Journal of Biodiversity and Environmental Sciences (JBES)
ISSN: 2220-6663 (Print) 2222-3045 (Online)
Vol. 7, No. 3, p. 195-200, 2015
http://www.innspub.net

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RESEARCH PAPER

OPEN ACCESS

The new record of Isotomidae (Collembola: Apterygota) for Iranian Fauna: an update to the species Listin Kermanshah Province (Western Iran)

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Article published on September 28, 2015

Key words: Springtails, Desoria zlotini, Taxonomy, Iran.

Abstract

The study of the Isotomidae fauna was investigated in12 different regions of Kermanshah Province (Western Iran) during 2013-2014. The specimens were collected from the surface layer of soil and leaf litter. Totally 11 species belonging to 6genera were found, which the species *Desoria zlotini* (Martynova, 1968) is recorded for the fauna of Iran. It is documented and species that have been found in different regions of Kermanshah Province until March 2015 are listed inthis paper. At present, 17 species, belonging to 9genera of Isotomidae are known from Kermanshah province.

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Introduction

Isotomidae is one of the most common families of Collembola and easily recognized by lacking setae on the dorsal side of prothorax, weak differentiation of chaeta-like components and uniformity of chaetotaxy of body segments (Potapov, 2002).

Kermanshah is one of Iranian province which located in the middle of the western part of Iran. The first studies of the Collembolan fauna in the west part of Iran werecarried out by Kahrarian *et al.* (2012). They reported 6 families, 15 genera and 9 species of Collembola which 8 genera were belonging to Isotomidae (Kahrarian *et al.*, 2012).In additional research preliminary Isotomidae fauna in Kermanshah province was reported only by six species which *Desoria tigrina* and *Folsomides* (aff. *marchicus*) recorded for the first time for the Iranian fauna (Kahrarian and Arbea, 2013).After that some other paper on Isotomidae fauna fromKermanshah province were published (Ghahramani Nezhad *et al.*, 2013; Kahrarian, 2015; Arbea and Kahrarian, 2015).In this study, we have investigated Isotomidae fauna in different regions of Kermanshahprovince during 2013-2014.

Material and methods

The updated Isotomides ckeck list was provided from two resources. First, it is based on bibliographic references and unpublished records from different regions of Kermanshah province. Second, results of sampling campaigns of Collembola by authors from different regions in Kermanshah province during 2013–2014 years are included. In the latter studies, all specimens were collected from a total of 12 sites ranging in elevation 1034 m a.s.l. to 2041 m a.s.l. from the surface layer of soil and leaf litter (Table. 1). The samples were retained in white plastic boxes and then were transferred to the Entomology Laboratory of Azad University of Kermanshah Branch. The species were extracted by Berlese Funnel and fixed in 75% ethanol. Specimens were cleared in a Nesbitt solution and mounted under slides in Hoyer's solution. Terminology for the primarily description given in Potapove, 2002 and then the specimens were sent to Dr. Javier Arbea and Dr. Mikhail Poapove for identification to species level.

Abbreviations used in this paper are: Abd = abdominal segment; Cl= claw; Mac= macrochaeta(e); Omma= ommatidium/ia; PAO = postantennal organ; Ret= retinaculum; Tita = tibiotarsus.

Results

A total of 11 species of Isotomidae belonging to 6 genera were collected and identified from Kermanshah Province which the species *Desoria zlotini* (Martynova, 1968)is new for the fauna of Iran. Moreover the present list of Isotomids fauna in Kermanshah province contains 17 species, belonging to 9 genera.

Discussion

Remarks on collected species

Desoria zlotini (Martynova, 1968)

Material examined: 20 ex, soil and leaf litter under oak trees (*Q. infectoria*), Sargool village (N33°58, E047°14, 1686m a.s.l.), Osmanevand area, Kermanshah county, Kermanshah, Iran; 10 ex, soil and leaf litter under Pine trees, Ghazanchi village (N34°25, E047°02, 1330m a.s.l.), Kermanshah county, Kermanshah, Iran. Holotype: Central Asia, Kirghizia (Potapov, 2002). This species is a new record for the Iranian fauna.

