

SOME AGROMYZIDAE (DIPTERA) FROM ISRAEL

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A B S T R A C T

A list of 41 species of Agromyzidae from Israel is given, together with their distribution and known host plants. Six new species are described: *Melanagromyza spinulosa*, *Ophiomyia memorabilis*, *Liriomyza freidbergi*, *Napomyza hermonensis*, *Napomyza ranunculella*, *Phytomyza kugleri*.

INTRODUCTION

The Agromyzidae of Israel have hitherto been largely unknown and it was therefore of considerable interest to study the material collected in recent years, mainly by Prof. J. Kugler and Mr. A. Freidberg from numerous localities from Hermon in the north to Sinai in the south. Among the 167 specimens examined, 41 species have been identified, including six described below as new to science. It has not been possible to identify several *Agromyza* and *Liriomyza* specimens in the absence of males.

The composition of this sample is essentially Palaearctic. Many of the species have ranges extending to central and even to northern Europe: of these, two - *Agromyza flavipeimis* and *Liriomyza alyssi* - have not previously been recorded in the Mediterranean area. Six are not known north of the Mediterranean - *Melanagromyza siciliensis*, *Japanagromyza salicifolii*, *Agromyza hiemalis*, *Pseudonapomyza hispanica* and *Phytomyza ferulae*; finally, five are of Oriental-Ethiopian origin - *Melanagromyza sojuae*, *Ophiomyia phaseoli*, *Pseudonapomyza asiatica*, *Ps. spicata* and *Ps. spinosa*.

It is certain that many further species await discovery and specialized collecting, in particular breeding adults from larval leaf-mines or from puparia which can without difficulty be found in stems of many plants, will be a rewarding task for the future.

Detailed references are only given for papers not included in Hendel's (1931-6) Monograph of Palaearctic species.

LIST OF SPECIES

Genus *Melanagromyza* Hendel, 1920

M. albocilia Hendel, 1931.

Ashqelon, 1 ♂, 1 ♀, 12.x.71; 3 km. E. Ashdod, 1 ♂, 10.viii.71, 1 ♀, 31.viii.71; Kefar Sirkin, 1 ♂, 7.x.71; 5 km. S.W.Raffid, 1 ♀, 20.x.71; all collected in shoots of *Convolvulus arvensis* (J. Kugler).

Distribution: Western and Central Europe, Egypt.

Biology: Internal stem-borer in *Convolvulus*.

Remarks: This series represents the first record of the host of this species, which was described from caught specimens from Hungary. A related species from Pakistan, *M. convolvuli* Spencer, 1971 is being considered for biological control of *Convolvulus arvensis* in America. (Spencer, 1973).

M. siciliensis Spencer, 1966a

Majdel-Shams, 2♀♀, 15.v.71 (Kugler).

Distribution: Sicily; Spain (Spencer, 1972)

Biology : internal stem-borer, host unknown.

Melanagromyza spinulosa sp.n. - Figs. 1,2

Adult : medium-sized species, with black squamal fringe and costa ending before vein M_{1+2} . Frons $1\frac{1}{2}$ times width of eye, not projecting above eye in profile; 2 reclinate *ors*, 2 partially incurved *ori*, orbital setulae in single row, reclinate; ocellar triangle large, apex extending almost to level of lower *ors*; eye large, upright, bare in both sexes; jowls $1/6$ height of eye, cheeks forming only narrow ring below eye; third antennal segment small, round, arista fine, not detectably pubescent; antennal bases approximate, not divided by

facial keel; 2 strong *dc*, *acr* numerous in some 8 rows; wing length 2 mm, costa ending midway between vein R_{4+5} and M_{1+2} , last and penultimate sections of M_{3+4} equal, first cross-vein slightly beyond midpoint of discal cell; colour: head black, frons mat, ocellar triangle and orbits weakly shining; mesonotum strongly shining, abdomen distinctly greenish; squamae grey, margin and fringe black; halteres black.

Male genitalia: aedeagus symmetrical (Figs. 1,2), enclosed in strong spinular membrane, basal sclerites jointed near apex. Holotype ♂, Israel, Dan, 12.iv.67; paratype: 1 ♂, same data (both Kugler), in Department of Zoology, Tel-Aviv University. Remarks. This is the only known palaeartic species in which the costa does not continue strongly to vein M_{1+2} . Among Ethiopian species (apart from the epidermal miners recently placed in the genus *Tropicomyia* by Spencer, 1973, only two-*M. curiosa* Spencer, 1959 from the Congo and *M. cyrtanthi* Spencer, 1960 from South Africa have a comparable venation). There is in fact nothing to suggest that *M. spinulosa* might be of Ethiopian origin. A further interesting feature is the particularly strong spinular membrane enclosing the aedeagus, although this is known in a number of species.

