



New record of *Friesea afurcata* Tullberg, 1869 (Collembola, Neanuridae) in Golestan national Park (Hyrcanian forests), Iran

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ABSTRACT. The family Neanuridae belonging to order Poduromorpha, class Collembola includes terrestrial animals which play vital roles in decomposition and nutrient cycle in soil. Up to now, the fauna of this family has not been investigated in various areas of Golestan national Park (Hyrcanian forests). In order to identifying species of the class Collembola in this park, numerous samplings were carried out from soil, humus, and moss in 2015 and 2016. Then, the Collembola specimens were separated by using Berlese Funnel, stored in 75-85 percent ethyl alcohol and identified according to valid identification keys. Meanwhile, the species *Friesea afurcata* Tullberg, 1869) from the Neanuridae family is reported for the first time in Iran and Golestan province.

Key words: New record, *Friesea*, Neanuridae, Golestan national Park

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Introduction

Hyrcanian forests are one of the most unique and ancient temperate deciduous broad-leaved forests in the world, partly located in south Caspian line in Iran. The Golestan National Park, in where the study was carried out, is categorized as a part of Hyrcanian forests. Biodiversity is one of the most prominent features of the Golestan National Park in northern Iran, which has been proved to be one of the world's biosphere reserves (Sohrabi & Sipman, 2007). Golestan National Park,

with an area of 91895 hectares, is one of the oldest biosphere reserves and is a mixed mountainous biome system. It is the unique example of the modest rainbow biome system in the world (Sarikhani & Majnonian, 1999). The park is located between 37° 16' to 37° 31' N 55° 43' to 56° 17' E at the border of three provinces Golestan, Khorasan and Semnan (Dehdardargahi & Makhdom, 2002). Collembola class as a major group of terrestrial creatures has been less studied

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in Hyrcanian forests (Mehrafrooz Mayvan, et al., 2015). In term of number, they are categorized as dominant Hexapoda in most land ecosystems. Because of few studying on their fauna in comparison of many other arthropod groups, very few variations of them have been known (Deharveng, 2004). Most of the Collembola species feed on decaying plant materials, fungi and bacteria. Some terrestrial acarids are predators of Collembola and in this case Collembola is a part of their food chain. Just a few species are known as pest in greenhouses, alfalfa farms and center of mushroom nursery (Gerson et al., 2003). Collembola density in some soils which are rich in nutritious elements reaches more than one million per square meter (Petersen & Luxton, 1982). The class Collembola is divided to four orders including Poduromorpha, Entomobryomorpha, Neelipleona and Symphypleona (Deharveng, 2004). The Family Neanuridae Börner, 1901 is variable in color, with or without pigment. Sensilar chaetotaxy is typical of the thoracic tergite 2 to the abdominal 5 constituted by 22/11111 pairs of sensory chaetae; Sometimes a pair of supplemental sensory chaetae appear in the first abdominal tergite. There is also a lateral microsensillum in the mesothorax. Subcylindrical or conical antennae. Sensory organ of the antennal segment 3 with five sensilla: two small internal sensilla, two other guard sensilla (dorsal and ventral) usually long, and a ventrolateral microsensillum. Antennal segment 4 with dorsal vestigial subapical sensillum (organite), a dorso-external microsensillum and several dorsal sensilla of varied form, commonly subcylindrical; ventrally, a sensory rape can be presented with short chaetae, dilated apically. The buccal cone can be short or elongated. Maxillary palp absent (Jordana et al., 1997). The family Neanuridae includes 6 subfamilies, 173

genera and 1,498 species spread throughout the world (Bellinger et al., 1997-2018). *Friesea* Dalla Torre, 1895 has 181 species whit highest number of species in the Friesinae subfamily. Cox (1982) reported *Friesea mirabilis* Tullberg, 1869, from Guilan and East Azerbaijan and Central from soil and leaf litter. Also Qazi & Shayanmehr (2016) have been reported *F. claviseta* Axelson, 1900 for the first time for Iran. The Collembola fauna of Golestan National Park is unknown and in the present study, new record of Collemola for Iran fauna was reported from this park.

Material and methods

This study was performed in Golestan national park in 2015-2016. Golestan province is located on the Eastern part of the Alborz Mountains (Fig. 1).

The specimens were sampled from soil, leaf-litter, moss on bottom parts of the trees, stock and rotted wood. The samples were carried to the laboratory and put in Berlese funnels to extraction of springtails. The specimens were kept in 75-85% ethanol alcohol. The samples were decolorized in 3-5 minutes in KOH 10%. Each specimen was fixed on the Hoyer medium to make microscopic slides. Identification was done using available valid keys (Massoud, 1967) and final confirmation and identification were done by Dr. Darius Skarzynski from Poland. Photos have been taken from each special species by a Nikon Eclipse microscopes.

Results

The species *Friesea afurcata* Tullberg, 1869 belonging to Neanuridae family is recorded for the first time from Iran and Golestan province.