Total length 1.5 - 1.6 mm. Spotty bluish-violet. Part of the head and intersegmental areas unpigmented. Appendages with weaker pigmentation. (Fig. 1). 8+8 Omma. PAO 1.5 times as longas an Omma. (Fig. 2A). Mouthpart as Fig.2B. Labrum with moderately broadened apical folds and simple ventroapical ciliation.Tita with 8 setae in the apical ring. Cl with inner teeth. Ret 4 teeth. Manubrial slightly thickened short apical setae (3 spin). Dens with many crenulations and about 12 posterior setae. (Fig. 2D). Mucro tridentate (Fig. 2E). Abd V and VI separate. Mac on Abd V longer than tergite length (Fig. 2F).

Desoria tigrina (Nicolet, 1842)

Material examined: 5 ex, soil and leaf litter under oak trees (*Q. infectoria*),Shikhsalah village (N34°58, E045°54, 1287m a.s.l.), TazehAbad county, Kermanshah, Iran; 5 ex, soil and leaf litter under Plum trees), Rijab village (N34°28, E045°58, 2041m a.s.l.), Dalaho county, Kermanshah, Iran. Probably cosmopolitan species. In the Palearctic, all over Europe, with scattered records from the Asiatic part such as Siberia and China (Potapov, 2002). already recorded from Iran by Kahrarian *et al.*, 2012; Kahrarian and Arbea, 2013; Kahrarian, 2015.

Table 1. Isotomidae species from Kermanshah. References: (1), Arbea and Kahrarian (2015); (2), Ghahramani nezhad *et al.*, (2013) (3), Kahrarian *et al.*, (2012); (4), Kahrarian and Arbea (2013); (5), Kahrarian (2015); (6) present work,

Species	Distribution	References
Desoria zlotini(Martynova, 1968)	Central Asia	(6)
D. tigrina (Nicolet, 1842)	Cosmopolitan	(3), (4), (5), (6)
Folsomia cf. asiatica (Martynova, 1971)	Middle Asia	(6)
F. binoculata (Wahlgren, 1899)	Holarctic	(2)
F. similis (Bagnall, 1939)	Holarctic	(5), (6)
F.quadrioculata(Tullberg, 1871)	Holarctic	(5), (6)
Folsomides parvulus (Stach, 1947)	Cosmopolitan	(3), (4), (5), (6)
F. marchicus(Frenzel, 1941)	Palaearctic	(3), (4), (5), (6)
F. halshinicus (Arbea and Kahrarian, 2015)	Endemic	(1)
F. subvinosus (Arbea and Kahrarian, 2015)	Endemic	(1)
Gnathofolsomia n. sp	Austrian caves	(3)
Hemisotoma pontica (Stach, 1947)	Palaearctic	(3), (4)
H. orientalis (Stach, 1947)	Palaearctic	(5), (6)
Pachyotoma n.sp	Palaearctic	(3)
Parisotoma notabilis (Schäffer, 1896)	Cosmopolitan	(3), (4), (5), (6)
Isotoma viridis (Bourlet, 1839)	Holarctic	(5), (6)
Isotomiella minor(Schäffer, 1896)	Cosmopolitan	(2), (5), (6)

Folsomia cf. asiatica (Martynova, 1971)

Material examined: 2 ex, soil and leaf litter under Walnut trees, Quri ghaleh village (N33°55.790', E047°06.381', 1241m a.s.l.), Paveh county, Kermanshah, Iran.This species was reported in Middle Asia, such as Tadzhikistan and Azerbaijan (Rasulova, 1984).In Iran this species is reported by Ahmadi-Rad and Kahrarian (Unpublish).

Folsomia cf. similis (Bagnall, 1939)

Material examined: 5 ex, soil and leaf litter under oak trees (*Q. infectoria*), Shabankareh village (N34°52, E046°30, 1632m a.s.l.), Paveh county, Kermanshah, Iran.Probably widely distributed in Holarctic with scattered records: Gr. Britain,Germany, Poland, Slovakia, Switzerland, France, Russia (Moscow), Abkhasia, Jugoslavia(Serbia). A few records from Japan and S Far East of Russia (Potapov, 2002). Already recorded from Iran (Moravvej *et al.*, 2007; Daghighi, 2012; Kahrarian, 2015).

Folsomia quadrioculata (Tullberg, 1871)

*Material examined:*21 ex, soil and leaf litter under oak trees (*Q. infectoria*), Chahar Zebar-e-Oliya village (N34°13, E046°40, 1592m a.s.l.), Kermanshah county, Kermanshah, Iran; 2 ex, soil and leaf litter under Walnut trees, Ghapgholi village (N34°44, E046°15, 1295m a.s.l.), Tazeh Abad county, Kermanshah, Iran; 2 ex, soil, Pasture, near Siahkhor village (N34°06, E046°31, 1442m a.s.l.), Eslamabad-e-Gharb county, Kermanshah, Iran. This species is widely distributed Holarctic species. In the Palaearctic, it has been recorded from all European and Northern Asiatic countries (Potapov, 2002). In Iran this species is reported by Cox, 1982; Kahrarian, 2015.

