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A review of the species of *Cerodontha* Rondani (Diptera: Agromyzidae) of Israel, with a new species of the subgenus *Poemyza* Hendel, 1931

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ABSTRACT

The Israeli species of *Cerodontha* Rondani are reviewed and *C*. (*Poemyza*) *israelica* n. sp. is described and illustrated. The following seven species are recorded from Israel for the first time: *C*. (*Butomomyza*) *angulata* (Loew, 1869), *C*. (*Cerodontha*) *phragmitophila* (Hering, 1935), *C*. (*Dizygomyza*) *crassiseta* (Strobl, 1900), *C*. (*D*.) *luctuosa* (Meigen, 1830), *C*. (*D*.) *suturalis* (Hendel, 1931), *C*. (*Icteromyza*) *geniculata* (Fallén, 1823), and *C*. (*I*.) *rozkosnyi* Černý, 2007. A key for identification of the subgenera and species in Israel is provided.

KEYWORDS: Diptera, Agromyzidae, *Cerodontha* (*Poemyza*) *israelica* n. sp., Israel, faunistics, key

INTRODUCTION

This is a second contribtion in a series of publications planned to monograph the entire Agromyzidae fauna of Israel genus by genus. The first contribution of this series dealt with the local species of *Pseudonapomyza* Hendel (Černý, 2009).

The cosmopolitan genus *Cerodontha* Rondani, 1861 currently contains 286 species, of which 139 are known from the Palaearctic region, 68 from the Nearctic region, 50 from the Oriental region, 41 from the Neotropical region, 20 from the Australasian/Oceanic region, and 20 species from the Afrotropical region. Of these, only *Cerodontha* (*C*.) *denticornis* (Panzer, 1806), has been recorded from Israel (Spencer, 1974). In the present paper, *Cerodontha* (*Poemyza*) *israelica* n. sp. from Israel is described and illustrated, and seven species of four subgenera: *C*. (*Butomomyza*) *angulata* (Loew, 1869), *C*. (*Cerodontha*) *phragmitophilla* (Hering, 1935), *C*. (*Dizygomyza*) *crassiseta* (Strobl, 1900), *C*. (*D*.) *luctuosa* (Meigen, 1830), *C*. (*D*.) *suturalis* (Hendel, 1931), *C*. (*Icteromyza*) *geniculata* (Fallén, 1823), and *C*. (*I*.) *rozkosnyi* Černý, 2007, are recorded from Israel for the first time, in addition to *C*. (*C*.) *denticornis*. Thus, this paper summarizes the taxonomic and faunistic knowledge on all *Cerodontha* species from Israel based on specimens deposited in the National Collection of Insects, Zoological Museum, Tel Aviv University, Tel Aviv, Israel (TAUI). Some of these species are potential pests of crops (Spencer, 1973).

MATERIALS AND METHODS

In total, 168 specimens were examined. The abdomen of most male specimens was detached and the terminalia were dissected. After examination of all dissected parts, the abdomen was placed in a drop of glycerin and gum resin on a card and pinned under the relevant specimen. For each species, a diagnosis, collection records (arranged alphabetically by localities), distribution, and drawings of the terminalia are given. Specimens are deposited in the National Collection of Insects, Zoological Museum, Tel Aviv University, Tel Aviv, Israel (TAUI), unless otherwise noted. Some specimens are deposited in the Muséum d'histoire naturelle, Genève, Switzerland (MHNG) and in the private collection of the author (CMCH). Terminology essentially follows McAlpine et al. (1981) and Papp and Darvas (2000). All drawings and descriptions of the phallus and other structures of the male terminalia are presented in a normal position (terminalia withdrawn).

Abbreviations of morphologocal terms used in the text and figures:

CuA_1 = cubitus
DM-Cu = discal medial-cubital crossvein (posterior crossvein, tp)
ge = genal seta
M_1 = 1st branch of media
oc = ocellar seta
os = orbital setulae
ori = anterior fronto-orbital setae
ors = posterior fronto-orbital setae
poc = postocellar seta
R_{2+3} = 2nd branch of radius
R_{4+5} = 3rd branch of radius
R-M = radial-medial crossvein (anterior crossvein, ta)
vi = vibrissal seta
vte = lateral (outer) vertical seta
vti = medial (inner) vertical seta
knee = articulation between femur and tibia and their parts immediately adjacent to this articulation

SPECIES TREATMENT

CERODONTHA Rondani, 1861

Cerodontha Rondani, 1861: 10. Type species: *Chlorops denticornis* Panzer, 1806: 22

Diagnosis

This genus was originally restricted to species with the first flagellomere having a dorsoapical spine-like projection or at least being conspicuously angulate (Spencer, 1976) and only one pair of scutellar setae. However, Nowakowski (1962) noted the

similarity in the male terminalia of *Cerodontha* species with those of many species included in different subgenera of *Dizygomyza* by Hendel (1931) and in *Phytobia* by Frick (1952a, 1959), especially the presence of a characteristically hooked or L-shaped paired structure within the epandrium in all species. All *Cerodontha* species with known biology develop exclusively in plants of four families of Monocotyledons: Cyperaceae, Iridaceae, Juncaceae, and Poaceae. Nowakowski (1962) therefore included all of these species in a single "natural genus" and, after publishing further revisionary studies in 1967 and 1972, produced a comprehensive monograph of the European species of *Cerodontha* in 1973, in which the following seven subgenera were included: *Butomomyza* Nowakowski, 1967, *Cerodontha* s. str., *Dizygomyza* Hendel, 1920, *Icteromyza* Hendel, 1931, *Phytagromyza* Hendel, 1920, *Poemyza* Hendel, 1931, and *Xenophytomyza* Frey, 1946. Nowakowski's papers (1972, 1973), Papp (1984), and recent works of Boucher (2002, 2003, 2005, 2008), and of Zlobin (1979, 1984, 1986, 1993a,b,c, 1996, 2000, 2001a,b,c,d, 2007) are considered among the most important studies on the generic and subgeneric classification of the genus *Cerodontha*.

KEY TO THE SPECIES OF *CERODONTHA* RONDANI IN ISRAEL

1. Scutellum with two setae; first flagellomere with spine-like projection (subgenus *Cerodontha* Rondani) **2**
–. Scutellum with four setae; first flagellomere rounded or axe-shaped, sometimes markedly enlarged in male, without projection **3**
2. Acrostichal setulae absent ..... ***denticornis* (Panzer)**
–. Acrostichal setulae present, at least in 2 rows ..... ***phragmitophila* (Hering)**
3. Lunule broad, in form of semicircle or slightly higher (Figs. 29, 35, 41, 47) **4**
–. Lunule high, narrow (Fig. 23) (subgenus *Poemyza* Hendel) ..... ***israelica* n. sp.**
4. Lunule higher than semicircle (subgenus *Butomomyza* Nowakowski) ..... ***angulata* (Loew)**
–. Lunule broad, nearly semicircular **5**
5. Frons dark, black or brown; lunule gray; ocellar triangle small, not extended to lunule margin, widely separated from antennal bases; first flagellomere in male enlarged (subgenus *Dizygomyza* Hendel) **6**
–. Frons normally yellow; lunule always yellowish; ocellar triangle usually extended to or almost to lunule margin; first flagellomere not enlarged in male (subgenus *Icteromyza* Hendel) **8**
6. Protuberant part of frons anterior to eye equal to width of pedicel in lateral view; arista barely longer than rest of antenna, thickened in basal 0.25–0.40 in both sexes. Paraphallus absent ..... ***crassiseta* (Strobl)**
–. Protuberant part of frons anterior to eye equal to about half width of pedicel in lateral view; arista longer than rest of antenna, thickened basally only in 0.25–0.40 of length in both sexes. Paraphallus present **7**
7. Notopleuron yellow ..... ***suturalis* (Hendel)**
–. Notopleuron black ..... ***luctuosa* (Meigen)**
8. Distiphallus 1.4 times as long as basiphallus, medial sclerite arched and curved dorsally, 4 times as long as proximal sclerite; proximal sclerite not recurved; caudal projection longer than broad (Fig. 6) ..... ***geniculata* (Fallén)**
–. Distiphallus more than twice as long as basiphallus, medial sclerite arched, broadly open, U-shaped, caudal projection shorter than broad (Fig. 11) ..... ***rozkosnyi* Černý**

Subgenus *Icteromyza* Hendel

Dizygomyza (*Icteromyza*) Hendel, 1931: 51. Type-species: *Dizygomyza geniculata* Fallén, 1823

Hendel (1931) characterized this subgenus by the elongate ocellar triangle that sometimes extends almost to the margin of the lunule; and he also noted the widely separated antennae and the large, semicircular lunule. The frons varies interspecifically from yellow to dark brown to almost black. The lunule is always yellowish. The larvae feed as leaf and stem miners. They are characterized by the anterior spiracles in the form of long knob-like projections, and the posterior spiracles assume ventral position in the form of claw-like projections directed anteriorly. The puparium is of a characteristic form with ventral curvature at the posterior end. Host plants are known for only six species (Benavent-Corai et al., 2005), all belonging to Cyperaceae and Juncaceae. The world fauna of the subgenus *Icteromyza* comprises 28 species in all zoogeographic regions, of which 11 species occur in the Palaearctic region. Two species, *C*. (*I*.) *geniculata* (Fallén) and *C*. (*I*.) *rozkosnyi* Černý, are known from Israel.

