno Co., Los Angeles Co., Riverside Co., San Barbara Co., San Luis Obispo Co., Stanislaus Co.]).

**Remarks.** One nontype male specimen (CSCA) has 5–6 *ori*, but the male genitalia are the same as the paratypes.

The species is one of two species of the genus *Melanagromyza* in California with a subcircular basiphallus, the other being *M. burgessi*. While *M. burgessi* is black with a slightly slightly greenish or bluish green sheen on the mesonotum in posterior view, and a slightly greenish, bluish green or coppery sheen on the abdomen, in *M. urticella* the mesonotum has a brilliant green sheen, and the abdomen has a brilliantly greenish, bluish, bluish green or coppery green sheen. In addition, the calypter is white or pale yellow in *M. urticella*, while in gray, brown or black in *M. burgessi*.

### *Melanagromyza virens* (Loew, 1869)

(Figs 270–289, Map 15)

*Agromyza virens* Loew, 1869: 46. Type locality: USA. Pennsylvania. LT ♀, MCZ, designated by Frick, 1957: 200. Malloch, 1913: 321; Malloch, 1915: 106.

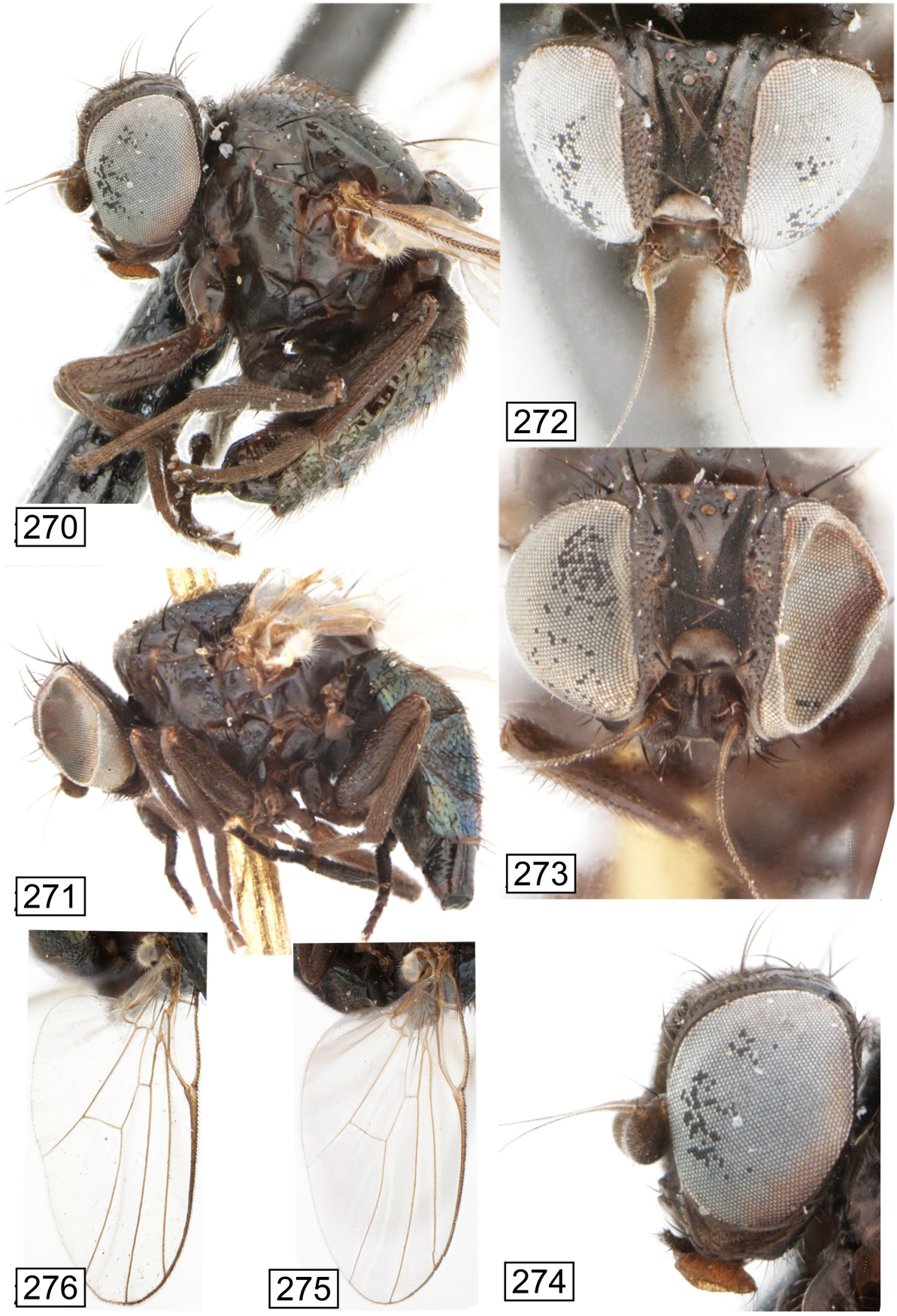
*Melanagromyza virens*. Frick, 1952: 380 (comb.); Shewell, 1953: 465; Frick, 1957: 200; Frick, 1959: 367; Shewell, 1953: 465; Spencer, 1963: 322; Frick, 1965: 796; Spencer, 1966b: 11; Spencer, 1969: 76; Spencer, 1973a: 123; Spencer & Stegmaier, 1973: 51 (incorrectly refer to LT as being from Washington DC); Spencer & Steyskal, 1986: 25; Benavent-Corai, 2005: 31.

*Melanagromyza heterothecae* Spencer 1966b: 10. Type locality: USA. Florida: Dade Co. HT ♂, USNM. Spencer 1969: 76 (syn.).

**Diagnosis.** Frons about 1.1 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate; anterior *ori* widely separated from posterior *ori*, proportional distance between setae in the *ori-ors* series from anterior to posterior 2.9:1.7:1; fronto-orbital plate slightly shining, and about 1/4–1/3 width of frons; fronto-orbital setulae in 3–4 dense irregular rows, single outer row reclinate and 2–3 inner rows proclinate; ocellar triangle broad, extending to posterior *ori*, moderately shining. Gena about 1/5–1/7 height of eye, highest point located at middle. Mesonotum with moderately greenish sheen, 0+2 *dc*, and *acr* in 8 irregular rows. Calypter white, margin pale yellow and fringe white. Mid tibia with 2 strong posterior setae. Abdomen with distinctly greenish sheen.

