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A new genus and eight new species of gall midges (Diptera: Cecidomyiidae) from Greece

Marcela Skuhravá

Bítovská 1227/9, CZ–140 00 Praha 4, Czech Republic; e-mail: skuhrava@quick.cz

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Abstract. One new genus and eight new species of the family Cecidomyiidae (Diptera) are described from Greece: *Phlomidiomyia* n. gen. *pustularis* sp. nov. from leaf pustule galls on *Phlomis fruticosa* L. (Lamiaceae), *Dasineura auriniae* sp. nov. from flower galls on *Aurinia petraea* (Ard.) Schur. (Brassicaceae), *Gephyraulus capsellae* sp. nov. from flower galls on *Capsella bursa-pastoris* (L.) Med. (Brassicaceae), *Jaapiella clematidicola* sp. nov. from swollen leaf buds of *Clematis flammula* L. (Ranunculaceae), *Jaapiella erysimicola* sp. nov. from swollen flower buds of *Erysimum graecum* Boiss. et Heldr. (Brassicaceae), *Janetiella onosmae* sp. nov. from rosette leaf galls on *Onosma frutescens* Lam. (Boraginaceae), *Macrolabis behen* sp. nov. from terminal leaf galls on *Silene behen* L. (Caryophyllaceae) and *Macrolabis pyricola* sp. nov. from terminal leaf galls on *Pyrus salicifolia* Lois. (Rosaceae). In the island of Samos *Lasioptera carophila* F. Löw, 1874 is associated with *Foeniculum vulgare* Mill.(=*Foeniculum officinale* All.) (Apiaceae) and has two generations. Larvae of the spring generation cause leaf vein galls at the points of ramification, larvae of the summer generation induce galls on umbellules.

Key words. Taxonomy, new species, biology, plant-insects interactions, Diptera, Cecidomyiidae, *Phlomidiomyia*, *Dasineura*, *Gephyraulus*, *Jaapiella*, *Janetiella*, *Lasioptera*, *Macrolabis*, parasitoids, Greece, Palaearctic region.

INTRODUCTION

In the course of 16 years – from 1994 to 2010 – we undertook eleven trips to the Greek mainland and six to the Greek islands with the aim of improving knowledge of gall midges in this part of Europe. We examined a total of 112 localities situated from sea level to mountains, added about two hundred gall midge species to the fauna of Greece and gathered 1330 records of their occurrence (Skuhravá & Skuhravý 1997, 2006, 2009, 2011). The present gall midge fauna of Greece includes 215 species of which 187 are valid described species and 28 species (13%) are identified to the genus level only. Many gall midge species are known only on the basis of the gall which is caused by larvae. In agreement with the International Code of Zoological Nomenclature (ICZN) (1963) the names of species described before 1931, based on the "work of an animal" (in this case the gall), or on immature stages, are accepted as valid names with their original author and date.

Although we took pains to obtain larvae, pupae and adults from these galls, the results were not always quite satisfactory. It should be necessary to visit such localities, where these galls occurred, several times in the course of one vegetation season to find larvae or pupae and then to try to rear adults. This was not possible during our short-term investigations.

Our results contributed not only to the improvement of knowledge of the gall midge fauna in Greece but also to the biology, zoogeography, biogeography, parasitism and distribution of gall midges (Skuhravá & Skuhravý 2010, Skuhravá & Thuroczy 2007). In the present article I establish one new genus and describe eight new species of gall midges on the basis of materials collected in the course of our investigations in Greece.

MATERIAL AND METHODS

During our faunistic investigations we used at each locality the time and area unit collection method that we established in 1955 and which is described also in our article (Skuhravá & Skuhravý 2010). In the course of our investigations in Greece we put one part of host plants with galls in polyethylene bags to obtain larvae, pupae, parasitoids and inquilines and the second part of host plants with galls in a vase with water and placed it in a simple rearing cage covered with thin muslin to obtain adults, with each host plant in an separate rearing cage. Larvae, pupae and adults of gall midges obtained from galls were put into vials with 75% ethanol and later the specimens were mounted on permanent microscope slides in Canada Balsam as medium for morphological studies.

Terminology of morphological characters of adults follows the terminology given in Skuhravá (1997), Sylvén & Tastás-Duque (1993) and Gagné (1994), terminology of larvae is after Möhn (1955), and terminology of pupae after Möhn (1961), with some small exceptions.

Types, paratypes, galls, herbarium items with host plants and galls and all other material is deposited in the collection by Marcela Skuhravá, Prague, Czech Republic.

RESULTS

Phlomidiomyia gen. nov.

Type species. *Phlomidiomyia pustularis* sp. nov.

The genus is defined by the following combination of characters:

Eyes separated at vertex by a short band without ommatidia; mouthparts reduced, palpi three-segmented, antennae 2+12 segmented in both sexes. male flagellomeres uninodal with long stems, female flagellomeres cylindrical with very short stems. Legs with simple tarsal claws. Wings with R_5 joining with costa at the wing apex; wings covered with setae, female eighth tergite divided into two longitudinal sclerites and ovipositor ending with a soft lamella, male genitalia with plump gonocoxites and small ovoid setulose gonostyli. Larva with simple, one lobed anterior part of sternal spatula. Pupa with small sclerotized antennal protuberances.

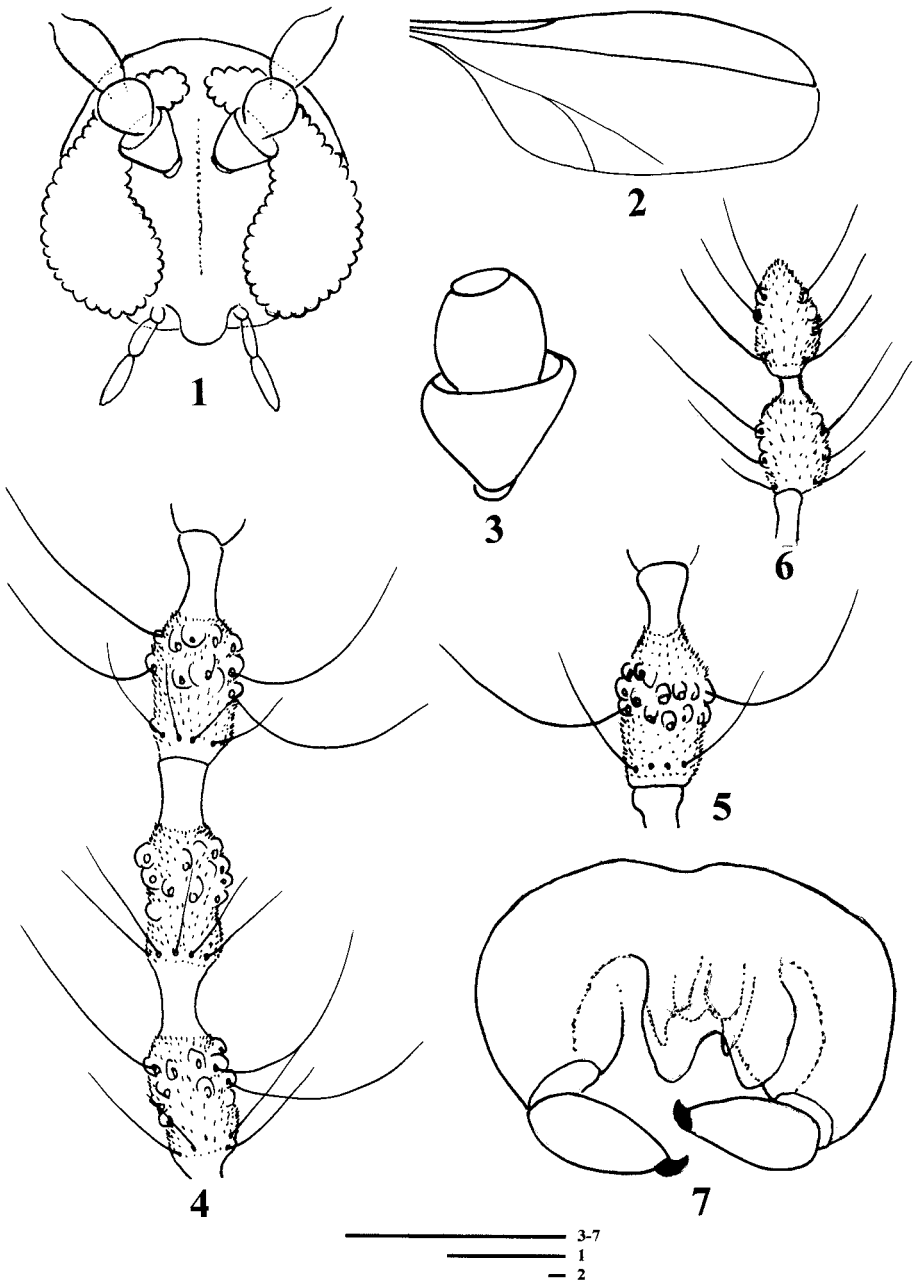
The new genus belongs to the tribe Dasineurini, as defined by Gagné (1910). In the key of Skuhravá (1997) it belongs in the group of genera with separated eyes, reduced mouthparts and with three segmented palpi. Larvae cause simple pustule galls on *Phlomis* (Lamiaceae).

Phlomidiomyia gen. nov. differs from *Phegomyia* Kieffer, 1913 by reduced mouthparts with only three palpi, from *Masakimyia* Yukawa et Sunose, 1976 by ovipositor having only simple terminal lamella and larval spatula sternalis with one-lobed anterior blade, and from *Acericecis* Gagné, 1983 (*Harrisomyia* Skuhravá, 1986) by eyes separated at vertex and not laterally and by the entire terminal lamella of the ovipositor.

Etymology. The name of this genus is derived from the host plant, *Phlomis*, where larvae cause simple leaf galls, and suffix "myia" which means fly.

Phlomidiomyia pustularis sp. nov.
(Figs. 1–15, 105–107)

Type material. **Holotype**: male. Greece: Corfu: Moraitika, 150 m a. s. l., *Phlomis fruticosa* L., flat pustule gall, emerg. 20.5.2004, leg. M. Skuhravá. Microscope slide Nr. 8050, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes:** Greece: 4 males, 7 females, 8 pupae, 2 larvae: same data as in holotype. **Additional material**: Middle Greece: Delfi, 19.4.1995: 5 males, 7 females; 1.5.1995: 1 larva, 1 pupa; Galaxidi, 29.4.1995: 11 males, 2 pupae; Peloponesos: Kalavruta, 2.6.1994: 2 females, 3 pupae; Crete: Bali, 24.4.1995: 2 males, 4 females, 2 larvae; Amfissa – Agios Georgios, 21.4.1995: galls; Chrisso, 14.4.1996: galls; Delfi, 15.4.1995: galls; Galaxidi, 18.5.1995: galls; Itea, 22.4.1995: galls; Kalesmeno, 1.5.1995: galls; Karpenisi, 28.4.1995: galls; Kirra, 20.4.1995: galls; Sernikaki: 17.4.1995: galls. – Peloponesos: Kalavruta. 23.5.1994: galls. – Crete: Amnissos, 26.4.1996: galls; Armeni, 23.4.1996: galls; Bali, 20.4.1996: galls; Knososs, 22.4.1996: galls; Krouzon, 22.4.1996: galls; Zaros. 21.4.1996: galls. – Corfu: Agios Dimitrios, 23.5.2004: galls; Lake Korisson, 21.5.2004: galls; Marathias, 25.5.2004: galls; Moraitika, 20.5.2005: galls. – Lefkada:



Figs. 1–7. *Phlomidiomyia pustularis* sp. nov., male. 1 – head, 2 – wing, 3 – scape and pedicel, 4 – first, second and third flagellomere, 5 – fifth flagellomere, 6 – last two flagellomeres, 7 – male terminalia. Scale bars = 0.1 mm.

Kollivata, 9.6.2009: galls; Ligia, 6.6.2009: galls; Neochori, 8.6.2009: galls; Nidri, 3.6.2009: galls; Nikiana, 5.6.2009: galls; Water Falls: 7.6.2009: galls. – Zakynthos: Kalamaki, 22.7.2010: galls. – Malta: Ghar Lapsi, 3.4.1999: galls. All galls were found by M. Skuhravá.

Diagnosis. Small flies, body about 1.2 –1.9 mm long (n=12), head and dorsal part of thorax dark brown, abdomen honey-coloured. Adults show sexual dimorphism in the size of the body, shape of abdomen, wings and legs. females have shorter and broader abdomen, wider wings, shorter and thicker legs than males.

Description. **Male**. Body size: 1.2–1.4 mm, wing 1.7–1.8 mm long and 0.5–0.6 mm broad. Head of normal size and position, with large eyes which are separated at vertex by a short band without ommatidia. Mouthparts reduced, frontoclypeus small with several long setae, labrum and labellae very small. Palpi three segmented; first segment very short and ovoid; second and third segment three times longer than the first; all segments covered with long setae.

Antennae 2+12 segmented (n=22). No variability in number of flagellomeres was observed. Scape obconical, basally narrower, pedicel smaller and ovoid, first and second flagellomeres separated. Each flagellomere consists of basal node and distal stem; the stem is a little shorter than the node; nodes are densely covered with microtrichia and bear several large sensorial pores and long setae.