Cerodontha (*Icteromyza*) *geniculata* (Fallén)

(Figs. 1–6)

Agromyza geniculata Fallén, 1823: 6

Diagnosis

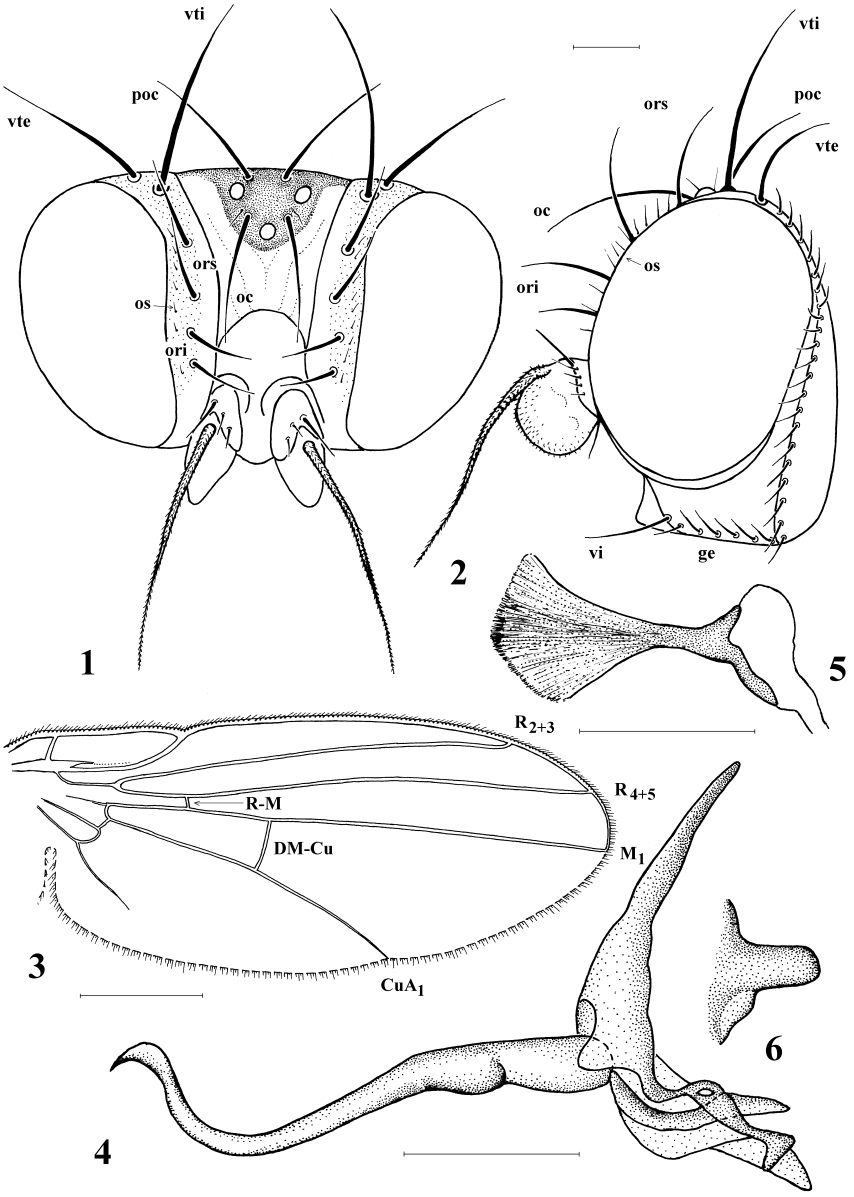
Frontal vitta yellow to boundary with vertex; lunule, parafacial, face, and palpus reddish-yellow. Fronto-orbital plate usually darkened in posterior half. First flagellomere and scape black, pedicel yellowish. Fronto-orbital plate flat, prominent anterior to eye, half as wide as pedicel in lateral view; 2 posterior fronto-orbital setae and 2 anterior fronto-orbital setae present (Figs. 1–2). Orbital setulae reclinate. First flagellomere round. Lunule slightly higher than semicircle. Gena deepest in posterior part, 0.3 times as high as eye; eye bare or covered with short and fine hairs. Scutum grayish, varying from largely mat to moderately shiny, thorax black laterally. Scutum with 1+3 dorsocentral setae, acrostichal setulae in 4 rows. Wing (Fig. 3): length 2.2–3.0 mm, last and penultimate sections of CuA_1 equal. Calypteres yellow, margin and fringe black. Legs black but all knees broadly yellow. Male terminalia (Figs. 4–6): Phallus as in Fig. 4, distiphallus compact, 1.4 times as long as basiphallus, medial sclerite arched and curved dorsally, 4 times as long as proximal sclerite; proximal sclerite not recurved. Mesophallus longer than proximal sclerite, without spine at base. Surstylus with 3–4 spines. Caudal projection (Fig. 6) longer than high.

Material Examined

ISRAEL: NE Berekhat Ya'ar, 6.vi.2003, A. Freidberg (1♂).

Distribution

Europe, Central Asia, Far East, North and South Africa. First record for Israel.



Figs. 1–6. *Cerodontha* (*Icteromyza*) *geniculata*. 1. Head, frontal view. 2. Head, lateral view. 3. Wing. 4. Phallus, lateral view. 5. Ejaculatory apodeme, lateral view. 6. Caudal projection, lateral view. Scale bars = 0.1 mm, except for Fig. 3 = 0.5 mm (Figs. 4–6, after Nowakowski, 1973).

Comments

This species was described by Fallén (1823) from Sweden under *Agromyza*. The larvae form linear mines in leaves of *Eriophorum latifolium* Hoppe (Cyperaceae), and frequently several larvae feed on a single leaf. There are some reports on larval feeding on *Carex pseudocyperus* L. Cyperaceae), but these have been not confirmed by rearing the adults (Nowakowski, 1973).

Cerodontha (*Icteromyza*) *rozkosnyi* Černý

(Figs. 7–12)

Cerodontha (*Icteromyza*) *rozkosnyi* Černý, 2007: 96

Diagnosis

General coloration black, microtrichia reddish-brown. Frontal vitta, lunule, face, parafacial, and gena yellow. Fronto-orbital plate pale brown to black dorsally, yellow ventrally. First flagellomere black, scape yelow, pedicel yellowish to brown. Frons (Fig. 7) broad, 1.5–1.9 times as wide as eye, ocellar triangle arched, extending to anterior margin of frons. Lunule twice as broad as high. Fronto-orbital plate only slightly protuberant beyond eye in profile, with 2 posterior fronto-orbital setae and 2–3 anterior fronto-orbital setae. Orbital setulae sparse and erect, in two irregular rows. Bases of antennae separated by narrow and swollen keel. First flagellomere small, higher than long, rounded distally, short pubescent. Parafacial forming narrow ring ventral to eye, gena deepest in posterior part, 0.24–0.28 times as high as eye, with 4–6 genal setae (Fig. 8). Scutum and scutellum black and dull, microtrichia reddish-brown. Posterior part of postpronotal callus and notopleuron paler, brown to yellowish. Scutum with 1+3 dorsocentral setae, two anterior setae only half as long as posterior one. Acrostichal setulae in 4 regular rows. Wing (Fig. 9) length 1.85–2.95 mm. Costa reaching vein M_1. Distal section of CuA_1 equal to or slightly longer than penultimate section. Calypteres bright yellow, their margin and fringe ochre yellow to brownish. Legs predominatly black, all knees broadly yellow. Male terminalia (Figs. 10–12): Phallus as in Fig. 10, distiphallus compact, more than twice as long as basiphallus, medial sclerite arched, broadly open, U-shaped, tubules divergent distally. Distal funnel not separated. Mesophallus about as long as proximal sclerite, without basal spine. Caudal projection not longer than broad (Fig. 11).

Material Examined

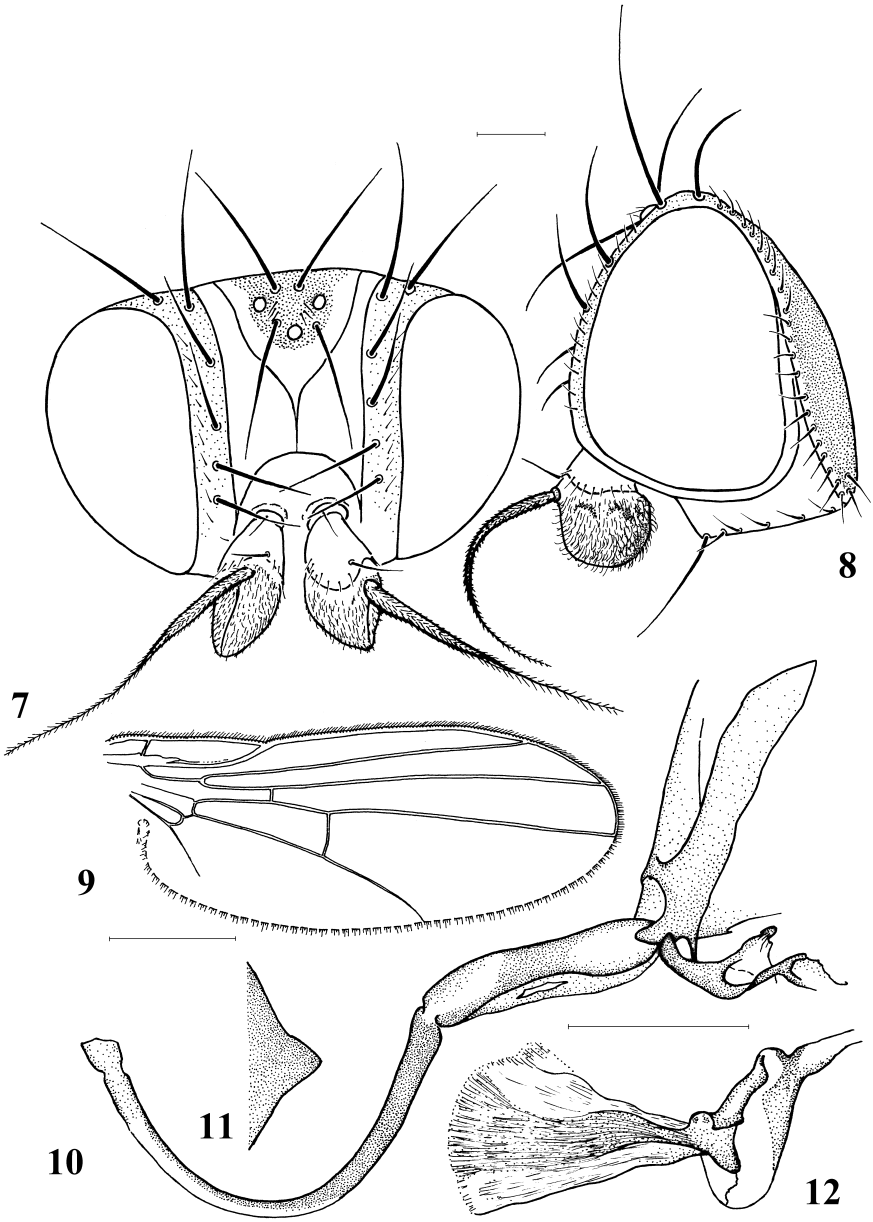
ISRAEL: Hula, 28.ii.1977, F. Kaplan (1♀); Rosh ha'Ayin, 13.v.1993, A. Freidberg (1♂).