M. sojaj (Zehntner, 1900)

Betecha, 2♀♀, 11.viii.70; Zefat, 1 ♂, 1 ♀, 17.x.70; Mt. Hermon, 1 ♂, 8.ix.71; W. Faria, 1 ♂, 10.x.71 (all Kugler); Miqwe Israel, 3♂♂, 1 ♀, 26.x.71; 4♂♂, 6.xi.71 (all M. Kaplan).

Distribution: Australia, Pacific area, India to Egypt.

Biology: internal stem-borer in Leguminosae, particularly *Glycine* and *Phaseolus*.

Remarks. This species is known as a minor pest on *Glycine* (Spencer, 1973).

Genus *Ophiomyia* Braschnikov, 1897

O. aeneonitens (Strobl, 1893)

Akko, 1 ♂, 4.x.70 (Kugler); 1 ♀, 10.viii.71 (A. Freidberg).

Distribution: Austria, Tunisia.

Biology: host and life history unknown.

Remarks: This is an uncommon species and only four specimens have hitherto been found.

O. beckeri (Hendel, 1923)

El Arish, 2♀♀, 15.xi.68 (A. Freidberg); Mt. Hermon, 2000 m.,
1 ♀, 8.ix.71 (Kugler)

Distribution: widespread from Mediterranean to Scandinavia;
common in South Africa.

Biology: mid-rib miner on several genera of Compositae,
particularly *Sonchus* and *Taraxacum*.

O. curvipalpis (Zetterstedt, 1848)

Mt. Hermon, 2000 m., 1 ♂, 27.ix.72 (A. Freidberg).

Distribution: widespread from Mediterranean to Scandinavia.

Biology: external stem-miner on Compositae.

O. labiatarum Hering, 1937

Banias, 1 ♂, 8.ix.71; K. Shamma, 1 ♂, 14.ix.71 (both Kugler);
Jericho, 1 ♂, 11.x.72 (A. Freidberg).

Distribution: Germany, England, Scandinavia; Canada.

Biology: external stem-miner on Labiatae.

O. major (Strobl, 1900)

Carmel, 1 ♂, 6.iii.71 (A. Freidberg)

Distribution: Yugoslavia, Italy, Spain; uncommon.

Biology: unknown.

Ophiomyia memorabilis sp.n. - Figs. 3-5

Adult: head (Fig. 3) with frons broad, twice width of eye,
only slightly projecting above eye in profile; 2 *ors*, 3 or
4 *ori*; orbital setulae sparse, reclinate; jowls 1/5 height
of eye, forming angle of 80° in front, vibrissal fasciculus
short, with slight curvature (on one side in 1 specimen only
partially fused); facial keel narrow, flattened above,
slightly raised at base of antennae; proboscis elongate;
2 strong *dc*, *acr* numerous, in some 10 rows; wing length 2.3mm
costa extending to vein M_{1+2} , last and penultimate sections
of M_{3+4} equal, first cross-vein slightly beyond midpoint of
discal cell; colour: entirely black, frons mat, ocellar
triangle and orbits weakly shining; mesonotum and abdomen
brilliantly shining; squamae dark grey, margin and fringe
black; halteres black.

Male genitalia: aedeagus as in Figs. 4,5.

Holotype ♂, Israel, Haifa, 1.iv.72; paratype: 1 ♂, Tel-Aviv,
10.ii.73 (both A. Freidberg), in Department of Zoology, Tel-
Aviv University.

Remarks. *O. memorabilis* can be included in the author's (1964) key to palaeartic species by the following extension to couplet 23: second alternative, for *O. ranunculicaulis*, read 23a; add new couplet:

23a Facial keel conspicuously widening
below base of antennae; jowls 1/10
height of eye *ranunculicaulis* Hering

- Facial keel only slightly widening
below base of antennae; jowls 1/5
height of eye *memorabilis* sp.n.

O. phaseoli (Tryon, 1895)

W. Faria, 1 ♀, 10.x.71 (A. Freidberg); Pardess Hanna, 2♂♂,
5♀♀, 20.x.40 (Duvdevani).

Distribution: a tropical species extending from N. Australia through Asia to Africa, at the northern limit of its range in Israel.

Biology: leaf-miner and stem-feeder on *Phaseolus* and some other genera of Leguminosae.

Remarks. This is one of the most serious pests in the family (Spencer, 1973).

O. pinguis (Fallén, 1823)

Mt. Hermon, 1400 m, 1 ♂, 21.vi.71 (A. Freidberg).

Distribution: Widespread but local from Mediterranean to Scandinavia.

Biology: leaf-miner and stem feeder on *Cichorium intybus* L.

Remarks: This is a serious pest on cultivated chicory in Italy, France, Belgium and the Netherlands (Spencer, 1973).