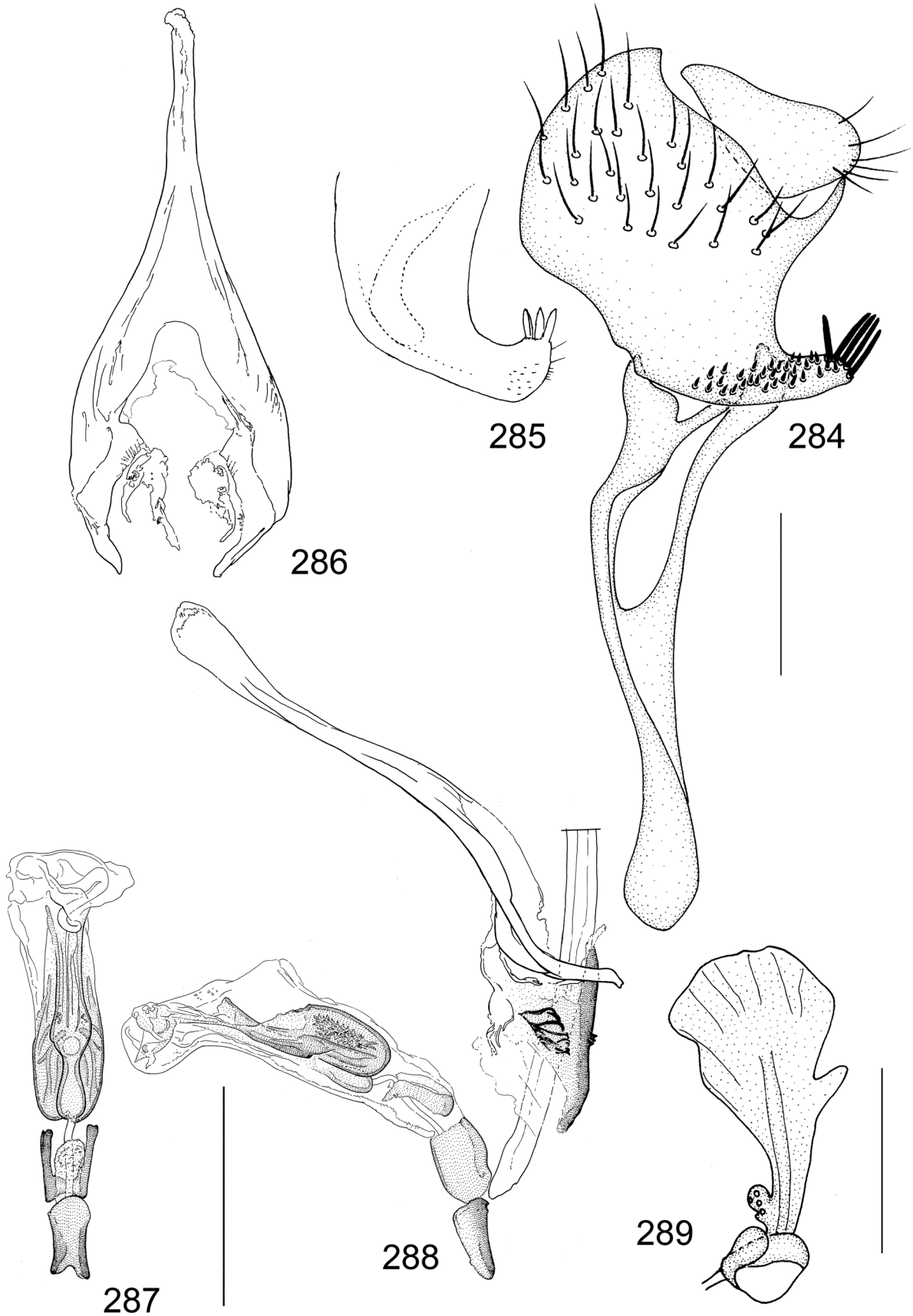
**Redescription.** FEMALE. Body length 2.5 mm (Lectotype, Fig. 271), 3.1 mm (Paralectotype, Fig. 277); wing length 2.9 mm (Lectotype), 3.2 mm (Paralectotype). MALE. Body length 2.3 mm, wing length 2.5 mm (Non-type, EMEC)

Head (Figs 272–279) blackish brown. Frons bulging anteriorly; as long as wide, 1.1 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate; anterior *ori* widely separated from posterior *ori*, proportional distance between setae in the *ori-ors* series from anterior to posterior 2.9:1.7:1; fronto-orbital plate slightly shining, as long as 1/4–1/3 width of frons; fronto-orbital setulae in 3–4 dense irregular rows, single outer row reclinate and inner 2–3 rows proclinate; ocellar triangle broad, extending to posterior *ori*, moderately shining; *oc* strong, as long as *ori*. Lunule grayish brown, 0.15 mm high, 1.3 times as wide as high. Gena yellowish brown, about 1/5–1/7 height




**FIGURES 270–276.** *Melanagromyza virens* (Loew, 1869). Lectotype female (MCZ): 270. habitus, lateral view (non-type, CNC); 271. habitus, lateral view; 272–274, head, dorsal and lateral view (273, 274, non type, CNC); 275–276. wing (276, non-type male, EMEC).


**FIGURES 277–283.** *Melanagromyza virens* (Loew, 1869). Paralectotype female (MCZ). 277. habitus, lateral view; 278, 279. head, dorsal and lateral view; 280. hind tibia; 281. wing; 282. label, Paralectotype (as Syntype); 283. label, Lectotype.




**FIGURES 284–289.** *Melanagromyza virens* (Loew, 1869). Non-type male (CNC). 284. epandrial complex and hypandrium, lateral view; 285. surstylus, lateral view, from original figure in Spencer & Steyskal (1986), for comparison; 286. hypandrium, ventral view; 287, 288. phallic complex, ventral and lateral view; 289. sperm pump. Scale 0.1 mm. (Figures 286–288 provided by Owen Lonsdale, CNC).

of eye, highest point located at middle. Eye pilose. Antenna blackish brown, 1st flagellomere short ovate and arista with microscopic setulae. Proboscis yellowish brown, palpus black.

Thorax (Figs 273, 274, 277) blackish brown. Mesonotum and scutellum with brownish gray pruinosity and moderately greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* and 1 strong *kepst*, each with additional 2–3 long setulae. Calypter white, margin pale yellow and fringe white. Fore tibia without strong posterior seta, mid tibia with 2 strong posterior setae. Wing with costa extending to $M_{1+2}$; costal ratio 4.7:1.7:1; *r-m* at middle of discal cell (Lectotype female, Fig. 275; 1 male in EMEC, Fig. 276; other non-types) or between middle and apical 1/3 of discal cell (Paralectotype female, Fig. 281; other non-types); ultimate and penultimate sections of $M_{1+2}$ in proportion of 1.5:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.6. Halter brown.

Abdomen (Figs 270, 271, 277) blackish brown, with distinctly greenish sheen (distinctly bluish green sheen in Paralectotype female, Fig. 277). Male genitalia (Figs 284–289): epandrium broad with long pointed process (short or long, its length being variable in individuals) on posterior margin; surstylus with several distinctly longer, thicker apical spines (Fig. 284), in addition to few irregular rows of short spines along distal margin; hypandrium Y-shaped with very narrow hypandrial apodeme; basiphallus very wide basally and slightly diverging apically; distiphallus with central process and apical membranous section slightly curved; ejaculatory apodeme fan-shaped with long stem.

**Type material.** Lectotype female (MCZ, No. 15703): **USA: PENNSYLVANIA:** Penn., Loew coll., virens m. (*Agromyza virens* Loew, 1869: 46. des. K.E. Frick, 1957: 200) [labels, Fig. 283]. Paralectotype female (MCZ, No. 15703): Loew coll. (*Agromyza virens* Loew, 1869: 46. Not "Paratype" (Frick, 1957: 200) teste Woodley, 1981) [labels, Fig. 282].

**Non-type material. CALIFORNIA: Contra Costa Co.**, 1 male (EMEC), Lafayette, 37°53′08.73″N 122°07′04.87″W, 25.IV.1946, T.O. Thatcher; **SOUTH CAROLINA: Beaufort Co.**, 1 female (CNC), Hilton Head Is., 12.VII.1965, H.F. Howden (identified by Spencer, 1966). **Canada: BRITISH COLUMBIA:** 1 male (CNC, male genitalia 1443#, identified by Spencer, 1966), Lakelse L. bog nr. Terrace, 14.VI.1960, J.G. Chillcott; **ONTARIO:** 1 female (CNC), Ottawa, 25.V.1958, J.R. Vockeroth (identified by Spencer, 1966); 1 male (CNC), Ottawa, 11.VI.1947, G.S. Walley (identified by Spencer, 1966); 1 male (CNC), Ottawa, 12.VI.1946, G.E. Shewell (identified by Spencer, 1966).

**Biology/Host plants.** Larvae are internal stem borers of species in the Asteraceae genera *Heterotheca* and *Eupatorium* (Spencer, 1969; Spencer, 1990), pupariating in the stem (Spencer & Stegmaier, 1973). The only known host for this species in California is camphorweed, *Heterotheca subaxillaris* (Lam.) Britton & Rusby, and although not specified on the label, the only subspecies present in California is *H. subaxillaris* subsp. *latifolia* (Buckley) Semple. See Map 15 for the California distribution of *M. virens* and host plant *Heterotheca subaxillaris* subsp. *latifolia*. The plant species is native to California, being found in disturbed sandy soils and along roadsides at elevations below 1150 m throughout California, and through the southern United States and northern Mexico. The plant is known from the Tehachapi Mountain Area, South Coast and eastern Sonoran Desert. Another aster species, *Eupatorium capillifolium* (Lam.) Small, is a known host (Spencer & Stegmaier, 1973; Spencer & Steyskal, 1986), but does not occur in California.

**Distribution.** USA (California (Map 15) [Contra Costa Co.*], District of Columbia, Florida, Illinois, Massachusetts, Pennsylvania, South Carolina), Canada (British Columbia, Quebec, Ontario).