Distribution

Czech Republic, Romania, Morocco. First record for Israel.

Comments

This species was originally recorded from a relatively warm area in northwest Bo-



Figs. 7–12. *Cerodontha* (*Icteromyza*) *rozkosnyi*. 7. Head, frontal view. 8. Head, lateral view. 9. Wing. 10. Phallus, lateral view. 11. Caudal projection, lateral view. 12. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 9 = 0.5 mm (Figs. 10–12, from Černy, 2007).

hemia in the Czech Republic, as well as from Romania and Morocco (Černý, 2007), and generally resembles *C.* (*I.*) *geniculata*. However, the species-specific structure of the male terminalia is distinctly different from *C.* (*I.*) *geniculata*. The biology of this species is unknown.

Subgenus *Cerodontha* Rondani

Cerodontha Rondani, 1861: 10. Type species: *Chlorops denticornis* Panzer, 1806: 22

Until recently, this subgenus was treated as a separate genus. The first flagellomere carries a conspicuous dorsoapical spine-like projection, and only apical scutellar setae are present. There is considerable color variation of body parts, from largely black to gray and yellow. The subgenus *Cerodontha* is especially closely related to the subgenus *Xenophytomyza*; both subgenera possess only one pair of scutellar setae. Host plants are known for only 9 species (Benavent-Corai et al., 2005), all of which are in the Poaceae. The world fauna of the subgenus *Cerodontha* comprises 63 species in all zoogeographic regions, 24 of which occur in the Palaearctic region. Two species are now recorded from Israel: *C.* (*C.*) *denticornis* (Panzer) and *C.* (*C.*) *phragmitophila* (Hering).

Cerodontha (*Cerodontha*) *denticornis* (Panzer)

(Figs. 13–17)

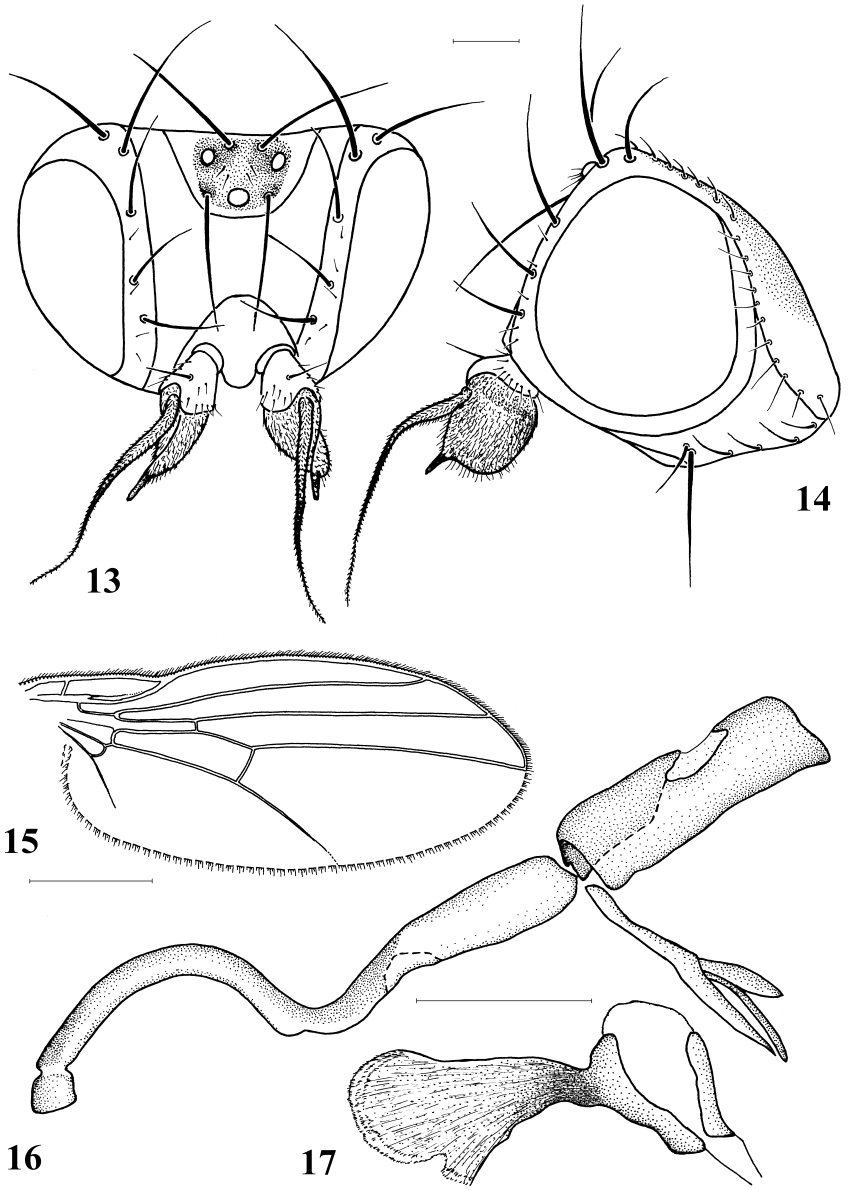
Chlorops denticornis Panzer, 1806: 22

Diagnosis

Frontal vitta, fronto-orbital plate, lunule, parafacial, face, and palpus yellow. Ocellar triangle and occiput black, posterodorsal margin of eye and vertex dark brown to black. First flagellomere entirely black, scape and pedicel yellow. Fronto-orbital plate prominent anterior to eye by distance equal to width of pedicel in lateral view, 2 (rarely 3) posterior fronto-orbital setae and 1 (rarely 2) anterior fronto-orbital setae (Figs. 13–14). Orbital setulae in one sparse row. First flagellomere with a conspicuous dorsoapical spine or projection, with hairs not longer than width of thickened base of arista. Gena deepest in posterior part, 0.3 times as high as eye, eyes almost bare. Scutum matt, grayish black or yellow in prescutellar area. Scutellum and anepisternum black or variably yellow. Scutum with 1+3 dorsocentral setae, acrostichal setulae absent. Wing (Fig. 15) length 1.7–2.8 mm. Abdomen entirely black or tergites with yellow border, sometimes also yellow laterally. Male terminalia (Figs. 16–17): Distiphallus compact, its distal arch flat, lower than a semicircle. Distal funnel higher than long. Basiphallic sclerites fused along their entire length. Paraphallus absent.

Material Examined

ISRAEL: ‘En Zin [Ein-Zin], 2.iii.1998, S. Alfi (1♀); Ein el-Fawar, Nahal Qana Reserve, 3 km SE Qarne Shomeron, 116 m, 32º09′N 35º07′E, 9.vii.2007, T. Stern (1♂); ‘Enot Zuqim, 9.vi.1997, A. Freidberg (1♂); Ga’ash, 30.v.1974, F. Kaplan (1♂, 1♀), 10.iii.1975, F. Kaplan (1♂, 1♀); Haifa, 27.iii.1994, beach, A. Freidberg (1♀); Har Her-



Figs. 13–17. *Cerodontha* (*Cerodontha*) *denticornis*. 13. Head, frontal view. 14. Head, lateral view. 15. Wing. 16. Phallus, lateral view. 17. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 15 = 0.5 mm (Figs. 16 and 17, after Nowakowski, 1973).

