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The study on Springtails in west part of Iran with new records for Iranian fauna

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Abstract

The results of Collembola fauna are much poorer in western part of Iran. In this study 13 different habitat types and 37 sampling areas of Lorestan province (Western Iran) were selected for studding on Collembolan's fauna during 2016-2017. Totally, 24 species of springtails from 18 genera and 8 families were recorded in this study. The species *Ceratophysella* cf. *borealis*, *Desoria neglecta*, and *Dicyrtoma grinbergsi* are new record for the Iranian fauna. Also three genera; *Pseudachorutes*, *Xenylla* and *Anurophorus* with the species *Anurophorus coiffaiti*, *Ceratophysella gibosa*, *Sphaeridia pumilis* and *Dicyrtoma ghilarovi* are new for the west part of Iran.

Key words: Lorestan province, Collembola, *Ceratophysella* cf. *borealis*, *Desoria neglecta*, *Dicyrtoma grinbergsi*

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Introduction

The Collembola fauna of Iran has been investigated by a low number of faunal groups. Although Farrahbakhsh (1964) reported the first report of the Collembola from Khouzestan, the first comprehensive report on Collembola was published about 20 years later by Cox (1982). He listed 70 species belonging to 30 genera of collembolan from, Mazandaran, Gilan and E. Azarbaijan (the northwestern and central Northern provinces of Iran). Over the recent decade, several research projects have become established by young researcher in many part of Iran especially in northern and central parts. (Daghighi *et al*., 2013; Falahati-Hosseinabad et al., 2013; Shayanmeh *et al*., 2013; Gharamaninezhad et al., 2013 and Yoosefi-Lafooraki and Shayanmehr, 2013). Much of these researches have been published on faunistic and taxonomic studies without sufficient figures and systematic descriptions (Except for new species).

Loresatan province is located in the western part of Iran. This province covers an area of more than 28559.5 square kilometers in west of Iran at 46º, 50' east to 50 degrees 2 minutes east of the Greenwich meridian, and 32 degrees and 38 minutes to 34 degrees 22 minutes north latitude (Gholami et al., 2015). Thus, what we know about collembolan is mainly based on the activity of Kahrarian (Kahrarian (2014); Kahrarian et al., (2012, 2013, 2014a, 2014b, 2015, 2016); Arbea and Kahrarian (2015, 2017)) and Smolis et al., (2016a, 2016b).

The present paper is preliminary study on Collembolan fauna in Lorestan province. In addition, we have compared four new species for Iranian fauna and one new species for Lorestan province fauna with other identified species by using sufficient figures and systematic descriptions.

Material and Methods

This study was conducted during 2016-2017 with geographical coverage of Lorestan province (as shown in Table 1). One to five samples were taken from the leaf litter or soil of most areas and habitats with a spade. In some areas/habitats more sample were taken due to technical reasons. (Including: convenient accessibility and proximity to the sampling area, more density of plant debris, etc.) All samples were stored in white plastic boxes and transferred into the laboratory. Collembola were extracted using the respirator or Berlese funnels. When greater clearing was required, Nesbitt's solution (40g chloral hydrate, 25 mL distilled water, and 2.5 mL concentrated acetic acid) was used for heavily pigmented specimens (Jordana 2012). For making permanent microscope slide, collembolan specimens were mounted in Hoyer's solution (Gum Arabic 15g, Chloral Hydrate 75g, Distilled Water 25ml, Glycerin 5ml).Observations were made with phase-contrast and transmitted- light microscopy. All specimens were identified by taxonomic keys such as Fjellberg (2007), Potapov (2002), Thibaud *et al*., (2004), Arbea and Kahrarian (2015) and Bretfeld (1999). The material is deposited in the insect collections of Islamic Azad University, Arak, Iran.

The Abbreviations used in descriptions:

Ant.—antennal segments; Abd--Abdomen; App. an—appendage anal; Epm--Empodium; PAO—postantennal organ; Tita—tibiotarsus.

Results

The results are presented on table 2. In all, 24 species of springtails from 18 genera and 8 families were recorded in this study (as shown in Table 2). The species *Ceratophysella* cf. *borealis*, *Desoria neglecta*, and *Dicyrtoma grinbergsi* are new record for the Iranian fauna. Also three genera; *Pseudachorutes*, *Xenylla* and *Anurophorus* with the species *Anurophorus coiffaiti*, *Ceratophysella gibosa*, *Sphaeridia pumilis* and *Dicyrtoma ghilarovi* are new for the west part of Iran.

Most species (17 species) were collected for the northern part of Lorestan province (Noorabad County), followed by Khoramabad County (15 species) in central part (as shown in Figure 1). Several factors can lead to differences in the number of identified species from each area and habitat. One should consider the different numbers of samples taken, as well as habitat type and the different times when the material was collected.