**Remarks.** Spencer & Stegmaier (1973) noted that "the orbits may be broader and the orbital setulae longer and more numerous in the male than in the female… In vew of this sexual dimorphism a reliable identification of individual caught females may be problematic", and indicated that several instances in the literature (e.g., Malloch (1913), as noted by Frick (1959)) may be the result of misidentifications, so most host plants mentioned in the literature need to be confirmed again except for *Eupatorium capillifolium* and *Heterotheca subaxillaris*.

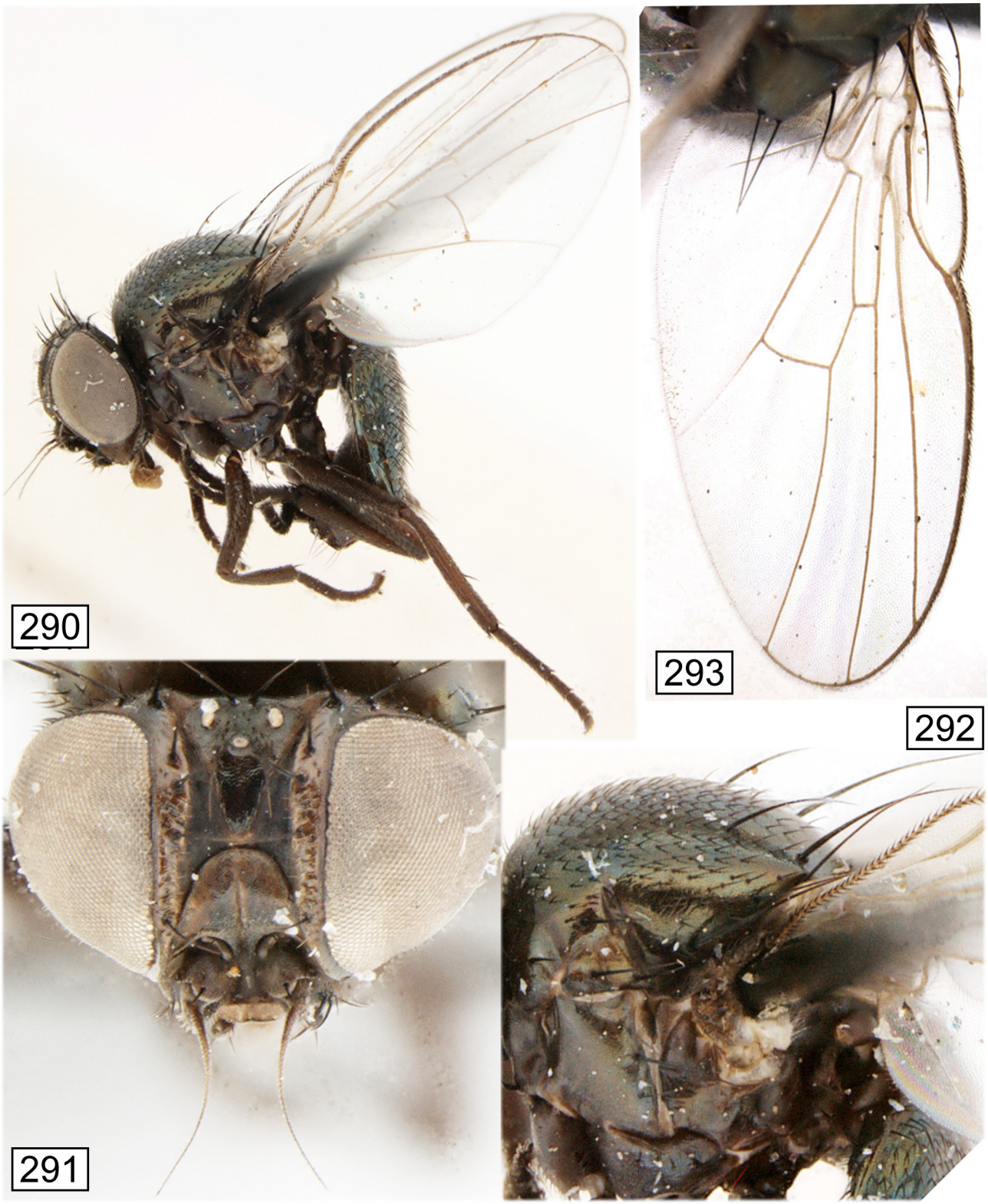
### ***Melanagromyza viridis* (Frost, 1931)**

(Figs 5, 6, 9, 290–299, Maps 18–19)

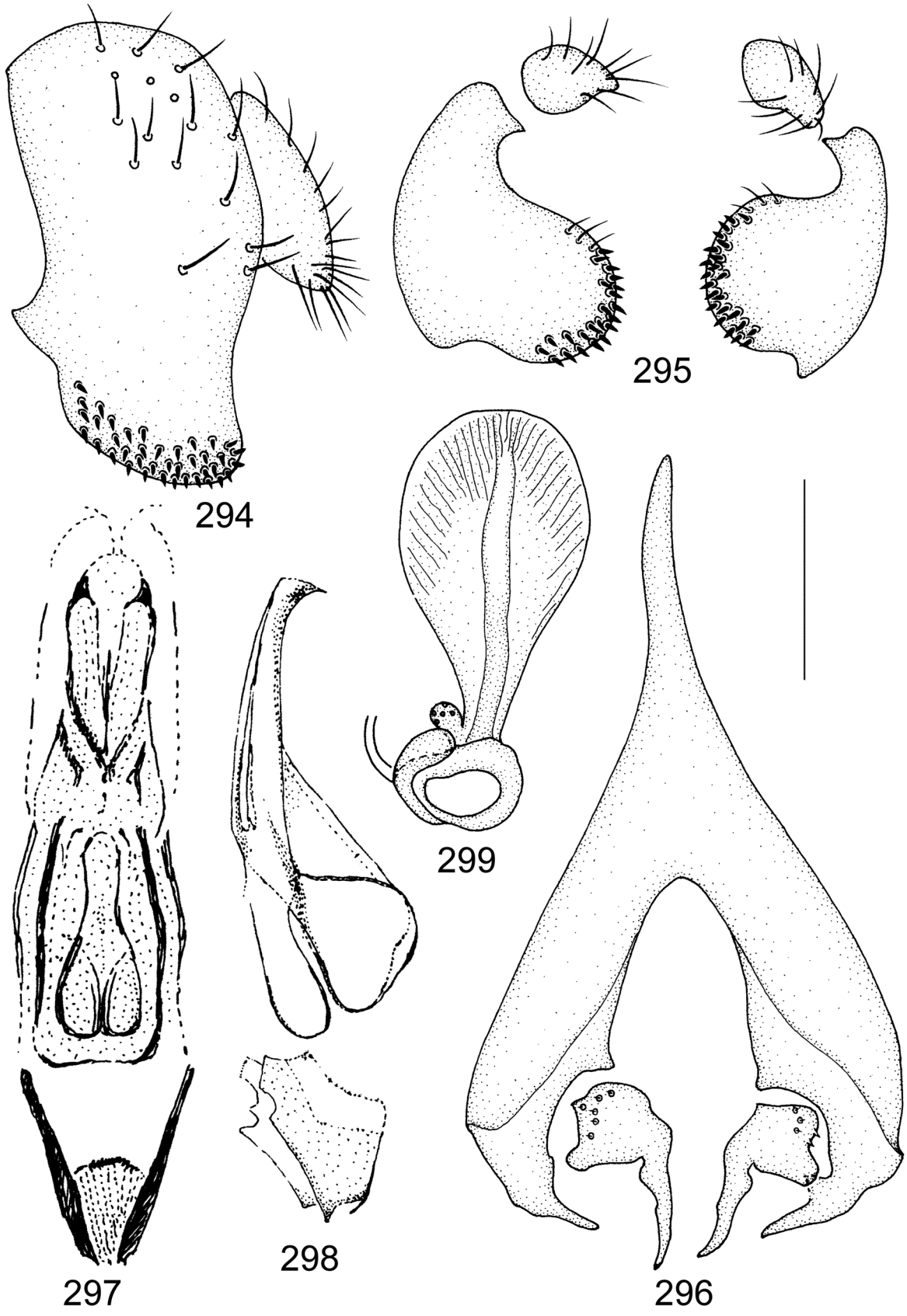
*Agromyza viridis* Frost, 1931: 277. Type locality: California: Kern Co.: Bakersfield. HT ♀, USNM.
*Melanagromyza viridis*. Frick, 1952: 380 (comb.); Frick, 1965: 796; Spencer, 1966b: 15; Spencer & Stegmaier, 1973: 53;

Spencer, 1981: 63; Spencer & Steyskal, 1986: 20; Benavent-Corai, 2005: 31; Palacios-Torres *et al*. 2008: 21; Palacios-Torres *et al*. 2010: 66.