mon [Mt. Hermon], 1300 m, 22.v.1973, A. Freidberg (1♀); Har Hermon [Mt. Hermon], 1400–1600 m, 24.v.1983, I. Yaron (1♀); Har Hermon [Mt. Hermon], 1600 m, 14.v.1981, A. Freidberg (1♀), 23.iv.1982, F. Kaplan (1♀); Har Hermon [Mt. Hermon], 1700 m, 20.v.1983 I. Nussbaum (1♂; TAUI),10.vi.1983, I. Nussbaum (2♀; TAUI); Har Hermon [Mt. Hermon], 1900 m, 21.v.1979, D. Furth (1♀); Har Hermon [Mt. Hermon], 2000 m, 7.viii.1974, F. Nachbar (1♂, 1♀), 8.viii.1974, F. Nachbar (1♂, 1♀), 8.vi.1975, F. Kaplan (4♂), 8.vi.1975, A. Freidberg (1♂; 3♀), 9.vii.1975, A. Freidberg (1♂, 1♀), 14.v.1981, A. Freidberg (1♂; TAUI), 24.v.1983, I. Nussbaum (1♀), 9.vi.1983, A. Freidberg and F. Kaplan (1♂, 2♀), 3.vi.1985, I. Nussbaum (1♂), 27.v.1986, A. Shlagman (1♀); Har Hermon [Mt. Hermon], 2000 m, 13.vi.1996, B. Merz (1♂; MHNG); Har Hermon, Mizpe Shlagim, 2100 m, 11.vi.2003, A. Freidberg (1♀); Har Meron [Mt. Meiron], 900 m, 27.iv.1984, A. Freidberg (2♀); Har Meron [Mt. Meiron], 1100 m, 27.iv.1984, A. Freidberg (1♂, 4♀); Har Meron [Mt. Meron], 14.v.1974, A. Freidberg (1♂); Har Meron Reserve, 'En Zeved, 32°59′N 35°26′E, 24.iv.2002, A. Freidberg (1♂); Har Meron, 1100 m, 22.v.1998, A. Freidberg (1♂); Hazeva, 30°43′N 35°15′E, Field School, Malaise Trap, 1.iii.1998, E. Ashkenazi, (1♀); Herzliyya, 9.vi.1981, A. Freidberg (1♀); 16.vi.1981, A. Freidberg (1♀); 22.vi.1981, Malaise Trap, A. Freidberg (1♀); 10.iv.1982, Malaise Trap, A. Freidberg (1♀); Herzliyya hill, 32°11′N 34°49′E, 17.iii.2008, A. Freidberg (1♀); Holon, 15.iv.1994, Malaise Trap, A. Freidberg (1♂); Holon, 15.iv.1994, A. Freidberg and F. Kaplan (1♂); Horvat Nappah [Nafech], 5.v.1975, F. Kaplan (1♂); Kefar Shemaryahu [Kfar Shemariahu], 1.v.1984, A. Freidberg (1♂, 1♀); Kefar Zekharya [Kfar Zecharia], 18.iv.1984, I. Yaron (1♂); Mahanayim, 6.v.1975, A. Freidberg (1♀); Majdel Shams [Majdel Chams], 14.x.1982, F. Kaplan (4♂, 1♀; TAUI and CMCH); Merom Golan [Merom Hagolan], 4.v.1979, D. Furth (2♂); Meron, 950 m, 18.iv.1984, I. Nussbaum (1♀); Migdal Afeq [Migdal Zedek], 22.xii.1993, A. Freidberg and F. Kaplan (1♂), 13.xii.1997, A. Freidberg (1♀); Nahal Nimrod [Nemrod], 1000 m, 8.xi.1984, A. Freidberg (1♂); Nahal Tirza, 'Ein Shibli [W. Faria, Ein-Shibli], 31.v.1981, A. Freidberg (4♂, 1♀; TAUI and CMCH); Netu'a, 8.iv.1987, I. Nussbaum (1♀); Panyas [Baniass], 13.vi.1982, A. Freidberg (1♀); Park haYarden, 24.ix.1997, A. Freidberg (1♂); Peza'el [Fazael], 28.iv.1976, M. Kaplan (1♀); Qeshet [Golan, Keshet], 18.v.1983, F. Kaplan (1♂); Rosh ha'Ayin, park, 16.iv.1993, A. Freidberg and F. Kaplan (1♂), 13.v.1993, (1♂), 6.vii.1993, A. Freidberg and F. Kaplan (2♂); ?Rosh haNiqra [Haykra], 24.v.1980, F. Kaplan (1♀); Sasa, 27.iv.1984, A. Freidberg (1♀); Savyon [Savion], 13.vii.1987, Malaise Trap, Y. Zvik (1♀); Tel Aviv, 23.vi.1977, A. Freidberg (1♂); Tel Aviv, beach, country club, 14.iii.1995, B. Merz (1♂; MHNG); Yeriho [Jericho], 8.iii.1976, A. Freidberg (1♂); Yotvata, dunes, 5.iv.1997, A. Freidberg (1♂, 1♀).

Distribution

Throughout most of Europe, and in Canary Islands, Africa, Israel (Spencer, 1974: 147), Central and East Asia.

Discussion

This species is easily recognizable by the absence of acrostichal setulae. Due to the

marked color variation, it has been described under several different names. The darkest form was described by Strobl (1900) as *C. nigroscutellata*, and *C. semivittata* (Strobl, 1909) represents the palest form. The larvae feed mainly in the leaf-sheaths of Poaceae, and were recorded from *Agropyron, Alopecurus, Avena, Calamagrostis, Dactylis, Festuca, Holcus, Hordeum, Phalaris, Phleum, Poa,* and *Triticum*. Although this is one of the most common species collected in large numbers in early summer, the mines are inconspicuous and difficult to find.

***Cerodontha* (*Cerodontha*) *phragmitophila* (Hering)**

(Figs. 18–22)

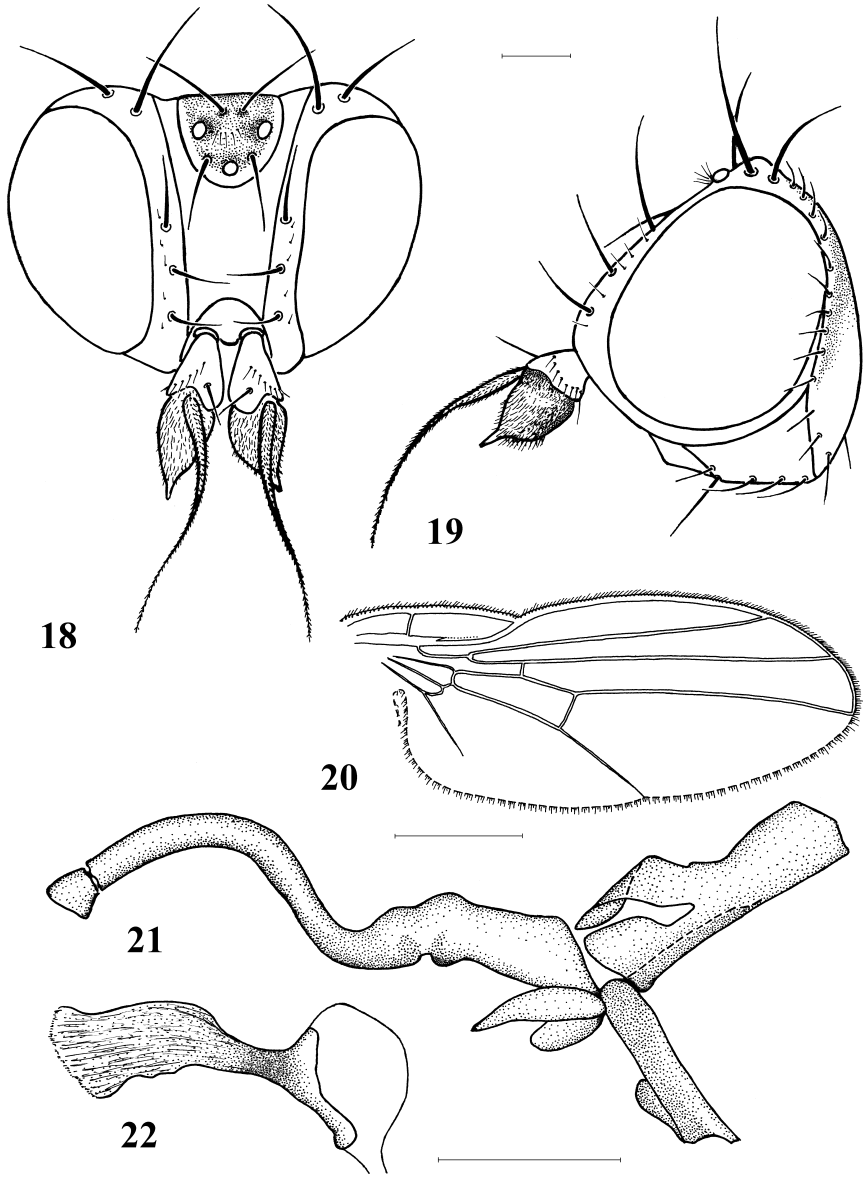
Cerodontha phragmitophilla Hering, 1935: 10

Diagnosis

Frontal vitta ochre-yellow, lunule, parafacial, face, and palpus yellow. Ocellar tubercle and occiput black, posterodorsal margin or eye, vertex and lateral part of fronto-orbital plate dark brown to black. Fronto-orbital plate usually prominent anterior to eye by distance equal to width of pedicel in lateral view (Figs. 18–19). Two (rarely 3) orbital setae and 1 (rarely 2) frontal setae present. Orbital setulae in one sparse row. First flagellomere brown to black, scape and pedicel yellow. Anterior margin of first flagellomere covered by hairs as long as thickened base of arista is broad. Lunule scarcely higher than semicircle. Gena deepest in posterior part, 0.3 times as high as eye, eye bare but sometimes with short and fine hairs. Thorax predominantly yellow, scutum with large, subshining matt black spot, space between middle dorsocentral seta and anterior margin of scutellum yellow, also scutellum extensively yellow. Anepisternum and anepimeron with a small to large brown to black spot. Katepisternum and katepimeron with a large central black spot. Scutum with 0+3 dorsocentral setae, acrostichal setulae in 2 rows reaching to level of middle postsutural dorsocentral seta. Wing (Fig. 20) length 1.8–2.7 mm, vein M_1 ending at tip of wing, last and penultimate sections of CuA_1 equal. Calypteres including their margin and fringe yellow. Legs yellow to brown, all coxae and femora yellow, tibiae and tarsi pale brown to brown or black. Abdomen predominantly yellow, with a broad black median longitudinal stripe. Male terminalia as in Figs. 21–22: Distiphallus compact, its distal arch flat, lower than a semicircle. Distal funnel higher than long. Mesophallus and proximal sclerite not separated by narrowed part. Basiphallic sclerites separated by a fissure in anterior part. Paraphallus consisting of two almost equal sclerites placed anterior to hypophallus.

