



## PRELIMINARY CHECKLIST OF THE COLLEMBOLAN FAUNA IN KERMANSHAH, SAHNEH AND HARSIN COUNTIES (KERMANSHAH: IRAN) WITH THREE NEW RECORDS FROM IRANIAN FAUNA

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### ABSTRACT

Preliminary checklist of the collembolan fauna in three counties of Kermanshah province (Kermansha, Sahneh and Harsin) were studied during 2010-2011. The present list contains 6 families, 15 genera and 9 species of which three species (*Desoria Tigrina*, *Fulsomides marchiws* and *Ceratophysella stercoraria*) and two genera (*Prodrepanura* and *Protaphorura*) are the first record for the Iranian fauna. All fauna are the first record from Kermanshah Province.

**Keywords:** Collembola, checklist, Iran, Kermanshah, new records

### INTRODUCTION

Springtails (Collembola) are one of the most important and abundant arthropod in the soil. They play an ecological role in soil genesis, dynamics and evolution (Palacios-Vargas, 1985). They also have an important role in the food chain by decomposition and soil respiration. In the recent years, Springtails have been used as model arthropods in basic research in soil ecology, and have been used as test organisms for soil ecotoxicological work such as the cladoceran, *Daphnia pulex*, has been used for tests of water quality (Van Straalen and Løkke, 1997).

The Collembolan fauna of several countries in the world has already been overviewed in the recent past (e.g. Mandal and Hazra, 2009) and about 8000 species has been described worldwide (Bellinger *et al.*, 2009). In spite of this fact, the Collembolan fauna of Iran has been studied by only a few workers and nobody examined Collembolan fauna in Kermanshah province until now.

The first records of Collembolan referring to Iran are noted by Cox in 1982. He listed 70 species belonging to 30 genera in 5 families from the northwestern and central north provinces of the country, of which 17 were belonging to the family Isotomidae and 14 species (6 genera) of them were belonging to the family Entomobryidae (Cox, 1982). After a relatively long spell of time some workers recorded different Collembolan fauna from some different parts of Iran.

Moravvej *et al.* (2003) identified 5 families and 14 genera of Collembola from the Tehran region with 5 of them belonging to the family Entomobryidae (*Entomobrya handscici*, *E. unostriigata*, *E. lindbergi*, *Pseudosinella octopunctat* and *Sinella curviseta*). Also Moravvej *et al.* (2007) described 5 species of Isotomidae from the Tehran region including two new records for the fauna of Iran. Baquero *et al.* (2008) reported *Entomobrya handschini* from Iran. Nematollahi *et al.* (2009) found 3 species of Entomobryidae (*Sinella tenebricosa*), Isotomidae (*Proisotoma minuta*) and Hypogastrudidae (*Ceratophysella* spp.) in vegetables and ornamentals greenhouses in Esfahan province. Kahrarian *et al.* (2011) reported genus *Prodrepanura* as a new record for the fauna of Iran.

### MATERIAL AND METHODS

This study was based on specimens collected from three counties; Kermanshah, Sahneh and Harsin Located in Kermanshah Province. The sites from which samples were taken are shown in (Fig.1). Kermanshah Province is located in the western part of Iran. It has a moderate and mountainous climate and elevation average of about 1350 metres above sea level. It rains most in winter and is moderately warm in summer. The annual rainfall is 500 mm. The average temperature in the hottest months is above 22°C.

Samples were collected from the surface layer of soil and

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plant debris that existed under the trees. The species were extracted from soil samples using Berlese Funnel and kept in 75% ethanol before sorting. In order to prepare specimens for identification, they were fixed by clearing for 1-2 min in 10% KOH in individual glass well. After cleaning, specimens were mounted in Hoyer's mounting liquid on slides for microscopic studies. The most collembolan samples were identified at the genus level according to Christiansen and Bellinger (1998) or send to Dr. Bruno Bellini (Entomobryidae), Dariusz Skarzynski (Hypogastruridae) and Javier Arbea (Isotomidae) for identification.

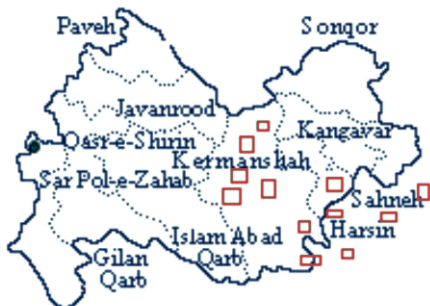


Fig.1 Kermanshah province map. Sampled area is marked with squares.

**RESULTS**

The updated number of Collembola species recorded from these three counties distributed in 6 families, 15 genera and 9 species. The most widely distributed family were Isotomidae with 8 genera. The habitats most abundant in Collembola species were in Kermanshah and Harsin surface layer of soil and plant debris respectively.