*Melanagromyza helianthi* Spencer, 1963: 314. Type locality: Cuba: Santiago de las Vegas. HT ♂, USNM. Spencer, 1966b: 15 (syn.).




**FIGURES 290–293.** *Melanagromyza viridis* (Frost, 1931). Holotype female (USNM). 290. habitus, lateral view; 291. head, dorsal view; 292. thorax, lateral view; 293. wing.




**FIGURES 294–299.** *Melanagromyza viridis* (Frost, 1931). Non-type male (CSCA). 294, 295. epandrial complex, lateral and ventral view; 296. hypandrium, ventral view; 297, 298. phallic complex, ventral and lateral view, from original figures in Spencer (1981), reproduced in Spencer & Steyskal (1986); 299. sperm pump. Scale 0.1 mm.

**Diagnosis.** Frons not projecting above eye, 1.1 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate; anterior *ori* widely separated from posterior *ori*, proportional distance between setae in the *ori-ors* series from anterior to posterior 3.6:2:1; fronto-orbital plate brilliantly shining and not widened at middle, about 1/5 width of frons; fronto-orbital setulae in 2 irregular rows, inner row inclinate and outer row reclinate; ocellar triangle brilliantly shining. Gena about 1/6 height of eye, highest point located slightly before middle. Mesonotum and scutellum with greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. Calypter white, margin and fringe white. Mid tibia with 1 strong posterior seta. Abdomen with brilliantly greenish sheen.

**Redescription.** MALE. Body length 1.5–2.1 mm, wing length 1.7–2.3 mm (Non-type). FEMALE. Body length 2.1–2.5 mm (Non-type) and 2.2 mm (Holotype), wing length 2.1–2.5 mm (Non-type) and 2.5 mm (Holotype).

Head (Figs 5, 6, 290, 291) brown. Frons blackish brown, not projecting above eye, nearly 1.2 times as wide as long, and 1.1 times as wide as eye; 2 *ori* inclinate and 2 *ors* reclinate, *ori* shorter than *ors*, anterior *ori* widely separated from posterior *ori*, proportional distance between setae in the *ori-ors* series from anterior to posterior 3.6:2:1; fronto-orbital plate brilliantly shining and not widened at middle, about1/5 width of frons; fronto-orbital setulae in 2 irregular rows, inner row inclinate, and outer row reclinate; ocellar triangle brilliantly shining; *oc* strong, nearly as long as *ors*; postocellar setae strong. Lunule (Figs 6, 291) brown shining, with a pair of brownish black median stripes, 0.20 mm high, slightly higher than wide, extending upward to ocellar triangle. Facial keel narrow and not raised. Gena about 1/6 height of eye, highest point located slightly before middle. 1 strong vibrissa. Eye pilose. Antennal 1st flagellomere short ovate and arista bare. Proboscis brownish yellow, palpus black.

Thorax (Figs 290, 292) blackish brown. Mesonotum and scutellum with greenish sheen. Mesonotum with 0+2 *dc*, *acr* in 8 irregular rows. 1 strong *anepst* with 2 long setulae and 1 strong *kepst* with 1 long setula. Calypter white, margin and fringe white. Fore tibia without posterior setae, mid tibia with 1 strong posterior seta (Fig. 9). Wing (Fig. 293) with costa extending to $M_{1+2}$; costal ratio 4.7:1.7:1; *r-m* beyond middle of discal cell; ultimate and penultimate sections of $M_{1+2}$ in proportion of 2.7:1; ultimate and penultimate sections of $CuA_1$ in proportion of 1:1.3. Halter brown.

Abdomen (Fig. 290) blackish brown, with brilliant greenish sheen. Male genitalia (Figs 294–299): surstylus with 2–3 rows short and thick spines and 2–3 long setulae; hypandrium Y-shaped with narrow hypandrial apodeme; basiphallus nearly V-shaped; distiphallus very long and narrow apically with upcurved, pointed tip; ejaculatory apodeme rounded and fan-shaped with long stem.

**Type material.** Holotype female (USNM, No. 62964): **CALIFORNIA: Kern Co.**, Bakersfield, 35°22′23.85″N 119°01′07.36″W, 23.IX.1930, reared from *Zinnia*.

**Non-type material. CALIFORNIA: Colusa Co.**, 3 males (CSCA, No. 31976), 39°11′16.97″N 121°59′43.74″W, 18.IX.1931, H.H. Keifer, ex. reared from *Zinnia* on 28.IX.1931; **Kern Co.**, 1 male (CSCA, No. 30732), Bakersfield, 35°22′23.85″N 119°01′07.36″W, 24.IX.1930, [collector not given], ex. reared from *Zinnia*; **Imperial Co.**, 3 males, 2 females (UCD), Algodones Dunes, Wash Road, 10.4 km se. Glamis, 32°55.4′N 114°59′W, 29.IV–2.V.2008, S.L. Heydon & K. Lorenzen, ex. microphyll forest, Malaise 2008AL54; 12 males, 3 females (UCD), Algodones Dunes, Osborne Overlook, 5.7 km wsw Glamis, 32°59′N 115°08′W, 24–28.III.2008, Bohart Museum survey team, ex. Malaise trap in sand bowl, 2008AL36; 3 males, 4 females (UCD), Algodones Dunes, Buttercup Region, 1.6 km ese Gordon's @ Hwy.8, 32°45.5′N 114°57.5′W, 24–28.III.2008, Bohart Museum survey team, ex. Malaise trap in creosote, 2008AL33; 4 males, 3 females (UCD), Algodones Dunes, Niland-Glamis Rd., 7.4 km n. Hwy 78, 33°02′N 115°08′W, 6–9.II.2008, 80 m, S.L. Heydon & T.J. Zavortink, ex. Malaise trap, 2008AL21; 1 female (UCD), Palo Verde, 33°25′58.11″N 114°43′55.85″W, 1.IV.1948, R.O. Schuster; 21 males, 30 females (CSCA), S. End, Chocolate Mts, Origiby Rd. 3mi, S. Jct Hwy, 33°02′14.75″N 115°37′17.73″W, ex. Malaise trap, 20.III.1978, M. Wasbauer & P. Adams; 1 female (CSCA), 1 mi, S. Jct. Hwy. 78 on Ogilby Rd., 33°02′14.75″N 115°37′17.73″W, 16.III.1975, M.S. & J.S. Wasbauer, ex. on *Encelia farinosa*; 1 female (CSCA), 3 mi. NW Glamis, 32°59′36.64″N 115°03′55.08″W, 15.III.1975, M.S. & J.S. Wasbauer, ex. Malaise trap 9A-6P; 2 females (CSCA), 33°00′40.93″N 115°28′24.08″W, 1 mi. S. Jct. Hwy. 78 on Ogilby Rd., 16.III.1975, M.S. & J.S. Wasbauer, ex. on *Encelia farinosa*; **Inyo Co.**, 1 female (UCD), Darwin Fall, 36°16′04.79″N 117°35′30.25″W, 15.VII.1953, E.I. Schlinger; **Lassen Co.**, 1 male, 1 female (UCD), Molitor, 40°32′21.98″N 120°42′43.21″W, 11.X.1952, E.I. Schlinger; **Los Angeles Co.**, 1 male (CSCA), S. Benito Co. New Idria Rd. 4 mi., SW. Jct. Panoche Rd. Griswold Creek, 36°34′59.84″N 120°48′37.65″W, 18.VIII.1983, P. Adams; **Monterey Co.**, 1 female (UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, ex. *Parthenium argentatum* Gray, 26.XI.1942, W.H. Lange; 1 female