Material Examined

ISRAEL: ‘Arava Valley, ‘Iddan Springs, in damp seep east of spring, el. 116 m, 30º49.04′N 35º16.95′E, 17.iii.1995, M. E. Irwin (1♂); Berekhat Ya’ar [Berekhat Ata nr. Hadera], 10.vi.1993, A. Freidberg (1♀); ‘Ein Hajla, 11.v.1977, A. Freidberg (1♀); ‘En Yahav, 24.vii.1995, A. Freidberg (1♂, 1♀); ‘Enot Zuqim (Ein Fashkha), 19.iii.1995, B. Merz (1♀; MHNG); ‘Enot Zuqim, 25.viii.1995, A. Freidberg (1♀); 7.vi.1996, A. Freidberg (1♂, 2♀); Hazeva, 1.iv.1983, Malaise Trap, A. Freidberg (1♂); Herzliyya,



Figs. 18–22. *Cerodontha* (*Cerodontha*) *phragmitophila*. 18. Head, frontal view. 19. Head, lateral view. 20. Wing. 21. Phallus, lateral view. 22. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 20 = 0.5 mm (Figs. 21 and 22, after Nowakowski, 1973).

28.viii.1977, F. Kaplan (1♀); Mizpe Shalem [Mitzpe Shalem], 3.iii.1983, A. Freidberg (5♂, 5♀; TAUI and CMCH); Nahal Zin, 'En Aqrabbim [Zin Wilderness Nakhal Zin at En Akrabim], 30º53.38′N 35º09.39′E, cane-covered sandy wadi el. 61 m, Sharkey Malaise Trap, 13.iii.1995, M.E. Irwin (1♂), 3.iv.1995, M.E. Irwin (1♀); Park haYarden, 24.ix.1997, A. Freidberg (1♂); Sappir, 1.v.1997, A. Freidberg (1♂); Qalya [Kallia], 2.xii.1982, A. Freidberg (2♀; TAUI and CMCH).

Distribution

Europe, Central Asia, North Africa. First record for Israel.

Comments

This species is characterized by distinct acrostichal setulae and moderately variable body coloration, with a variably-shaped yellow spot proximal to the scutellum. It differs from its congeners by the structure of the male terminalia: the distiphallus is complete, the meeting point of the mesophallus and the proximal sclerite not narrowed, and the paraphallus, consisting of two almost similar sclerites, is distinct proximal to the hypophallus. The larvae mine in leaf sheaths of *Arundo donax* L. and *Phragmites australis* (Cav.) Steud. (Poaceae).

Subgenus *Poemyza* Hendel

Dizygomyza (*Poemyza*) Hendel, 1931: 35. Type species: *Agromyza pygmaea* Meigen, 1830

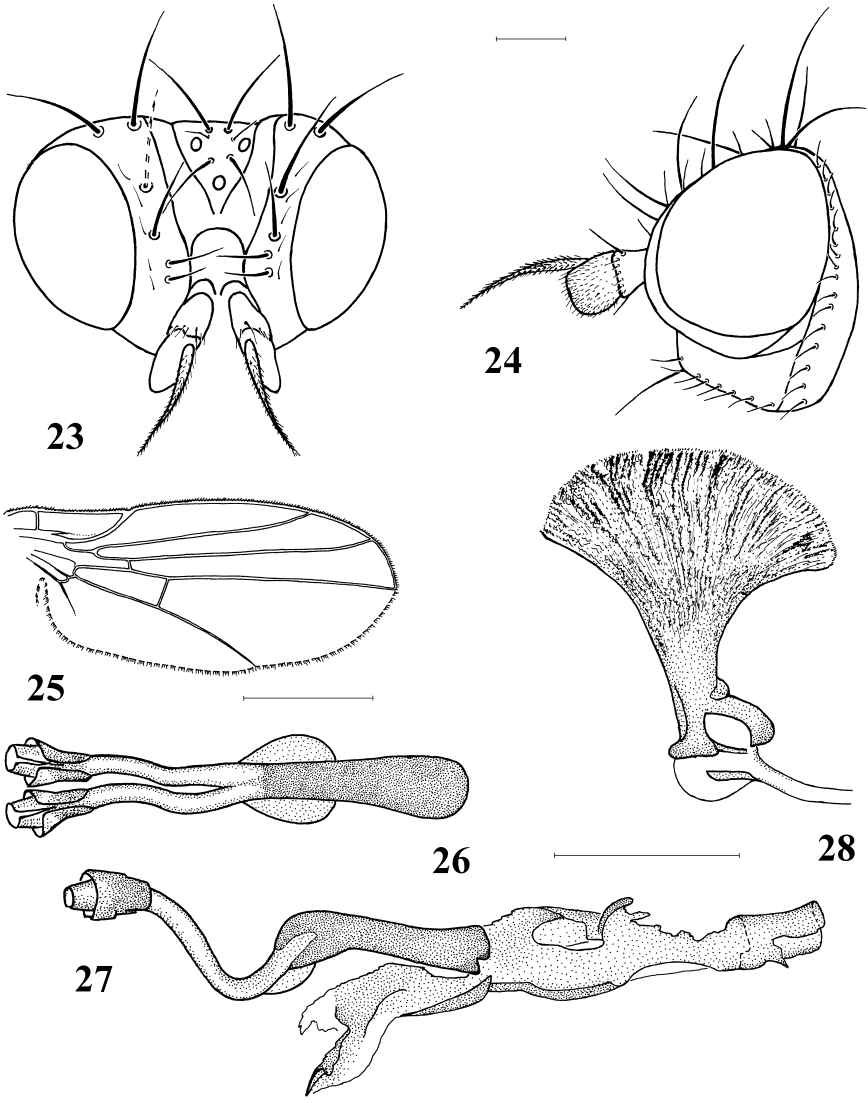
Hendel (1931) characterized this subgenus by the high, narrow lunule and the prominent orbits that widen toward the lunule. Hendel's concept remains essentially valid, although according to studies by Nowakowski (1967, 1972), several of Hendel's species are synonyms and others are placed in the subgenus *Butomomyza*. Nowakowski (1972) provides a detailed distinction between *Poemyza* and *Xenophytomyza* and between *Poemyza* and *Icteromyza* based on 12 characters in the male terminalia. The majority of species in *Poemyza* are leaf miners on Poaceae but one species from the United States is a leaf miner on *Carex* (Cyperaceae) (Spencer and Steyskal, 1986). The world fauna of *Poemyza* comprises 81 species in all zoogeographic regions, 59 species of which are in the Holarctic region, 53 in the Palaearctic region, and 16 in the Nearctic region. Only *Cerodontha* (*Poemyza*) *israelica* n. sp. is known to occur in Israel.

Cerodontha (*Poemyza*) *israelica* Černý, n. sp.

(Figs. 23–28)

Diagnosis

Small species, first flagellomere densely covered with moderately long hairs, arista short, only 1.85 times as long as first flagellomere; scutum blackish-brown slightly shiny; acrostichal setulae in 4 rows; calypteres gray, with ochre-brown margin and dark brown to black fringe; epandrium without caudal projection. Total body length 1.75 mm.



Figs. 23–28. *Cerodontha* (*Poemyza*) *israelica* n. sp., holotype male. 23. Head, frontal view. 24. Head, lateral view. 25. Wing. 26. Phallus, ventral view. 27. Same, lateral view. 28. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 25 = 0.5 mm.

Description

Male

Head (Figs. 23–24): Dark, ocellar triangle slightly shining; frontal vitta ochre-brown, fronto-orbital plate subshining, blackish-brown with very narrow pale medial margin. Occiput blackish-brown, both vertical setae in dark area. Gena ochre, parafacial ochre yellow to blackish-brown. Antennal pits blackish-brown. Scape, pedicel, and first flagellomere blackish-brown. Palpus blackish-brown. Frons broad, about twice as wide as eye at level of anterior ocellus, slightly tapering toward lunule. Fronto-orbital plate broad, conspicuous, about 0.25 times as wide as frons, markedly broadened at lunule, prominent anterior to eye in profile. parafacial distinctly projecting dorsal to eye in profile. Lunule higher than semicircular, subtriangular, ochre-brown, markedly narrowed at ventral part of fronto-orbital plate. Two long reclinate and slightly eclinate posterior fronto-orbital setae, 2 inclinate and shorter anterior fronto-orbital setae. Reclinate orbital setulae sparse and long, reaching about 0.3 length of posterior fronto-orbital setae. Ocellar seta long, its tip reaching ventral to level of ventral posterior fronto-orbital seta. First flagellomere longer than high, oval, marginal hairs shorter than width of thickened base of arista. Arista short, only 1.85 times as long as first flagellomere, spindle-shaped, dilated basally, short setulose, longest rays shorter than basal diameter of arista. Gena highest in posterior part, reaching 0.40 height of eye. One strong and long vibrissal seta and 7 short genal setae present. Ventral facial margin well developed, yellow, peristomal margin black. Eye entirely bare.

Thorax Scutum blackish-brown, subshining. Scutellum shining black. Posterior part of postpronotal lobe and notopleuron brown. Katepisternum blackish-brown. Scutellum 1.92 times as broad as long. Scutum with 3 long postsutural dorsocentral setae, 1st reaching only 0.6 and 2nd 0.86 length of 3rd dorsocentral seta. Additional 2 postsutural and 4–5 presutural dorsocentral setae only slightly longer than acrostichal setulae. Acrostichal setulae sparse and long, arranged in 4 rows almost reaching level of posterior dorsocentral setae, 5–6 presutural and 6–7 postsutural intra-alar setulae present. One strong intra-alar seta present, 0.7 times as long as posterior dorsocentral seta. One strong lateral post-alar seta and 1 shorter medial post-alar seta present. All other usual setae present: 1 postocellar, 1 medial vertical, 1 lateral vertical, 1 propleural, 1 postpronotal, 1+1 notopleural, 1 anepisternal, 1 katepisternal, 1 supra-alar, 1 basal scutellar, 1 apical scutellar.