Wing: costa interrrupted at junction with R_5; subcosta visible only in the basal part; R_1 reaches before the middle in the anterior wing margin; R_5 joins with costa at the wing apex; Cu is forked.

Legs very long and slender, tarsal claws simple, claws curved near midlength, empodia as long as claws.

Male genitalia: gonocoxites short and thick; gonostyles elongated, ovoid, a little shorter than one half of gonocoxites, densely covered with microtrichia and with long setae, apically with a strong claw; cerci deeply emarginate, hypoproct bilobed, parameres sheathing the aedeagus shorter than hypoproct.

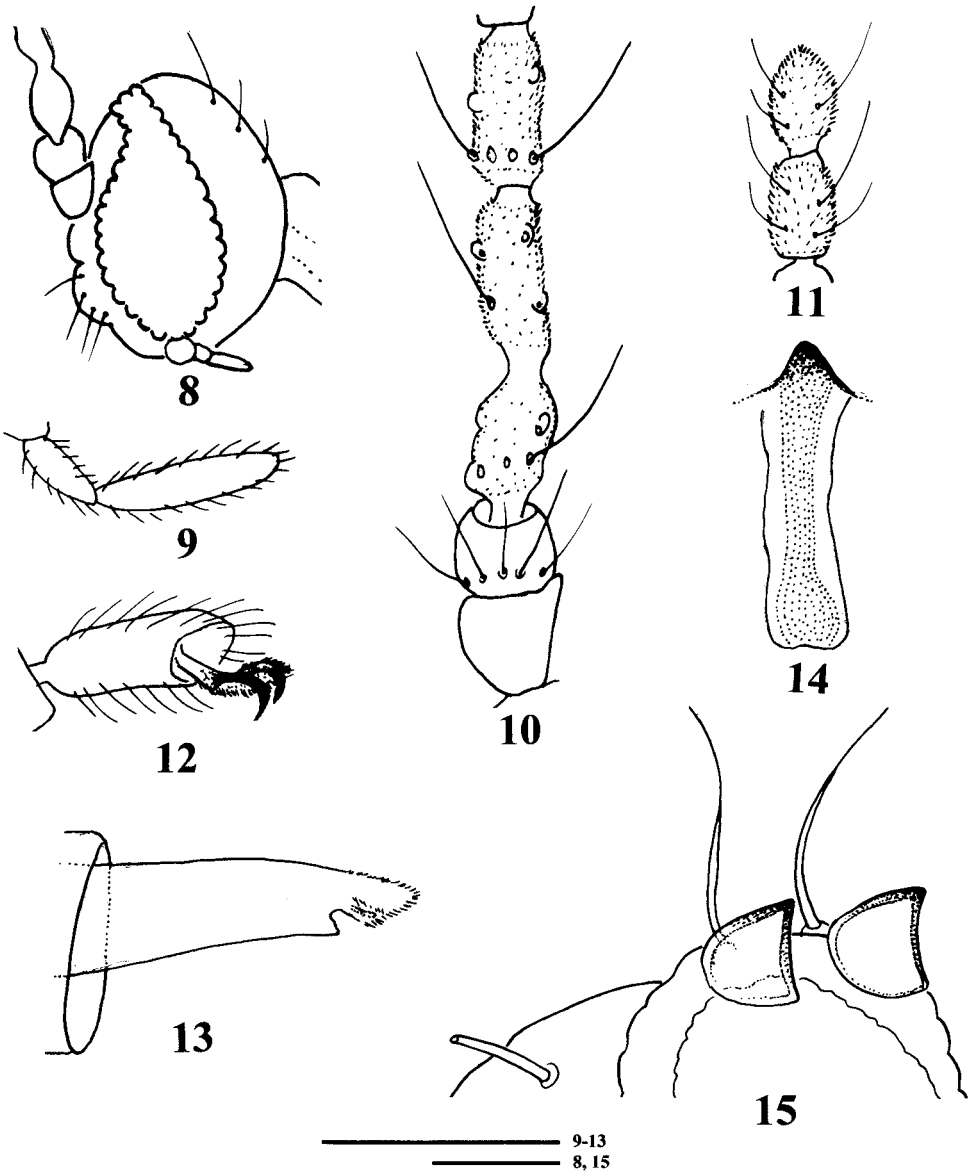
Female. Body size: 1.3–1.9 mm, wing length 1.3–1.9 mm, wing width 0.5–0.6 mm. Head with large eyes joined at vertex by a very narrow band formed of one row of ommatidia. Mouthparts reduced, very small, palpi three-segmented. Antennae 2+12 segmented (n=15). No variability in number of flagellomeres was observed. Scape obconical, pedicel globular and smaller; first and second flagellomeres separated, third to twelth flagellomeres cylindrical, each consisting of a node and a very short stem; flagellomeres densely covered with microtrichia and each with several sensory pores and several setae.

Female abdomen: 1st to 5th segments of usual shape, subsequent segments narrower, tergite of the eighth segment divided into two longitudinal sclerites; ovipositor long and protrusible, cerci fused into single terminal lamella, which is densely pubescent; hypoproct small, sometimes not visible.

Egg. The fully developed egg is elongated and cylindrical, 250 μm long and 65 μm broad.

Larva. The third larval instar is 1.3–1.5 mm long, 0,7 mm broad, yellow coloured. Integument of ventral side is quite smooth, integument of dorsal side is formed by very small, pointed plates, terminal papillae are not visible. Sternal spatula on the ventral side of the prothoracic segment is relatively short and broad, with single-lobed anterior triangular blade, relatively broad stem and basal part. It is 125 μm long, anterior part 25 μm long and stem is 30 μm wide.

Pupa. 1.8 mm long, 0.75 mm wide, honey-coloured. Integument of ventral and dorsal sides of abdominal segments is covered with very small spinulae. At the bases of antennal sheaths are a pair of pointed antennal protuberances, on the pupal head is a pair of cephalic papillae with 210 μm long cephalic setae. Prothoracic spiracle is in the form of 100 μm long tube.



Figs. 8–15. *Phlomidiomyia pustularis* sp. nov., female. 8 – head, 9 – palpus, 10 – scape, pedicel, first, second and third flagellomeres, 11 – last two flagellomeres, 12 – fifth tarsomere with claw and empodium, 13 – ovipositor, 14 – sternal spatula of larva, 15 – anterior body part of pupa. Scale bars = 0.1 mm.

Differential diagnosis. The larva of *Phlomidiomyia pustularis* sp. nov. differs substantially from the larva of *Acericecis campestre* Harris, 2004 that develops singly in a small depression on the lower side of the leaf of *Acer campestre* (Aceraceae). In contrast to larvae of *Phlomidiomyia pustularis* sp. nov., the larvae of *Acericecis campestre* do not have a sternal spatula but have a complete set of papillae and three pairs of terminal papillae with short setae. Similarly as the larva of *Acumyia acericola* Harris, 2008 developing in fruits of *Acer campestre*, the larva of *Phlomidiomyia pustularis* sp. nov. has a sternal spatula with one-lobed anterior part, but females do not have aciculate ovipositor and the puparium is not formed in the course of larval development.
Etymology. This species is named for the ability of larvae to induce pustule galls on leaves of its host plant.
Host plant: *Phlomis fruticosa* L. (Lamiaceae).
Gall. Flat blister on leaf visible on both sides, with a chamber inside (Figs. 105–107).
Life history. Several generations of *Phlomidiomyia pustularis* sp. nov. develop in the course of one vegetative season. Females lay eggs on the upper side of very young developing leaves of *Phlomis fruticosa*. Larvae penetrate into plant tissue and induce flat pustule galls on leaves. Irregular pustules 3–4 mm across are raised on the upperside where it is slightly greener than the remaining part of the leaf. On the lower side of the leaf it includes a slightly hypertrophied epidermis and a partly swollen vein. Inside each gall is a chamber where two to four larvae develop together. Usually four to six galls develop on one leaf but up to sixty galls were found on one leaf. In such cases the galls are joined, forming a large irregular pustule with several separated chambers. Larvae pupate in galls, each larva in a white cocoon. Pupae break the wall of the gall on the lower side and adults then emerge. Sometimes pupal exuviae remain in the opening of the gall. After emergence females lay eggs on young leaves or on the same leaf where they developed.

Population levels of *Phlomidiomyia pustularis* sp. nov. developing in galls on leaves of *Phlomis fruticosa* were significantly reduced by four species of parasitic Hymenoptera belonging to four families that were identified by C. Thuroczy, viz. *Aprostocetus* sp. (Eulophidae), *Mesopolobus mediterraneus* (Mayr, 1903) (Pteromalidae), *Platygaster* sp. (Platygastridae) and *Torymus* sp. (Torymidae) (Skuhravá & Thuroczy 2007).

Only males of *Phlomidiomyia pustularis* sp. nov. were reared from galls collected at the locality Galaxidi in April 1995. All twenty two reared males had swollen abdomens, resembling female abdomens and were filled by small particules. I supposed that these gall midge males had been attacked by some endoparasitoid whose developmental stadium filled the abdomen and caused a total mortality of all females of the population. I asked Prof. Petr Horák from the Department of Parasitology, Charles University, Prague, for consultation and examination of attacked gall midge males. Unfortunatelly neither he or his collaborators found a causer but they suggested that the causer might be some bacterium or other microorganism. For identification of these causers it is necessary to have fresh material, which is not possible to obtain at present.
Distribution. Greece and Malta. The host plant of this species, *Phlomis fruticosa*, is a small shrub of the family Lamiaceae, native to Albania, Cyprus, Greece, Italy, Turkey and the former Yugoslavia (Tutin et al. 1964–1980). Houard (1918: 107) reported pustule galls on leaves of *P. fruticosa* found at Pylos, Palaeo-Avarino (south-western Peloponesos), 20 May, 1917, leg. by R. Maire. He gave a description of this gall and figured pustule galls on the leaf but incorrectly designated the causer as "*Asphondylia phlomidis* Trotter". In reality, these galls were caused by *Phlomidiomyia pustularis* sp. nov.

We found galls of *P. pustularis* sp. n. in middle Greece, at Peloponesos, and in four Greek islands, viz. Crete, Corfu, Lefkada, Zakynthos (Skuhravá & Skuhravý 1997, 2006, 2011) and in Malta (Skuhravá et al. 2002). Usually the galls of *Phlomidiomyia pustularis* sp. nov. were abundant

at all localities where they occurred. We did not find galls of this species in the other six islands in the Mediterranean Sea where we have made our investigations.

Dasineura Rondani, 1840

Dasineura Rondani, 1840: 12, 17.

Type species. *Tipula sisymbrii* Schrank, 1803 (by subsequent designation of ICZN 1998: 246, Opinion 1911).

The genus is defined by the following combination of characters:

Antennae 2+11 to 2+15, flagellomeres in male with stems, in female without stems, palpi four segmented, R_5 joining costa well before wing apex and curved anteriorly, cu forked, tarsal claws with tooth, empodium about as long as the claws, ovipositor long, cerci of female fused, larva with bilobed sternal spatula and 8 terminal papillae (Skuhravá 1997).

Dasineura is the largest genus of the family Cecidomyiidae containing 490 species worldwide. Most of these species – 335 – occur in the Palaearctic Region, 112 species in the Nearctic Region and only a few species in other biogeographic regions. Larvae induce galls mainly on leaves, or on leaf and flower buds on host plants of various plant families. In Europe most species are associated with Fabaceae, Rosaceae, Asteracae, Brassicaceae and Lamiaceae. *Dasineura* is the most species-rich genus in the Palaearctic Region and is abundant in Western Europe where 230 species occur (Skuhravá 1986, 2006, Skuhravá, Skuhravý 2010). In Greece 32 species of *Dasineura* were recorded. Species of this genus cause galls on host plants on several plant families (Skuhravá & Skuhravý 1997, 2006, 2009, 2011).

Dasineura auriniae sp. nov.

(Figs. 16–28)

Type material. **Holotype**: male. Greece: Meteora, 613 m a. s. l., from *Aurinia petraea*, swollen flower bud, em. 8.5.1995, leg. M. Skuhravá. Microscope slide Nr. 7901, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes**: 1 male, 4 females, 5 larvae: same data as in holotype. **Additional material**: galls, Meteora, 25.4.1995, leg. V. Skuhravý and M. Skuhravá.

Diagnosis. Small flies, body 1.1–1.6 mm long (n=2), head and dorsal part of thorax brown, abdomen honey-coloured, antennae and legs cream-coloured.

Description. male. Body size: 1.6 mm, wing 1.5 mm long, 0.6 mm broad. Head of normal size and position, with large holoptic eyes. Eye bridge six ommatidia broad medially; ommatidia relatively large and circular. Mouthparts well developed, palpi four segmented; first very short and ovoid; second segment two times longer, third segment a little longer and the fourth is the longest; all segments covered with long setae. Antennae 2+13 segmented (n=2), Scape obconical, pedicel smaller and ovoid, first and second flagellomeres fused. Each flagellomere consists of basal node and distal stem; the stem is a little shorter than the node; flagellomeres densely covered with microtrichia and in the middle part with several long setae. Wing with costa interrrupted at junction with R_5; R_1 reaches before the middle of the anterior wing margin; R_5 slightly curved, joining costa before the wing apex. Legs long and slender, claws with small tooth, empodia as long as claws.