3.1., Order: Podoromorpha

Family: Hypogastruridae

Genus: *Ceratophysella* Borner 1932

***Ceratophysella* cf *borealis* Martynova 1977**

***Examined material*:** 2 specimens, surface layer of soil under apple tree (*Malus pumila* Mill, 1768), Dareh Gorg village (N 48°42'56"; E 34°3'48"; 2039m a.s.l), Broojerd County, Lorestan, Iran. April, 2017. 4 specimens, surface layer of soil from alfalfa farm (*medicago sativa* L.), Chalanchulan village (N 48°54'25"; E 33°39'13"; 1495m a.s.l) Dorood County, Lorestan, Iran. April, 2017. 3 specimens, surface layer of soil under Aglet Shrub (*Crataegus aronia* (L.) Riedl), Firuzabad city(N 48°43'3"; E 33°56'27"; 1380m a.s.l) Aleshtar County, Lorestan, Iran.March, 2017. 4 specimens, surface layer of soil and leaf litter under Oak forest (*Quercus brantii* Lindly 1840), Khoramafad city (N 48°17'51"; E 33°35'47"; 1310 m a.s.l) Khoramafad County, Lorestan, Iran. March, 2017.

Distribution: *Ceratophysella borealis* was reported in some countries such as Russia and Siberia (Thibaud et al., 2004). It is the first report of this species in Iran.

Description: grey - violet species with a relative long body size (up to 2 mm). tegumentary granulation rather coarse with 12 granules between the p1 setae on Abdomen V (as shown in Figure 2A). Head with 8+8 Ommatidia. Maxillae with 6 lamellae, the edge of maxillae are ciliated and the corpus toothless. The eversible sac weakly developed. Antena IV with a simple apical bulb (as shown in Figure 2B).Tibio tarsus I-III each with one pointed tenet hair. Claw with one internal tooth and two lateral teeth (as shown in Figure 2C). Dens with 7 seta which the 2 internal setae are thickened. Anal spines distinct (about 1.5 times longer than the claw), strong and located on a high papillae (as shown in Figure 2D). Micro and macro setae very distinctly differentiated. Micro seta p3 on Abd IV absent (as shown in Figure 2E). P1 seta on Abd IV longer than p2 seta (as shown in Figure 2F).

Remarks: Up to now two species of the genus *Ceratophysella* are known from the western part of Iran: *C. stercoraria* (Stach 1963) and *C. dnticulate* (Bagnall 1941). *C.*cf. *borealis* having 8+8 Ommatidia and a short filament on Empodium (not longer than 1/2 the inner edge of claw). These characters are most similar to *C. dnticulate* and *C. stercoraria*, but they clearly differ in the size of p1 seta on Abd IV (for *C.*cf. *borealis* p1 seta on Abd IV longer than p2 seta(as shown in Figure 2F) but p1 seta on Abd IV shorter than p2 seta in *C.dnticulate* and *C. stercoraria*) and the granulated form on Abd V (*C. stercoraria* with a strongly granulated, wart-like hump on Abd V (as shown in Figure 2G); *C. borealis* and *C.dnticulate* without such a hump).

***Ceratophysella gibosa* (Bagnall 1940)**

***Examined material*:** 10 specimens, surface layer of soil and leaf litter under Oak forest (*Q. brantii*), Sabzekhani (N 47°51'44"; E 34°0'41"; 2001m a.s.l), Noorabad County, Lorestan, Iran. February, 2017. 5 specimens, surface layer of soil from alfalfa farm (*m. sativa*), Aligudarz (N 49°41'28"; E 33°15'11"; 2184m a.s.l), Aligudarz County, Lorestan, Iran. July, 2017.

Distribution: This species is reported from many part of Holarctic. In Iran this species was recorded by Moravvej (2003) from Tehran.

Description: grey- brown species with a relative medium body size (up to 1.5 mm). tegumentary granulation as like the genus. Abd V whit a litter coarse granules between the p1 setae (as shown in Figure 3A). Head with 8+8 Ommatidia. PAO with 4 lobe. The eversible sac weakly developed. Ant IV with a simple apical bulb (as shown in Figure 3B). Tita I-III each with one pointed tenet hair, and 19, 19, 18 setae respective. Claw with one internal tooth and two lateral teeth. Dens with 7 seta which the basal setae twice as long as other (as shown in Figure 3C) Anal spines distinct and yellow (about 1.3 times longer than claw III), located on high papillae (as shown in Figure 3A). Micro and macro setae very distinctly differentiated (Thibaud *et al*., 2004).

Abd IV with 2+2 medial microseta. Microseta m1 on Abd IV absent (as shown in Figure 3D). P1 seta on Abd IV shorter than p2 seta (as shown in Figure 3D).