Genus *Japanagromyza* Sasakawa, 1958

J. salicifolii (Collin, 1911)

Ilanot, Sharon, coastal plain 1 ♂, 10♀♀, no date, leaf-miner on *Populus* sp. (J. Halperin); Sinai, W. Watir, 1 ♀, 1.ix.70 (Kugler).

Distribution: Widespread from Central Asian Republics of U.S.S.R. to Turkey and Egypt; also in Portugal.

Biology: blotch-miner on *Populus* and *Salix*.

Genus *Agromyza* Fallén, 1810

A. cinerascens Macquart, 1835

Tel-Aviv, 1 ♀, 10.ii.73 (A. Freidberg).

Distribution: widespread throughout Europe; also Tunis.

Biology: leaf-miner on Gramineae.

A. flavipennis Hendel, 1920

Carmel, 1 ♀, 23.i.71 (Kugler).

Distribution: western Europe; new to Mediterranean area.

Biology: leaf-miner on *Lamium album* L.

A. frontella (Rondani, 1875)

Haifa, 2♂♂, 1.iv.72 (A. Freidberg)

Distribution: widespread in Europe, common in south; also in U.S.A.

Biology: leaf-miner on *Medicago sativa* L., on which significant damage can be caused (Spencer, 1973).

A. hiemalis Becker, 1908

Holon, 2♂♂, 4♀♀, 21.i.73; Haifa, 1 ♀, 6.i.73; Tel Aviv, 12.ii.73 (all A. Freidberg); Wadi Falik, 1 ♀, 24.i.72; Hadera 31.i.72 (both M. Kaplan).

Distribution: widespread in Mediterranean area, extending also to Canary Islands.

Biology: leaf-miner on *Urtica urens* L.

A. intermittens Becker, 1907

Nahal Yam, 1 ♀, 3.ii.73 (A. Freidberg)

Distribution: widespread in Europe, including Mediterranean area, extending eastwards to Central Asia.

Biology: leaf-miner on Gramineae.

A. nana Meigen, 1830

Haifa, 1 ♀, 6.i.73; Carmel, 1 ♀, 4.xii.71; Monfort, 1 ♀, 10.xii.72 (all A. Freidberg); Kefar Sold, 2♀♀, 2.i.73 (M. Kaplan); Yeroham, 1 ♀, 18.iii.71 (Kugler).

Distribution: widespread throughout Europe and Mediterranean area, extending eastwards to northern India.

Biology: leaf-miner on Papilionaceae, particularly *Medicago*, *Melilotus* and *Trifolium*.

A. near pseudoreptans Nowakowski, 1967

Monfort, 1 ♀, 26.xii.70 (Kugler)

Distribution: widespread in Europe.

Biology: leaf-miner on *Urtica* spp.

Remarks: This species was originally confused with *A. reptans* Fall. Several species occur in this group, which can only be reliably separated by the male genitalia. This identification must therefore be tentative until confirmation can be obtained from examination of males.

A. rondensis Strobl, 1900

Netiv Ha'lamed-He, 1 ♂, 21.xi.72 (M. Kaplan)

Distribution: widespread in Europe from southern Spain to Scandinavia.

Biology: leaf-miner on Gramineae.

Remarks. Hendel (1931) misinterpreted this species and it was clarified by Spencer (1966b).

A. vicifoliae Hering, 1932

N. Poleg, 1 ♀, 6.ii.73; Tel-Aviv, 1 ♀, 10.ii.73 (both A. Freidberg)

Distribution: widespread in Europe, including Sicily.

Biology: leaf-miner on *Vicia* spp.

Six further females cannot be positively identified, as follows:

sp.1, Carmel, 1 ♀, 23.v.71 (Kugler); Kesalon, 1 ♀, 10.ii.73 (M. Kaplan).

sp.2, Shtula, 1 ♀, 15.xi.67; Qnaitra, 1 ♀, 3.iv.71 (both Kugler).

sp.3 Yavne, 1 ♀, 18.ii.71 (Kugler).

sp.4 Arad, 1 ♀, 5.i.70 (Kugler).

Genus *Cerodontha* Rondani, 1861

C. (Cerodontha) denticornis (Panzer, 1806)

Tel-Aviv, 1 ♀, 12.v.71 (Kugler)

Distribution: widespread and common in much of Europe.

Biology: miner in leaf-sheath of many grasses, pupating internally.