Hypopygium: gonocoxites cylindrical, gonostyles smaller and arched, covered with microtrichia and with setae, apically with a claw; cerci and hypoproct are not visible; aedeagus longer than parameres.

Female. Body size: 1.2–1.5 mm (n=4). Antennae 2+11 to 2+12 segmented (n=4), scape obconical, pedicel globular and smaller; first and second flagellomeres separated; flagellomeres short, without stems, densely covered with microtrichia. Flagellomeres distally reducing in length, the last two flagellomeres fused. Ovipositor long and protrusible, ending with slender terminal lamella which is densely haired.

Larva. 1.8–2.2 mm long, 0.4–0.6 mm broad, with bilobed sternal spatula.

Differential diagnosis. *Dasineura auriniae* sp. nov. is similar to *Dasineura sisymbrii* (Schrank, 1803), the type species, larvae of which cause spongy whitish swellings on *Rorippa palustris* (L.) Besser and related species and genera of *Brassicaceae*. Only a few reliable morphological differences may be found for identification of species of the genus *Dasineura*. Sylvén & Tastás-Duque (1993) searched for such differences in external terminal structures of the female abdomen and found useful ultrastructures using electron microscopy. Unfortunately such methods are not available for most researchers. Some differences in morphological characters visible in optical microscope were found: adults of *D. auriniae* sp. nov. are smaller and have antennae with 2+11 to 2+13 segments, adults of *D. sisymbrii* are larger and have antennae with 2+14 segments. Terminal lamella of *D. auriniae* sp. nov. is slender, pointed, densely covered with small hairs (Fig. 24), whereas the lamella of *D. sisymbrii* is rounded with groups of very small microtrichia (Sylvén & Tastás-Duque 1993, Fig. 4A, 5A, 7).

Etymology. The specific name of the new species, *auriniae*, is derived from the generic name of the host plant of the larva.

Host plant. *Aurinia petraea* (Ard.) Schur. (Brassicaceae).

Gall. Swollen flower bud.

Life history. Pink-orange coloured larvae cause flower bud galls on *Aurinia petraea*. Galls including larvae were found on 25.4.1995. Larvae left galls on 28.4.1995 and entered the soil where they pupate. First adults emerged after ten days on 8.5.1995 and last adults on 11.5.1995. This species have probably two or more generations per year.

Distribution. Middle Greece: Meteora, 613 m a. s. l. (Skuhravá & Skuhravý 1997, as *Dasineura* sp. on *Aurinia petraea*).

Comments. This is the first evidence of gall midge species inducing galls on *Aurinia petraea* on the whole. As far as I know this gall on *Aurinia petraea* is not mentioned in any publication of cecidological literature.

Gephyraulus Rübsaamen, 1916

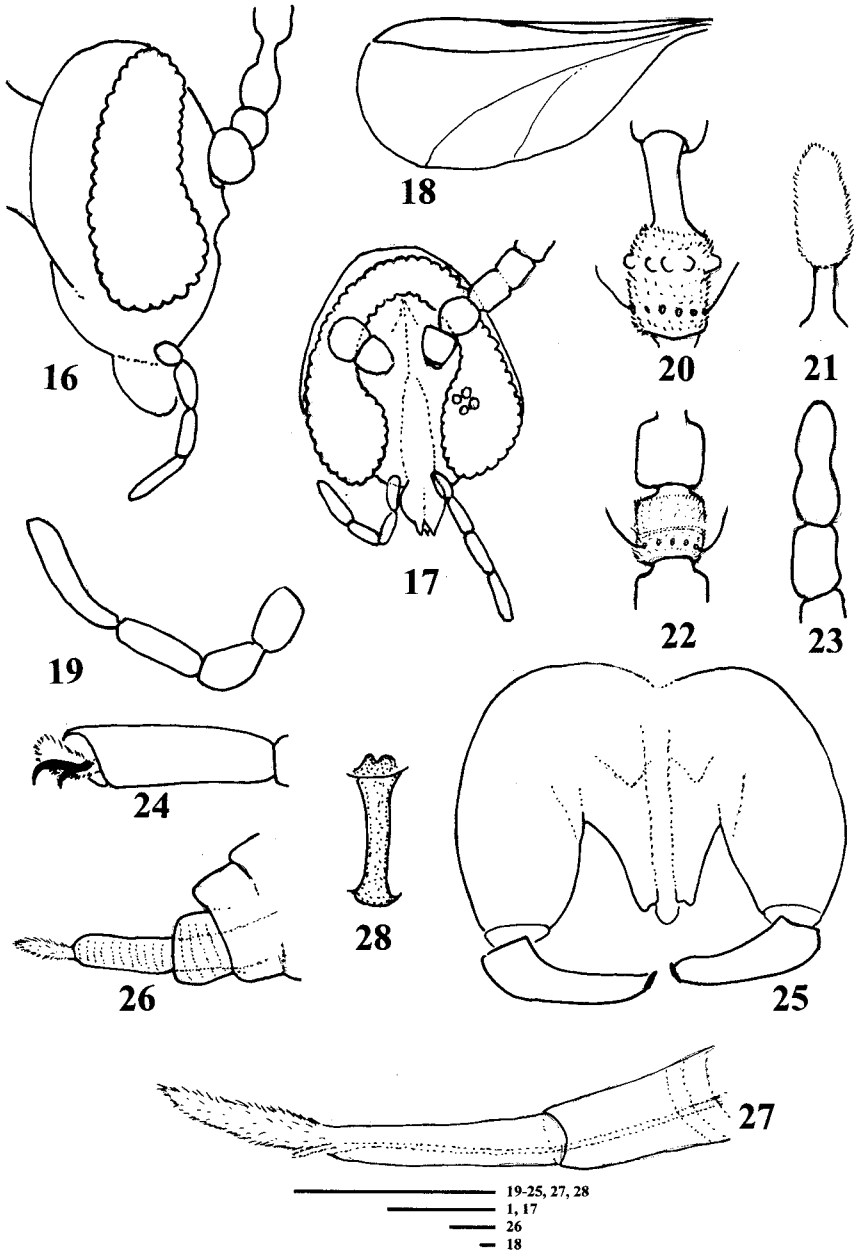
Gephyraulus Rübsaamen, 1916: 490.

Type species. *Cecidomyia raphanistri* Kieffer, 1886 (original designation).

The genus is defined by the following combination of characters:

Antennae 2+12 to 2+14, flagellomeres in male with stems, in female without stems, mouthparts prolonged, palpi four segmented, wing with R_5 straight, joining costa anterior to apex, cu forked, tarsal claws with tooth, empodium about as long as or somewhat longer than claws, ovipositor protrusible, cerci fused, upper lamella sclerotized and having dorsally near the tip a depressed area furnished with several sensory setae. Larva with bilobed spatula sternalis and 8 terminal papillae (Skuhravá 1997).

Gephyraulus is a small genus including nine species all associated with Brassicaceae in the Palaearctic Region and two species associated with *Mangifera indica* (Anacardiaceae) in the Oriental Region (Skuhravá 2006, Gagné 2010). Larvae of Palaearctic species are host specific and cause flower bud galls on various genera of Brassicaceae. *Gephyraulus raphanistri* causing



Figs. 16–28. *Dasineura auriniae* sp. nov. 16 – head of male, 17 – head of female, 18 – wing, 19 – palpus, 20 – male fifth flagellomere, 21 – male distal flagellomeres, 22 – female fifth flagellomere, 23 – female last two flagellomeres, 24 – fifth tarsomere with claw and empodium, 25 – male terminalia, 26 – female postabdomen, 27 – terminal part of ovipositor of another specimen at higher magnification, 28 – sternal spatula of larva. Scale bars = 0.1 mm.

flower bud galls on *Raphanus raphanistrum*, is widely distributed in Europe, and was examined as a potential biological control agent against weed in Australia (Vitou et al. 2008). Five other species were discovered in Kazakhstan (Fedotova 2000) and one species in North Africa (Sylvén & Solinas 1989). Until now no species of this genus has discovered in Greece (Skuhravá & Skuhravý 1997, 2006, 2009, 2011).

***Gephyraulus capsellae* sp. nov.**
(Figs. 29–42, Fig. 109)

Type material. **Holotype**: male. Greece: Corfu: Corfu fort., 50 m a. s. l., *Capsella bursa- pastoris*, swollen flower bud, em. 7.6.2004, leg. M. Skuhravá. Microscope slide Nr. 8015, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes**: 9 males, 10 females, 2 larvae; same data as in holotype.

Diagnosis. Small flies, body 1.3–1.8 mm long (n=11), head and dorsal part of thorax dark brown, abdomen brown, wings slightly cream-coloured, antennae and legs light brown.

Description. male. Body size: 1.3–1.6 mm, wing 1.5–1.9 mm long, 0.6–0.7 mm broad (n=5).

Head of normal size and position, with large holoptic eyes. Holoptic eyes with circular ommatidia, eye bridge six ommatidia broad medially.

Mouthparts formed of labial lobes and labrum well developed and prolonged. Palpi four segmented; first short and ovoid; second segment a little longer, third segment a little longer than the third and the fourth is the longest; all segments densely covered with microtrichia and with long setae.

Antennae 2+12 to 2+13 segmented (n=7), usually 2+13, scape obconical, basally narrower, pedicel ovoid, first and second flagellomeres partially fused. Each flagellomere consists of basal node and distal stem, each of about same length; each node is furnished with a whorl of strong short setae at the base, with several prominent sensorial pores and several long setae in the middle; all flagellomeres densely covered with microtrichia.

Wing with costa interrrupted at junction with R_5; R_1 reaches before the middle of the anterior wing margin; R_5 straight, joining costa before the wing apex; Cu forked. Wing with anterior margin covered densely with setae, wing surface with sparsely occurring setae. Legs long and slender, densely covered with long setae and short scales, tarsal claws toothed, empodia as long as claws or a little longer.

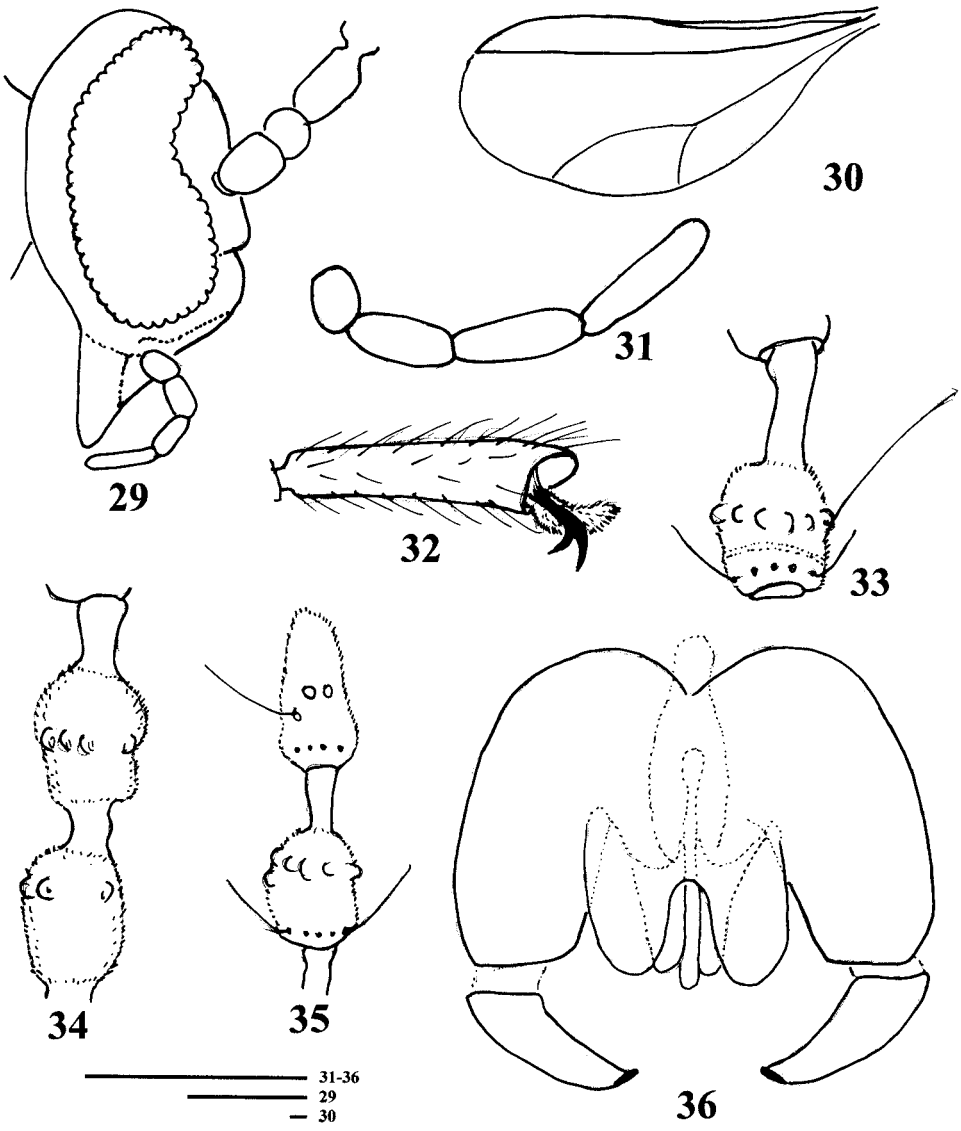
Male genitalia: gonocoxites cylindrical, gonostyli of about one half of gonocoxites, broad at the basal part, bent, with tapering distal part, densely covered with microtrichia, apically with a claw; aedeagus rounded, longer than parameres; cerci deeply emarginate, hypoproct bilobed.

