

Five new records of gall midges (Diptera: Cecidomyiidae) from Iran

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Abstract: Five gall midge species were identified as new records for the fauna of Iran from the Joghatay region of Razavi Khorasan Province, NE Iran. These species are *Campylomyza flavipes* Meigen, 1818 (Micromyinae); *Micromyza lucorum* Rondani, 1840 (Micromyinae); *Rabdophaga salicis* (Schrank, 1803) (Cecidomyiinae); *Rhopalomyia efremovi* Fedotova, 1999 (Cecidomyiinae); and *Rhopalomyia monogynasphaera* Fedotova, 1999 (Cecidomyiinae). As many parts of the country have not been studied in terms of Cecidomyiidae fauna, the gall midge fauna of Iran will be increased considerably with further research.

Key words: Cecidomyiidae, Cecidomyiinae, Micromyinae, fauna, Insecta

Cecidomyiidae is a large family of nematoceros Diptera with 6203 species in the world (Gagné and Jaschhof, 2014). Many of them are well known as plant gall makers. Their larvae have a variety of feeding habits. Many of them are herbivores and are considered to be important destructive pests. Some species are fungivorous or saprophagous and are found in soil among fallen leaves, logs, and manure. A number of species are important predators of other arthropods such as aphids, psyllids, scale insects, and mites.

As in the case of other insect groups, the gall midges of Iran have not been adequately studied. Modarres Awal (2011) reviewed the literature and listed only 15 species. Recent works (Hashemi Khabir et al., 2011; Karimpour and Skuhrava, 2012; Sadeghi et al., 2012; Joghataie et al., 2013; Honarmand et al., in press) have added more species as new records. Before the present study, the total number of recorded gall midges in Iran was only 24 species. Of course, this list is far from complete, as the fauna of many regions of the country has never been investigated so far. In order to address this issue and improve our knowledge of the Iranian fauna, and to facilitate further detailed research, the present study investigated the fauna of gall midges in the Joghatay region (26°25'N to 36°53'N, 56°36'E to 57°16'E) of Razavi Khorasan Province of Iran for the first time.

During the years 2011 and 2012, the first 2 authors conducted a faunistic survey on gall midge species associated with different plants including field crops, trees, and wild vegetation like *Artemisia* spp. and *Astragalus* spp. The study area was located in the northeastern region of Iran, where no previous studies have been conducted. We surveyed each locality by walking through it slowly while buds, leaves, flowers, fruits, and stems of herbaceous plants, shrubs, and trees were visually examined. Several specimens of each host plant with galls were put in separate small plastic bags and brought to the laboratory. Some specimens of each host plant with galls were placed in small emergence cages to obtain adults. In addition, some galls with larvae were put into vials with 75% alcohol for morphological studies. In the meantime, some adult specimens were collected with a hand net by sweeping vegetation in cereal and alfalfa fields. Species were identified by the third author. Identification of galls is based on Houard (1908–1909) and Buhr (1964–1965); that of adults is based on Skuhrava (1997). Systematic knowledge follows Gagné (2010) and Gagné and Jaschhof (2014). Voucher specimens are deposited in the collection of the Department of Plant Protection, Ferdowsi University of Mashhad, Iran. Some specimens are also held in the collection of Marcela Skuhrava (Prague, Czech Republic).

The occurrences of *Campylomyza flavipes* Meigen, *Micromyza lucorum* Rondani, *Rabdophaga salicis* (Schrank), *Rhopalomyia efremovi* Fedotova, and *Rhopalomyia*

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monogynasphaera Fedotova in Iran are reported for the first time. The first 2 species belong to the subfamily Micromyinae and the rest belong to Cecidomyiinae.

Campylomyza flavipes Meigen, 1818

Subfamily: Micromyinae

Tribe: Campylomyzini

Material examined: 1 ♂, 2 ♀♀, collected from a corn field in Joghatay (36°37'55"N, 57°04'22"E), 21 August 2012, leg. M. Joghata; 1 ♂, collected from an alfalfa field in Joghatay (36°37'55"N, 57°04'22"E), 22 August 2012, leg. M. Joghata; 1 ♂, collected from an alfalfa field in Shahrestanak (36°42'20"N, 57°10'1"E), 4 September 2012, leg. M. Joghataie.

Remark: The larvae of this species are saprophagous or mycophagous and are found in soil among fallen leaves, logs, and manure.