Genus *Liriomyza* Mik, 1894

L. alyssi (Hering, 1960), comb.nov.

Phytobia (Trilobomyza) alyssi Hering, 1960

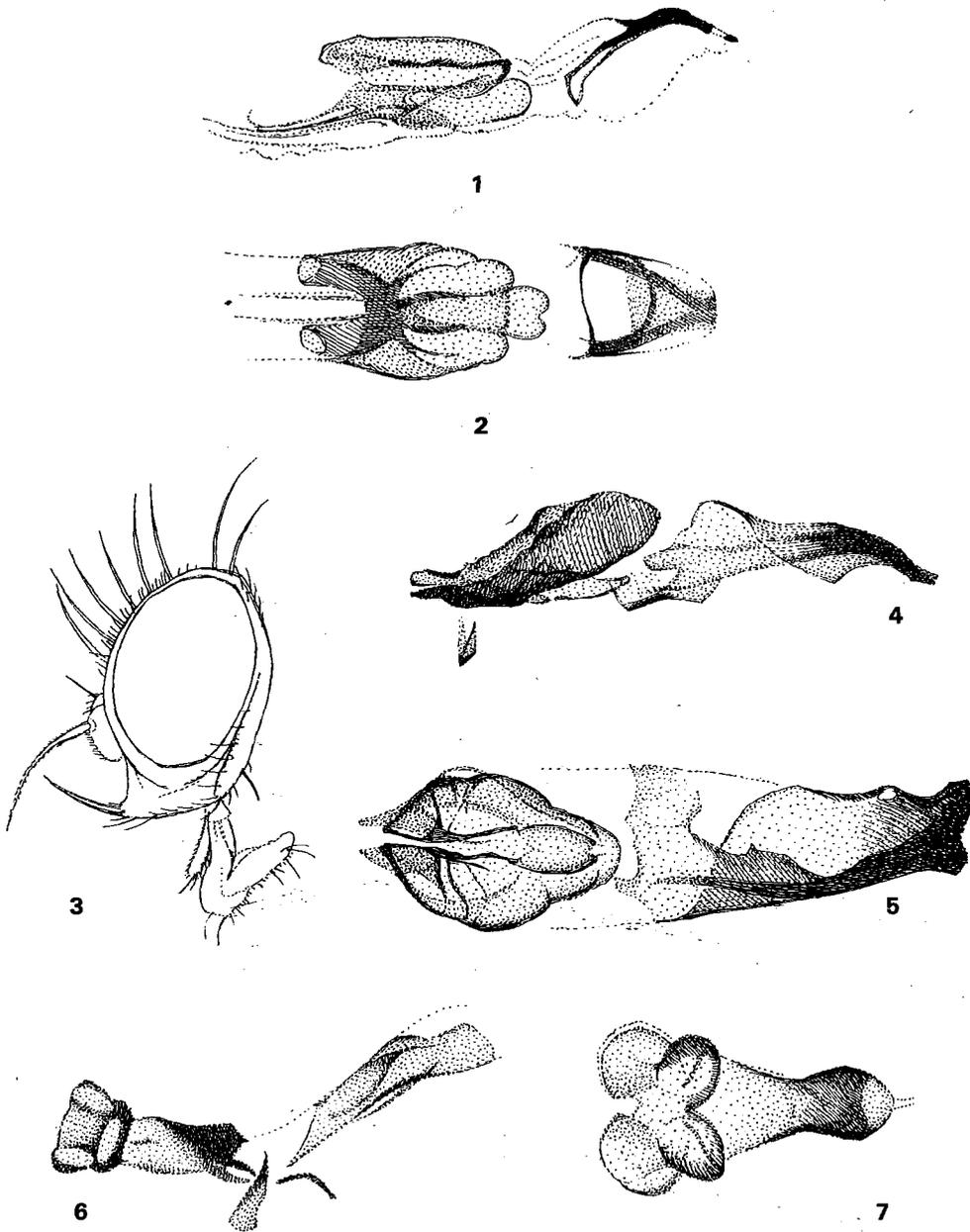
El Arish, 1 ♂, 3.ii.73 (A. Freidberg).

Distribution: Germany (Thuringia).

Biology: leaf-miner on *Alyssum*.

Remarks. This is an uncommon species, hitherto only known from the type specimens bred from *Alyssum montanum* L.

The scutellum is dark and Hering therefore described it in the genus *Phytobia*. However, its correct generic position is revealed by its male genitalia. *L. alyssi* is closely related to *Liriomyza sisymbriacaulis* (Hering, 1962), comb. nov.,



Figs. 1,2. *Melanagromyza spinulosa* sp.n.: 1, aedeagus, side view; 2, same, ventral view.

Figs. 3-5. *Ophiomyia memorabilis* sp.n.: 3, head; 4, aedeagus, side view; 5, same, ventral view.