Female. Mouthparts prolonged, palpi four-segmented. Antennae short, 2+12 segments (n=9), only one female with 2+13. Scape obconical, pedicel globular and smaller; first and second flagellomeres partially fused; flagellomeres cylindrical, without stems, with a whorl of strong short setae at the base and several sensorial pores and setae in the middle; all flagellomeres densely covered with microtrichia.

Abdomen is thick and is quite filled with about 60 up to 100 eggs. Ovipositor protrusible, cerci fused, upper lamella sclerotized and having dorsally near the tip a depressed area furnished with several sensory setae. Dorsal part of the eighth abdominal segment with a pair of longitudinal strongly sclerotized rods having broadened anterior part and tapered posterior part.

Larva. The third instar larva is 1.8 mm long and 0.6 mm broad. It has a bilobed sternal spatula 160 μm long, anterior part 70 μm broad, with rounded lobes and shallow incision between them.

Differential diagnosis. Adults of *Gephyraulus capsellae* sp. nov. are smaller than adults of *Gephyraulus raphanistri* (Kieffer, 1886) and have a smaller number of antennal segments. females of *G. capsellae* sp. nov. have the eighth abdominal segment with a pair of longitudinal strongly sclerotized rods having broadened anterior part and tapered posterior part (Fig. 40), in contrast to



Figs. 29–36. *Gephyraulus capsellae* sp. nov., male. 29 – head (palpi seem to be shortened owing to microscope projection), 30 – wing, 31 – palpus, 32 – fifth tarsomere with claw and empodium, 33 – fifth flagellomere, 34 – first and second flagellomeres, 35 – last two flagellomeres, 36 – male terminalia. Scale bars = 0.1 mm.

the shape of this structure in *G. raphanistri* where the anterior part is narrow and posterior part broadened (Sylvén & Tastás-Duque 1993, Fig. 1.D). Gonostyli of male terminalia in *G. capsellae* sp. nov. are evenly tapered in distal half, in contrast to gonostyli of *G. raphanistri* where the distal half of gonostyli is bent (Skuhravá 1997, Fig. 418). The sternal spatula of the larva of *G. capsellae* sp. nov. has deeper incision between lobes of anterior part (Fig. 41) than in *G. raphanistri* (Möhn 1955, Taf. 24, Fig. 5).

Etymology. The specific name of the new species, *capsellae*, is derived from the generic name of the host plant where larvae induce flower bud galls.

Host plant: *Capsella bursa-pastoris* (L.) Medik. (Brassicaceae).

Gall. Swollen flower bud (Fig. 109).

Life history. *Gephyraulus capsellae* sp. nov. has several generations per year. Females lay eggs on small flower buds of *Capsella bursa-pastoris*. Larvae quickly develop inside flower buds and the internal development of the flower parts is stopped. Attacked flower buds enlarge and change into galls. Evetually attacked flower buds are 3 mm in diameter and do not developfruits. One, two or three larvae develop inside each flower bud. Mature larvae leave galls where they developed, fall to the ground and enter the soil where they pupate. Pupation lasts 10–17 days.

Distribution. Greece: Corfu.

Comments. The host plant – *Capsella bursa-pastoris* – is native to eastern Europe and Asia minor and is naturalized and considered a common weed in many parts of the world. It is remarkable that the galls of *Gephyraulus capsellae* sp. nov. were found only at a single locality – in Greece, on the island of Corfu, and have not been observed at any other locality in the world. This is the first evidence of a gall midge species inducing galls on *Capsella bursa-pastoris*.

Jaapiella Rübsaamen, 1916

Jaapiella Rübsaamen, 1916: 490.

Type species. *Jaapiella catariae* Rübsaamen, 1916 (original designation).

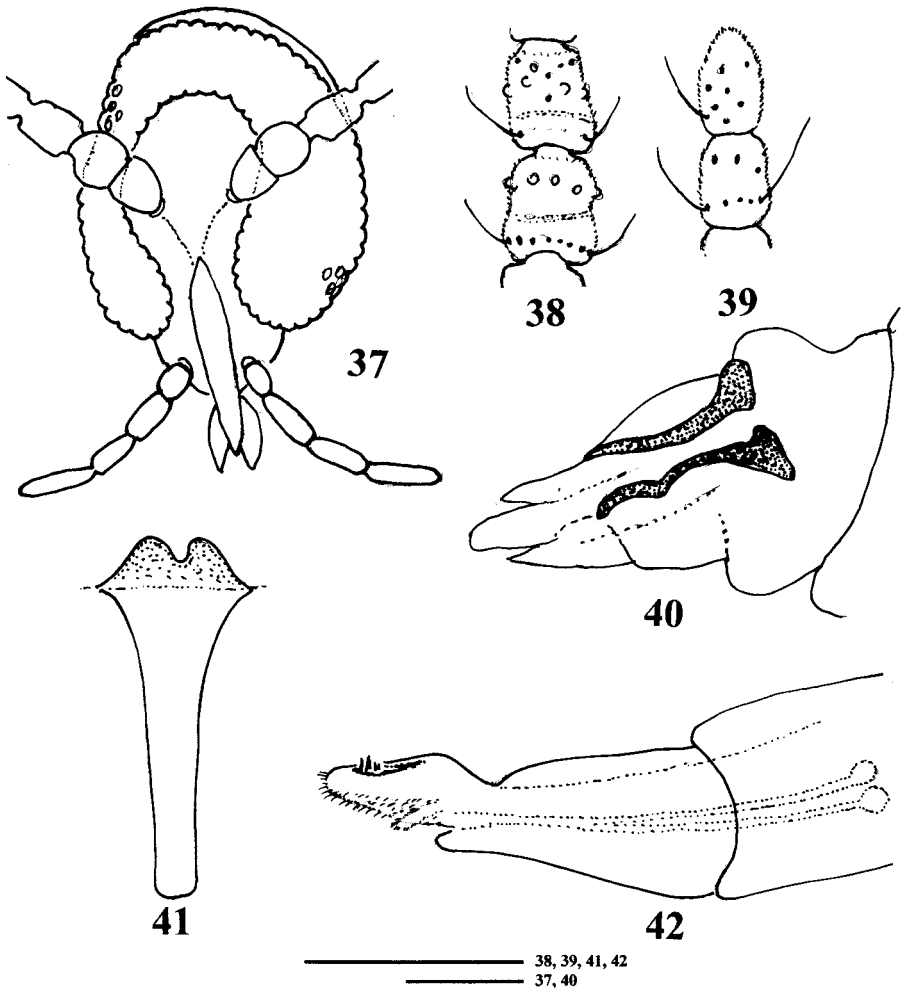
The genus is defined by the following combination of characters:

Antennae: 2+8 to 2+14 segments, male flagellomeres with stems, female flagellomeres cylindrical without stems, mouthparts well developed, wing with R_5 joining C well before the wing apex, Cu forked, tarsal claws toothed, empodium as long as claws. male terminalia with gonocoxites usually thick and with apicomesal swelling, ovipositor long and protrusible, ending with fused cerci and hypoproct (Skuhravá 1997). Larva with bifid sternal spatula; terminal segment with eight papillae bearing short setae. *Jaapiella* is in morphological characters very similar to *Dasineura*, from which it differs in smaller body size, shorter R_5 vein, fewer antennal segments in both sexes and by an apicomesal swelling of the gonocoxite.

Jaapiella is a Palaearctic genus with 80 species of which 35 species occur in Western Europe. Larvae induce galls on leaf and flower buds and leaves of host plants of various plant families. Some species are inquilines in galls of other gall midges, larvae of other species live in flower heads of various Asteraceae without apparent symptoms. Sometimes their attack results in non-flowering, or flower heads may be stunted or dried up. Higher species numbers occur in Central and Western Europe and species numbers reduce towards the marginal parts of Europe. Only a few species were found in northern and southern Europe and on islands in the Mediterranean. A relatively large number of species occurs in Kazakhstan (Fedotova 2000, Skuhravá 2006, Skuhravá & Skuhravý 2010, Skuhravá & Sobhian 2004). Six species of *Jaapiella* were recorded in Greece (Skuhravá & Skuhravý 1997, 2006, 2009, 2011).

Jaapiella clematidicola **sp**. **nov**.
(Figs. 43–58, Fig. 108)

Type material. **Holotype**: male. Greece: Corfu: Marathias, 150 m a. s. l., *Clematis flammula*, swollen leaf buds, em. 7.6.2004, leg. M. Skuhravá. Microscope slide Nr.8031, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes**: 4 males, 9 females, 1 larva, same data as in holotype. **Additional material**: Greece: Peloponesos: Xylokastron, Kalavruta, galls. Middle Greece: Amfissa – Agios Georgios, Chrisso, Delfi, Galaxidi, Itea, Kalesmeno, Karpenisi, Kirra, Sernikaki. Crete: Amnissos, Armeni, Bali, Knososs, Krouzon, Zaros; galls were found at all these localities.



Figs. 37–42. *Gephyraulus capsellae* sp. nov., female. 37 – head, 38 – fifth and sixth flagellomeres, 39 – last two flagellomeres, 40 – female postabdomen, 41 – terminal part of female abdomen in detail, 42 – sternal spatula of larva. Scale bars = 0.1 mm.

Diagnosis. Small flies, body 0.9–1.2 mm long (n=10), head and dorsal part of thorax dark brown, abdomen light brown, legs and antennae more light brown.

Description. male. Body size: 0.9–1.0 mm long, wing 1.1–1.2 mm long, 0.4–0.5 mm broad (n=5).

Head relatively large in comparison with remaining body parts, with large holoptic eyes. Eye bridge 4 ommatidia broad medially; ommatidia relatively small and circular.

Mouthparts well developed, of normal size. Palpi four segmented; the first short and ovoid; second segment three times larger, third and fourth segments longer; all segments covered with long setae.

Antennae 2+ 12 (n=5). Scape obconical, basally narrower, pedicel smaller and ovoid, first and second flagellomeres fused. Each flagellomere consists of basal node and distal stem; the stem is shorter than the node; at the base of the node is a whorl of thin setae, in the middle several sensory pores, some of them with long setae; flagellomeres densely covered with microtrichia.

Wing with costa interrupted at junction with R_5; R_1 reaches costa before the middle of the anterior wing margin; R_5 slightly curved, joining costa well before the wing apex; Cu forked. Anterior wing margin covered with thin setae.

Legs long and slender, tarsal claws toothed, empodia as long as claws.

Male genitalia: gonocoxites with large apicomesal lobe; gonostyli nearly the same length as gonocoxites, uniformly broad, apically with rounded claw; aedeagus thin; cerci broad, separated by deep excision, hypoproct bilobed, parameres sheathing aedeagus longer than gonocoxites.

Female. Head with large holoptic eyes, eye bridge five ommatidia broad medially; ommatidia circular. Mouthparts well developed as in male, palpi four-segmented.

Antennae 2+12 segmented (n =9). Scape obconical, pedicel globular and smaller; first and second flagellomeres fused, flagellomeres cylindrical, without stem; each flagellomere with several sensory pores and several long setae and densely covered with microtrichia. Ovipositor long, with small terminal lamella which is covered with microtrichia.

Larva. The third instar larva is very small, only 1.4 mm long and 0.5 mm broad. Integument is covered with very small pointed plates. Spatula sternalis on the ventral side of the prothoracic segment is 124 μm long, with bilobed anterior part which is 30 μm broad. Anal segment with four pairs of terminal papillae each bearing a very small seta.

Differential diagnosis. *Jaapiella clematidicola* sp. nov. is similar to *Jaapiella catariae* Rübsaamen, 1916, the lectotype of which was established by Sylvén & Tastás-Duque (1993), from which it differs by smaller body size, lesser number of antennal segments including in males and females 2+12 segments in comparison with 2+14 segment in males of *J. catariae*, wing vein R_5 not straight but bent, and by apicomesal swelling on the gonocoxite (Fig. 50) which is very large in *J. clematidicola* sp. nov. in comparison with this swelling in *J. catariae* (Sylvén & Tastás-Duque 1993, Fig.11.C). Spatula sternalis of *J. clematidicola* sp. nov. is similar to spatula sternalis of *Jaapiella veronicae* (Vallot, 1827) as figured in Möhn (1955, Taf. 25, Fig.5) but in *J. clematidicola* sp. nov. is slender and has longer stem (Fig. 58).

Etymology. The specific name of the new species, *clematidicola*, is derived from the generic name of the host plant where larvae were found and the suffix "cola" from the Latin verb *colo* which means to inhabit.