The genus *Friesea* von Dalla Torre, 1895 is distinguished from other genera of Neanuridae by its characteristic elongate, parallel-sided body, hook-shaped maxilla

carrying a toothed internal lamella, triangular maxillary capitulum with two lamella, anal spines present or absent, the lack of the postantennal organ and by the presence of S-chaetae on antennal segment IV (Massoud, 1967).

It has diversified in a large number of species of similar habitus, characterized by a combination of regressive characters (pigment, eyes, furca, tibiotarsal chaetotaxy), and various degrees of capitation of tibiotarsal tenent hairs and of body macrochaetae (Weiner et al., 2009). *Friesea* is a specious genus with nearly 190 species described to date. (e.g., Cassagnau & Rapoport, 1962; Greenslade & Deharveng, 1997; Weiner et al., 2009; Queiroz & Mendonça, 2015).

***Friesea afurcata* Tullberg, 1869**

Diagnosis: Size; 1.2 mm, approx. Greyish. Chaetotaxy quite long in the back, scattered, the largest chaeta clearly serrated at least on two sides. Abdominal VI conical. 8+8 eyes. Without Postantennal organ. Sensory organ of antennal 3 will be described later and compared to that of other species of *Friesea*. Claws with internal tooth. No trace of furca. 4 bristle-like anal spines (fig. 2). The species is new for Iran.

Material examined: 28 specimens-Golestan National Park (37°16' to 37°31'N 55°43' to 56°17'E), Moss, humus, soil and leaf litter, 3 Feb 2016, 5 May 2016, 5 Aug 2016, 4 Nov 2015. The average height above sea level: 1378 meters, Susan Khanahmadi leg.

Discussion

After present study number of recorded species of the family from Iran reaches to 3. The previous two reported species of genus *Friesea* in Iran including *F. mirabilis* (Tullberg 1871) which was reported by Cox (1982) from Guilan and East Azerbaijan and Central and *F. claviseta* (Axelson, 1900) by Qazi & Shayanmehr (2016) from Tehran province. In current study we collected the species *F. afurcata* from Golestan province.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

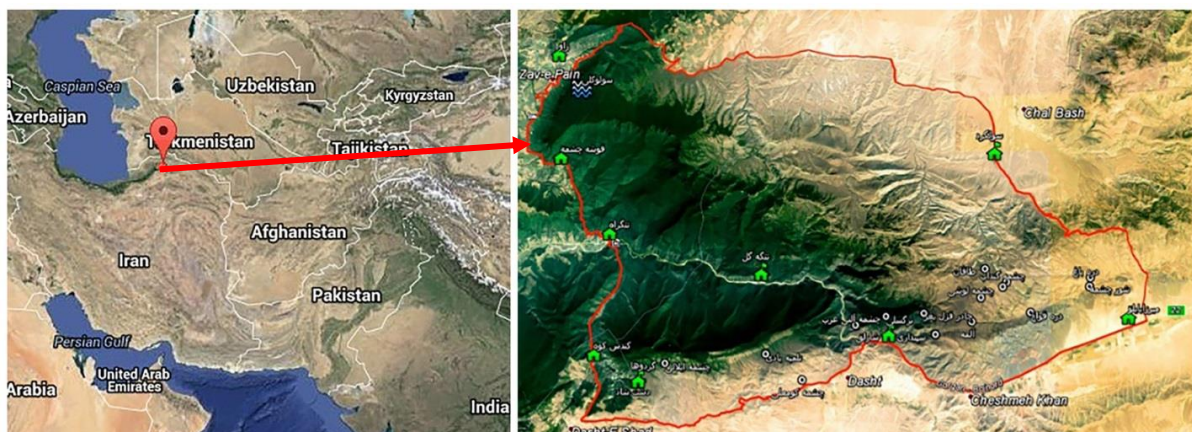


Figure 1. Study Station-Golestan National Park



Figure 2. *Friesea afurcata*, General habitus.

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گزارش جدید گونه *Friesea afurcata* Tullberg, 1869 (Collembola, Neanuridae) در پارک جنگلی گلستان (جنگل‌های هیریکانی)، ایران

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چکیده: خانواده Neanuridae متعلق به رده پادمان (Collembola) و راسته Poduromorpha از جمله بندپایان خاک‌زی می‌باشند که نقش مهمی در تجزیه و چرخه مواد در خاک ایفا می‌کنند. تاکنون فون این خانواده در مناطق مختلف پارک جنگلی گلستان (جنگل‌های هیریکانی) بررسی نشده است. به منظور شناسایی گونه‌های رده پادمان در این پارک نمونه برداری‌های متعددی از خاک، خاکبرگ و خزه در سال‌های ۱۳۹۴ و ۱۳۹۵ انجام گرفت و پادمان موجود در آنها با استفاده از قیف برلیز جداسازی و در اتیل الکل ۷۵ یا ۸۵ درصد نگهداری شدند و با کلیدهای شناسایی معتبر مورد شناسایی قرار گرفتند. در این بین، گونه *Friesea afurcata* Tullberg, 1869 از خانواده Neanuridae برای اولین بار در ایران و استان گلستان گزارش می‌شود.

واژگان کلیدی: گزارش جدید، *Friesea*, Neanuridae، پارک جنگلی گلستان