(UCD), Salinas, 36°40′39.85″N 121°39′19.80″W, ex. reared from *Parthenium argentatum*, 3.XI.1942, W.H. Lange; **Riverside Co.**, 1 female (CSCA), Indio, 33°43′14.08″N 116°12′56.02″W, ex. *Tiquilia plicata*, 27.III.1960, M. Wasbauer; 4 males, 3 females (CSCA, No. 68015-39), Palm Springs, 33°49′49.07″N 116°32′43.05″W, 22.III.1968, L.C. Cordill & R.J. Gill, ex. reared on head of *Geraea canescens*; 1 female (UCD), Chino Cyn, 8 mi W Palm Springs, 33°51′06.45″N 116°33′28.93″W, ex. *Encelia farinosa* (host plant), 29.III.1970, E.E. Grissell & E.F. Denno; 1 female (UCD), Thousand Palms, 33°49′12.06″N 116°23′25.04″W, 29.III.1970, E.E. Grissell & E.F. Denno; 2 females (UCD), Blythe west 18 mi, 33°37′02.04″N 114°35′21.03″W, 2–3.IV.1963, M.E. Irwin & F.D. Parker; 1 female (UCD), Blythe W. 16 mi, 33°37′02.04″N 114°35′21.03″W, 3.IV.1966, R.O. Schuster; 1 female (UCD), P. L. Boyd DRC, Coyote Wash, 33°57′56.29″N 117°22′11.92″W, ex. *Phacelia distans*, 5.IV.1978, R.W. Brooks; **Sacramento Co.**, 3 males, 2 females (CSCA, No. 31935), Sacramento, 38°34′53.66″N 121°29′39.84″W, 1.IX.1931, H.H. Keifer, ex. reared from *Zinnia* on 4.IX.1931; 1 male, 5 females (CSCA, No. 31935), Sacramento, 38°34′53.66″N 121°29′39.84″W, 1.IX.1931, H.H. Keifer, ex. reared from *Zinnia* on 10.IX.1931; 2 females (CSCA, No. 31935), Sacramento, 38°34′53.66″N 121°29′39.84″W, 1.IX.1931, H.H. Keifer, ex. reared from *Zinnia* on 2.IX.1931; 1 female (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 1.IX.1931, ex. reared from *Zinnia* on 10.IX.1931, H.H. Keifer collector; 2 males, 1 female (CSCA, No. 31880), Sacramento, 38°34′53.66″N 121°29′39.84″W, 19.VIII.1931, [collector not given], ex. reared from *Zinnia* on 29.VIII.1931; 1 male, 2 females (CSCA, No. 31880), Sacramento, 38°34′53.66″N 121°29′39.84″W, 19.VIII.1931, [collector not given], ex. reared from *Zinnia* on 21.VIII.1931; 2 females (CSCA, No. 31880), Sacramento, 38°34′53.66″N 121°29′39.84″W, 19.VIII.1931, [collector not given], ex. reared from *Zinnia* on 24.VIII.1931; 1 female (CSCA, No. 31880), Sacramento, 38°34′53.66″N 121°29′39.84″W, 19.VIII.1931, [collector not given], ex. reared from *Zinnia* on 26.VIII.1931; 1 male (CSCA), Sacramento, 38°34′53.66″N 121°29′39.84″W, 17.VI.1931, Wilson; **San Bernardino Co.**, 31 males, 1 female (CSCA), 12 mi ESE Tecopa, 35°50′53.88″N 116°13′35.09″W, 13–14.IV.1978, M. Wasbauer and T. Eichlin; 1 female (UCD), Calico, 34°56′56.00″N 116°51′51.01″W, 28.IV.1924, E.C. Toftner; 1 female (UCD), Essex E. 14 mi, 34°00′16.61″N 116°50′59.45″W, 3.IV.1968, R.O. Schuster; 1 female (CSCA), 7 mi. SW Kelso, Sand Dunes, 34°06′24.99″N 117°17′23.46″W, 20–21.IV.1969, M.S. & J.S. Wasbauer, ex. *Encelia farinosa*; **San Diego Co.**, 1 male (UCD), Borrego Valley, 33°15′23.58″N 116°19′25.42″W, 11.IV.1969, E. Grissell; 5 males, 5 females (CSCA), Borrego-Clark L. N. End, 33°20′12.13″N 116°16′45.03″W, 23.III.1978, M. Wasbauer & P. Adams; 2 males (CSCA), Borrego St. Pk. Clark Dry lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 10A-4P; 1 male (CSCA), Borrego St. Pk. Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 9A-3P; 3 males (CSCA), Borrego St. Pk. Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 1P-4P; 3 males (CSCA), Borrego St. Pk. Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 1P-4P; 2 males, 3 males (CSCA), Borrego St. Pk. Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 1P-4P; 1 male (CSCA), Borrego St. Pk. Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 5P-10A; 5 males (CSCA), Borrego St. Pk. Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 1.IV.1977, M. Wasbauer & J. Slansky, ex. Malaise trap 1P-4P; 4 males (CSCA), Anza-Borrego Desert State Park, Clark Dry Lake, 33°15′28.01″N 116°24′24.32″W, 31.III.1977, M. Wasbauer & J. Slansky; 1 male (CSCA), Borrego St. Pk. Clark, 33°15′28.01″N 116°24′24.32″W, 28.III.1977, M. Wasbauer & J. Slansky; 2 females (CSCA), Borrego Springs, 33°15′21.14″N 116°22′30.04″W, 30.III.1960, M. Wasbauer; 1 male (CSCA), Anza-Borrego State Park, Grapevine Canyon, 32°56′03.45″N 97°04′41.03″W, 4.5 mi. NE Scissors Crossing, 1600 ft., 19.IV.2003, S.D. Gaimari & E.M. Fisher (03-18). **ARIZONA: Cochise Co.**, 1 female (CSCA), SW Res. Sta., 5400 ft., 5 mi. W. Portal, Chiricahua Mts. 16–17.VII.1978, M. Wasbauser, ex. Malaise trap 8A-6P; 1 female (CSCA), SW Res. Sta., 5400 ft., 5 mi. W. Portal, Chiricahua Mts., 16–17.VIII.1978, M. Wasbauer, ex. Malaise trap 8A-6P; **Yuma Co.**, 3 females (UCD), Quartzsite S 14 mi, 1.IV.1968, R.O. Schuster. **HAWAII: Oahu, Honolulu Co.**, 1 male (CSCA), Haleiwa, 20.IV.1999, ex. *Verbesina encelioides* flower heads, M. Ramadan, 99-140; 1 male (CSCA), Oahu, Pawaa, 5.IV.2000, ex *Bidens ferulifolia* flower head, ME. Chun, 2000-109; **TEXAS: Uvalde Co.**, 1 male (CSCA), Speir Rch. 3 mi. NW Uvalde, 4.V.1977, T. Eichlin & M. Wasbauer, ex. Malaise trap 9A-5P; 5 females (CSCA), Speir Rch. 3 mi. NW Uvalde, 6.V.1977, T. Eichlin and M. Wasbauer, ex. Malaise trap 9A-6P; 1 female (CSCA), Speir Rch. 3 mi. NW Uvalde, 2.V.1977, T. Eichlin & M. Wasbauer, ex. Malaise trap 10A-6P. **Mexico: BAJA CALIFORNIA SUR:** 36 males, 29 females (CSCA), Rancho Tablon area, 13 km. S. Guillermo Prieto, ex. Malaise trap, 14–17.IV.1983, M. Wasbauer; **TAMAULIPAS:** 4 males, 9 females (CSCA), 29 km. SE Manuel-micro. sta., 1.XI.1982, J. Huber.