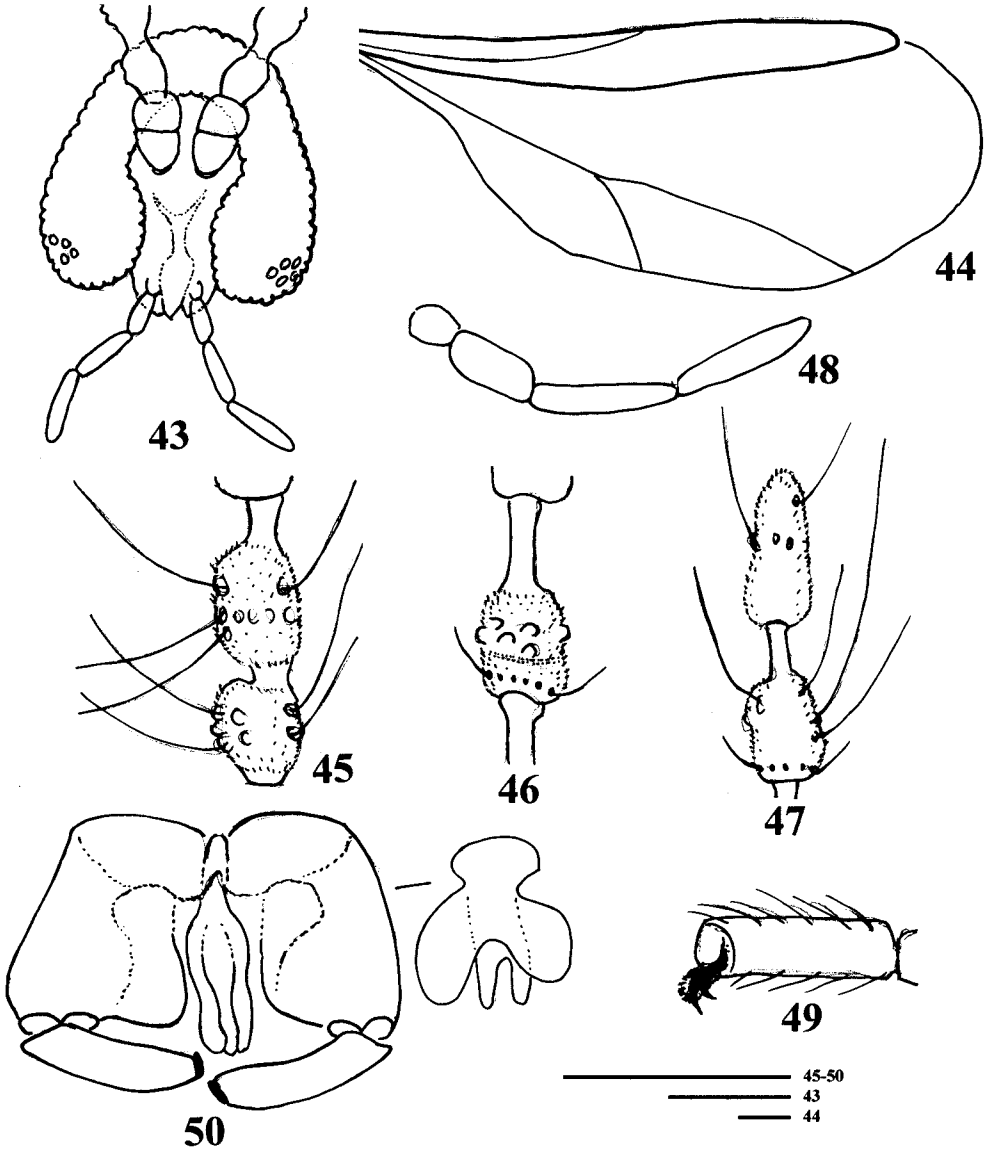
Host plant. *Clematis flammula* L. (Ranunculaceae).

Gall. Leaf bud gall at vegetative tip (Fig. 108).

Life history. Several generations develop during one growing season. Larvae develop in swollen leaf bud galls of *Clematis flammula*. The gall is small, globular, about 7 mm in diameter and is situated at the vegetative tip of the shoot. It is formed of several small densely haired leaves among which several rose-red larvae develop. Fully grown larvae leave galls, fall to the soil, pe-

netrate into it and pupate in the upper soil layer. Adults emerge from the soil after several days, in our rearing cages in Greece after nine days.

DISTRIBUTION. Greece (mainland), islands of Crete and Corfu.



Figs. 43–50. *Jaapiella clematidicola* sp. nov., male. 43 – head, 44 – wing, 45 – first and second flagellomeres, 46 – fifth flagellomere, 47 – last two flagellomeres, 48 – palpus, 49 – fifth tarsomere with claw and empodium, 50 – male terminalia with separated cerci and hypoproct. Scale bars = 0.1 mm.

Comments. *Clematis* is a large plant genus of perennial climbing shrubs with more than 300 species distributed over most of the world, especially in Asia and North America. Thirteen gall midge species belonging to eight genera are associated with various species of *Clematis*, causing galls of various types. They are spread over the Holarctic Region, viz. seven species occur in Asia, five in North America and only one species is known to occur in Europe – *Dasineura clematidina* Kieffer, 1913, larvae of which cause flower bud galls on *Clematis viticella* and *C. vitalba*. *Jaapiella clematidicola* sp. nov. is the second species associated with *Clematis* found in Europe.

***Jaapiella erysimicola* sp. nov.**
(Figs. 59–71)

Type material. **Holotype**, male: Greece: Itea, 70 m a. s. l., *Erysimum graecum*, swollen flower bud, emerg. 10.5.1995, leg. M. Skuhravá. Microscope slide Nr. 7981, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes**: 2 males, 7 females, same data as holotype.

Diagnosis. Very small flies, body 0.9–1.1 mm long (n=10), head black coloured owing to black eyes, thorax, abdomen, all legs and antennae honey-coloured.

Description. **Male**. Body size: 0.9–1.1 mm, wing 1.0 mm long, 0.4 mm broad (n=3).

Head of normal size and position, with large holoptic eyes, eye bridge six ommatidia broad medially; ommatidia circular.

Mouthparts well developed, of normal size. Palpi four segmented; the first short, the other three longer; all segments covered with setae.

Antennae 2+13 to 2+14 segmented (n=3); scape obconical, pedicel, first and second flagellomeres fused; flagellomeres consisting of basal node and distal stem; the stem as long as the node; all flagellomeres densely covered with microtrichia and with several long setae.

Wing with costa interrupted at junction with R_5; R_5 strongly curved, joining costa before the wing apex; Cu_1 forked. Anterior wing margin and surface densely covered with setae.

Legs long and slender, densely covered with long setae, tarsal segments very densely covered with setae and scales and claws are quite hidden among them, only a very few are distinct and are toothed, empodia as long as claw.

Male genitalia: gonocoxites with large apicomesal lobe which is covered with long setae; gonostyli arched, densely covered with microtrichia, apically with a small claw; aedeagus slender, parameres sheathing aedeagus longer than gonocoxites.

Female. Head with large holoptic eyes, eye bridge six ommatidia broad medially; eyes with circular ommatidia. Mouthparts well developed as in male, palpi four-segmented.

Antennae 2+12 (n=7). Scape obconical, pedicel globular and smaller; first and second flagellomeres fused; flagellomeres cylindrical, short, without stems, densely covered with microtrichia.

Ovipositor long, ending with a single terminal lamella.

Larva is not known.

Differential diagnosis. *Jaapiella erysimicola* sp. nov. is similar to *J. clematidicola* sp. nov. from which it differs by number of antennal segments in male which is 2+13 to 2+14 in *J. erysimicola* sp. nov. and 2+12 in *J. clematidicola* sp. nov., by wing vein R_5 which is strongly bent in *J. erysimicola* sp. nov. and slightly in *J. clematidicola* sp. nov.

Etymology. The specific name of the new species, *erysimicola*, is derived from the generic name of the host plant where larvae were found and the suffix "cola" from the Latin verb *colo* which means to inhabit.

Host plant. *Erisymum graecum* Boiss. et Heldr. (Brassicaceae).

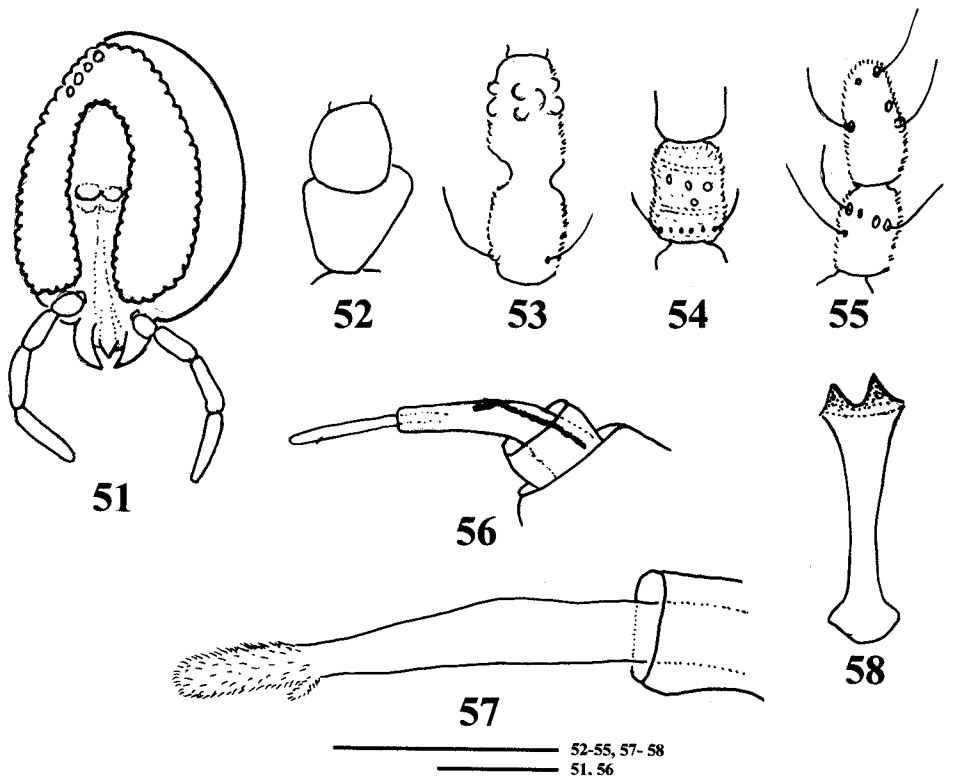
Gall. Swollen flower bud.

Life history. Only a little is known about the biology of this species. Probably two generations develop per year. Gregarious larvae developed in swollen flower buds of *Erisymum graecum*. Attacked flower buds stopped their development and did not produce fruits. Fully grown larvae left galls before the end of April, entered the soil where they pupated and adults emerged after 18 days.
Distribution. Greece.

Janetiella Kieffer, 1898

Janetiella Kieffer, 1898: 23.

Type species. *Cecidomyia thymi* Kieffer, 1888 (subsequent designation of Coquillett 1910: 556).



Figs. 51–58. *Jaapiella clematidicola* sp. nov., female. 51 – head, 52 – scape and pedicel, 53 – first and second flagellomeres, 54 – fifth flagellomere, 55 – last two flagellomeres, 56 – female postabdomen, 57 – terminal part of female abdomen in detail, 58 – sternal spatula of larva. Scale bars = 0.1 mm.

The genus is defined by the following combination of characters:

Antennae 2+12 to 2+15, flagellomeres in male with stems, in female without stems, mouthparts well developed, palpi three or four segmented, wing with R_5 uniting with costa before wing apex, cu forked, tarsal claws simple, without tooth, empodium about as long as the claws, ovipositor long, cylindrical, cerci of female fused, male genitalia with gonostyli gradually tapering and pubescent, larva with bilobed sternal spatula and 8 terminal papillae (Skuhravá 1997).

Janetiella is a Holarctic genus with 24 species of which twelve occur in Europe, three in Asia and nine in North America. Larvae cause stem swellings, leaf and flower bud galls, swellings of needles or develop in seed. They are associated with host plants belonging to several plant families. Four species of *Janetiella* were recorded in Greece, viz. *Janetiella euphorbiae* De Stefani, 1908, causing galls on vegetative tips of *Euphorbia wulfenii*, *Janetiella fortiana* Trotter, 1901, causing stem swellings on *Erysimum graecum*, *Janetiella lemeei* (Kieffer, 1904), inducing tubular galls on leaf veins of *Ulmus minor*, and *Janetiella thymi* (Kieffer, 1888), inducing leaf bud galls at shoot tips of *Thymus serpyllum* (Skuhravá & Skuhravý 1997, 2006, 2009, 2011). All species of this genus are poorly known, insufficiently described and the original material of most species, including the type species, is lost. Gagné (2009) redescribed the male and female of *Janetiella thymi* on the basis of material collected, reared and identified by E. Sylvén and illustrated important morphological characters of adults.

***Janetiella onosmae* sp. nov.**

(Figs. 72–84, Fig. 110)

Type material. **Holotype**: male, Greece: Delfi, 18.4.1995, *Onosma frutescens*, rosette leaf gall, leg. M. Skuhravá. Microscope slide Nr. 7952, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes**: 9 males, 11 females, same data as holotype. **Additional material**: galls on *Onosma frutescens*, as *Dasineura* sp. (Skuhravá & Skuhravý 1997): Amfissa – gios Georgios, Arachova, Chrisso, Delfi: 10 males, 10 females, same locality as holotype; galls: Lefkada: Nikiana, June 2009.

