

**A new *Phyllolabis* from Israel with reduced wings and halteres
(Diptera: Limoniidae)**

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ABSTRACT

Phyllolabis parvihalterata n. sp., a new limoniid species from Israel, is described based on numerous male and female specimens collected along winter pools in the Upper Galilee. This species is compared to *P. golanensis* Starý and Freidberg, from which it differs primarily by the greatly reduced wings and halteres. These characters also distinguish this species from all other congeners.

INTRODUCTION

In this article, we describe from Dalton, Upper Galilee, Israel, a peculiar new species of *Phyllolabis* (Diptera: Limoniidae) that has reduced wings and halteres in both sexes.

Dalton is one of two settlements (the second is Jish) within the range of the small basaltic Dalton plateau (= Ramat Dalton) located at about 800–850 m asl and surrounded by mountains primarily made of limestone and chalk. At this site, within a narrow area of a few square kilometers and close to the artificial Dalton reservoir, about 20 temporary natural winter pools of various sizes are found (Figs. 1–3), which hold water from January to late May.

The area is well known for the large number of rare and endangered plant species it supports. In just one square kilometer, 38 rare plant species have been recorded, and 12 of them are considered endangered in Israel (“red taxa”), such as *Eryngium barrelieri* (Apiaceae), *Trifolium israeliticum* (also endemic), and *Vicia hulensis* (Papilionaceae) (Shmida et al., 2011). Some other notable plant species recorded during our surveys were *Veronica syriaca* (Scrophulariaceae) (Fig. 3), *Romulea bulbocodium* (Iridaceae), *Ranunculus aquatilis* (Ranunculaceae), and an extremely abundant species of *Medicago* (Fabaceae). Overall, the Ramat Dalton region can be considered as a disjunct enclave of the vast basalt area east of the Jordan (Jebel Druze—to the Golan). Biogeographically,

it comprises a continental marginal Mediterranean biota, which is enriched in many derived Irano–Turanian elements. In addition, several endemic species of aquatic invertebrates were recorded in the temporary winter pools (Gasith et al., 2009), and horse, cow, and gazelle herds graze the vegetation (Fig. 2). Due to this biological richness, especially of rare plants, it has been suggested both by scientists and various other authorities to declare this area officially as a nature reserve.

The entomofauna of the plateau has never been systematically explored. Individuals of the new *Phyllolabis* species were first detected and collected by the second author during a survey of aquatic invertebrates of the winter pools while they were wandering near the water edge.

To date, the genus *Phyllolabis* Osten Sacken, 1877, comprises 46 species from the Nearctic (13 spp.), Palaearctic (19 spp.), and Oriental (14 spp.) regions (Oosterbroek, 2011). Alexander (1961) mentioned the fact that *Phyllolabis* species were collected only in the Northern Hemisphere and emphasized a marked concentration of the species in the Himalayas. It seems, however, that this genus, generally confined to mountains, may be similarly species-rich in other mountainous regions. In addition to some characters of the wing venation (e.g., crossvein m-cu at distal end of discal cell) and thorax (meron well-developed), *Phyllolabis* is mainly characterized by its large, highly modified and complex male terminalia. Relationships of the genus seem to be with *Crypteria* Bergroth, 1913, *Neolimnophila* Alexander, 1920, *Cladura* Osten Sacken, 1860, and some other genera, including *Chionea* Dalman, 1816 (Starý, 1992, see Remarks below). Recently, two of us (Starý and Freidberg, 2007) described *Phyllolabis golanensis* from Israel, apparently the first species of the genus in which brachypterous females are known, although the halteres of this species are normal for the genus even in the females. In the new species we describe here, both wings and halteres are reduced in both sexes. While wings are rather frequently reduced to varying degrees in various unrelated crane fly taxa, especially in females, reduction of the halteres appears to be rare, and is shared only by the micropterous *Chionea* Dalman. Thus, the reduced halter is the most significant single diagnostic character for this new species.

