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New records of Poduromorpha for the Iranian springtail fauna (Collembola)

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Kahrarian, M.: *New records of Poduromorpha for the Iranian springtail fauna (Collembola)*.
Abstract: In this study the fauna of *Poduromorpha* was investigated in west part of Iran (Kermanshah, Hamadan and Lorestan provinces) during 2013 and 2014. The specimens were collected from the surface layer of soil and leaf litter. Among different species of *Poduromorpha*, *Willemia buddenbrocki* (Huther, 1959), *W. scandinavica* (Stach, 1949) and *Axenyllodes monoculatus* (Jordana & Ardanaz, 1981) are recorded as new for the fauna of Iran. *A. monoculatus* is also new for Asia.

Keywords: new genera, new species, Hypogastruridae, Odentellidae.

Introduction

Collembola or springtails comprise one of the most widespread and abundant groups of terrestrial arthropods. They are found everywhere, to the utmost reaches of multicellular animals in the Antarctic and Arctic and in all habitats except the open oceans and deep areas of large lakes. Among Collembola, Poduromorpha is one of the smallest of the four Collembola orders and easily recognized by having a distinct prothorax that bears dorsal setae and third and fourth abdominal segments that are similar in sizes.

The first study on Poduromorpha in Iran was carried out by Cox (1982). He listed Collembola fauna (70 species belonging to 30 genera in 5 families) from the northwestern and central north provinces of the country, which 30 species of them were belonging to Poduromorpha (Cox 1982). After that, other Iranian researchers started to work on the Collembola fauna in several regions of Iran therefore the list of species increased. Western Iran is a large section of this country. Most of the region is co-located with Zagros Mountains starting from Turkey and Kurdistan and ending in Persian Gulf. Data on the Collembolan fauna in west part of Iran are little known. Prior to this work, only a few papers have been published on this subject (Kahrarian & Arbea 2013, Kahrarian et al. 2012, 2013 and 2014, Ghahramaninezhad et al. 2013). These studies have only been conducted in Kermanshah province and there is no data of Collembola in other provinces.

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Material and Methods

This study was carried out in three provinces (Kermanshah, Hamadan and Lorestan) in western part of Iran during 2013-2014. All specimens were collected from the surface layer of soil and leaf litter. The samples were retained in white plastic boxes and transferred to the Lab. The species were extracted by Berlese funnel, fixed in 75% ethanol and cleared in a Nesbitt solution and mounted on slides with Hoyer medium. Fjellberg's terminology (1998, 2007) was applied for preliminary description and confirmed by Dr. Igor Kaprus.

Abbreviations: Ant. - antennal segment; Abd. - abdominal segment; PAO - postantennal organ; PSO - pseudocelli; Th. - thoracic tergite.

Results and Discussion

Among different species of Poduromorpha, two species of Hypogastruridae and one species of Odentellidae were identified as new for the fauna of Iran. Moreover, *Axenyllodes monoculatus* (JORDANA & ARDANAZ 1981) is also new for Asia. Among these species *A. monoculatus* was recorded in the highest density. The species *Willemia buddenbrocki* (Huther, 1959), *W. scandinavica* (Stach, 1949) and *A. monoculatus* were found in Kermanshah province while *A. bayeri* (Kseneman, 1935) was found only in Hamadan province.

Willemia buddenbrocki (Huther, 1959) Family: **Hypogastruridae**

Examined material: 1 ex, soil and leaf litter under oak trees (*Quercus infectoria*), Chahar zebar-e-oliya area, Kermanshah county, Kermanshah, Iran. November, 2013.

Distribution: This species was reported in some countries such as Germany, Italy, Canary Island, Portugal and Nepal (THIBAUD et al. 2004). It is the first record of this species in Iran.

Description: Small species (body length 0.4 mm); ant. I and II with 6 and 11 setae respectively; ant. III with two guard sensilla which long and bent in the same direction (Fig. 1a); ant. IV with a simple, small eversible apical bulb and 6 sensilla, of which 4 subcylindical and 2 (e_3 and i_2) large and spherical situated in two cavites (Fig. 1a). Labral formula: 2/5, 3, 4. PAO with 12-14 simple lobes (Fig. 1b); Tbiotarsi with 11 setae; empodium very small (about one sixth as long as the length of the claw) (Fig. 1c). Anal spines present and relatively long (THIBAUD et al. 2004).

Dorsal chaetotaxy: Head without seta a_0; Th. II and III with 2+2 setae on the row of m; abd. I-III and V with two rows; abd. IV with 3 rows; sensory setae m_7 on Th. II and III and p_4 on abd. II-IV as candle-like sensilla. The others fine and weakly longer than the normal setae. Sternite on abd. II with a_3 setae; sternite of abd. IV with the setae a_3 and m_1 (THIBAUD et al. 2004).

Willemia scandinavica (Stach, 1949) Family: **Hypogastruridae**

Examined material: 1 ex, soil and leaf litter under oak trees (*Q. infectoria*), Koohenany village, Kuhdasht county, Lorestan, Iran. January, 2014; 1 ex, soil and leaf litter under oak trees (*Q. infectoria*), Shabankareh village, Paveh county, Kermanshah, Iran. November, December, 2013 and January, 2014.