Diagnosis. Medium sized flies, body 1.9–2.4 mm long (n=10), head black coloured owing to black eyes, thorax, abdomen, legs and antennae honey coloured.

Description. **Male**. Body size: 1.9–2.2 mm, wing 1.9–2.2 mm long, 0.8–1.1 mm broad (n=5).

Head of normal size and position, with large holoptic eyes. Eye bridge four ommatidia broad medially; ommatidia small.

Mouthparts well developed, slightly prolonged. Palpi four segmented; the first very short, second segment a little longer; third and fourth segments of the same length and slender; all segments covered with long setae.

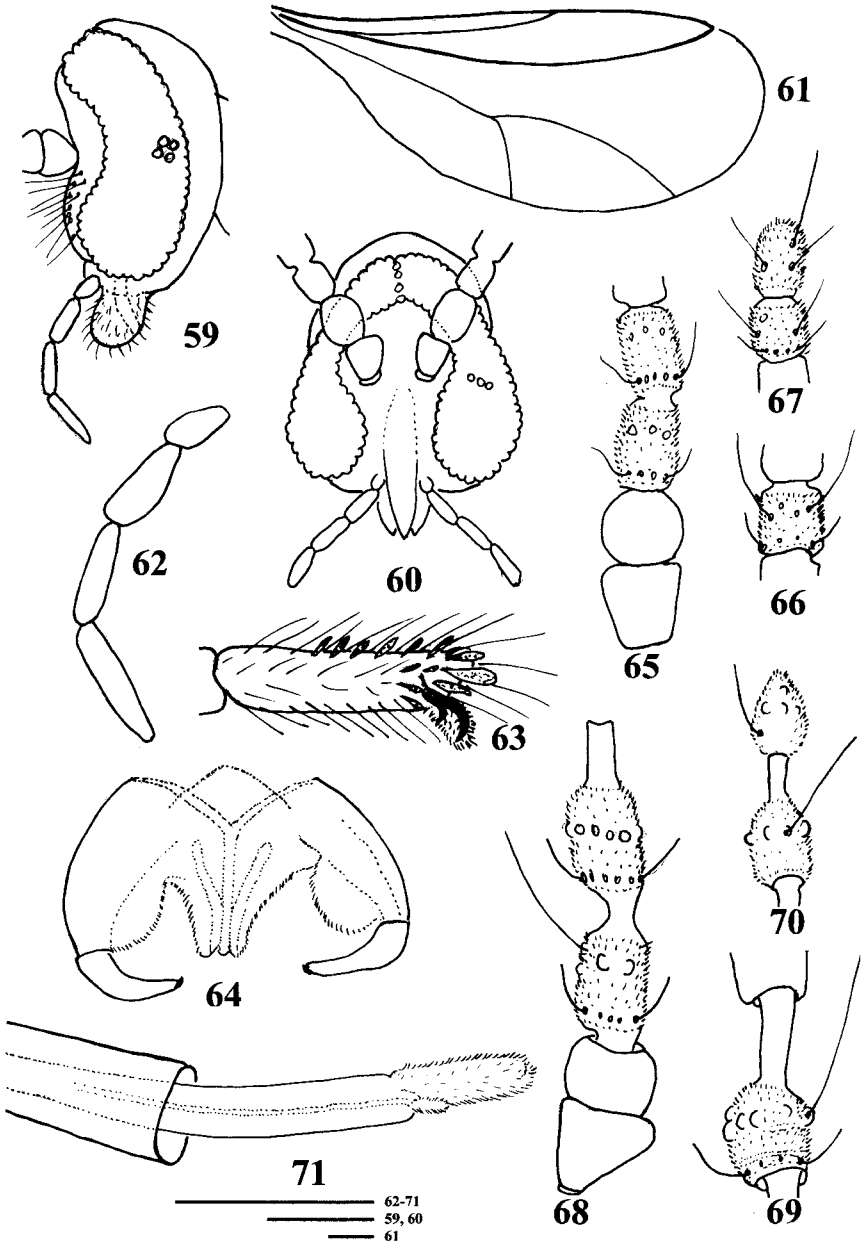
Antennae 2+14 to 2+15 segmented (n=10), usually 2+15. Scape obconical, basally narrower, pedicel ovoid, first and second flagellomeres fused. Each flagellomere consists of basal node and distal stem; the stem is as long as node; at base of node is a ring of pores with short strong setae, in middle part several sensory pores, some of them with long setae; all flagellomeres densely covered with microtrichia. The last two flagellomeres in holotype are fused.

Wing with costa interrupted at junction with R_5; R_1 reaches the middle of the anterior wing margin; R_5 straight, joining costa before the wing apex; Cu visible only at the basal part.

Legs very long and slender, tarsal claws simple, without tooth, empodia a little longer than claws.

Male genitalia: gonocoxites cylindrical, gonostyles shorter than gonocoxites, thick, cylindrical, tapering from middle to the end, densely covered with microtrichia, apically with a claw; aedeagus broad, blunt at the end , cerci broad, deeply emarginate, hypoproct narrow, deeply emarginated, parameres sheathing aedeagus, shorter than gonocoxites.

Female. Body size: 2.1–2.4 mm, wing 2.0–2.1 mm long, 0.8 mm broad (n=5).



Figs. 59–71. *Jaapiella erysimicola* sp. nov. 59 – head of male, lateral view, 60 – head of female, frontal view, 61 – wing, 62 – palpus, 63 – fifth tarsomere with claw and empodium, 64 – male terminalia, 65 – female scape, pedicel, first and second flagellomeres, 66 – female fifth flagellomere, 67 – female last two flagellomeres, 68 – male scape, pedicel, first and second flagellomeres, 69 – male fifth flagellomere, 70 – male two last flagellomeres, 71 – ovipositor. Scale bars = 0.1 mm.

Head with large holoptic eyes, eye bridge four ommatidia broad medially; ommatidia circular. Mouthparts well developed as in male, palpi four-segmented.

Antennae 2+14 to 2+15 segmented (n=10), usually 2+14, scape obconical and pedicel globular, both of about same size; first and second flagellomeres fused; flagellomeres cylindrical, without stems; all flagellomeres densely covered with microtrichia and with several long setae.

Ovipositor very long, fully protrusible, terminal lamella slender, densely covered with microtrichia and setae.

Differential diagnosis. *Janetiella onosmae* sp. nov. differs from *Janetiella thymi* by the number of antennal segments; antennae of male and female of *J. onosmae* sp. nov. consist of 2+14 to 2+15 whereas of *J. thymi* only of 2+12 segments. Ovipositor of *J. onosmae* sp. nov. ending in a very long and slender, densely haired lamella (Fig. 84) whereas the lamella of *J. thymi* is short and ovoid (Gagné 2009, Fig. 12).

Etymology. The specific name of the new species, *onosmae*, is derived from the generic name of the host plant where larvae were found.

Host plant: *Onosma frutescens* L. (Boraginaceae).

Gall. Leaf bud gall at the vegetative tip (Fig.110).

Life history. Two generations develop per year. Larvae develop in large rosette leaf bud galls on *Onosma frutescens*. The gall is globular, about 15 mm in diameter and is composed of many small deformed leaves. Larvae develop among leaves, each larva in one folded leaf as in a small cradle where they also pupate. Adults reared in middle of April.

Distribution. Greece. We found galls of this species at four localities in middle Greece, viz. Amfissa – Agios Georgios, Arachova, Chrisso, Delfi, at altitudes 340–950 m a. s. l. (Skuhravá & Skuhravý 1997, as *Dasineura* sp. on *Onosma frutescens*) and in the island Lefkada at Nikiana in June 2009 (Skuhravá & Skuhravý 2011).

Galls similar to those caused by *Janetiella onosmae* sp. nov. were found in Iran and reported by Rübsaamen (1899) as "Triebspitzdeformation" on *Onosma bulbotrichum* DC. They were found near Sultanabad in Persia (now Iran) by Prof. Hausknecht in 1889. These galls are mentioned in Houard (1922–1923, Nr. 2726, as Cécidomyide). Baudyš (1928) found similar galls on *Onosma javorkae* Simk. in Croatia.

The host plant *Onosma frutescens* is a small shrub distributed in the eastern Mediterranean – south-eastern Europe and western Asia, in Crete, Greece, Turkey, Syria, Lebanon and Israel. The galls of *Janetiella onosmae* sp. nov. are inconspicuous and I hope that they will be discovered also in other countries of the eastern Mediterranean where the host plant occurs.

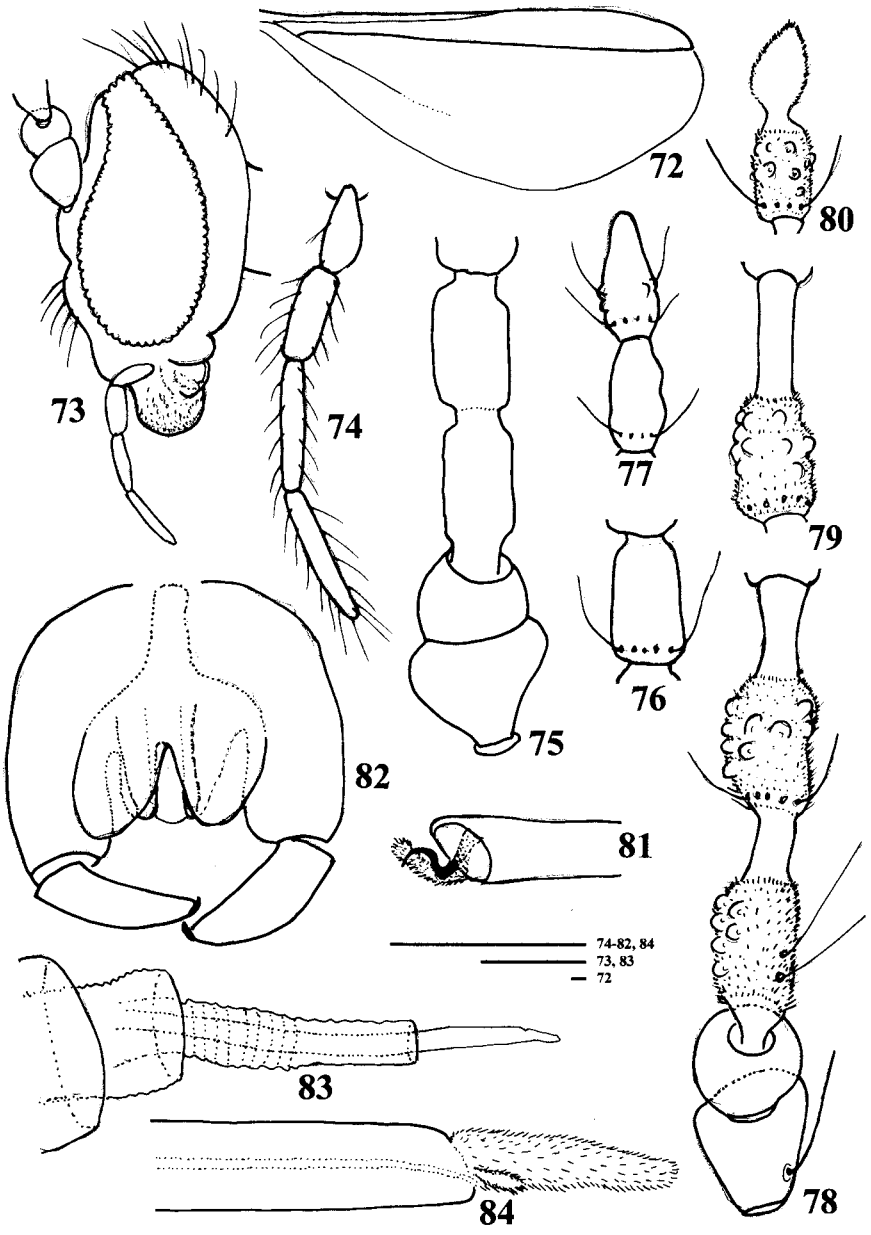
Macrolabis Kieffer, 1892

Macrolabis Kieffer, 1892: 214.

Type species. *Cecidomyia pilosellae* Binnie, 1877 (subsequent designation of Felt 1911: 44).

The genus is defined by the following combination of characters:

Antennae 2+7 to 2+13 segmented, flagellomeres short, suboval and without stems in both sexes, mouthparts well developed, palpi three or four segmented, wing with R_5 joining costa before wing apex, cu forked, tarsal claws with tooth, empodium longer than claws, male genitalia with gonocoxites large and greatly swollen, gonostyli prolonged, arched, tapering distally, aedeagus, aedeagal sheath, cerci and hypoproct very short, ovipositor long, protrusible, cerci of female fused, larva with bilobed sternal spatula and 8 terminal papillae (Skuhravá 1997).



Figs. 72–84. *Janetiella onosmae* sp. nov. 72 – wing, 73 – head of male, 74 – palpus, 75 – female scape, pedicel, first and second flagellomeres, 76 – female fifth flagellomere, 77 – female two last flagellomeres, 78 – male scape, pedicel, first and second flagellomeres, 79 – male fifth flagellomere, 80 – male two last flagellomeres, 81 – fifth tarsomere with claw and empodium, 82 – male terminalia, 83 – female postabdomen, 84 – terminal part of female abdomen in detail. Scale bars = 0.1 mm.