Figs. 6,7. *Liriomyza freidbergi* sp.n.: 6, aedeagus, side view; 7, distiphallus, ventral view.

which Hering described in the genus *Phytobia*, subgenus *Cephalomyza*. It is also close to and even possibly identical with *xanthocera* (Czerny, 1910), which Hendel included in *Cephalomyza*. However, the frons in *xanthocera* is distinctly yellow, rather than the dark brown of *alyssi* and more material will be necessary before deciding on this possible synonymy.

L. cicerina (Rondani, 1875)

Afula, 3♂♂, 1 ♀, 8.v.71 (Kugler).

Distribution: widespread from western Mediterranean to the Ukraine, extending north to Scandinavia.

Biology: leaf-miner on *Cicer arietinum* L., frequently occurring as a pest on this important crop (Spencer, 1973).

L. congesta (Becker, 1903)

Plugot, 1 ♀, 31.iii.71 (Kugler); Sinai, Ste. Katherina, 1 ♀, 29.v.71 (A. Freidberg).

Distribution: widespread in Mediterranean, extending northwards to Scandinavia.

Biology: leaf-miner on Leguminosae, particularly *Medicago*, *Pisum*, *Vicia*.

Liriomyza freidbergi sp.n. - Figs. 6,7

Adult: frons twice width of eye, narrowly projecting above eye in profile; 1 reclinate *ors* 3 largely incurved *ori*; orbital setulae reclinate, sparse; jowls 1/3 height of eye; third antennal segment small, round; mesonotum with 3+1 *dc*, *acr* in 4 rows; wing length 1.9 mm, discal cell large, last section of M_{3+4} only twice length of penultimate; colour: frons, jowls and face uniformly dark brown, orbits darker, more black; all antennal segments black; mesonotum deep black, largely mat but with some subshine; mesopleura black in lower three-quarters, bright yellow along upper margin, rear of humerus and notopleura yellow; lower pleura largely black, only sternopleura narrowly yellow along upper margin; scutellum yellow centrally; legs: femora black but broadly yellow at knees, coxae, tibiae and tarsi entirely black; squamae grey, margin and fringe black; halteres yellow.

Male genitalia: aedeagus as in Figs. 6,7; surstyli entirely separated by a suture, with a single short spine at end.

Holotype, ♂, Israel, Javne, 24.vii.72 (A. Freidberg), in Department of Zoology, Tel-Aviv University.

Remarks. The dark frons and generally black coloration make this a distinctive species. It can be included in the following extension to couplet 19 of Hendel's (1931) key:

- | | | |
|-----|---|---|
| 19 | Antennae entirely black | 19a |
| - | First and second antennal segments never entirely black | 20 |
| 19a | Halteres black | <i>alpicola</i> (Strobl) (now in <i>Phytoliriomyza</i>) |
| - | Halteres yellow | 19b |
| 19b | Legs entirely black | <i>fasciventris</i> (Becker) |
| - | Femora with bright yellow knees | <i>freidbergi</i> sp.n. |

L. morio (Brischke, 1881)

Ramon, 1 ♀, 10.ii.73 (A. Freidberg)

Distribution: widespread but local in Europe, recorded from Rumania but not previously known from Mediterranean area.

Biology: leaf-miner on *Galium* and *Asperula*.

It has not been possible to identify 4 further specimens as follows:

Mt. Hermon, 1300 m, 1 ♀, 8.ix.71 (Kugler); Rechov, 1 ♀, 29.xi.72 (M. Kaplan); N. Poleg, 1 ♀, 6.ii.73 (A. Freidberg); Hadera, 1 ♂ (aedeagus missing), 14.x.72 (A. Freidberg).

Genus *Pseudonapomyza* Hendel, 1920

Ps. asiatica, Spencer, 1959

Sedom, 1 ♂, 20.ix.71 (Kugler); Tel-Aviv; 1 ♀, 7.i.70 (Kugler)

Distribution: widespread in Tropical Asia, India, Cape Verde Is., Ethiopia and southern Africa.

Biology: leaf-miner on Gramineae, including *Zea mays* L. and wild grasses.

Ps. hispanica Spencer, 1973

Givat-Brenner, 1 ♂, 1 ♀, 21.vi.71 (J. Kugler).

Distribution: only also known from several localities in Spain.

Biology: leaf-miner on *Sorghum halepense* (L.) Pers.

Ps. spicata (Malloch, 1914)

Givat-Brenner, 2♀♀, 28.iv. and 28.vi.71 (Kugler)

Distribution: widespread in Pacific area, also Iraq, Egypt and Sudan; recorded from Jerusalem (Spencer, 1973: 274)

Biology: Leaf-miner on Gramineae, recorded from *Zea mays* L., *Triticum aestivum* L., *Panicum miliaceum* L. and *Saccharum miliaceum* L. and many wild grasses.

Remarks. This species is known as a potentially serious pest on corn in Hawaii (Spencer, 1973).