Wing: (Fig. 25): 1.63 mm long, membrane mainly hyaline, base of wing ochre-yellow, veins brown, calypteres gray with ochre-brown margin and dark brown to black fringe. Knob and stem of halteres yellow. Costa reaching vein M_1. Ratio of costal sections 2–4 = 3.06:1.28:1.00. Discal cell large, the last part of CuA_1 about 1.39 times as long as penultimate part. Distance between R-M and DM-Cu 1.2 times as long as DM-Cu.

Legs: Blackish-brown, foreknee yellow, yellow part as broad as femur, mid-knee only slightly paler, tibiae without posterodorsal setae.

Abdomen: Blackish-brown, 6th tergite 1.5 times as long as 5th tergite. Male terminalia (Figs. 26–28): epandrium as broad as high, without caudal projection. Cerci narrow, reaching 0.24 height of epandrium. Phallus (Figs. 26–27) symmetrical, distiphallus with

characteristic S-shaped and paired tubules, surrounded by distal sclerite in shape of a funnel. Only short but conspicuous tubes distinct anterior to funnel. Mesophallus short and oval. Ejaculatory apodeme (Fig. 28) with broad blade, Y-shaped, as long as broad, with narrow and short stalk. Hypandrium U-shaped, with long arms.

Female

Unknown.

Type Locality

Israel, 'En Mabua, Nahal Perat.

Type Material

Holotype ♂ labeled: "Holotype" (red label); "ISRAEL: 'En Mabua, 27.ii.2007, A. Freidberg" (printed on white label); "*Cerodontha* (*P.*) *israelica* sp. nov., det. M. Černý 2010" (printed on white label). Terminalia dissected, mounted on the same pin (medium: glycerin and gum resin).

Etymology

This species is named after Israel, the country in which it was found.

Biology

Unknown.

Distribution

Israel, currently known only from the type locality.

Comments

Cerodontha israelica is one of the smallest species of the *atra*-group (Nowakowski, 1972, Zlobin, 1993a). It is apparently closely related to a Russian species from the Altai, *C*. (*P*.) *altaica* Zlobin, but differs from it distinctly in the following characters: the new species is smaller (body 1.75 mm, wing 1.63 mm); the parafacial is markedly wide, well visible anterior to the eye in lateral view; discal cell large, the last part of CuA_1 about 1.39 times as long as penultimate part. Conspicuous differences are also found in the male terminalia; the distiphallus is unique to the species as its distal tubules are distinctly anterior to the funnel-like dilated distal sclerite, and the caudal projection of the epandrium is missing (compare to Zlobin, 1993a).

Subgenus *Butomomyza* Nowakowski

Cerodontha (*Butomomyza*) Nowakowski, 1967: 633. Type species: *Agromyza angulata* Loew, 1869

Nowakowski (1967) erected this subgenus for a small group of species with a characteristic lunule, which is broad but higher than a semicircle. The first flagellomere in the male is never enlarged as in *Dizygomyza* species. The shape of the phallus implies relationship with the subgenus *Dizygomyza* rather than with *Poemyza*. The main differences between *Butomomyza* and *Dizygomyza* are found in the larval characters. All known larvae of *Butomomyza* are characterized by the presence of a pair of rounded areas covered with

dense black cuticular teeth. These are situated lateral to the anus, sometimes extending to the hind spiracles dorsally. The larvae usually feed on Cyperaceae, particularly *Carex*, but one European species, *C.* (*B.*) *rohdendorfi* Nowakowski, breeds in Poaceae (Benavent-Corai et al., 2005). The world fauna of the subgenus *Butomomyza* comprises 36 species in all zoogeographical regions. The majority of species are widespread in the temperate zone of the northern hemisphere, and 12 species occur in the Palaearctic region. Only one species, *C.* (*B.*) *angulata* (Loew) is known to occur in Israel.

***Cerodontha* (*Butomomyza*) *angulata* (Loew)**

(Figs. 29–34)

Agromyza angulata Loew, 1869: 47

Diagnosis

Frons (Figs. 29–30) 1.5 times as wide as eye, brownish-black, fronto-orbital plate black, not widened toward base of antennae. Two posterior fronto-orbital setae and 2 anterior fronto-orbital setae present. The first flagellomere small, round in both sexes, with small tuft of hairs at dorsal corner, all antennal segments black. Scutum with 1+3 strong dorsocentral setae, acrostichal setulae in 6 rows. Prescutellar seta variable, frequently well developed. Wing (Fig. 31) length 1.8–2.8 mm. Calypteres and their fringe invariably yellow, rarely somewhat darker. Legs with femora black, knees variable, yellowish on fore leg, sometimes also paler on mid and hind legs. Male terminalia (Figs. 32–34): phallus with distal tubules enlarged at apex, not divergent, surstylus with patch of setae on ventral corner. Caudal projection of epandrium small (Fig. 32).

Material Examined

ISRAEL**:** Panyas [Baniass], 24.iv.1982, F. Kaplan (1♂).

Distribution

Europe, North Korea, South Korea, Canada, USA. First record for Israel.

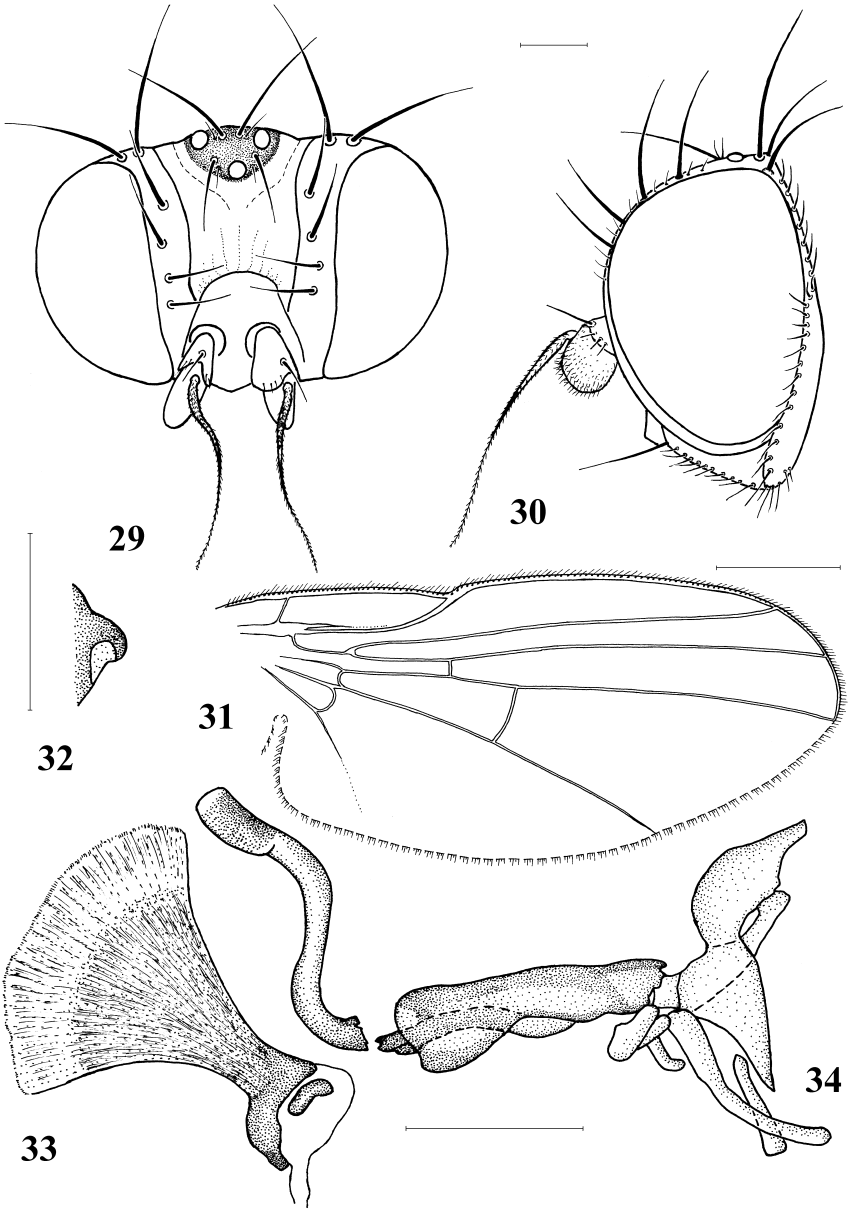
Comments

The color of the frons and the margin of the calypteres and their fringe are somewhat variable, and identification of specimens may thus be unreliable, though structures of the male terminalia provide sufficient characters. The larva forms a long, narrow, greenish mine on *Carex* spp. and rarely on *Scirpus sylvaticus* L.

Subgenus *Dizygomyza* Hendel

Dizygomyza Hendel, 1920: 130. Type species: *Agromyza morosa* Meigen, 1830

Until recently, this subgenus was treated as a separate genus on the basis of its distinctive characters (Hendel, 1920). It is recognizable externally by the semicircular lunule, widely spaced antennal bases, and the enlarged first flagellomere that is covered densely by whitish pile in the male. The larval posterior spiracles retained the primitive



Figs. 29–34. *Cerodontha* (*Butomomyza*) *angulata*. 29. Head, frontal view. 30. Head, lateral view. 31. Wing. 32. Caudal projection, lateral view. 33. Ejaculatory apodeme, lateral view. 34. Phallus, lateral view. Scale bars = 0.1 mm, except for Fig. 31 = 0.5 mm (Figs. 33 and 34, after Nowakowski, 1973).

arrangement of three bulbs. The larvae are all leaf-miners on Cyperaceae, Iridaceae, Juncaceae, and Poaceae (Benavent-Corai et al., 2005). The world fauna of the subgenus *Dizygomyza* comprises 67 species in all zoogeographical regions; 30 species occur in the Palaearctic region. Three species, *C*. (*D*.) *crassiseta* (Strobl), *C*. (*D*.) *luctuosa* (Meigen), and *C*. (*D*.) *suturalis* (Hendel) are known from Israel.