Macrolabis is a Palaearctic genus with 60 species of which 35 are distributed in Europe and only one species is known to occur in North America. Larvae induce galls on leaf and flower buds on host plants of various families and about one half of species are inquilines in galls of other gall midges. Species numbers decrease from Central and Western Europe to the south and no species was found in Macedonia and Montenegro in the Balkan Peninsula and in the islands in the Mediterranean, with the exception of Corsica. Species of this genus were found abundantly in Kazakhstan (Skuhravá 2006, Skuhravá & Skuhravý 2010, Fedotova 2000). Three species of the genus *Macrolabis* were found in Greece, viz. *Macrolabis lamii* Rübsaamen, 1915, causing leaf bud galls on *Lamium* sp., *Macrolabis luceti* Kieffer, 1899, inquiline in galls of *Dasineura rosae* (Bremi, 1847) (= *Wachtliella rosarum* Hardy, 1850) on *Rosa* sp. and *Macrolabis lutea* Rübsaamen, 1914, inquiline in galls of *Spurgia euphorbiae* (Vallot, 1827) (=*Bayeriola capitigena* Bremi, 1847) on *Euphorbia cyparissias* (Skuhravá & Skuhravý 1997, 2006, 2009, 2011).

***Macrolabis behen* sp. nov.**
(Figs. 85–96)

Type material. **Holotype**: male, *Silene behen*, leaf bud gall, Greece: Crete: Knossos, em. 2.5.1996, leg. M. Skuhravá. Microscope slide Nr. 8004, deposited in the collection of M. Skuhravá, Prague, Czech Republic. **Paratypes**: 8 males, 12 females, same data as holotype.

Diagnosis. Very small flies, body 1.0 –1.3 mm long (n=10), head black owing to black eyes, thorax, abdomen, antennae and legs honey coloured.

Description. **Male**. Body size: 1.0–1.2 mm, wing 1.2–1.3 mm long and 0.4–0.5 mm broad (n=3).

Head of normal size and position, with large holoptic eyes. Eye bridge six ommatidia broad medially; ommatidia relatively small and circular.

Mouthparts well developed, of normal size, palpi four segmented; first small and ovoid; second segment two times longer than the first; third segment longer and the fourth is the longest; all segments covered with microtrichia and long setae.

Antennae 2+9 to 2+10 segments (n= 10). Scape obconical, basally narrower, pedicel ovoid, first and second flagellomeres separated; all flagellomeres cylindrical, without stems, about twice as long as broad, densely covered with microtrichia and with several long setae.

Wing with costa interrrupted at junction with R_5; R_5 slightly curved, joining costa well before wing apex; Cu forked but indistinct.

Legs long and slender, tarsal claws toothed, empodia as long as claws or a little longer.

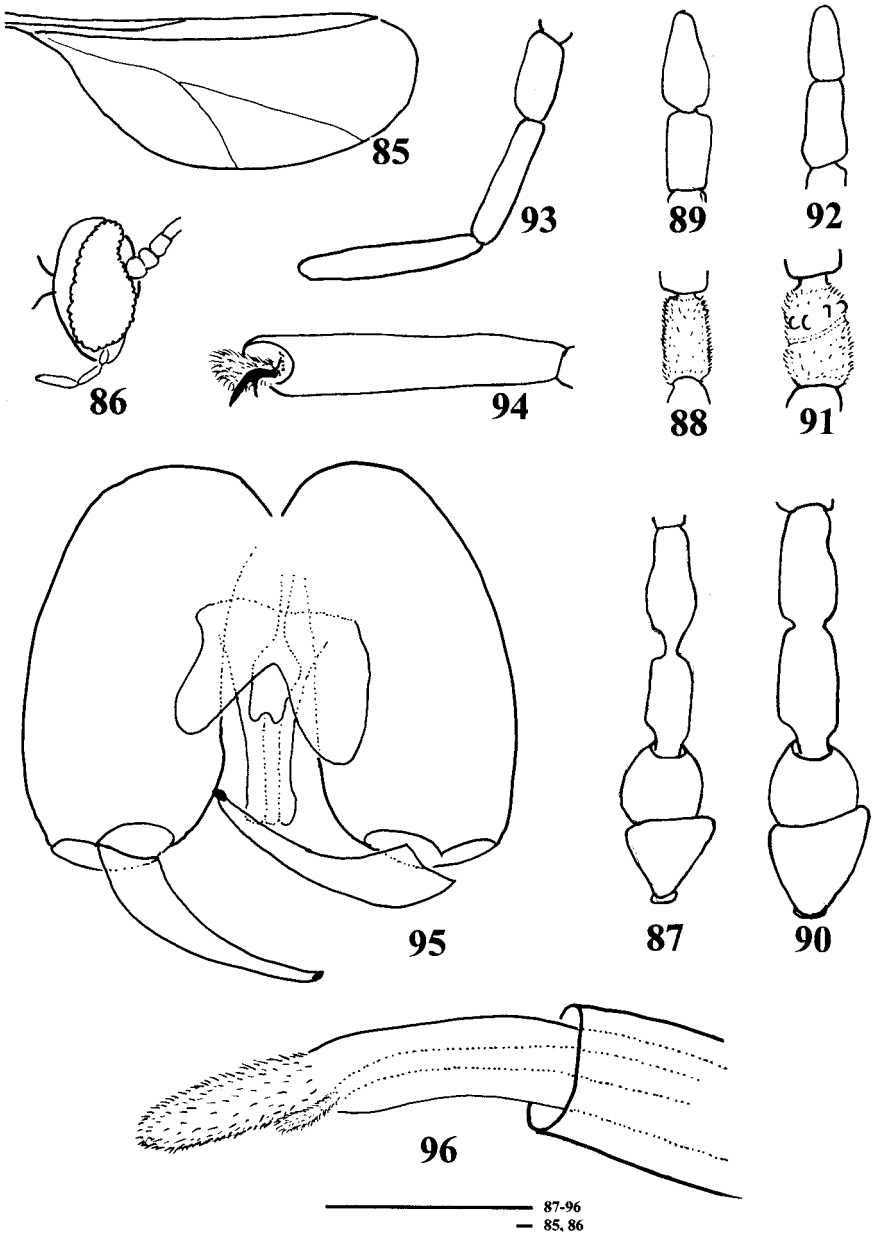
Male genitalia: gonocoxites large and thick, cylindrical, gonostyli slender, about as long as gonocoxites are broad, broader at the base, tapering to the end and with black claw apically; aedeagus narrow, blunt apically, cerci deeply emarginate, hypoproct bilobed, parameres as long as gonocoxites.

Female. Body size: 1.1–1.3 mm, wing 1.3–1.5 mm long, 0.5–0.6 mm broad. Head with large holoptic eyes, eye bridge five ommatidia broad medially; eyes with circular ommatidia. Mouthparts well developed as in male, palpi four-segmented.

Antennae with 2+12 to 2+13 segments (n=10). Scape obconical, pedicel globular; first and second flagellomeres separated; flagellomeres cylindrical, without stems, densely covered with microtrichia.

Abdomen of all females is full of eggs. Ovipositor protrusible, usually very long, terminal lamella small, slender and densely covered with hairs.

Differential diagnosis. *Macrolabis behen* sp. nov. is in general habit very similar to the type species of this genus, *Macrolabis pilosellae* (Binnie, 1877), larvae of which develop in galls



Figs. 85–96. *Macrolabis behen* sp. nov. 85 – wing of female, 86 – head of male, 87 – male scape, pedicel and first and second flagellomeres, 88 – male fifth flagellomere, 89 – last two flagellomeres of male, 90 – female scape, pedicel and first and second flagellomeres, 91 – female fifth flagellomere, 92 – female last two flagellomeres, 93 – male palpus, 94 – fifth tarsomere with draw and empodium, 95 – male terminalia, 96 – ovipositor in detail. Scale bars = 0.1 mm.

on *Hieracium pilosella* (Asteraceae). Males of both species have the same number of antennal segments (2+10) but they differ in the shape of the male terminalia. Gonocoxites of *M. behen* sp. nov. are large and cylindrical (Fig. 95) in contrast to those of *M. pilosellae* which are short and ovoid, gonostyli of *M. pilosellae* (Skuhravá 1997, Fig. 428) are much shorter than these of *M. behen* sp. nov. The female of this species differs from the female of *M. pyricola* sp. nov. by the shape of terminal lamella of the ovipositor. The lamella of *M. behen* sp. nov. is apically rounded (Fig. 96) whereas the lamella of *M. pyricola* sp. nov. is tapered and pointed (Fig. 104).

Etymology. The specific name of the new species, *behen*, is derived from the species name of the host plant where larvae were found.

Host plant. *Silene behen* L. (Caryophyllaceae).

Gall. Leaf bud gall at the vegetative tip.

Life history. Two generations develop per year. Larvae develop in terminal leaf galls on *Silene behen*. The spindle gall is formed of several rolled leaves. Inside one gall many cream coloured larvae develop. Larvae left galls on 22 April 1996 and entered the soil where they pupated. Adults emerged after ten days on 2 May and emergence lasted up to 5 May 1996.

Distribution. Greece: Crete.

Comments. The host plant, *Silene behen*, is distributed in the Mediterranean region. In 2011 it was included in the list of invasive species and its occurrence was recently recorded from Belgium. Until now nobody has recorded any galls on *Silene behen*. *Macrolabis behen* sp. nov. is the first known gall midge species associated with this host plant. It should be included into considerations as a potential biological control agent of this invasive weed.

***Macrolabis pyricola* sp. nov.**

(Figs. 97–104, Fig. 111)

Type material. **Holotype**: female, *Pyrus salicifolia*, inquiline of *D. pyri*. Greece: Rizario, 300 m a. s. l., 20.5.1996, leg. M. Skuhravá. Microscope slide Nr. 7900, deposited in the collection of M. Skuhravá, Prague, Czech Republic.

Diagnosis. Small fly, body 1.3 mm long, head black coloured owing to black eyes, thorax, abdomen, antennae and legs honey coloured.

Description. **Female**. Head with large holoptic eyes, eye bridge four ommatidia broad medially; eyes with many circular ommatidia. Mouthparts well developed, palpi four-segmented. Antennae 2+10 segmented. Scape obconical, pedicel globular, first and second flagellomeres fused, cylindrical, all flagellomeres densely covered with microtrichia.

Wing: R_5 joining costa well before the wing apex, costa without setae. Cu visible only in the basal part.

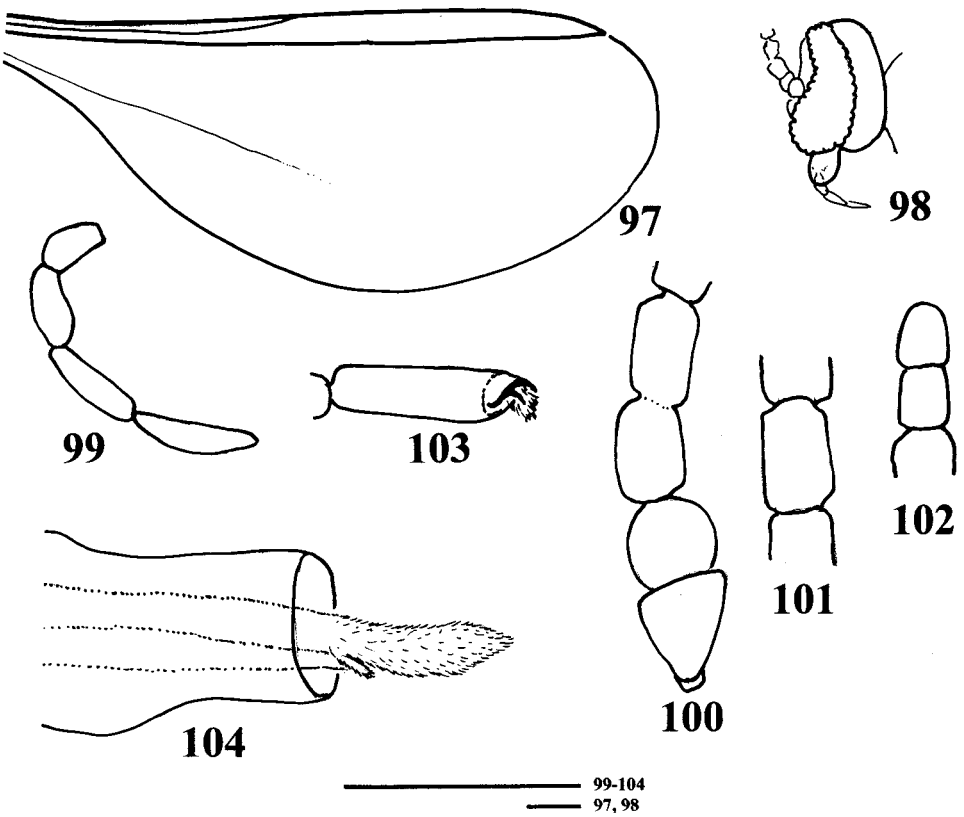
Legs long with toothed claws and empodium.

Abdomen is quite filled of eggs. Ovipositor is short, only a small part is protruded; terminal lamella small, densely haired.