Ps. spinosa Spencer, 1973

Hadera, 1 ♂, 14.x.72; Sinai, Ste. Katherina, 1 ♂, 25.V.71 (both A. Freidberg); Ein Gedi, 1 ♂, 29.iv.71 (Kugler).

Distribution: widespread from Australia and India to Egypt, West and South Africa.

Biology: leaf-miner on Gramineae, including the cultivated cereals *Hordeum vulgare* L. and *Triticum aestivum* L. Shoots of young cereals have been damaged in Egypt either by *spinosa* or the better known species *spicata* (Malloch) with which it largely overlaps in distribution. The two species have been confused in the past and were separated by Spencer (1973).

Genus *Napomyza* Hendel, 1920

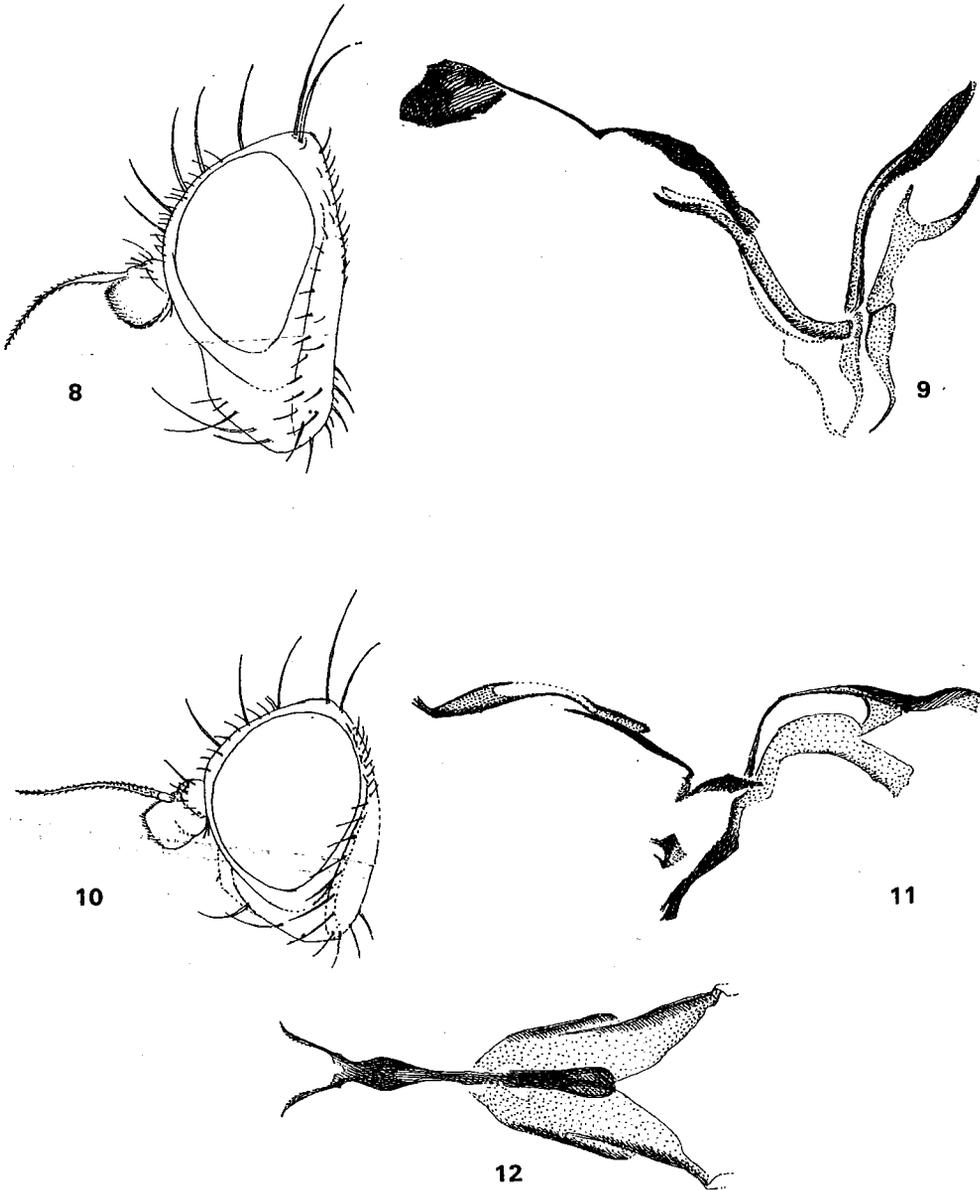
Napomyza hermonensis sp.n. - Figs. 8,9

Adult: frons broad, nearly 3 times width of eye, conspicuously projecting above eye in profile (Fig. 8); 2 ors, 3 strong ori; orbital setulae numerous, proclinate; jowls deep, almost $\frac{1}{2}$ height of eye, cheeks broad below eye; third antennal segment small, rounded, arista slender; 3+1 strong *dc*, *acr* irregularly in 2-4 rows, some extending to level of second *dc*; wing length from 2.75 mm in male to 3.3 mm in female, second costal section short, $\frac{1}{4}$ - $\frac{1}{2}$ times length of fourth; colour: frons, jowls and face brownish-orange; lunule and cheeks slightly more greyish; hind-margin of eye black, both vt on black ground; palps black; first antennal segment orange, second and third black; mesonotum mat grey, sides of thorax similar but upper margin of mesopleura narrowly orange; legs black, with all knees orange-yellow; abdomen black with hind-margins of all tergites narrowly orange; wing base orange; squamae pale grey, margin and fringe dark.

Male genitalia: aedeagus (Fig. 9) with slender basal tubule of distiphallus having conspicuous angle at midpoint.

Holotype ♂, Israel, Mt. Hermon, 1600 m, 17.x.72; paratypes: 2♂♂, 6♀♀, same data (all A. Freidberg). Holotype and paratypes in Department of Zoology, Tel-Aviv University, 2 paratypes in author's collection.

Remarks. The distinguishing characters of this species are the large size and, in the aedeagus, the characteristic angle in the distiphallus. It is not certain whether the dark colour of the frons and the orange colour of the normally yellow areas is natural or due to discoloration after death. The latter possibility cannot be excluded, since some degree of similar discoloration is apparent in the specimens of *lateralis* recorded below.



Figs. 8,9. *Napomyza hermonensis* sp.n.: 8, head; 9, aedeagus,

Figs. 10-12. *Napomyza ranunculella* sp.n.: 10, head, 11, aedeagus,
side view; 12, distiphallus, ventral view.