**1- A Key to Collembola in Kermanshah Province**

**1-1 Key to the Orders of Class Collembola (3 Orders)**

- 1. Abdominal tergal segmentation distinct; trunk elongate .....2
- Abdominal tergal segmentation indistinct; trunk subglobular .....Symphyleona (Bourletiellidae, *Sminthurus*)
- 2. Prothoracic tergum distinct.....
- Poduromorpha Prothoracic tergum indistinct ..... Entomobryomorpha

**1-2 Key to Families and Genera of the Order Poduromorpha (2 Families, 2 genera)**

- 1. Postantennal organ absent ..... Hypogastruridae, *Ceratophysella*
- Postantennal organ present..... Onychiurinae, *Orthonychiurus*

**1-3 Key to Families and Genera of the Order Entomobryomorpha (2 Families, 5 genera)**

- 1. Body setae mostly ciliate; multilaterally ciliate macrosetae sometimes cylindrical, usually truncate or broadened at the tip; scales absent or present .....2 (Entomobryidae)

- Body setae usually smooth or unilaterally ciliate; multilaterally ciliate macrosetae always acuminate; scales absent ..... 3(Isotomidae)
- 2. Mucro bidentate..... *Entomobrya*
- Mucro falcate ..... *Prodrepanura*
- 3. Fourth and fifth segments distinctly separate, if the separation is indistinct then the non setaceous band separating them is the same width as those between other segments.....4
- Fourth and fifth segments dorsally fused with sixth abdominal segment, often with a non-setaceous band between segments 4 and 5, where this occurs the band is narrower than that between other segments .....

**Gnathofolsomia**

- 4. Chaetotaxy of fifth and sixth abdominal segments strikingly different from fourth in chaetotaxy, both or sometimes only the sixth segment have strong straight macrochaetae and a few normal setae ..... *Isotomodes*
- Chaetotaxy of fifth and sixth abdominal segments not strikingly different, if macrochaetae present there are numerous small setae ..... *Pachyotoma*

**List of Collembolan fauna from Kermanshah County**

The greatest known diversity is found in Kermanshah County with 5 families and 15 genera. These fauna are listed as follow:

**ORDER ENTOMOBRYOMORPHA**

**1- Family: Isotomidae (Schäffer, 1896)**

This family has the greatest diversity in three counties with 8 genera according below:

**Subfamilia: Pachyotominae (Potapov, 2001)**

- Genus:**
- I-1: Pachyotoma* (Bagnall, 1949)

**Subfamilia: Anurophorinae (Börner, 1901)**

- Genus:**
- I-2: Isotomodes* (Linnaniemi, 1907)
- I-3: Cryptopygus* (Willem, 1901)
- Species:** *C. ponticus* (Stach, 1947)

**Subfamilia: Isotominae (Schäffer, 1896)**

- Genus:**
- I-4: Parisotoma* (Schäffer, 1896)
- Species:** *P. notabilis* (Schaffer, 1896)
- I-5: Desoria* (Reuter, 1895)
- Species:** *D. Tigrina* (Nicolet, 1842)
- The first record for Iranian fauna

**Subfamilia: Proisotominae (Stach, 1947)**

- Genus:**
- I-6: Gnathofolsomia* (Deharveng and Christian, 1984)
- I-7: Folsomia* (Willem, 1902)
- I-8: Folsomides* (Stach, 1922)

**Species:** *F. parvalus* (Stach, 1922)  
**Species:** *F. marchicus* (Frenzel, 1941)

**2: Family Entomobryidae (Schäffer, 1896)**  
**Subfamilia: Entomobryinae (Schäffer, 1896)**

**Genus:**  
2-1: *Entomobrya* (Rondani, 1861)  
**Species:** *E. atrocincta* (Schött, 1896)  
2-2: *Prodrepanura* (Stach, 1963)  
The first record for Iranian genera  
**Subfamilia: Seirinae (Yosii, 1961)**  
2-3: *Seira* (Uchida, 1958)  
**Species:** *S. domestica*

#### **ORDER PODUROMORPHA**

**3: Family Hypogastruridae (Börner, 1906)**

**Genus:**  
3-1: *Ceratophysella* (Börner, 1932)  
**Species:** *C. stercoraria* (STACH, 1963)  
The first record for Iranian fauna

**4: Family Onychiuridae (Lubbock, 1867)**

**Subfamilia: Onychiurinae (Börner, 1901)**  
**Genus:**  
4-1: *Orthonychiurus* (Stach, 1954)  
4-2: *Protaphorura* (Absolon, 1901)

#### **ORDER SYMPHYPLEONA**

**5: Family Sminthuridae (Börner, 1906)**

**Genus:**  
5-1: *Sminthurus*  
5-2: *Sphaeridia* (Linnaniemi, 1912)  
**Species:** *S. pumilis* (Bretfeld and Gauer, 1994)  
**List of Collembolan fauna from Sahneh County**