Remarks: This species is very similar to: *C. stercoraria*, but clearly distinguished by the number of median microsetae on Abd IV (abd IV with 2+2 medial microseta in *C. gibosa* and 3+3 in *C. stercoraria*). Moreover the m3 seta on Th II, the a1 seta on Abd IV and the a2 seta on Abd V are absent in *C. stercoraria. C. gibosa* is closely differ with *C. borealis* in the size of p1 seta on Abd IV (for *C.*cf. *borealis* p1 seta on Abd IV longer than p2 seta (as shown in Figure 2F) but p1 seta on Abd IV shorter than p2 seta in *C. gibosa* (as shown in Figure 3D)).

3.2., Order: Entomobryomorpha
Family: Isotomidae
Genus: *Desoria* Nicolet 1841
***Desoria neglecta* (Schaffer 1900)**

***Examined material*:** 2 specimens, surface layer of soil and leaf litter under Walnut tree (*Juglans regia* L.), Oshtorinan city (N 48°37'38"; E 34°4'46"; 1893 m a.s.l), Broojerd County, Lorestan, Iran. April, 2017. 4 specimens, surface layer of soil and leaf litter from Pine forest (*Pinus eldarica* Medw), Khoramabad County (N 48°17'46"; E 33°34'38"; 1276 m a.s.l), Lorestan, Iran. May, 2017. 3 specimens, surface layer of soil under Barberry Shrub (*Berberis vulgaris*), Dorud (N 48°58'36"; E 33°32'40"; 1564 m a.s.l) Dorood County, Lorestan, Iran. March, 2017. 4 specimens, surface layer of soil under Aglet Shrub (*C. aronia*), Badavar village (N 47°55'0"; E 34°5'37"; 1810 m a.s.l) Noorabad County, Lorestan, Iran. April, 2017.

Distribution: *Desoria neglecta* is distributed in most countries of Holarctic such as Norway, Sweden, Finland, Germany, the European part of Russia and some Asiatic and N American part (Mongolia, Taimyr, Magadan) (Potapov 2002). *D. neglecta* is a new record for the Iranian fauna.

Description: body size about 1.8 mm. color violet, grey or grayish green (in Iranian species) (as shown in Figure 4A) and maybe see in grayish brown or red (Potapov 2002). Abd V and VI separated (as shown in Figure 4B). Tip of the abdomen paler than the rest of the body. Head with 8+8 ommatidia. PAO about two time as long as ommatidia. Maxillary palp bifurcate (as shown in Figure 4F). Tita with 11 setae in apical ring. Claw and Empodium with distinct teeth. Retinacl with 8-15 setae. Manubrium with 2+2(3) (3 setae in this study) short apical setae. Manubrial thickening with incision (as shown in Figure 4E). Dens with many crenulation and 15-30 posterior setae. Mucro with four or five teeth (four in this study) and without setae (as shown in Figure 4C). Ant IV with subapical pin-seta simple (as shown in Figure 4D).

Remarks: Although type specimens of *D. neglecta* were not revised, simple sub apical pin-seta on Ant IV and separate Abd V and VI can be well mark for this species. So far only *D. tigrina* (Nicolet 1842) is known from western Iran (Kahrarian and Arbea 2013). These two species are most similar in some characters such as: Mucro without setae and with four teeth; Tita with 11 setae in apical ring; and separate Abd V and VI, but they clearly differ in the manubrial thickening (manubrial thickening with incision in *D. neglecta* (as shown in Figure 4E) and simple in *D. tigrina* (as shown in Figure 4H)) and maxillary palp (maxillary palp is bifurcate in *D. neglecta* (as shown in Figure 4F) and simple in *D. tigrina* (as shown in Figure 4G)).

3.3., Order: Symphipleona
Family: Dicyrtomidae
Genus: *Dicyrtoma* Borner, 1903
***Dicyrtoma grinbergsi* Stebaeva, 1966**

***Examined material*:** 2 specimens, surface layer of soil and leaf litter under Oak forest, Khoramabad County (N 48°17'51"; E 33°35'47"; 1310 m a.s.l), Lorestan, Iran. March, 2017.

Distribution: This species was reported in a few countries such as Russia and Taiwan (Bretfeld 1999). It is the first report of this species in Iran.

Description: body size relative small (up to 1.3 mm). Body color pale red. Tow short spines at the tip of the head. Antennae long and slender, one pair of short cuticular cones among base of antennae (as shown in Figure 5A). Clypeus with 3 single and 3 pairs of slightly thickened medial setae (as shown in Figure 5B). Emp I narrower than III; filament of Emp III equal or smaller than claw but filament of Emp I longer than claw (as shown in Figure 5C), Claws with 2 inner and 2 pairs of lateral teeth. Both edges of mucro serrate and all setae of dens smooth (as shown in Figure 5D). Retinacl with 3 teeth (as shown in Figure 5E). App. An. thick, short and pointed.