N. lateralis (Fallén, 1823)

Jerusalem, 1 ♂, 3.x.71; Hazeva, 1 ♂, 3.iii.71 (both Kugler);
Betecha, 1 ♂, 17.x.72 (A. Freidberg)

Distribution: widespread in Europe from Mediterranean to
Scandinavia; also Canada.

Biology: stem-borer in Compositae, genera recorded include
Calendula, *Lactuca*, *Matricaria*.

Napomyza ranunculella sp.n. - Figs. 10-12

Adult: head (Fig. 10) with frons $1\frac{1}{2}$ times width of eye,
slightly projecting above eye in profile; orbits well different-
iated with 2 equal, reclinate *ors* and 1 incurved *ori*; orbital
setulae sparse, in single row, proclinate; jowls $\frac{1}{3}$ height of
eye, cheeks prominent below eye; third antennal segment large,
distinctly longer than broad; proboscis short, normal; mesonotum
with 3+1 strong *dc*, *acr* sparse, in 2 rows; wing length 2.8 -
3.1 mm, second costal section slightly more than twice length of
fourth; colour: frons normally bright yellow, varying to orange
or pale brown; orbits invariably paler yellow; hind-margin of
eye black to base of *vti*; jowls and face yellow; first antennal
segment yellowish, second and third black; palps black; meso-
notum conspicuously ash-grey, pleura similar, with upper margin
of mesopleura narrowly bright yellow; fore-coxae and all knees
bright yellow, legs otherwise black; abdomen largely black but
tergites 1-3 yellow laterally and all with narrow yellow hind-
margins; inverted 8th sternum yellow; squamae yellow, margin
and fringe dark; wing base conspicuously yellow.

Male genitalia: aedeagus as in Figs. 11, 12; 8th sternum pre-
sent as a narrow strip partially fused with 8th tergum; sur-
styli fused with epandrium; blade of ejaculatory apodeme large.

Host: *Ranunculus* sp., larvae feeding internally in stem and
receptacle.

Holotype ♂, Israel, 27.iii.68 (Rozen); paratypes: 2 ♂♂, 3 ♀♀,
same data; 2 ♀♀, Turkey, Bornova-Izmir, 16.v.66 (H. Giray).

Holotype and 4 paratypes in Department of Zoology, Tel-Aviv
University; 2 paratypes in Department of Zoology, University,
Bornova; 1 in author's collection.

Remarks. This species is closely related to *cineracea* Hendel,
1920 which is common in western and northern Europe and is
also known in Canada (Spencer, 1969). It is readily distin-
guishable by the yellow fore-coxae and the conspicuously ash-
grey mesonotum. Recent studies have shown that species in this
group correctly belong in *Napomyza*, despite the absence of the
second cross-vein (Spencer, in press).

Genus *Phytomyza* Fallén, 1810

P. conyzae Hendel, 1920

Tel-Aviv, 1 ♂, 26.x.71; Carmel, 1 ♀, 2.x.71 and 1 ♀, 23.i.71; Jericho, 1 ♀, 7.iv.70; Tel-Dan, 1 ♂, 16.vi.71 (all Kugler).