Folsomides marchicus (Frenzel, 1941)

Material examined: 1 ex, soil and leaf litter under oak trees (*Q. infectoria*), near Patagh village (N34°25, E046°01, 1404m a.s.l.), Sar-e-Pol-e-Zahab county,

Kermanshah, Iran; 3 ex, soil, Pasture, near Siahkhor village (N34°06, E046°31, 1442m a.s.l.), Eslamabad-e-Gharb county, Kermanshah, Iran; 2 ex, soil in Grassland, near Dehlili village (N34°25, E046°00, 1034m a.s.l.), Paveh county, Kermanshah, Iran.Cosmopolitan, already recorded from Iran by Kahrarian *et al.,* 2012; Kahrarian and Arbea, 2013.

Folsomides parvulus(Stach, 1922)

Material examined: 8 ex, soil and leaf litter under oak trees (*Q. infectoria*), Chahar Zebar-e-Oliya village (N34°13, E046°40, 1592m a.s.l.), Kermanshah county, Kermanshah, Iran.Cosmopolitan, already recorded from Iran by Cox, 1982; Kahrarian and Arbea, 2013; Yoosefi Lafoorakiandand Shayanmehr, 2012; Gazi and Shayanmeh, 2014; Kahrarian, 2015.

Fig. 1. Habitus of *Desoria zlotini.*

Hemisotoma orientalis (Stach, 1947)

Material examined: 10 ex, soil and leaf litter under oak trees (*Q. infectoria*), Chahar Zebar-e-Oliya village (N34°13, E046°40, 1592m a.s.l.), Kermanshah county, Kermanshah, Iran;1 ex, soil and leaf litter under oak trees (*Q. infectoria*), near Patagh village (N34°25, E046°01, 1404m a.s.l.), Sar-e-Pol-e-Zahab county, Kermanshah, Iran. Xerothermic species. Several records from Ukraine, Kazakhstan, S Siberia (Khakassia), SE France (Potapov, 2002). In Iran this species is reported by Cox, 1982; Kahrarian, 2015.

Isotoma viridis (Bourlet, 1839)

Material examined: 5 ex, soil and leaf litter under oak trees (*Q. infectoria*), Shabankareh village (N34°52, E046°30, 1632m a.s.l.), Paveh County, Kermanshah, Iran; 10 ex, soil, Pasture, near Dehlili village (N34°25, E046°00, 1034m a.s.l.), Paveh county, Kermanshah, Iran.It isrecorded from all over the Holarctic. More rarely in Asia (Potapov, 2002). In Iran this species is reported by Cox, 1982; Yahyapour, 2012; Kahrarian, 2015.

Isotomiella minor (Schaeffer, 1896)

Material examined: 5 ex, soil and leaf litter under oak trees (*Q. infectoria*), Shabankareh village (N34°52, E046°30, 1632m a.s.l.), Paveh county, Kermanshah, Iran; 2 ex, soil and leaf litter under Walnut trees, Quri ghaleh village (N33°55.790', E047°06.381', 1241m a.s.l.), Paveh county, Kermanshah, Iran.Cosmopolitan, already recorded from Iran by Cox, 1982; Daghighi, 2012; Yahyapour, 2012; Ghahramaninezhad *et al*., 2012; Kahrarian, 2015.

Parisotomanotabilis (Schaeffer, 1896)

Material examined: 7 ex, soil and leaf litter under oak

trees (*Q. infectoria*), Shabankareh village (N34°52, E046°30, 1632m a.s.l.), Paveh county, Kermanshah, Iran; 2 ex, soil and leaf litter under oak trees (*Q. infectoria*), near Patagh village (N34°25, E046°01, 1404m a.s.l.), Sar-e-Pol-e-Zahab county, Kermanshah, Iran. Cosmopolitan, already recorded from Iran by Cox, 1982; Moravvej*et al.,* 2007; Kahrarian *et al.*, 2012; Kahrarian and Arbea, 2013; Kahrarian, 2015.