General distribution: Widespread Holarctic (East Palearctic, Sweden, Ukraine, Russia, Spain, Austria, Britain, Estonia, France, Germany, Sweden, Netherlands, Latvia, Lithuania, USA, and New Zealand) (www.faunaeur.org; Gagné, 2010).

Micromya lucorum Rondani, 1840

Subfamily: Micromyinae

Tribe: Micromyini

Material examined: 3 ♂♂, collected from a corn field in Joghatay (Kalateh Ghorbanali; 36°36'14"N, 57°04'32"E), 7 August 2012, leg. M. Joghataie.

Remark: This species was identified based on adult specimens collected by hand net in a corn field. It is said that the larvae of this species, like other members of the subfamily, are mycophagous or sapromycophagous and develop in decaying plant materials and in soil.

Distribution: Austria, Britain, Germany, Northern Ireland, Italy, Latvia, Hungary, Lithuania, Russia, Spain, the Netherlands, Ukraine, East Palearctic, Uzbekistan, Russia (Far East), North Africa (Algeria), USA (Minnesota), Mexico, Costa Rica, and Dominica (Gagné, 2010).

Rabdophaga salicis (Schrank, 1803)

Subfamily: Cecidomyiinae

Tribe: Dasineurini

Material examined: This species was identified based on the characteristic features of galls on shoots of the host plant *Salix alba* (Salicaceae) collected in Joghatay (Abas Abad; 36°47'02"N, 57°10'22"E), 7 September 2012, leg. M. Joghataie.

Remark: Larvae cause globular or cylindrical galls on branches of *Salix* spp. (Salicaceae). Collected gall-swellings on the shoots of *Salix alba* were about 10 mm in diameter; inside each gall was a chamber with 1 larva.

General distribution: Euro-Siberian. It is a species with a large distribution area, known from 20 countries in Europe, from several countries in Asia, and from northern Africa (Skuhrava, 1986, 1997).

Rhopalomyia efremovi Fedotova, 1999

Subfamily: Cecidomyiinae

Tribe: Rhopalomyiini

Material examined: Several galls on shoots of *Artemisia* sp. (Asteraceae), and 1 ♀, collected in Kalateh Ghorban Ali in the vicinity of Joghatay (36°36'14"N, 57°04'32"E), 18 May 2012, leg. M. Joghataie.

Remark: The examined female specimen was reared from spindle swelling galls on side shoots of *Artemisia* sp.; galls were about 15 mm long and 10 mm broad; inside with a chamber, outer walls of galls were smooth.

General distribution: This species has only been recorded from Kazakhstan on *Artemisia dracunculus* (Asteraceae) (Gagné, 2010).

Rhopalomyia monogynasphaera Fedotova, 1999

Subfamily: Cecidomyiinae

Tribe: Rhopalomyiini

Material examined: Several galls on shoots of *Artemisia* sp. (Asteraceae), and 2 ♀♀, Kalateh Ghorban Ali in the vicinity of Joghatay (36°36'14"N, 57°04'32"E), 18 May 2012, leg. M. Joghataie.

Remark: The examined specimens were reared from rounded galls on thin shoots of *Artemisia* sp.; galls 8–10 mm in diameter, composed of woolen fibers. For the first time, this species was described based on specimens collected from *Artemisia monogyna* (Asteraceae) (Gagné, 2010); this is the second record of it in the world.

Distribution: Kazakhstan and Iran.

Based on recorded gall midge species from Iran, it is obvious that the fauna of gall midges of Iran, with an area of 1,600,000 km² and varying natural conditions, is far from complete. This argument is supported when Iran is compared with a country like Kazakhstan, which is located in a similar geographic region, where in an area of 2,780,000 km² a total of 804 gall midge species have been recorded (Skuhrava and Skuhravy, 2009). The species richness of gall midge species in a country is influenced by several factors, including geographic position, climatic factors, size of the country, floral composition, and anthropic factors, and also by the intensity of investigations and the ability and experience of researchers (Skuhrava and Skuhravy, 2009).

The results presented here have added 5 new species to the Cecidomyiidae fauna of Iran; thus, the Iranian gall midge fauna has now reached 29 species, which is very little when compared with the 6203 known species in the family worldwide. Thus, it can be expected that with further research in different parts of the country, the recorded Iranian gall midge fauna will be considerably increased.

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