**Biology/Host plants.** Larvae of this species feed within flower and seed heads of various asters (Spencer, 1981; Spencer & Stemaier, 1973; Spencer & Steyskal, 1986; Spencer, 1990), and also may feed on species of Boraginaceae. In California, this species has been reared from: flower heads of desertsunflower / hairy desertsunflower, *Geraea canescens* Torr. & A. Gray (Asteraceae); Guayule, *Parthenium argentatum* (both of the former only as the cultivated plants, no general distribution records in California); flower heads of *Verbesina encelioides*; and from cultivated zinnias, *Zinnia*. It has also been collected in association with Pot-marigold, *Calendula officinalis* L. (Asteraceae); Common sowthistle, *Sonchus oleraceus* L. (Asteraceae); fanleaf tiquilia / fanleaf crinklemat, *Tiquilia plicata* (Torr.) A. T. Richardson (Boraginaceae); Brittlebrush, *Encelia farinosa* Torr. (Asteraceae); and Distan phacelia, *Phacelia distans* Benth. (Boraginaceae). See Maps 18 and 19 for the California distribution of *M. viridis* and host plants *Calendula officinalis, Sonchus oleraceus*, *Tiquilia plicata* (Map 18), *Encelia farinosa, Geraea canescens* and *Phacelia distans* (Map 19). See Map 11 for the distribution of host plant *Verbesina encelioides*, and the "Biology/Host plants" section for *Melanomyza minimoides* for discussion of the plant species. The plant *C. officinalis* is naturalized to California, being found in disturbed areas at elevations below 500 m, and is known from the Central Coast, San Francisco Bay Area, Outer South Coast Ranges, South Coast and San Bernardino Mountains. The plant *S. oleraceus*, which is native to Europe, is naturalized to California, being found in disturbed places at elevations below 2500 m throughout California, and much of North America. The plant *T. plicata* is native to California, being found in dune areas and sandy gravel flats at elevations below 1100 m throughout California, and to western Arizona, southern Nevada, and northern Mexico, and is known from the Desert region. The plant *E. farinosa* is native to California, being found in the Coastal scrub and stony desert hillsides at elevations below 1500 m throughout California, and to southwestern Utah and northwestern Mexico, and is known from the eastern part of the South Coast region, and the adjacent Peninsular Ranges and Desert region. The plant *G. canescens* is native to California, being found in sandy desert soils at elevations below 1300 m throughout California, and to southwestern Utah, western Arizona and northern Mexico, and is known from the Desert region. The plant *P. distans* is native to California, being found in clay to rocky soils and slopes at elevations below 2700 m throughout California, and to southern Nevada and northern Mexico, and is known from the southern North Coast Ranges, the northern and southern Sierra Nevada Foothills, the southern High Sierra Nevada, Sacramento Valley (Sutter Buttes), San Joaquin Valley, Central Western California, Southwestern California, East of Sierra Nevada and Desert. Outside of California, it has also been reared from flower heads of *Bidens ferulifolia* (Jacq.) DC, and from species of *Tithonia* (Asteraceae).

**Distribution.** USA (California (Maps 18, 19) [Colusa Co.*, Imperial Co., Inyo Co.*, Kern Co., Lassen Co., Los Angeles Co., Monterey Co.*, Nevada Co., Riverside Co., Sacramento Co.*, San Bernardino Co.*, San Diego Co., Ventura Co., Yolo Co.], Arizona, Colorado, Florida, Hawaii*, North Carolina, Texas), Chile, Cuba, Mexico, Trinidad.

**Remarks.** The holotype is female, but Spencer & Stegmaier (1973) incorrectly referred to it as male. The species is easily separated from other Californian species by the distinctive lunule and the highly shining frons and fronto-orbital plates.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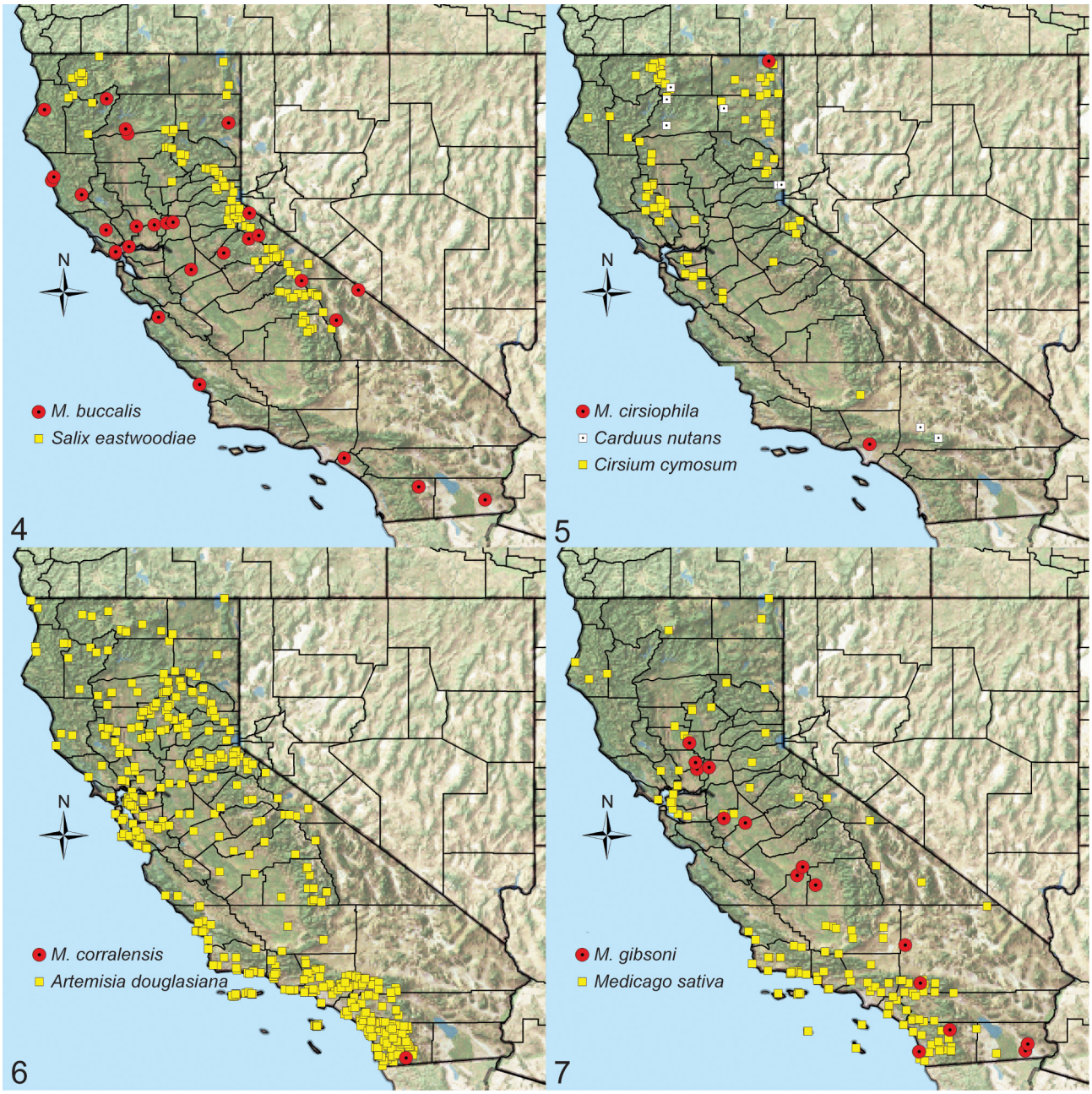
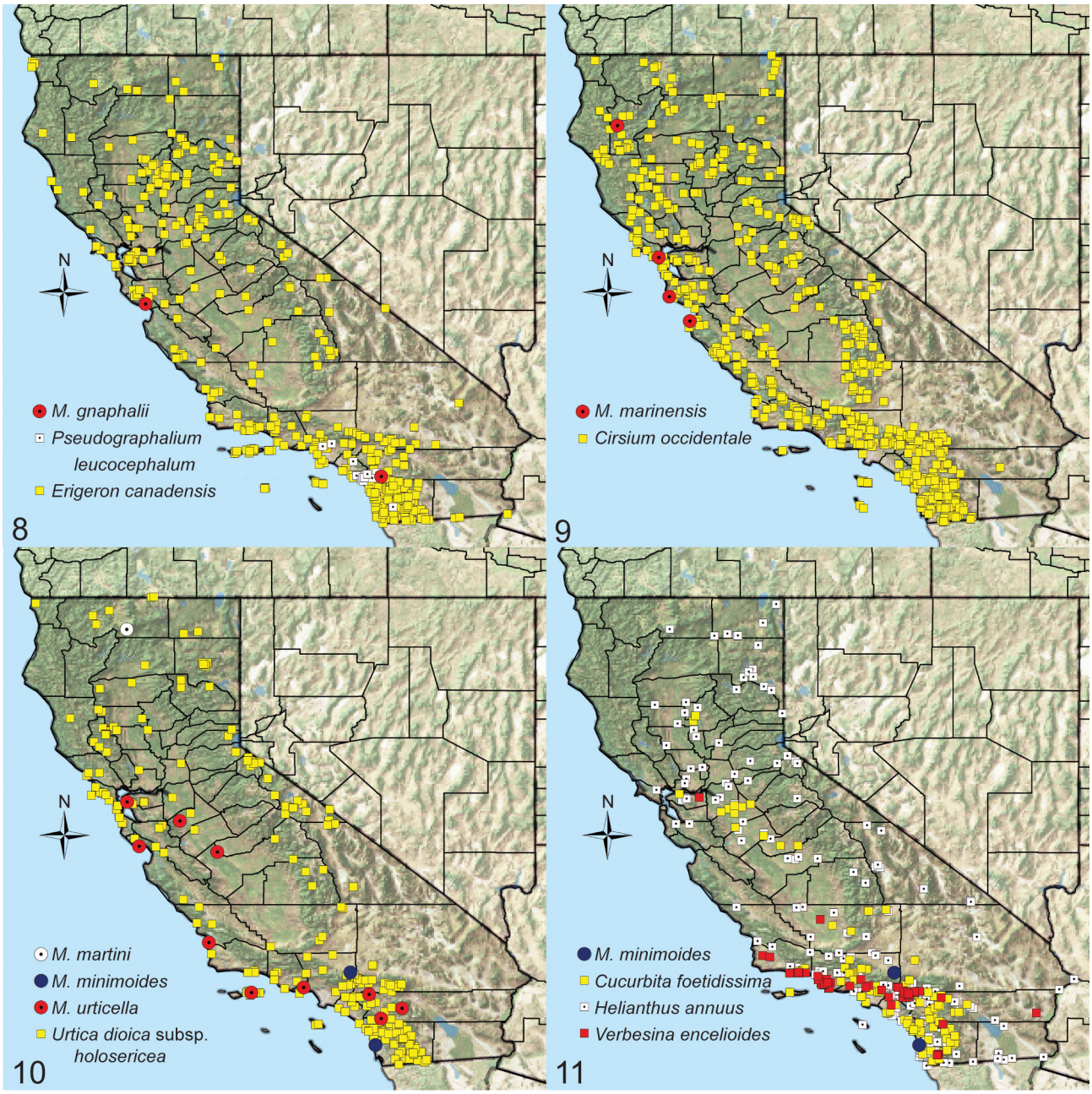
**Appendix**
**Californian species list of the genus *Melanagromyza***