Terminology follows closely McAlpine (1981). The following acronyms are used in the text: TAUI—Tel Aviv University, Department of Zoology, Tel Aviv, Israel; JSO—Collection of J. Starý, Olomouc, Czech Republic. The holotype and most paratypes are deposited in TAUI; some paratypes are deposited at JSO and in The Natural History Museum, London (BMNH), and the United States National Museum of Natural History (Smithsonian Institution), Washington, D.C. (NMNH).

TAXONOMY

Phyllolabis parvialterata Starý, Wizen, and Freidberg, n. sp. (Figs. 1–14)

Description

Small species with reduced wing and halter in both sexes. General body coloration



Figs. 1–3. Habitat and collecting methodology of *Phyllolabis parvihalterata* n. sp. in Ramat Dalton, Israel. 1. Panoramic view of one of the winter pools. 2. A winter pool with nearby *Veronica syriaca* in bloom (5–10 cm tall and blue-white flowers). 3. The third author (AF), demonstrating the apparently best way to detect and collect *P. parvihalterata*. A sweeping net has proved to be useless for that purpose.

dark grayish-brown. Legs comparatively short and stout. Body length (in dry condition) 3.8–4.6 mm, wing length 0.8 mm, halter length 0.2 mm.

Male

Head (Fig. 4). Dark grayish-brown. Antenna 15-segmented, brown, extending to about posterior margin of thorax. Flagellomeres spindle-shaped, decreasing in size towards apex of antenna, last flagellomere slightly constricted in middle, indicating fusion of flagellomeres 13 and 14. Verticils about half length of their respective flagellomeres, arranged in whirls near their bases. Dense, short, suberect, whitish pubescence apparent on all flagellomeres.

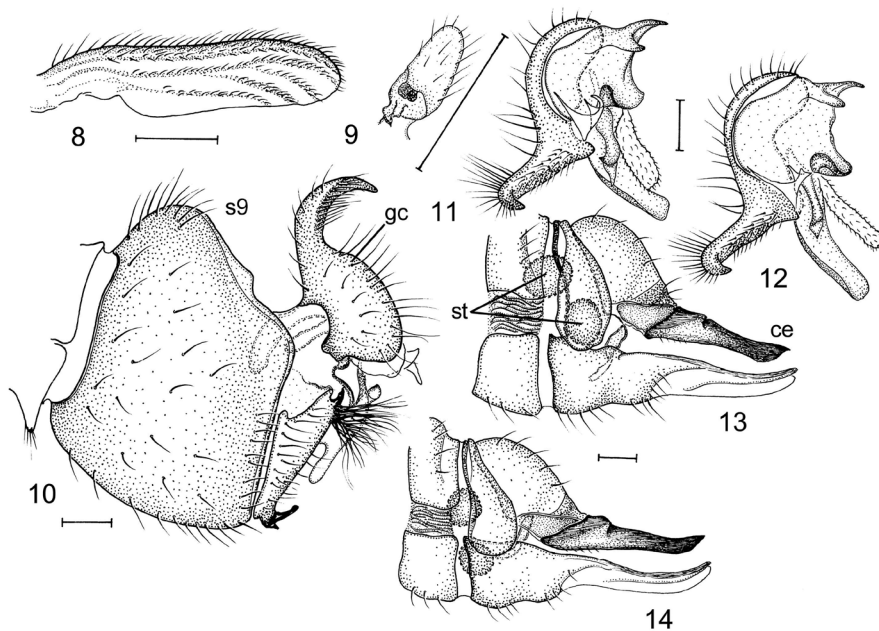
Thorax. Dull brown, in general reduced in accordance with reduction of wings, rather flat dorsally, provided with two longitudinal rows of yellow setae on prescutum and scutum. Transverse suture obliterated. Pleuron with meron reduced compared to condition in fully-winged species. Wing reduced to brachypterous condition, extending slightly beyond first abdominal segment, with venation consisting, in addition to costa,