Distribution: widespread in western Europe, particularly common in Mediterranean area.

Biology: leaf-miner on *Inula viscosa* (L.) Desf., other *Inula* spp., also *Pulicaria dysenterica* (L.) Gaertn.

P. ferulae Hering, 1927

El Arish, 1 ♂, 3.ii.73; Qalqilya, 1 ♂, 27.xii.72 (both A. Freidberg).

Distribution: widespread and common in Mediterranean area, also Canary Islands.

Biology: leaf-miner on Umbelliferae, genera recorded include *Daucus*, *Ferula*, *Scaligeria*.

P. horticola Goureau, 1851

Wadi Far'ia, 3♂♂, 2♀♀, ex. *Sonchus oleraceus* L., 25.i.71; Abu Kabir, Tel-Aviv, 1 ♂, 2♀♀, 7.ii.71; Sinai, *Ste.Katherina*; 1 ♀, 28.v.71 (all Kugler); El Arish, 2♀♀, 3.ii.72; N. Poleg', 2♀♀, 6.ii.73; Shefech Zohar, 1 ♂, 8.iii.72, ex. *Aharonsonia faktorovskyi* (all Freidberg); Sde Eliyahiu, 3♂♂, 2♀♀, 6.iv.67 (D. Gerling).

Distribution: widespread from western Europe to India; East and South Africa.

Biology: polyphagous leaf-miner, recorded on 34 plant families. A pest on *Pisum* (Spencer, 1973).

Note. This species was previously confused with *P. atricornis* Mg. until the group was clarified by Griffiths (1967).

Phytomyza kugleri sp. nov. - Figs. 13, 14

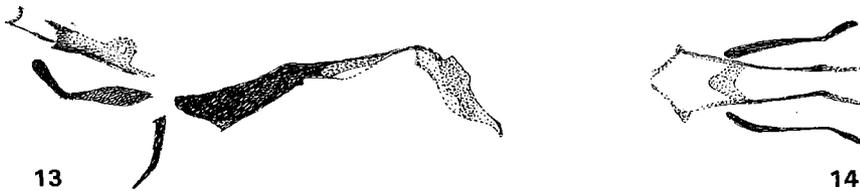
Adult: frons just less than twice width of eye, not projecting above eye in profile; 2 reclinate ors, the upper slightly weaker; 1 incurved ori; jowls 1/8 height of eye, cheeks narrow below eye; third antennal segment small, round; 3+1 strong dc, acr irregularly in 3-4 rows; wing length 1.5 mm in male, second costal section short, 1½ times length of fourth; Colour: frons, orbits, face and antennae black; jowls slightly more brownish; mesonotum greyish-black, with distinct subshine, sides of thorax black, upper hind-corner of mesopleura and wing base yellow; legs: femora black, with fore-knees narrowly

yellow; tibiae and tarsi on fore-legs yellowish; squamae yellow, margin and fringe brownish-ochrous.

Male genitalia: aedeagus as in Figs. 13, 14.

Holotype ♂, Israel, Wadi Faria, 10.x.71 (Kugler), in Department of Zoology, Tel-Aviv.

Remarks. In Hendel's (1936) key, as amended by Hering (in Spencer, 1968: 426), this species runs to *obscura* Hd. in couplet 236. The male genitalia indicate a possible relationship with the *obscura* group, particularly to *nepetae* Hd. It seems probable that the host will be in the Labiatae.



Figs. 13,14. *Phytomyza kugleri* sp.n.: 13, aedeagus, side view; 14, distiphallus, ventral view.

P. origani Hering, 1932

Tel-Aviv, 1 ♂, 1 ♀, 2.ix.71; Tel-Dan, 3♂♂, 18.vi.71; Jericho, 1 ♀, 6.iv.71; N. Tabor, 1 ♀, 10.x.71; K. Shamai, 1 ♀, 14.iv.71 (all Kugler).

Distribution: widespread in Europe but local.

Biology: leaf-miner on *Origanum vulgare* L.

P. plantaginis Robineau-Desvoidy, 1851

Afula, 1 ♂, 8.v.71 (Kugler)

Distribution: widespread in Europe from Scandinavia to Mediterranean; also in North America.

Biology: leaf-miner on *Plantago* spp.

Phytomyza spoliata Strobl, 1906

Kefar Sold, 1 ♀, 2.v.72 (M. Kaplan).

Distribution: occurring from Mediterranean area to Scandinavia but uncommon.

Biology: leaf-miner on *Centaurea*.

Remarks. This is an unusually dark specimen but in all essential characters it agrees with *spoliata*, including the inward displacement of the upper ors.

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