1. *Melanagromyza buccalis* Spencer, 1969. **Nearctic:** Canada (Ontario, Quebec), USA (Arizona, California, Colorado, Maryland, Missouri, New York, Virginia).
2. *Melanagromyza burgessi* (Malloch, 1913). **Nearctic:** USA (California, Colorado, Illinois, Indiana, Kansas, Massachusetts, Michigan, New York, North Dakota).
3. *Melanagromyza californiana* **sp. nov. Nearctic:** USA (California).
4. *Melanagromyza chemsaki* **sp. nov. Nearctic:** USA (California).
5. *Melanagromyza cirsiophila* Spencer, 1981. **Nearctic:** USA (California, Colorado, Nebraska). **Neotropical:** Costa Rica.
6. *Melanagromyza corralensis* Spencer, 1981. **Nearctic**: USA (California).
7. *Melanagromyza gibsoni* (Malloch, 1915). **Nearctic:** USA (Arizona, California, Colorado, Texas). **Neotropical:** Chile.
8. *Melanagromyza gnaphalii* Spencer, 1981. **Nearctic:** USA (California).
9. *Melanagromyza gonzalesina* **sp. nov. Nearctic:** USA (California).
10. *Melanagromyza malevola* Spencer, 1981. **Nearctic:** USA (California).
11. *Melanagromyza maligna* Spencer, 1981. **Nearctic:** USA (California).
12. *Melanagromyza marinensis* Spencer, 1981. **Nearctic:** USA (California, Utah).
13. *Melanagromyza martini* Spencer, 1969. **Nearctic:** Canada (Alberta, British Columbia, Ontario, Saskatchewan), USA (California).
14. *Melanagromyza minima* (Malloch, 1913). **Nearctic:** USA (California, Florida, Mississippi); **Neotropical:** Antigua, Costa Rica, Domimica, Dominican Republic, Guadalupe, Guatemala, Jamaica, Mexico, Panama, Peru, Puerto Rico, Trinidad, Venezuela.
15. *Melanagromyza minimoides* Spencer, 1966b. **Nearctic:** USA (Arkansas, California, Florida, Maryland, Ohio, Texas); **Neotropical:** Argentina, Bolivia, Dominican Republic, Guadalupe, Mexico, Venezuela, Uruguay.
16. *Melanagromyza muguensis* Spencer, 1981. **Nearctic:** USA (California, Oregon).
17. *Melanagromyza osoflacensis* Spencer, 1981. **Nearctic:** USA (California).
18. *Melanagromyza palaensis* Spencer, 1981. **Nearctic:** USA (California).
19. *Melanagromyza quadrisetosa* Spencer, 1981. **Nearctic:** USA (California).
20. *Melanagromyza sagehenensis* Spencer, 1981. **Nearctic:** USA (California, Montana).
21. *Melanagromyza scrophulariae* Spencer, 1981. **Nearctic:** USA (California).
22. *Melanagromyza splendida* Frick, 1953a. **Nearctic:** USA (Arizona, California, Florida, Hawaii, Illinois, Michigan, New York, South Carolina); **Neotropical:** Bahamas, Chile, Jamaica, Mexico.
23. *Melanagromyza trispinella* Spencer, 1981. **Nearctic:** USA (California).
24. *Melanagromyza trispinosa* Spencer, 1981. **Nearctic:** USA (California).
25. *Melanagromyza urticella* Spencer, 1981. **Nearctic:** USA (California).
26. *Melanagromyza virens* (Loew, 1869). **Nearctic:** Canada (British Columbia, Quebec, Ontario), USA (California, Florida, Pennsylvania, South Carolina).
27. *Melanagromyza viridis* (Frost, 1931). **Nearctic:** USA (Arizona, California, Colorado, Florida, Hawaii, North Carolina, Texas). **Neotropical:** Chile, Cuba, Mexico, Trinidad.