#### **ORDER ENTOMOBRYOMORPHA**

**1: Family: Isotomidae (Schäffer, 1896)**

**Subfamilia: Pachyotominae (Potapov, 2001)**  
**Genus:**  
1-1: *Pachyotoma* (Bagnall, 1949)

**Subfamilia: Proisotominae (Stach, 1947)**

**Genus:**  
1-2: *Gnathofolsomia* (Deharveng and Christian, 1984)  
1-3: *Folsomides* (Stach, 1922)  
**Species:** *F. parvalus* (Stach, 1922)  
**Species:** *F. marchicus* (Frenzel, 1941)

#### **ORDER PODUROMORPHA**

**2: Family Hypogastruridae (Börner, 1906)**

**Genus:**  
2-1: *Ceratophysella* (Börner, 1932)  
**Species:** *C. stercoraria* (Stach, 1963)

#### **ORDER SYMPHYPLEONA**

**3: Family Sminthuridae (Börner, 1906)**

**Genus:**  
3-1: *Sminthurus*  
3-2: *Sphaeridia* (Linnaniemi, 1912)  
**Species:** *S. pumilis* (Bretfeld and Gauer, 1994)

**List of Collembolan fauna from Harsin County**

#### **ORDER ENTOMOBRYOMORPHA**

**1: Family: Isotomidae (Schäffer, 1896)**

**Subfamilia: Pachyotominae (Potapov, 2001)**  
**Genus:**  
1-1: *Pachyotoma* (Bagnall, 1949)

**Subfamilia: Anurophorinae (Börner, 1901)**

**Genus:**  
1-2: *Isotomodes* (Linnaniemi, 1907)

**Subfamilia: Proisotominae (Stach, 1947)**

**Genus:**  
1-3: *Gnathofolsomia* (Deharveng and Christian, 1984)  
1-4: *Folsomides* (Stach, 1922)  
**Species:** *F. parvalus* (Stach, 1922)  
**Species:** *F. marchicus* (Frenzel, 1941)

**2: Family Entomobryidae (Schäffer, 1896)**

**Subfamilia: Entomobryinae (Schäffer, 1896)**

**Genus:**  
2-1: *Entomobrya* (Rondani, 1861)  
**Species:** *E. atrocincta* (Schött, 1896)  
2-2: *Prodrepanura* (Stach, 1963)

#### **ORDER SYMPHYPLEONA**

**3: Family Sminthuridae (Börner, 1906)**

**Genus:**  
3-1: *Sminthurus*  
3-2: *Sphaeridia* (Linnaniemi, 1912)  
**Species:** *S. pumilis* (Bretfeld and Gauer, 1994)

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#### **REFERENCES**

- Baquero, E., H.J. Schulz, A. Moravvej and R. Jordana, 2008. On the identity and geographical distribution of *Entomobrya handschini* Stach, 1922 (Collembola: Entomobryidae). Abh. Ber. Naturkundemus. Gorlitz., S. 257–269.
- Bellinger, P.F., K.A. Christiansen and F. Janssens, 2009. Checklist of the Collembola of the World. <http://www.collembola.org>. 29.11.2009.

- Christiansen, K.A. and P.F. Bellinger, 1998. The Collembola of North America. North of the Río Grande, 2nd Edition, Grinnell College, Iowa.
- Cox, P., 1982. The collembola fauna of North and Western Iran, Entomologists' monthly magazine, 118 (Jan-April), pp. 39-43.
- Kahrarian, M., J. Shaobo, A. Nikpy, L. M. Noor, L., Z. Yan and Z. Yuping, 2011. The first report of genus of Entomobryidae (Hexapoda: Collembola), from Iran. Global Conference on Entomology- (GCE). March 5-9, 2011 Chiang Mai, Thailand.
- Mandal, G.P. and A.K. Hazra, 2009. The Diversity of Collembola (Hexapoda) from East and North East India with some notes on their Ecology. Rec. Zool. Surv. Ind., 298: 1-206.
- Moravvej, S.A., K. Kamali and S.H. Hodjat, 2003. Biodiversity of Collembola of Tehran Region and Preliminary observation on several species. Master of Science thesis in Agriculture Entomology. Tarbiat Modarres University . (In Persian with English abstract).
- Moravvej, S.A., M. Potapov, K. Kamali and S.H. Hodjat, 2007. Isotomidae (Collembola) of the Tehran region (Iran). Zoology in the Middle East. 41
- Nematollahi, M.R., M.R. Bagheri and J.M. Radwanski, 2009. New reports of Collembola for Iran with surveying of their importance in the greenhouses of Esfahan province, Iran. Plant Protec. J., 1(3): 327- 335. (In Persian with English abstract).
- Palacios-Vargas, J.G., 1985. Microartrópodos del Popocatepetl (Aspectos ecológicos y biogeográficos de los ácaros oribátidos y insectos colémbolos). UNAM: Mexico D.F. Thesis Doctoral, pp. 132.
- Van Straalen, N.M. and H. Løkke, 1997. Ecological approaches in soil ecotoxicology. In: Straalen, N.M. and H. Løkke (Eds.). Ecological Risk Assessment of Contaminants in Soil, Chapman Hall, London, pp. 3-21.