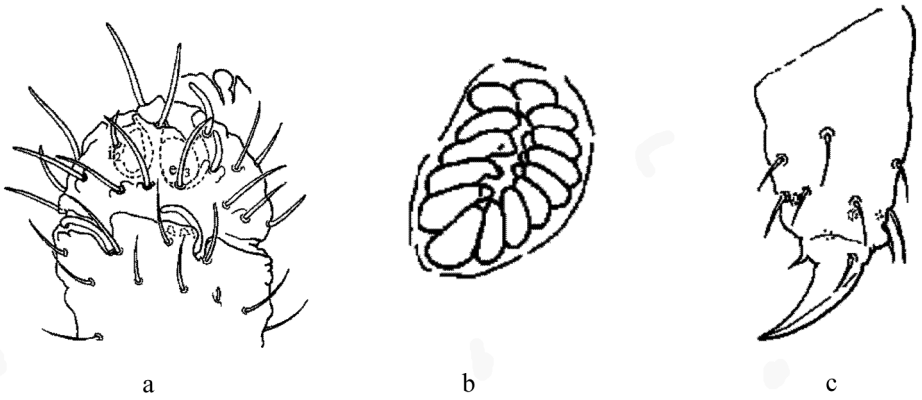

Fig. 1: ***Willemia buddenbrocki.*** **a) ant. IV with reversible apical bulb and ant. III. b) PAO with 14 simple lobes and c) tibiotarsus and claw (THIBAUD et al. 2004)**

Distribution: This species was reported in some countries such as the United States of America, Canada, Mexico, Germany, Austria, Romania, Poland, Norway, Finland, Russia, Italy, the Canary Islands, Portugal, Belarus and Ukraine (THIBAUD et al. 2004). It is the first record of this species in Iran.

Description: Small species (body length 0.6-0.7 mm); ant. I and II with 7 and 12 setae respectively, ant. III with two long and straight guard sensilla (Fig. 2a). ant. IV with a simple, eversible apical bulb and 4 sensilla, of variable shape (Fig. 2a). Labral formula: 4/4, 5, 4. PAO with 5-9 simple lobes (Fig. 2b). Tbiotarsi I-III with 17,17 and 16 setae respectively. Empodial filament about one third as long as the inner edge of the claw. Anal spines small with variable form (THIBAUD et al. 2004).

Dorsal chaetotaxy: Head with seta a_0; Th. II and III with 3+3 setae on row m; abd. I-III and V with two rows; abd. IV with 3 rows. Sensory setae p_4 on abd. I and III weakly candle-like, the others fine and somewhat longer than the normal setae. Sternite on abd. IV with setae a_1 and without row m. Anal vesicle with 18 setae and the setae z and 3 hr present (THIBAUD et al. 2004).

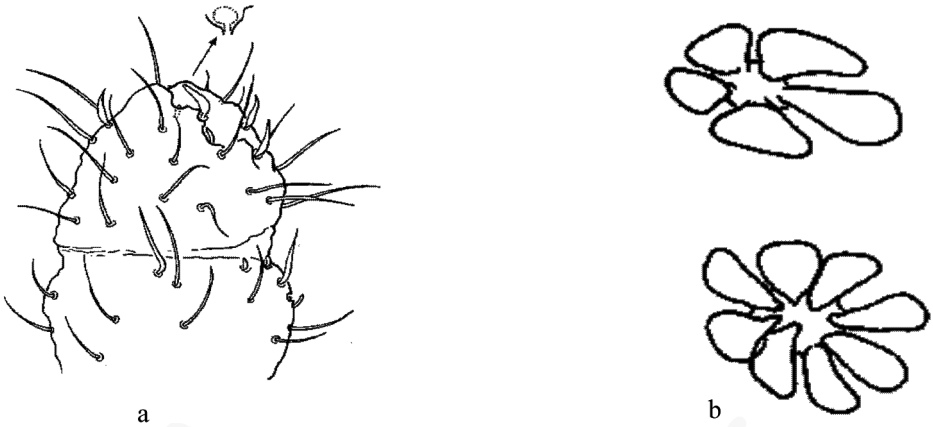

Fig. 2: ***Willemia scandinavica*****. a) ant. IV with reversible apical bulb and ant. III. b) two PAO with 5 and 8 simple lobes (THIBAUD et. al., 2004).**

Axenyllodes monoculatus (Jordana & Ardanaz, 1981) Family: **Odentellidae**

Examined material: 22 exx, soil and leaf litter under oak trees (*Q. infectoria*), Patagh area, Sar-e-pol-e-Zahab county, Kermanshah, Iran. November, 2013 and March, 2014; 1 ex, soil and leaf litter under elm trees (*Ulmus* spp.), Ghaleh shahin village, Sar-e-pol-e- Zahab county, Kermanshah, Iran. April, 2014.

Distribution: This species was reported in a few countries e.g. from Spain (Jordana and Ardanaz 1981) and seems to be a new for Asia.

