

Faunistic survey of Entomobryidae family (Collembola: Hexapoda) in Iran

MEHRI SHOEIBI, MASOUMEH SHAYANMEHR, ELHAM YOOSEFI LAFOORAKI &
MAHMOOD MEHRAFROOZ MAYVAN

Abstract

To carry out the present research soil and leaf litter from different forests in Mazandaran province (in northern Iran) and parks in Markazi province (in western Iran) were transferred to the laboratory and the specimens were extracted by Berlese funnels and were identified. Six species belonging to family Entomobryidae were collected and two new species are recorded for Iranian fauna of Collembola. *Entomobrya quinquelineata* Börner, 1901 and *E. mesopotamica* Rusek 1981 are recorded for the first time from Markazi province (Iran).

Keywords: Collembola, Entomobryidae, Iran, Mazandaran, Markazi.

Introduction

The class of Collembola is divided to four orders Poduromorpha, Entomobryomorpha, Symphypleona and Neelipleona (JANSSENS and CHRISTIANSEN 2011). The order of Entomobryomorpha has a greatly reduced prothorax and the fourth abdominal segment is two to four times longer than the third segment in most families (D'HAESE 2003). The family of Entomobryidae SCHÖTT, 1891 within this order is characterized by the mucro: with 2 teeth or falcate, with or without basal spine. Antennae with 4 to 6 segments and body with or without scales are other characters of the Entomobryidae (JORDANA 2012). The family is divided in three subfamilies: Capbryinae, Entomobryinae, Orchesellinae (SOTO-ADAMS *et al.* 2008). In this investigation some species belonging to this family were collected from two provinces, Mazandaran and Markazi, in Iran. Mazandaran province is situated in northern Iran and has a moderate Caspian weather. Markazi province is located in western Iran and the climate of this province is semi-arid, moderate and cold mountainous type. The most important study on Iranian fauna of Collembola was performed by COX (1982). In this research she recorded some species from Mazandaran province. Also YAHYAPOUR (2012) had a survey on Collembola fauna of Sari region in this

province. Up to present, nobody has studied on Collembola fauna in Markazi province and the present study is the first work in this field from this province.

Material and Methods

To perform the present study the sampling was done in forests in Mazandaran province and from parks in Markazi province. Specimens were extracted from litter and soil by the Berlese funnels and preserved in 75% alcohol. Obtained specimens were cleared in potassium hydroxide and mounted on slides in Hoyer's medium and identified by systematic keys such as FJELLBERG (2007) and JORDANA (2012).

Results

In sum, six species belonging to family Entomobryidae were collected and two new species are recorded for Iranian fauna of Collembola. Short report on distribution and diagnostic characterizations of collected and identified species are given below:

Subfamily Entomobryinae:

Entomobrya quinquelineata BÖRNER, 1901

Material examined: Markazi province, Arak industrial park, N34°04' E49°50', 4 December 2012 and 25 January 2013.

Distribution: Europe (Germany, Switzerland, the Netherland, Lithuania and Spain) and Austria (JORDANA 2012), Iran: This species is recorded for the first time from Iran.

Habitat: The soil under *Fraxinus* sp. and *Ulmus* sp.

Description: With 8 ommatidy and smooth labral papillae. Antennal length 1000 μm , 2-3 times the length of the head and fourth segment of antennae with a simple apical vesicle. Claw with 4 teeth on internal edge: first pair at 50% distance from base of claw, and 2 unpaired teeth, first one at 72% distance from base and the most distal one minute. Dorsal tooth basal. Empodium spike-like with smooth external edge on leg III. Mucro with 2 teeth, subapical tooth in size similar to the apical one. Mucronal spine present (JORDANA 2012).

Entomobrya mesopotamica RUSEK 1981

Material examined: Markazi province, Arak Wildlife Refuge, N34°03' E49°46', 13 May 2012 and 1 February 2013.

Distribution: Baghdad, Al Jadriyah (Iraq) (RUSEK 1981, JORDANA 2012), Iran: This species is recorded for the first time from Iran.

Habitat: The soil under the *Buxus* sp. and *Salix* sp.

Description: With 8 ommatidy. Labral papillae with a chaeta-like projection. Antennal length 590 μm , 2-3 times the length of the head and fourth segment of antennae with a simple apical vesicle. Claw with 4 teeth on internal edge: first pair at 45% distance from base of claw, and 2 unpaired teeth, first one at 71% distance from base and the most distal one minute. Dorsal tooth approximately at the level of internal pair of teeth. Empodium spike-like with smooth external edge on leg III. Mucro with 2 teeth, antero-apical tooth smaller than the apical one. Mucronal spine present (JORDANA 2012).

Entomobrya lindbergi STACH, 1960

Material examined: Mazandaran province, Sari, N36°34' E53°03', 18 December 2012.

Distribution: South Palearctic, Afghanistan, Egypt, UAE and Yemen (JORDANA 2012), Iran: Tehran (MORAVVEJ 2003), Gilan/Rasht (DAGHIGHI 2012).

Habitat: The leaf litter under *Morus* sp.

Description: With 8 ommatidy. Labral papillae wrinkled or with some projections. Antennal length 1039 μ m, 2-3 times the length of the head, fourth antennal segment with bilobed apical vesicle. Claw with 4 teeth on internal edge: first pair at 50% distance from base of claw, and 2 unpaired teeth, first one at 75% distance from base and the most distal one minute. Dorsal tooth basal. Empodium spike-like, with smooth external edge on leg III. Mucro with 2 teeth, antero-apical tooth bigger than the apical one. Mucronalspine present (JORDANA 2012).