Figs. 4–7. Habitus photographs taken in the lab (Figs. 4, 5) and photographs taken in nature of live *Phyllolabis parvihalterata* n. sp. 4. Male. 5. Female. 6. Male wandering in his natural habitat. 7. A live male carried by an ant worker, *Messor semirufus* (Formicidae), probably as prey.

of remnants of four longitudinal veins indicated by setulae on wing membrane (Fig. 8). Halter reduced to short, sac-like appendage (Fig. 9). Legs short and stout, brown. Coxae enlarged, mid and hind coxa set close together; femora thickened (Fig. 4) and slightly darkened distally; tibiae slightly darkened distally; tarsal segments 2–5 blackish.

Abdomen. Dark brown, darker than thorax, covered with yellow setae, denser and more extensive dorsally on posterior tergites, and with conspicuous tuft of much longer hairs laterally on sternite 5 (Fig. 4). Both tergites and sternites with protruding posterior corners (most developed in sternite 5), thus abdomen with serrate lateral margins. Male terminalia (Figs. 4, 10–11) unusually large, in general structure similar to those of *Phyllolabis golanensis*, but differing in details. Segment 9 (basal ring) greatly inflated, dark brown, subshiny, paler posteriorly. Posterior margin of tergite 9 broadly and shallowly emarginate, without any projection in middle. Posterior aspect of sternite 9 with darkly pigmented, unevenly bilobed appendage ventrally on each side of median interruption and somewhat anvil-shaped, pale, median structure more dorsally, the latter in canopy of long, fine, pale yellow hairs arising laterally in compact tufts. Gonocoxite with curved process projecting from dorsal aspect of base; this process provided with dense seam of long, golden setae distally. Gonostyli comparatively small, inserted medially on gonocoxite and concealed within hypopygium, not projecting outwardly, but extremely complex, in general similar to the condition in *P. golanensis* (Figs. 11 and 12).



Figs. 8–14. Diagnostic characters of *Phyllolabis* spp. Figs. 8–11, 13. *Phyllolabis parvihalterata* n. sp. (paratype). 8. Wing. 9. Halter. 10. Male terminalia, general, lateral view. 11. Male terminalia, gonocoxite, and gonostyli, medial view. 13. Female terminalia, general, lateral view. Figs. 12, 14. *Phyllolabis golanensis* Starý and Freidberg (paratype). 12. Male terminalia, gonocoxite, and gonostyli, medial view. 14. Female terminalia, general, lateral view. Abbreviations: ce—cerci, gc—gonocoxite, st—spermathecae, s9—segment 9. Scale bars—0.25 mm.

Female

(Fig. 5). Resembling male in general appearance, including reduced wing and halter. Antenna shorter than in male, with flagellomeres more rounded. Abdominal sclerites without protruding posterior corners; no tuft of hairs on sternite 5 (Fig. 5). Female terminalia (Fig. 13): External structure usual for genus (see Nielsen, 1961, Figs. 5–6; Savchenko, 1967, Fig. 3). Tergite 10 strongly vaulted. Cercus shiny dark brown, generally broad, straight, abruptly tapered before apex and produced into sharp point. Ventral margin of cercus slightly concave, indistinctly serrate just before apex. Spermathecae two, large, short-ovoid, and darkly pigmented.

Material Examined

Holotype ♂, ISRAEL: Dalton, 33°01.1'N 35°27.9'E (altitude: 824 m asl, not recorded on the labels), 5.iii.2011, G. Wizen & A. Freidberg. Paratypes: Same collection data as holotype (35♂, 35♀; TAUI, JSO, BMNH, NMNH). Same locality, 1.iii.2011, G. Wizen (2♂; TAUI) (coordinates: 33°01.045'N 35°27.940'E). The holotype is double-mounted, a minuten pin on a plastic block, is in excellent condition and is deposited in TAUI.

