



New records and new species of gall midges (Diptera: Cecidomyiidae) developing on Chenopodiaceae in Egypt

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Abstract

The Cecidomyiidae (Diptera: Bibionomorpha) fauna of Egypt is poorly known. Investigations in northern Egypt in 2013 revealed the presence of seven species of gall midges on three host plant species: *Atriplex halimus* L., *Arthrocnemum macrostachyum* (Moric.) and *Suaeda pruniosa* Lange (all Chenopodiaceae). Among the gall midges, *Baldratia salicorniae* Kieffer and *Stefaniella trinacriae* De Stefani are reconfirmed records in Egypt; *Houardiella gracilis* Dorchin & Freidberg and *Asphondylia punica* Marchal are new records; and *Baldratia karamae* Elsayed & Skuhravá **n. sp.**, *Primofavilla aegyptiaca* Elsayed **n. sp.** and *Stefaniella skuhravae* Elsayed **n. sp.** are new to science. Adult morphology of the latter three new species is described and illustrated, and their biology and geographic distribution are given.

Key words: *Atriplex*, *Arthrocnemum*, *Suaeda*, taxonomy

Introduction

The family Cecidomyiidae (Diptera: Bibionomorpha), or gall midges, is one of the largest families of Diptera (Gagné 1994), with 6203 species in 736 extant and fossil genera worldwide (Gagné & Jaschhof 2014). Cecidomyiidae show a great diversity of larval feeding habits, ranging from mycophagous, through highly specialized phytophagous (including gall makers), to zoophagous, with many species predaceous on insects and other invertebrates, or endoparasitic in aphids and psyllids (Harris 1994). About three-fourths of Cecidomyiidae species are phytophagous (Skuhravá *et al.* 1984, Gagné & Jaschhof 2014).

More than 3100 gall midge species are known in the Palaearctic region (Skuhravá 2006), to which Egypt belongs (Soós & Papp 1986). Skuhravá (1986) referred to 25 species of gall midges occurring in Egypt, based mainly on information from Steyskal & El-Bialy (1967). At present, the known gall midge fauna includes 48 species (including new records and new species of the present study) (Skuhravá *et al.* 2014).

Plants in the goosefoot family (Chenopodiaceae) are typically annual herbs, subshrubs, shrubs, or more rarely perennial herbs or small trees. It contains about 100 genera and 1400 species, most of them adapted to arid regions, deserts, and saline habitats outside of southern Africa. Many species have economic importance, such as the sugar beet *Beta vulgaris* L., or are medicinally important, such as *Dysphania ambrosioides* (L.) and *Salsola collina* Pall. Many other species are used as forage by animals in desert, semi-desert, and steppe regions (Gelin *et al.* 2003).

Chenopodiaceae are well known to be host plants for gall midges, as more than 300 gall midge species have been recorded from about 115 chenopod species. Lasipterini is the main tribe of gall midges infesting chenopods, but some members of the tribes Asphondyliini, Oligotrophini, and Alycaulini have also been recorded from them (Dorchin 1998).

Dorchin (1998) stated that further surveys throughout North Africa, the Middle East, and central Asia are necessary to clarify the biodiversity of Cecidomyiidae in those regions. The present work is a contribution to add to the understanding of the Egyptian Cecidomyiidae fauna.

pair of anterior, small, trichoid sensilla; tergite 8 very narrow, about 0.33 width of tergite 7, with median pair of trichoid sensilla. Sternites 1–7 with scattered setae, in addition to posterior row of strong hyaline setae; sternum 8 undifferentiated from the surrounding membranous tissue. Genitalia (Fig. 28): Gonocoxite slightly elongate, with setulose mediobasal lobe. Gonostylus 0.5 times as long as gonocoxite, arched, ending with a strong tooth. Cerci fused at base, forming one apically notched sclerite, setulose. Hypoproct entire, setulose, shorter than tips of cerci, with rounded tip. Parameres dorsally covered with dense tiny setae, and surrounding aedeagus. Aedeagus cylindrical, straight, slightly longer than parameres, with truncate tip. **Female:** (Fig. 29): Tergites 1–7 with 1–2 posterior rows of strong, hyaline, setae, and anterior trichoid sensilla; tergite 8 weakly sclerotized, about half width of tergite 7, divided into two sclerites. Sternites 2–7 with 1–2 posterior rows of hyaline setae. Ovipositor: segment 8 with lateral group of strong, curved, internally directed setae; membranous part rugose with papillae surrounded with tiny spines. Segment 9 (ovipositor trunk) with two sclerotized rods that widen posteriorly, forming weakly sclerotized triangular plate covered with tiny spines. Lateral plate bearing about 25 thick and strong setae. Aculeus straight, thick, tapered at apex, with two rows of tiny setae, every row consists of ~22 setae. Apical lamella rectangular and setose.

Holotype. Female, Egypt, El-Amria district (30°59'54.00"N, 29°49'7.00"E), 4. VI.2013, A. K. Elsayed reared from galls on male floral inflorescences of *Atriplex halimus*.

Paratypes. All material from Egypt, El-Amria district, Alexandria, reared by A. K. Elsayed from galls on male floral inflorescences of *A. halimus*. 1 males, 12.VI.2013; 1 male, 13.VI.2013; 2 females, 14.VI.2013; 2 females, 3 males, 16.VI.2013; 4 males, 17.VI.2013; 5 males, 2 females, 19.VI.2013; 8 males, 20.VI.2013; 1 female, 22.VI.2013; 2 females, 24.VI.2013.

Distribution. Egypt (El-Amria district).

Etymology. This species is named in honor of Mrs. Marcela Skuhravá, the Czech entomologist and expert on the family Cecidomyiidae (Diptera).

Biology. Larvae of *S. skuhravae* induce small, slight swellings (Fig. 9 and 10) on male floral inflorescences of the salt marsh plant *Atriplex halimus*. The gall consists of a single chamber, and pupation takes place inside it. The pupal exuviae protrude from the emergence hole, and can be distinguished by their hyaline color. The galls were collected and the adults emerged from the end of May to October 2013.

Remarks. The genus *Stefaniella* contains 9 species (Gagné & Jaschhof 2014). Dorchin & Freidberg (2008) revised all the species and found no significant differences between them in morphological characters. They concluded that study of the immature stages is needed, and molecular study will be useful to determine relationships between the species. They added that the currently the best characters for distinguishing species of *Stefaniella* are those of their galls.

There are two known species of *Stefaniella* that induce galls on *A. halimus*: *S. atriplicis* Kieffer, 1898 and *S. trinacriae* De Stefani, 1900 (Dorchin & Freidberg 2008, Gagné & Jaschhof 2014). *Stefaniella atriplicis* induces small stem galls, each gall about 4–5 mm in diameter and multiple chambers (Skuhravá *et al.* 2007). *Stefaniella trinacriae* induces large galls on the stems, each gall about the size of a hazelnut and having multiple chambers. In contrast to the preceding species, *S. skuhravae* induces small galls on the male floral inflorescence, and each gall consists of only a single chamber. Therefore, we consider it to be a new species.

Acknowledgements

We would like to express our thanks to Prof. Dr. Amin E. Aly (Department of Crop Science, Faculty of Agriculture, Alexandria University, Egypt) for identification of the host plant species. We thank Drs. Keith M. Harris and Makoto Tokuda for their valuable comments on the draft of this paper. Drs. Raymond J. Gagné and Mathias Jaschhof also provided important comments on a previous version of this manuscript.

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