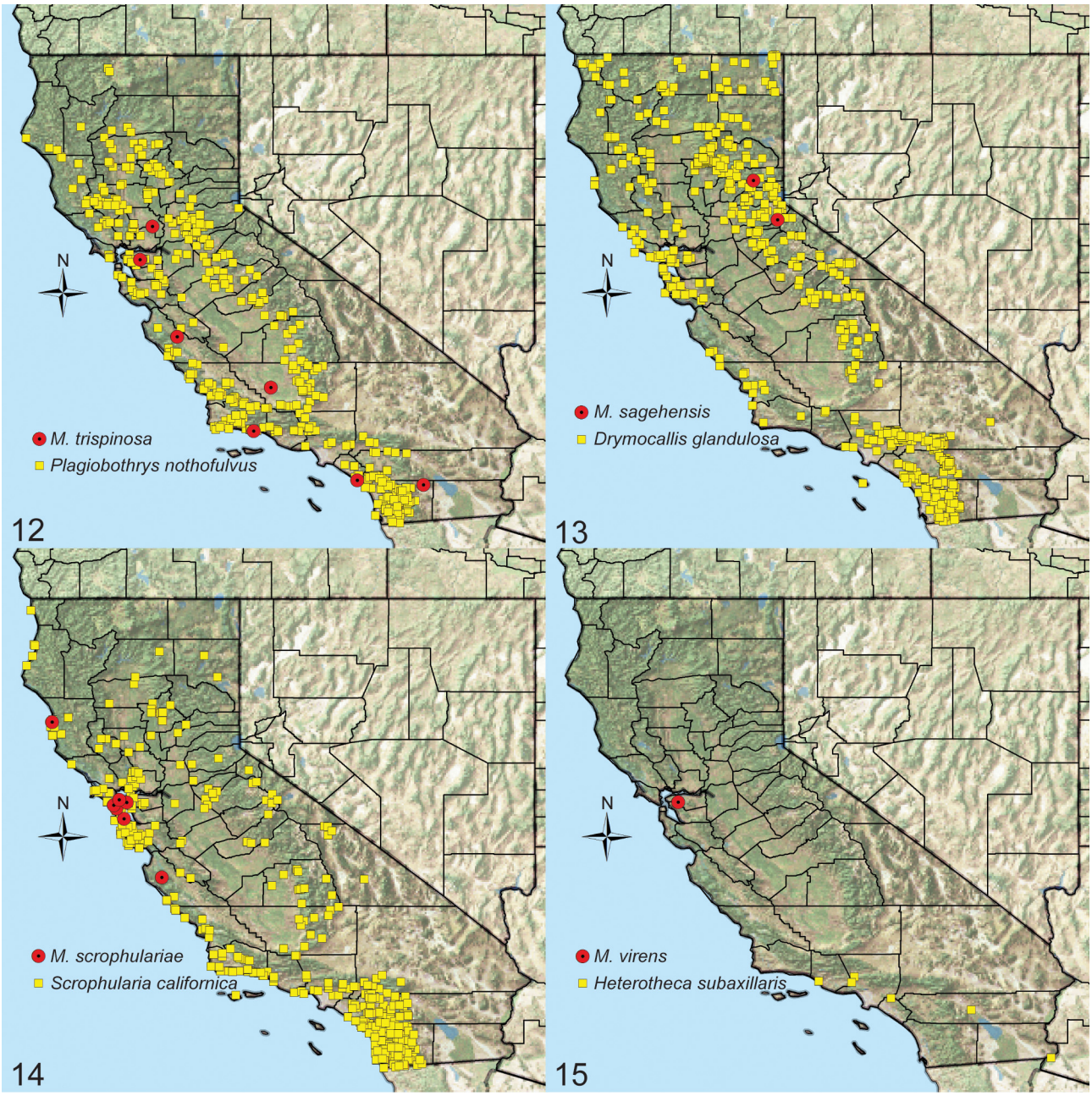

**MAPS 1–3.** California distribution of species of *Melanagromyza* with no known host plants. 1. *M. burgessi, M. chemsaki, M. maligna, M. palaensis*. 2. *M. californiana, M. malevola, M. minima, M. quadrisetosa*. 3. *M. gonazlesina, M. muguensis, M. osoflacensis, M. trispinella*.



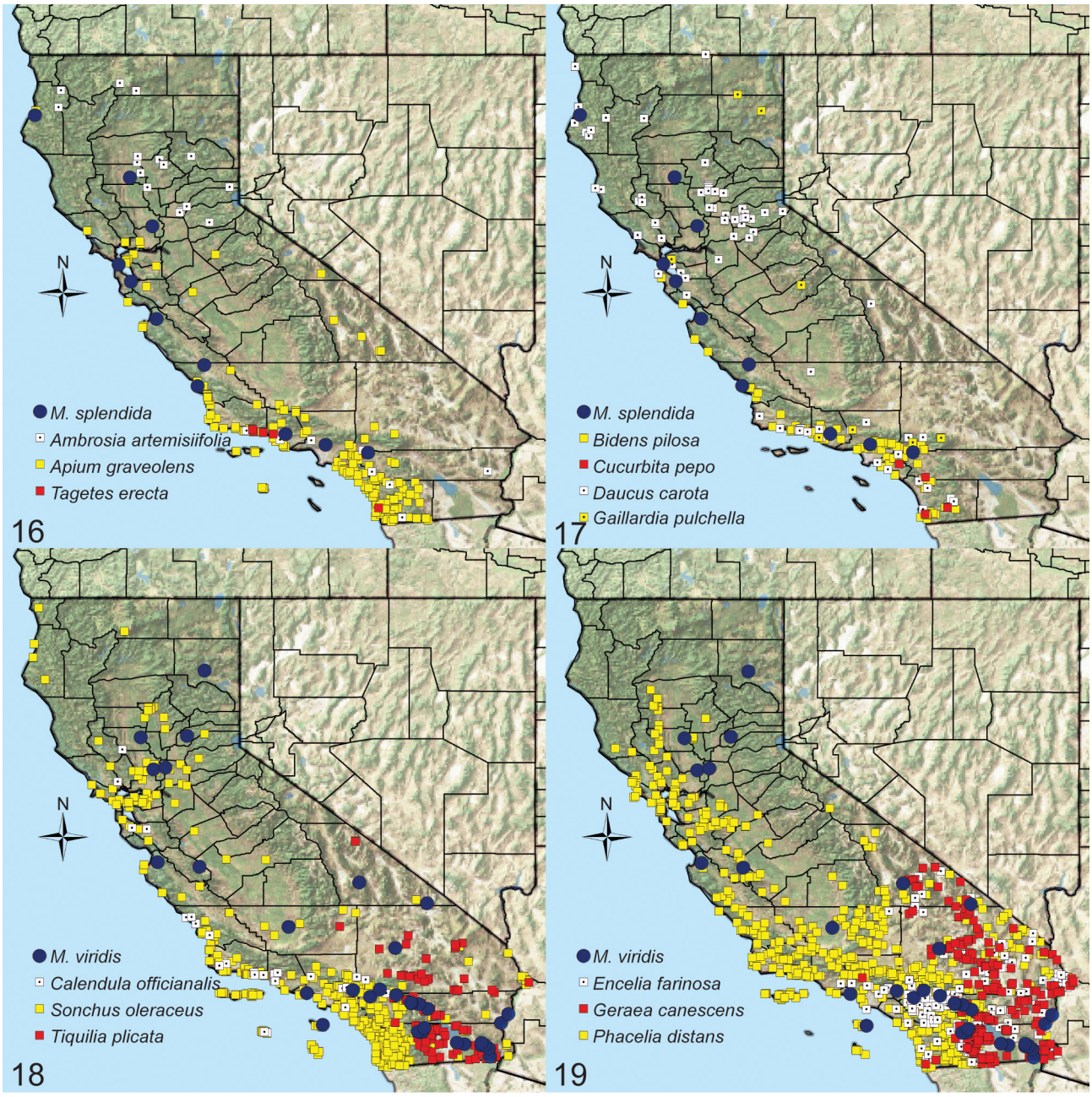

**MAPS 4–7.** California distribution of species of *Melanagromyza* along with known host plants. 4. *M. buccalis* and host plant *Salix eastwoodiae* (see Map 11 for distribution of the other host plant, *Helianthus annuus*). 5. *M. cirsiophila* and host plants *Carduus nutans* and *Cirsium cymosum*. 6. *M. corralensis* and host plant *Artemsia douglasiana*. 7. *M. gibsoni* and host plant *Medicago sativae*.




**MAPS 8–11.** California distribution of species of *Melanagromyza* along with known host plants. 8. *M. gnaphalii* and host plants *Erigeron canadensis* and *Pseudographalium leucocephalum*. 9. *M. marinensis* and host plant *Cirsium occidentale*. 10. *M. martini, M. minimoides* and *M. urticella* and host plant *Urtica dioica* subsp. *holosericea*. 11. *M. minimoides* and host plants *Cucurbita foetidissima, Helianthus annuus* and *Verbesina encelioides*.




**MAPS 12–15.** California distribution of species of *Melanagromyza* along with known host plants. 12. *M. trispinosa* and host plant *Plagiobothrys nothofulvus*. 13. *M. sagehensis* and host plant *Drymocallis glandulosa*. 14. *M. scrophulariae* and host plant *Scrophularia californica*. 15. *M. virens* and host plant *Heterotheca subaxillaris*.




**MAPS 16–19.** California distribution of species of *Melanagromyza* along with known host plants. 16–17. *M. splendida*: 16. host plants *Ambrosia artemisiifolia, Apium graveolens* and *Tagetes erecta*; 17. host plants *Bidens pilosa, Cucurbita pepo, Daucus carota* and *Gaillardia pulchella*. 18–19. *M. viridis*: 18. host plants *Calendula officianalis, Sonchus oleraceus* and *Tiquilia plicata*; 19. host plants *Encelia farinosa, Geraea canescens* and *Phacelia distans*.