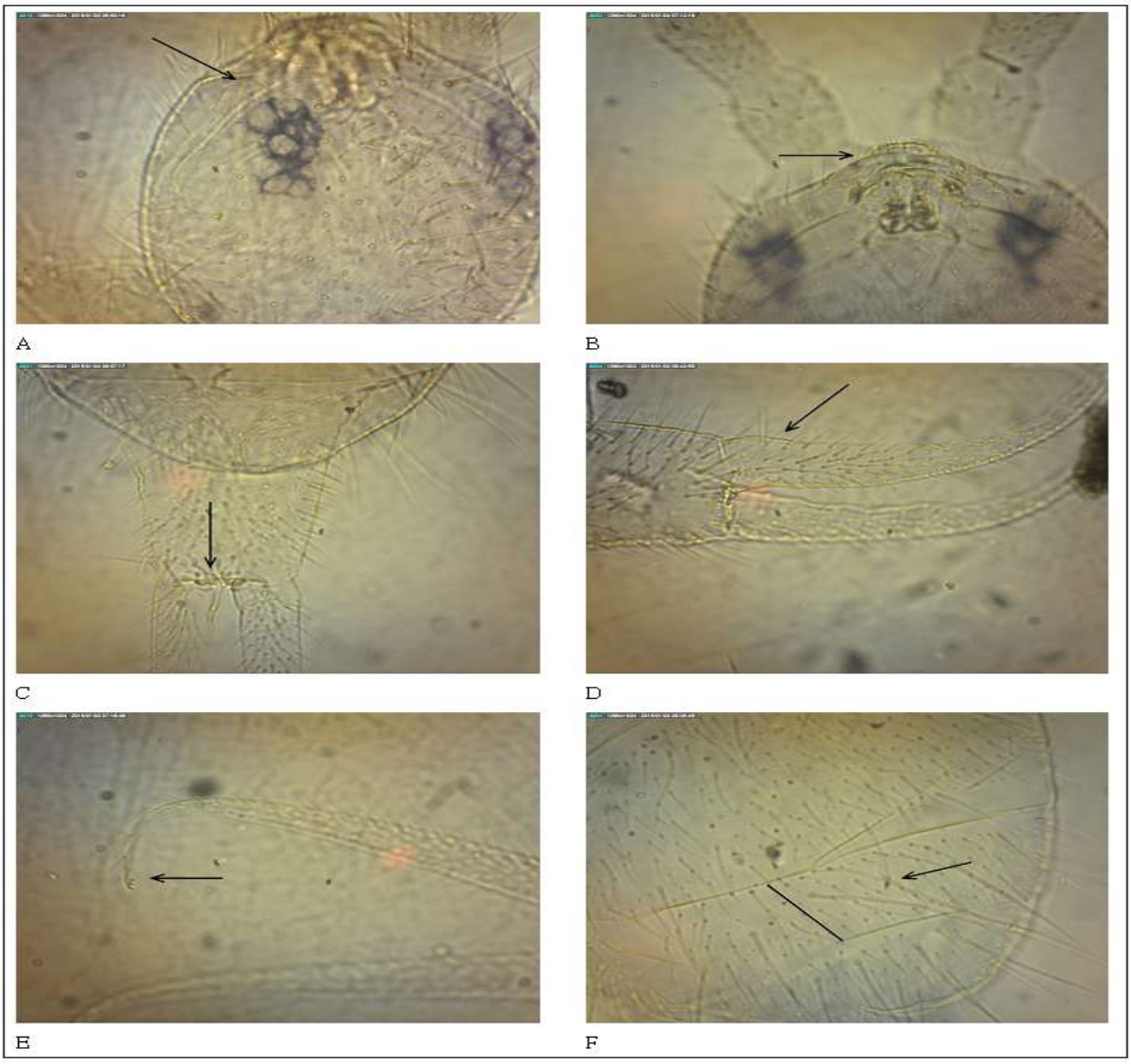

Fig. 2. Some morphological characters of *Desoria* zlotini. A)PAO and Ommatidi,B) Labrum with roundish and high apical folds,C) Manubrial thickening,D) Dens and their crenulations,E)Mucro,F) Mac on Abd V.

Acknowledgements

The author warmly thanks to Dr. Javier Arbea from Spain and Mikhail Potapov from Russia for their kindly cooperation in identification of specimens and for providing valuable information. We also wish to thank from The Islamic Azad University for supporting projects. This research was supported by Islamic Azad University, Kermanshah Branch, Kermanshah, Iran.

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