Differential diagnosis. *Macrolabis pyricola* sp. nov. is similar to *Macrolabis mali* Anfora, 2005, larvae of which live as inquilines in galls of *Dasineura mali* (Kieffer, 1894) (Anfora et al. 2005). *M. pyricola* sp. nov. differs from *M. mali* by the number of antennal segments: female of *M. pyricola* sp. nov. has 2+10, whereas female of *M. mali* 2+12. *M. pyricola* sp. nov. differs from *M. behen* sp. nov. by the shape of ovipositor which is ending in *M. pyricola* sp. nov. with slightly pointed lamella (Fig. 104) in contrast to the rounded lamella of *M. behen* sp. nov. (Fig. 96).

Etymology. The specific name of the new species, *pyricola*, is derived from the generic name of the host plant where larvae were found and the suffix "cola" from the Latin verb *colo* which means to inhabit.

Host plant. *Pyrus salicifolia* Lois. (Rosaceae).
Gall. Rolled leaf margin (Fig. 111).
Life history. Larvae of *Macrolabis pyricola* sp. nov. were found in very small galls at the vegetative tip of *Pyrus salicifolia* which are similar to galls caused by *Dasineura pyri* (Bouché, 1847) on *Pyrus communis*. The gall is formed of a very small rolled leaf margins each of them is inhabited by only one creme coloured larva. Ten larvae left galls collected at Rizario on 8 May and entered the sand in rearing cage. Only this single female emerged after 12 days. It seems that high mortality of this gall midge population occurred. It is not quite clear if this species is gall causer or inquiline in galls caused by *Dasineura pyri*.
Distribution. Greece.



Figs. 97–104. *Macrolabis pyricola* sp. nov., female. 97 – wing, 98 – head, 99 – palpus, 100 – scape, pedicel, first and second flagellomeres, 101 – fifth flagellomere, 102 – two last flagellomeres, 103 – fifth tarsal segment with claw, 104 – end part of ovipositor. Scale bars = 0.1 mm. Scale bars = 0.1 mm.

Lasioptera Meigen, 1818

Lasioptera Meigen, 1818: 88.

Type species. *Lasioptera picta* Meigen, 1818 (subsequent designation of Karsch 1877: 14, validated by ICZN 1970) (= *Tipula rubi* Schrank, 1803).

The genus is defined by the following combination of characters:

Antennae 2+13 to 2+ 26, with great variability in number of flagellomeres within species, depending on body size; flagellomeres very short, cubic, without stems in both sexes, mouthparts of normal form and size, palpi four segmented, wing vein R_5 very short, uniting with costa almost at or before basal half of wing, cu forked, tarsal claws with tooth, empodium about as long as the claws, ovipositor long, with subapical sclerotized plate bearing several hooked spines dorsally and with smaller straight spines laterally, cerci of female fused, larva with bilobed sternal spatula and 8 terminal papillae (Skuhravá 1997).

Lasioptera is a large genus containing 130 species worldwide. Most of these species – 50 – occur in the Palaearctic Region and 27 of those in Europe, 34 in the Nearctic Region and only a few species in other biogeographical regions. Larvae induce galls on stems of host plants of various families, mainly on Poaceae and Apiaceae, cause leaf galls, develop in fruits without making galls or are inquilines in galls of other gall midges or other insects. Galls are usually associated with fungal mycelia (so called ambrosia galls). Larvae of *Lasioptera buhri* develop in stems of host plants belonging to several genera of three different families. Species of the genus *Lasioptera* are relatively abundant in Central and Western Europe and numbers decrease northwards and southwards. Also in Central Asia its numbers are low – only three species occur in Kazakhstan (Skuhravá 2006, Skuhravá & Skuhravý 2010, Fedotova 2000). Seven species of *Lasioptera* were recorded in Greece (Skuhravá & Skuhravý 1997, 2006, 2009, 2011). Recently Dorchin & Freidberg (2011) described adults of *Lasioptera foeniculi*, larvae of which develop in fruit galls on *Foeniculum vulgare* in Israel.

Lasioptera carophila Löw, 1874

(Fig. 112)

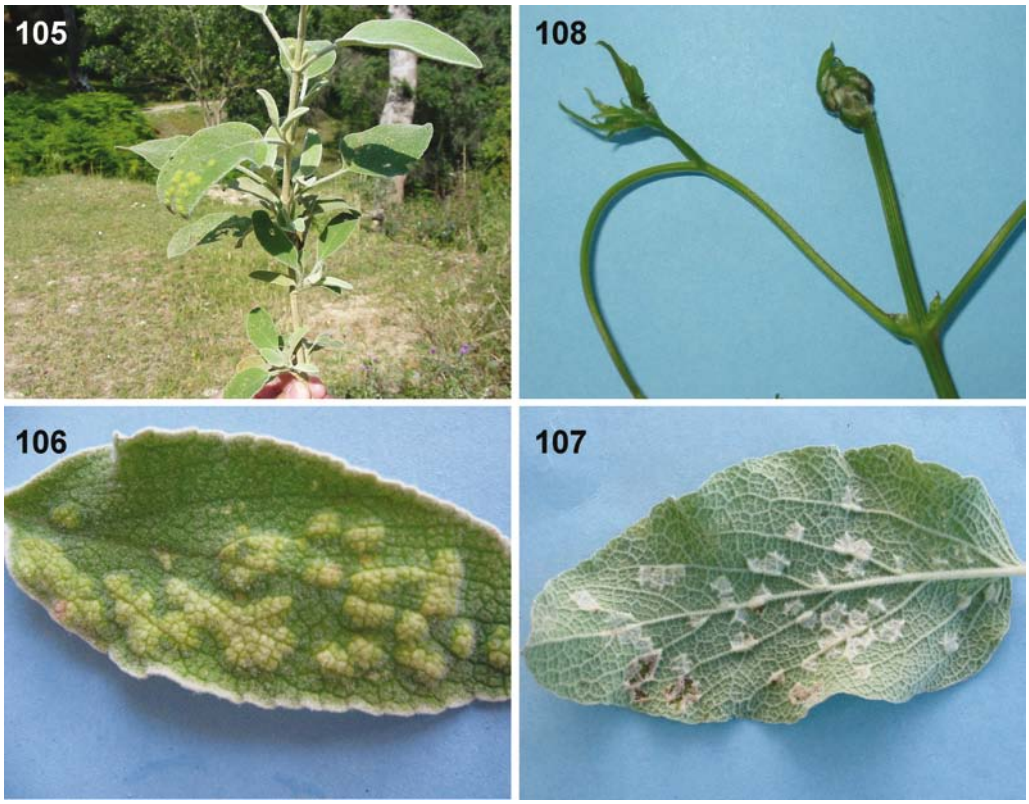
Material examined. Greece: Samos: Pythagorion, 50 m a. s. l., 23.6.2005: galls on *Foeniculum vulgare* at the point of ramification of leaflet veins; Mesokampos, 50 m a. s. l., 22.6.2005: galls; Paleokastro, 250 m a. s. l., 25.6.2005: galls; Samos (town), 27.6.2005: galls; 1 ♂, 2 ♀, reared from galls on *Foeniculum vulgare*, Pythagorion, 25.6.2005; pupa and larva, same locality, 25.6.2005; Greece: Samos: Pandroso, 600 m a. s. l., 25.6.2005: galls on umbellules of *Bupleurum rotundifolium*, 3 larvae; all material in the collection of M. Skuhravá.

When we found peculiar galls on leaves of *Foeniculum vulgare* (Fig. 112) – swellings at the point of ramification of leaflet veins – at several localities in Samos, we considered them to be caused by a new gall midge species of the genus *Lasioptera* (Skuhravá & Skuhravý 2006). Solitary orange coloured larva develop inside a chamber. The leaf blade of this plant species is quite reduced and leaves are formed only of green veins. We found these strange and conspicuous galls at only four localities in Samos. We did not find them anywhere on twelve other islands in the Mediterranean Sea where we have investigated gall midges (Skuhravá & Skuhravý 2010). Identification of larvae and of adults reared from galls on *Foeniculum vulgare* showed that these galls are caused by larvae of *Lasioptera carophila*.

This is a polyphagous species and uses various host plant species and genera of Apiaceae for its development in various parts of its distribution area, which is widespread in Europe, south-western Asia and North Africa (Houard 1908–1909, 1913, Buhr 1964–1965, Skuhravá 1986).

In Central Europe *Lasioptera carophila* is a species with decreasing population density. The galls were more abundant in the past than in the present. In the Czech Republic the galls were found at more than 200 localities at altitudes ranging from 170 to 700 m a.s.l., mainly on *Pimpinella saxifraga* and *P. magna*, and occasionally on another 40 species of various host plant genera of the family Apiaceae (Skuhravá 1994a, 1994b).

In Central Europe *Lasioptera carophila* usually uses *Pimpinella saxifraga* for its development. *L. carophila* has here two generations in the course of each vegetative season. The solitary larva produces a swelling at the point of insertion of the umbellules. The walls of the chamber are covered with mycelium. Larvae hibernate in the galls where they pupate in the spring. Adults usually emerge at the end of April and at the beginning of May when females may lay eggs on umbellules of the host plants, which are at that time fully developed. females usually lay eggs on developing inflorescences of the nearest host plant to that from which they emerged. Larvae of the summer generation develop inside swellings of umbellules. Some larvae remain in galls up to the spring of the next year, some larvae pupate and females that fly in July or August may still



Figs. 105–108. Galls of gall midges (Diptera: Cecidomyiidae). 105 – A small shrub of *Phlomis fruticosa* with one leaf (on the left) covered with several galls of *Phlomidiomyia pustularis* sp. nov. at the type locality Moraitika, Corfu, in May 2004, 106 – pustule galls caused by larvae of this species on the upper side of the leaf, 107 – shape of these galls on the lower side of the leaf, 108 – gall of *Jaapiella clematidicola* sp. nov. on terminal leaf bud of *Clematis flammula* at the type locality Marathias, Corfu, in May 2004.

Figs. 109–112. Galls of gall midges (Diptera: Cecidomyiidae). 109 – Flower bud galls caused by *Gephyraulus capsellae* sp. nov. on *Capsella bursa-pastoris*, at the type locality Corfu–fortification, in May 2004. 110 – Galls of *Janetiella onosmae* sp. nov. on terminal leaf buds of *Onosma frutescens*, at Nikiana, Lefkada, in June 2009. 111 – Galls on leaves of *Pyrus salicifolia* similar to galls caused by *Dasineura pyri* (Bouché, 1847) from which one female of *Macrolabis pyricola* sp. nov. emerged at Rizario, in the north-western part of Greece, in May 1996. 112 – Galls of *Lasioptera carophila* F. Löw, 1874, formed by swellings on leaflet veins of *Foeniculum vulgare* at the point of ramification, found at Pythagorion, Samos, in June 2005. All photos by Václav Skuhravý.

find the umbellules of the host plant in suitable condition for egg lying. In Central Europe *L. carophila* has usually only one generation, rarely two generations that develop on the same host plant species. It is fully adapted to the phenology of its host plant which is a perennial herb that persists for many years and each year grows up as a young green plant from roots remaining in the soil (Barnes 1949, Skuhravá & Skuhravý 1960).

In contrast, the females of *Lasioptera carophila* that developed in galls on umbellules of *Foeniculum vulgare* in southern Greece at the time of their emergence in the spring – in April – do not have suitable umbellules of this host plant at their disposal. It is too early, since at that time only leaves have developed. Therefore females searching for suitable places for egg laying found ramifications of leaf veins which structurally similar to the structure of umbellules. females of *L. carophila* lay eggs at these places and larvae penetrate inside plant tissues where they subsequently develop and form galls. Adults from galls on leaf veins of *Foeniculum vulgare* emerged at the end of June.

In Greece *L. carophila* is classed as a frequent species. Its galls were found at 29 localities occurring from the most northern part to the most southern part of the country. Localities were situated at altitudes ranging from 50 to 800 m a. s. l. (Skuhravá & Skuhravý 1997, 2006, 2011). In the course of our investigations the galls were found on inflorescences of seven host plant species of six plant genera, viz. *Bunium creticum*, *Smyrnium rotundifolium*, *S. orphanidis*, *Physospermum commutatum*, *Ferula communis*, *Tordylium apulum* and *Pimpinella major*. Most galls were found on *Ferula communis*. Probably only one generation of *L. carophila* develops on most of these host plants. Larvae hibernate in galls on umbellules and pupate there in the spring. Adults fly from galls and females find umbellules of host plants suitable for egg-lying. Only in the island of Samos we found the galls of this species formed on leaf veins of *Foeniculum vulgare*. The population of *L. carophila* associated with *Foeniculum vulgare* in Samos is bivoltine and uses for its development two places on one host plant. Larvae of the spring generation develop in leaf vein galls at the point of ramification and larvae of the summer generation cause galls on umbellules.

In Israel another species of the genus *Lasioptera*, namely *Lasioptera foeniculi* Dorchin et Freidberg, 2011, develops in the fruits of *Foeniculum vulgare*. Galls were observed in the course of September and November. Larvae left galls and pupated in the soil. Adults emerged after ten days. In a very short time during the fall two generations develop (Dorchin & Freidberg 2011). This species is well adapted in its life cycle to the rough environmental conditions in Israel, with high temperatures, drought and short vegetative period of the host plant.

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