Description: body elongated with yellowish-white color; strong granulation homogeneously distributed throughout body, forming symmetrical drawings dorsally on each segment. All segments of the body covered with relatively short hairs; thorax I with a row of hairs, thorax II and III with three rows and abdominal segments with two rows of hairs (Fig. 3d). Antenna conical, typical of genera, with strong granulation. Ant. IV retractable bulb terminated with 5 sensory hairs thickened and a small sensilla between two of these special hairs. Ant. III with two small mallets within hairs guard fossa and two cylindrical and curved inward (Fig. 3a). antennal I and II without distinct hairs, with increased granularity and decrease the number of hairs from previous. PAO structure very close to the eye within a simple structure with three lobes (Fig. 3b). Unguis short, without lateral or internal teeth. Empodium present (Fig. 3d). Ventral tube with 4 +4

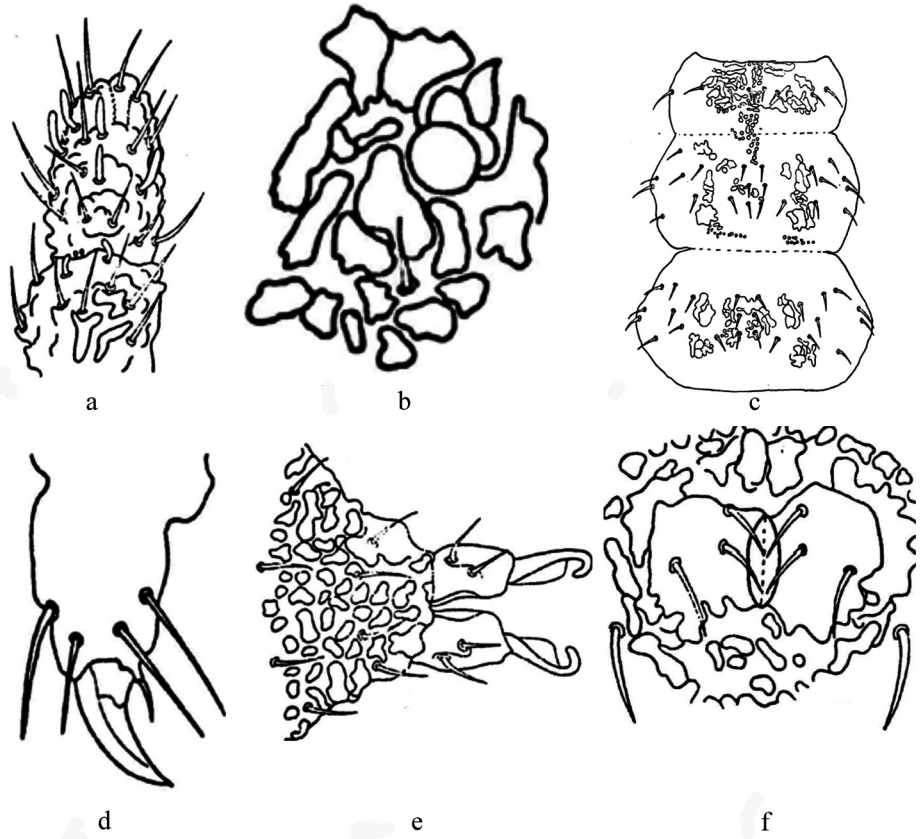

Fig. 3: ***Axenyllodes monoculatus*****. a) Ant. III and IV. b) PAO and simple eye. c) general aspect of thorasis segments. d) tibiotarsus and unguis. e) furca and f) venteral tube (JORDANA & ARDANAZ 1981)**

hairs, 3 +3 in the central and 1 +1 lateral and external (Fig. 3f). tenaculum with 2 +2 teeth. Manubrium with strong granulation; dens with 2 +2 hairs and finer granularity; mucro hook-shaped and approximately equal to the dens longitude with a thin inner sheet (Fig. 3e). Terminal and conical anal spines on papillae (JORDANA & ARDANAZ 1981).

Axenyllodes bayeri (Kseneman, 1935) Family: **Odentellidae**

Examined material: 5 exx, soil and leaf litter under elm trees (*Ulmus* spp.), Avarzaman area, Nahavand county, Hamadan, Iran. May, 2014.

Distribution: A common species in European region (JORDANA 1997). In Iran this species is reported by COX (1982).

Description: Body without pigment. Tegumentary granulation developed polygonal granules with rounded corners. Setae sub-equal, smooth, pointed. Antennal segments I, II, III, with 7, 10 and 14 regular setae. Sensory organ of antennal III with five knuckle typical sensilla. Antennal IV knuckle with six thickened sensilla. Tibiotarsus I, II, III with 10,10,9 pointed setae. Unguis with no internal or lateral tooth. Empodium present and pointed. Ventral tube with three pairs of setae; retinaculum with two teeth on each arm. Dens with two setae. Mucro hook-shaped, almost same size as dens. Manubrium with eight pairs of dorsal setae. Abd. VI with a pair of short anal spines (JORDANA 1997).

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