Distribution

Israel.

Ecology

On 5.iii.2011, we collected 71 individuals, about equally divided between males and females, that were moving on the muddy ground in the low vegetation (Figs. 1–3, 6). We recorded a few cases of what appeared to be predation of live specimens by workers of the harvester ant, *Messor semirufus* André (Fig. 7). We also observed adults in copula on the ground. The male was above the female and was holding her with his legs, making it almost impossible for a potential rival to reach her. Some of the individuals were taken alive to the lab for photography.

Etymology

The compound name of this new species, *parvialterata*, refers to the reduced halteres (parvus = small, minute), the most significant character of the species, an adjective in nominative singular.

Remarks

Phyllolabis parvialterata n. sp. is readily distinguishable from its congeners based on its reduced wings and halteres in both sexes. It appears to be most closely related to *P. golanensis*, a species with brachypterous females but fully-winged males, and both species appear to be related to *P. theowaldi* Mannheims, from Greece (Starý and Freidberg, 2007). Although the type localities of *P. parvialterata* and *P. golanensis* are only about 30 km apart, they are located on both sides of the Rift Valley, which appears to be a significant barrier to the distribution of species from both east and west of the Rift. While this fact may partly explain the diverging evolution of these species, the edaphic conditions of their habitats (both are basaltic) may support our hypothesis that they have a common ancestor that lived in a basaltic habitat. The structure of the male terminalia of the two species is extremely complex and difficult to describe. The close similarity between these species in this respect is quite surprising and exists even in the modified gonostyli. The slight differences in some parts that are more or less developed or differently shaped are illustrated in Figs. 11 and 12. In any case, we definitely consider these species to be distinct. However, given the great similarity in the male terminalia, these taxa may have diverged quite recently. External characters of *P. parvialterata*, compared to those of *P. golanensis*, do not include only features related to the reduction of the wings, such as the structure of the thorax, halteres, and legs, but also clearly independent traits in the shape of the male abdominal sclerites and the tuft of hair on the male sternite 5, the latter is absent in *P. golanensis*. The female terminalia of the two species likewise exhibit differences in that in *P. parvialterata* tergite 10 is more arched, the cerci are differently shaped, and the spermathecae larger (Figs. 13, 14).

As already mentioned, the thorax is somewhat reduced in *P. parvialterata* in accordance with the reduction of the wings, with the dorsal part rather flat, not as vaulted as in fully-winged *Phyllolabis* species, the transverse suture obliterated, and the coxae

enlarged. The meron is reduced compared to the usual condition in *Phyllolabis*, with the mid and hind coxae close together (in fully-winged *Phyllolabis*, including *P. golanensis*, the meron is well-developed, and the mid and hind coxae are moderately separated, although not as much as in the so-called pot-bellied Eriopterini of Alexander (1947)). In general, the structure of the thorax in *P. parvihalteredata* is similar to that of various brachypterous crane fly females, and is intermediate between the condition in *Chionea* and the fully-winged *Phyllolabis*. Alexander (1916) described *Pterochionea bradleyi* (now in *Cladura* Osten Sacken), considering it, on the one hand, to be closely related to *Crypteria* Bergroth, and, on the other hand, related to *Chionea*. Alexander (1916) did not include *Phyllolabis* in this group, and this was done only relatively recently (Stary, 1992). Reduction of the halteres in *P. parvihalteredata* and in *Chionea* is similar in that in both, the halter lacks the stem (pedicel) (Byers, 1983). This similarity supports the presumed affinity of the two genera.

If *P. parvihalteredata* is indeed restricted to basaltic soils at relatively high altitude and with relatively high precipitation, chances are that it is endemic to the Dalton plateau, as such basaltic enclaves are rare in Israel west of the Rift Valley. This would add considerably to the conservation value of the Dalton plateau which, as mentioned before, deserved special attention from the nature protection authorities of Israel, even before the discovery of this peculiar species.

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