Pseudosinella octopunctata BOERNER, 1901

Material examined: Markazi province, Arak industrial park, N34°06' E49°42', 1 February 2013, Arak/Mostafakhomeyni industrial park, N34°04' E49°50', 25 January 2013, Arak Wildlife Refuge, N34°03' E49°46', 1 February 2013, Mazandaran province, Sari/Semeskandeh Wildlife Refuge, N36°32' E52°7', 22 March 2013.

Distribution: Cosmopolitan (FJELLBERG 2007), Iran: Central, Mazandaran, Gilan, East Azarbaijan, West Azarbaijan, Zanjan (COX 1982), Mazandaran/Sari (YAHYAPOUR 2012).

Habitat: The leaf litter and soil under *Ulmus* sp., *Buxus* sp. And *Poa* sp.

Description: Color white, with diffuse bluish grey pigment on antennae and dorsal and ventral side of head, body with scattered brownish red pigment. With 4 ommatidi. Maxillary outer lobe with 3 sublobal hairs and a small spine. Claws narrow, with small paired inner teeth, posterior slightly larger and more distal than anterior. Lateral teeth small, set beyond middle of unguis. Fourth segment of abdomen with 3+3 macrochaetae in the median field (FJELLBERG 2007).

Subfamily Orchesellinae:

Heteromurus major (MONIEZ, 1889)

Material examined: Mazandaran province, Noor/Sisangan Wildlife Refuge, N36°28' E51°49', 28 September 2012, Lafoor, N36°12' E52°47', 20 October 2012, Sari/Semeskandeh Wildlife Refuge, N36°32' E52°7', 23 November 2012 and 22 March 2013.

Distribution: Algeria (north), Austria, Bulgaria, Chile, Czechoslovakia, France, Germany, Greece, Hungary, Italy, Mexico, Palestine, Portugal, Romania, Spain, Switzerland, USSR (Azerbaijan SSR), Yugoslavia (MARI MUTT 1980), Iran: Central, Mazandaran, Gilan, East Azarbaijan (COX 1982), Mazandaran/Sari (YAHYAPOUR 2012), Gilan/Rasht (DAGHIGHI 2012).

Habitat: The leaf litter and soil under *Quercus* sp.

Description: Coloration variable. With 8+8 ocelli, Tibiotarsi without smooth setae. Ungues quadridentate, seldom tridentate. Unguiculus with small outer tooth. Tenent hair apically clavate. Furcula without smooth setae. Mucro with basal spine (MARI MUTT 1980).

Heteromurus nitidus (Templeton, 1835)

Material examined: Mazandaran province, Savadkooh/Jawarem Wildlife Refuge, N36°13' E52°53', 3 June 2012, Sari/Semeskandeh Wildlife Refuge, N36°32' E52°7', 22 March 2013.

Distribution: Cosmopolitan, Iran: Mazandaran, Gilan (COX 1982).

Habitat: Leaf litter

Description: White or with diffuse reddish pigment on body and under the 1+1 ocelli. Head and body with blunt finely striate scales which are also present on antennae, legs and furca. Manubrium with about 10+10 smooth dorsal setae, dens with one dorsal smooth seta near base. Tibiotarsi with a double row of smooth setae on the inner side. Apical tenent hair short, pointed. Claws with a pair of small subequal inner teeth set in the middle of unguis ventral edge, sometimes with a weak distal tooth in distal 1/3. Lateral teeth small, set near base. Unguiculus with a ventral tooth (FJELLBERG 2007).

Discussion

A total, six species were collected and identified in this research. Two species, *Entomobrya quinquelineata* and *E. mesopotamica* are recorded for the first time for Iranian fauna which were collected from Markazi province. The species, *E. lindbergi* is recorded for the first time from Mazandaran province. Until now, 8 species of *Entomobrya* genus were recorded from Iran (COX 1982, MORAVVEJ 2003, DAGHIGHI 2012, KAHRARIAN *et al.* 2012, YAHYAPOUR 2012), which has reached to 10 species by this study. The species *Pseudosinella octopunctata* is recorded for the first time from Markazi province. Five species belonging to this genus are recorded from Iran by other researches (COX 1982, DAGHIGHI 2012, YAHYAPOUR 2012, GHAHRAMANINEZHAD *et al.* 2013). Iranian Entomobryidae fauna is included a total of 25 species up to now (COX 1982, MORAVVEJ 2003, NEMATOLLAHI *et al.* 2003, KAHRARIAN *et al.* 2011, DAGHIGHI 2012, YAHYAPOUR 2012, GHAHRAMANINEZHAD *et al.* 2013, YOOSEFI LAFOORAKI and SHAYANMEHR 2013) and by the present study, the list of species has increased to 27. The number of species is expected to increase in the future, especially in Markazi province.

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MEHRI SHOEIBI, MASOUMEH SHAYANMEHR
ELHAM YOOSEFI LAFOORAKI, MAHMOOD MEHRAFROOZ MAYVAN

Agricultural Entomology
Sari University of Agricultural Sciences and Natural Resources
Sari, Iran, Po. Box. 578
Corresponding author's email
eyoosefi@ymail.com
Telephone number
(+98) 151-3822567