***Cerodontha* (*Dizygomyza*) *crassiseta* (Strobl)**

(Figs. 35–40)

Agromyza grossicornis Zetterstedt var. *crassiseta* Strobl, 1900: 63

Diagnosis

Frontal vitta, lunule, parafacial, and face black to blackish-brown, at most yellowish transparent, palpus black. Fronto-orbital plate blackish-brown. First flagellomere black at scape and pedicel. Fronto-orbital plate (Figs. 35–36) wide, prominent, half as wide as pedicel in lateral view. Two posterior fronto-orbital and 2 anterior fronto-orbital setae present. Orbital setulae between posterior fronto-orbital setae and basis of antenna sparse. Lunule broad, lower than semicircle. Gena highest in posterior part, 0.35 times as high as eye. Parafacial distinct as narrow ring ventral to eye. Eyes entirely bare. First flagellomere large, markedly longer than high, aristal thickening in basal 0.7–0.8 in male and 0.5–0.7 in female. Scutum and scutellum black, grayish dusted. Anepisternum dark, only with a very narrow yellow dorsal margin. Scutum with 1+3 dorsocentral setae, 1st seta shorter than postsutural setae, inserted anterior to line of presutural setae, acrostichal setulae in 4–6 irregular rows, reaching beyond line of 4th dorsocentral setae. Wing (Fig. 37) length 2.3–3.0 mm, last and penultimate sections of CuA_1 equal. Calypteres, including their margin and fringe yellowish-white. Legs blackish-brown but fore knee yellow to reddish-yellow, mid and hind knees rusty-yellow to black. Abdomen black, at most with very narrow yellow posterior margin of tergites. Male terminalia (Figs. 38–40): phallus with S-forming distiphallus, medial sclerite 2.00–2.25 times as long as proximal sclerite, distal arch almost regular, lower than semicircle, much lower and shorter than proximal arch. Distal sclerite not separated, twice as long as broad. Mesophallus less than twice as long as high. Surstylus with 3–4 spines.

Material Examined

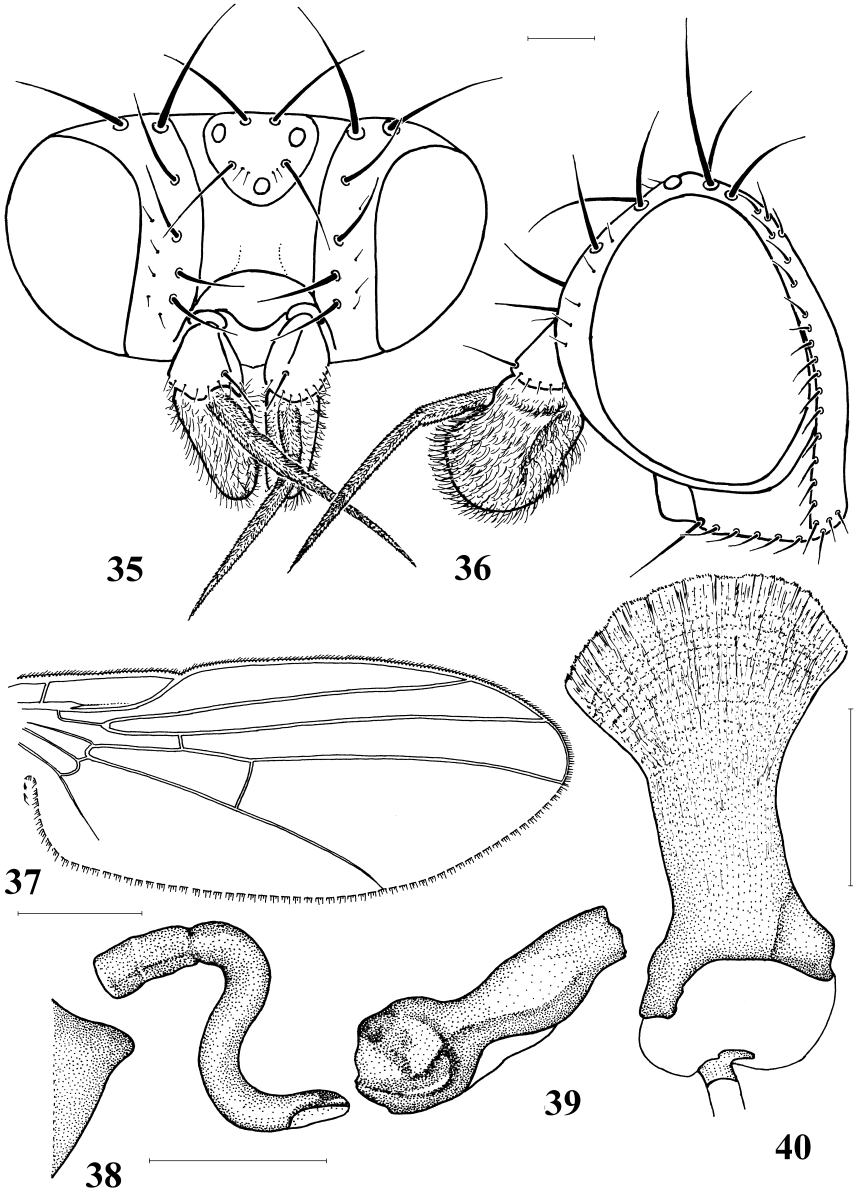
ISRAEL: Har Hermon [Mt. Hermon], 23.iv.1982, F. Kaplan (1♂, 3♀; TAUI and CMCH); Har Horesha, 17.iii.1995, A. Freidberg (1♂); Mizpe Ramon, observatory, 17.iii.1995, A. Freidberg (1♂); Shivta, 8.xii.1980, A. Freidberg (1♀).

Distribution

Europe. First record for Israel.

Comments

This is one of five species that are known to feed on Poaceae. It is widespread in Europe and is newly recorded from Israel. This is a distinctive species with a short and



Figs. 35–40. *Cerodontha* (*Dizygomyza*) *crassiseta*. 35. Head, frontal view. 36. Head, lateral view. 37. Wings. 38. Caudal projection, lateral view. 39. Phallus, lateral view. 40. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 37 = 0.5 mm (Figs. 39 and 40, after Nowakowski, 1973).

thickened arista, and male terminalia with unusually short phallus. The larva forms leaf mines on *Dactylis glomerata* L. and *Poa compressa* L.

***Cerodontha* (*Dizygomyza*) *luctuosa* (Meigen)**

(Figs. 41–46)

Agromyza luctuosa Meigen, 1830: 182

Diagnosis

Frons dark brown, fronto-orbital plate gray or, if darker, not shining. First flagellomere enlarged in male. Gena ochre-brown to dark brown. Frons (Figs. 41–42) twice as broad as eye. First flagellomere large, 0.3–0.4 times as high as eye in male, with hairs along anterior margin being as long as thickened base of arista is broad. Scutum matt grayish. Anepisternum with yellow narrow dorsal border gradually broadened to wing base. Scutum with 1+3 dorsocentral setae, acrostichal setulae in 4–6 irregular rows reaching beyond line of 4th dorsocentral setae. Wing (Fig. 43) length 2–3 mm, last section of CuA_1 1.0–1.7 times as long as preceding section. Calypteres including fringe whitish-yellow. Legs black, with only fore knee narrowly yellowish. Abdomen normally with tergites 2–5 yellow laterally and narrowly yellow bordered posteriorly, rarely entirely black. Male terminalia (Figs. 44–46): phallus with S-shaped distiphallus, medial sclerite 4.5 times as long as proximal sclerite, its distal arch regular, higher than semicircle, only slightly longer and higher than proximal arch. Distal sclerite not separated, 1.5 times as long as broad. Paraphallus and mesophallus fused, mesophallus 3.5–4.5 times as long as high, apically slightly tapered. Surstylus with 3–4 spines. Caudal projection of epandrium small, but distinct (Fig. 44).

Material Examined

ISRAEL: Panyas [Baniass], 13.vi.1982, A. Freidberg (2♂; TAUI).

Distribution

Throughout most of Europe, and in Iraq, Uzbekistan, China, Japan, Tunisia, North America. First record for Israel.

Comments

Six species in the subgenus *Dizygomyza* are known to mine in Juncaceae, and only the larva of *C.* (*D.*) *luctuosa* forms yellowish leaf mine on *Juncus effusus* L. There are some reports on larval feeding on *J. bufonius* L., *J. conglomeratus* L., and *J. inflexus* L., but these have not been confirmed by rearing the adults (Nowakowski, 1973).

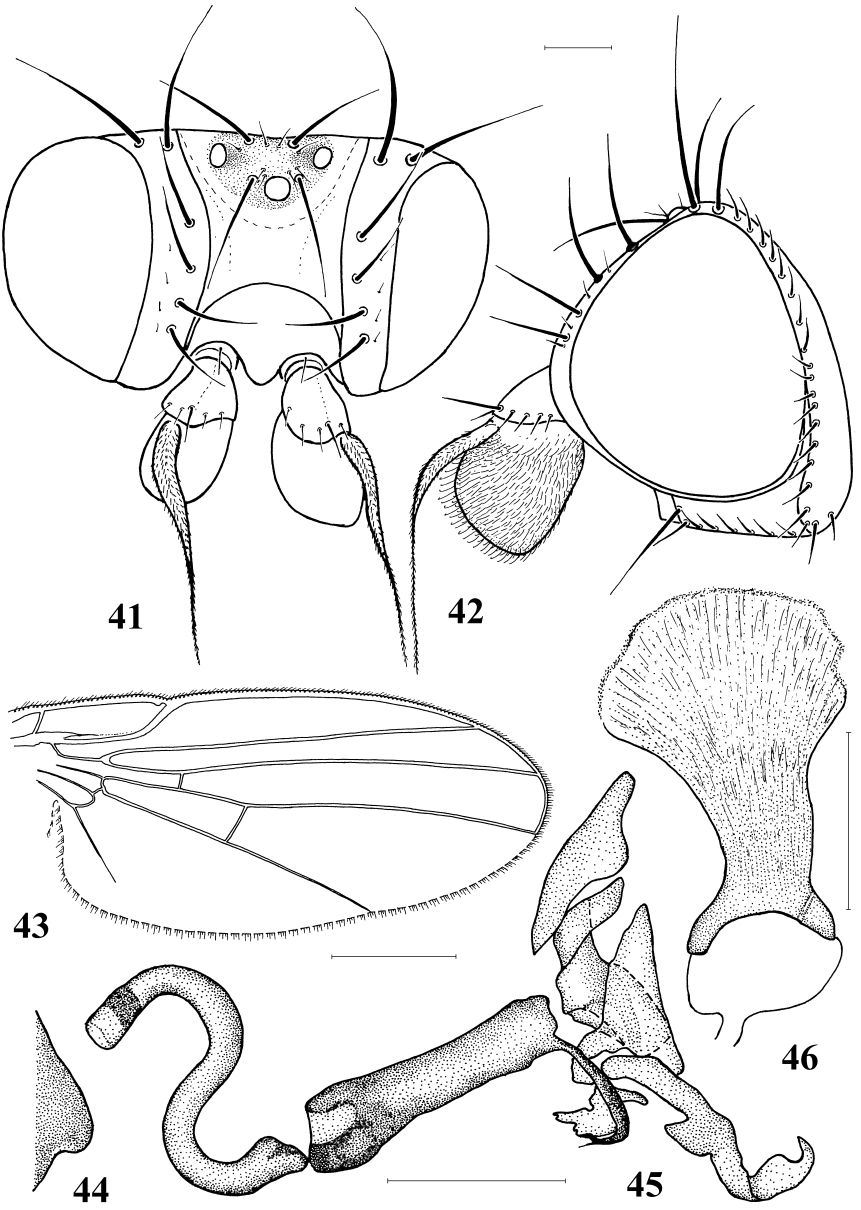
***Cerodontha* (*Dizygomyza*) *suturalis* (Hendel)**

(Figs. 47–52)

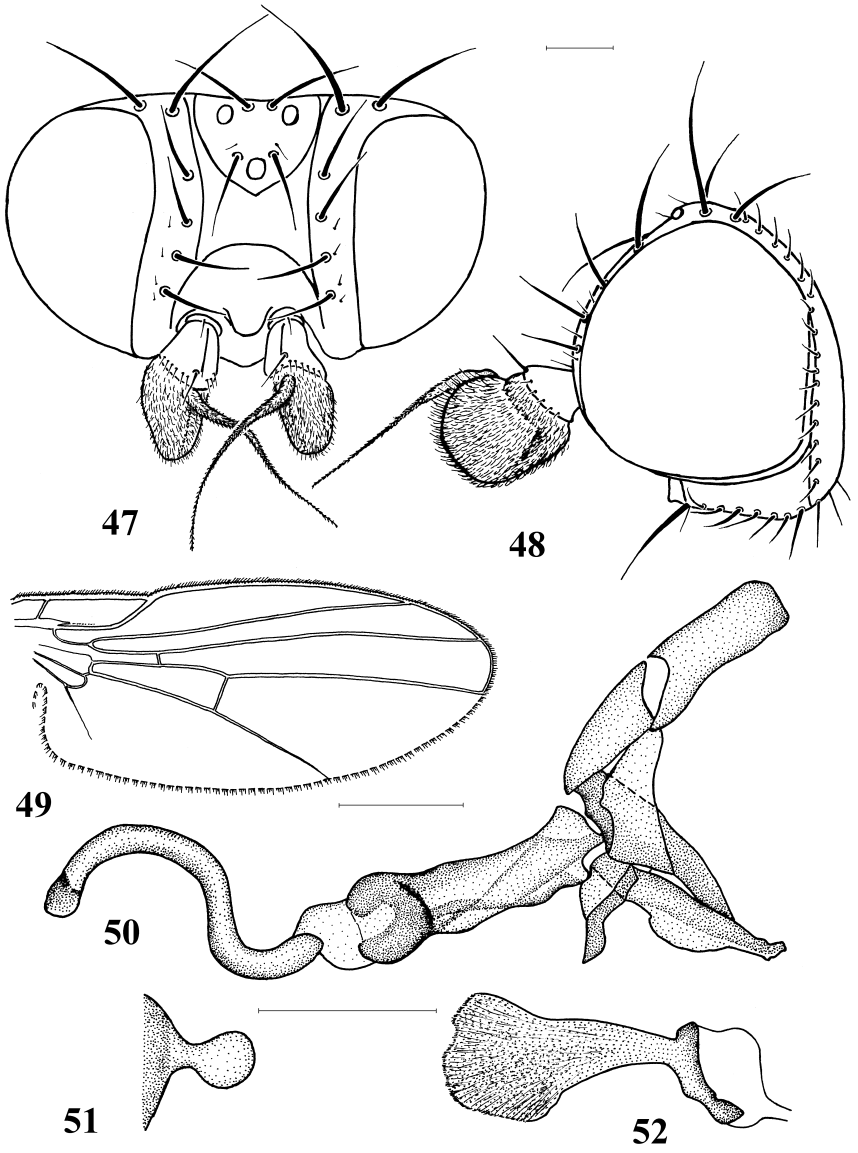
Dizygomyza (*Dizygomyza*) *morosa* var. *suturalis* Hendel, 1931: 91

Diagnosis

Frontal vitta blackish-brown, paler in dorsal part, fronto-orbital plate predominantly



Figs. 41–46. *Cerodontha* (*Dizygomyza*) *luctuosa*. 41. Head, frontal view. 42. Head, lateral view. 43. Wing. 44. Caudal projection, lateral view. 45. Phallus, lateral view. 46. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 43 = 0.5 mm (Figs. 45 and 46, after Nowakowski, 1973).



Figs. 47–52. *Cerodontha* (*Dizygomyza*) *suturalis*. 47. Head, frontal view. 48. Head, lateral view. 49. Wing. 50. Phallus, lateral view. 51. Caudal projection, lateral view. 52. Ejaculatory apodeme, lateral view. Scale bars = 0.1 mm, except for Fig. 49 = 0.5 mm (Figs. 50 and 52, after Nowakowski, 1973).

black and gray. First flagellomere brownish-black, scape and pedicel ochre-brown. Gena and lunule ochre-brown. Fronto-orbital plate (Figs. 47–48) barely visible anterior to eye in lateral view, gena 0.3 times as high as eye. Posterior part of postpronotal lobe and notopleuron pale yellow, anepisternum bordered with narrow yellow dorsal and posterior margin. Scutum with 1+3 dorsocentral setae. Acrostichal setulae in 4 (rarely 5) rows reaching beyond line of 4th dorsocentral setae. Prescutellar setulae barely 1.5 times as long as acrostichal setulae. Wing (Fig. 49) 2.0–2.7 mm long. Last section of CuA_1 1.0–1.5 times as long as preceding section. Fore femora distally broadly yellow, mid and hind femora barely yellowish. Abdomen black, broadly yellow at posterior margin of tergites 1–4. Male terminalia (Figs. 50–52): phallus with S-shaped distiphallus, medial sclerite 1.66–1.75 times as long as mesophallus, its distal arch not recurved and almost semicircular, 1.50–1.75 times as long as, and somewhat higher than, proximal arch. Distal sclerite small, not separated, 1.0–1.5 times as long as broad. Paraphallus and mesophallus separated, mesophallus 3.0–3.5 times as long as high, not tapered apically. Surstylus with 4–5 spines.

Material Examined

ISRAEL: Berekhat Ya'ar [Berekhat Ata near Hadera], 10.vi.1993, A. Freidberg (2♂); Berekhat Ya'ar, 28.iv.2004, L. Friedman (1♂); Berekhat Ya'ar, North, 23.v.2003, A. Freidberg (1♂); Berekhat Ya'ar, South, 23.v.2003, A. Freidberg (3♂); L. Friedman (1♂); NE Berekhat Ya'ar, 6.vi.2003, A. Freidberg (9♂, 4♀; TAUI and CMCH); SE Berekhat Ya'ar, 6.vi.2003, A. Freidberg (4♂, 1♀); Horvat Nappah [Golan, Nafech], 26.iv.1984, A. Freidberg (1♂); Hula, 17.iii.1981, A. Freidberg (1♂); Kefar Shemaryahu [Kfar Shemariahu], 1.v.1984, A. Freidberg (1♀); Nov, 8.i.1984, I. Nussbaum (1♂); Park Rosh ha'Ayin, 16.iv.1993, A. Freidberg and F. Kaplan (3♂, 2♀).

Distribution

Europe, Mongolia, China, Japan. First record for Israel.

Comments

Hendel (1931) described this species from Austria as a variety of *morosa* on the basis of the conspicuously yellow posterior part of the postpronotal lobe and the notopleuron, noting that this variety may represent a distinct species. Nowakowski (1967) examined the male terminalia of both species (*morosa* and *suturalis*) and confirmed that they are distinct. The larvae mine the leaves of *Carex hirta* L. (Cyperaceae).

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