Remarks: So fare 3 species of the genus *Dicyrtoma* are known from the Iran. *Dicyrtoma minuta* (Fabricius, 1783), *Dicyrtoma fusca* Lubbock, 1873 (Shayanmehr et al., 2013) and *Dicyrtoma ghilarovi* Brefeld, 1996 (Mehrafrooz Mayvan et al., 2015). *D. grinbergsi* is clearly differ in the shape of the dens setae with *D. fusca* and *D. ghilarovi* Brefeld, 1996 (in *D. grinbergsi* and *D. fusca* setae of dens with large basal teeth and broadened basally in both species, while in *D. grinbergsi* all setae of dens smooth (as shown in Figure 5D & 6A)). Moreover, in *D. grinbergsi* Retinacl with 3 teeth, while, in *D. minuta* Retinacl with 4+4 teeth and 4 seata.

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Table 1- Information on different habitat types and sampling areas selected for sampling in Lorestan province.

Location	E	N	Altitude	Date	Habitat
Aligudarz border	49°41'28"	33°15'11"	2184	July, 2017	Alfalfa
	49°42'59"	33°41'44"	2020	April,2016	Pasture
Azna	49°18'33"	33°26'47"	1771	June2017	Peach tree
Chenar	47°47'36"	33°31'40"	1380	February, April ,2017	Oak Forest
Barkhordar	48°10'58"	34°23'05"	1937	May, 2016	Aglet Shrub
Firuzabad	48°43'03"	33°56'27"	1380	March, 2017	Aglet Shrub
Dorud border	49°13'17"	33°26'48"	1741	April, 2017	Aglet Shrub
	48°58'36"	33°32'40"	1564	April, 2017	Barberry tre
Dareh Gorg	48°42'56"	34°03'48"	2039	April, 2017	Apple tree
ChalanChulan	48°54'25"	33°39'13"	1495	April, 2017	Alfalfa Farm
SabzeKhani border	47°52'30"	34°00'47"	1879	May, June 2016	Plum tree
	47°51'44"	34°00'41"	2001	May, 2016;February2017	Oak Forest
CheshmeKuh	48°43'16"	33°18'13"	1799	July, 2017	Oak Forest
Kuhdasht border	47°33'14"	33°31'12"	1220	August,2016	Plum tree
	47°42'00"	33°31'15"	1245	January, 2017	Barley Farm
	47°33'14"	33°31'02"	1245	November, 2016	Walnut tree
HassanGavyar	47°54'42"	33°58'33"	1793	March, 2017	Pasture
Melavy	47°48'03"	34°05'09"	735	May, 2016	*Astragalus*
Angoshteh	48°32'33"	34°05'20"	1937	May, 2016	Walnut tree
Chm Angir	48°12'36"	33°26'22"	1146	May, 2017	Oak Forest
Kabutarlan	48°55'16"	33°05'37"	2159	August,2016	Pasture
Kaka Reza	48°14'31"	33°41'44"	1663	March, April, 2017	Oak Forest
Noorabd	47°57'26"	34°04'05"	2000	June, 2017	Aglet Shrub
Tarhani	48°15'00"	33°50'57"	1611	March, 2017	Apple tree
Qomesh	47°46'54"	33°59'56"	1827	April, 2017	Oak Forest
GarmahKhani	47°51'43"	33°59'42"	1964	April, July 2017	Oak Forest
Kerman Jub	48°11'23"	33°43'06"	1723	May, 2017	Oak Forest
Paalam	48°00'14"	32°50'42"	324	January, 2017	Pasture
Dehseyed	49°40'60"	33°11'30"	2142	June, 2016	Alfalfa Farm
Khoramabad border	48°17'51"	33°35'47"	1310	January, 2017	Oak Forest
	48°17'31"	33°34'59"	1262	January, 2017	Plum tree
	48°17'46"	33°34'38"	1276	May, 2017	Pine Forest
Rashno	48°03'57"	33°56'31"	2127	April, 2017	*Astragalus*
Poldokhtar	47°43'16"	33°10'11"	675	January, 2017	Vegetable
Hayatolgheyb	47°56'14"	33°28'36"	957	January, 2017	Oak Forest
Oshtorinan	48°37'38"	34°04'46"	1893	April, 2017	Walnut tree
Badavar	47°55'00"	34°05'37"	1810	April, 2017	Aglet Shrub

Table 1- The identified of collembolan species and their corresponding habitat of collection

Habitate	1	2	3	4	5	6	7	8	9	10
Number of sampling	30	19	15	3	4	5	9	3	4	10
Ceratophysella stercorari	×	×	–	–	×	–	–	–	–	–
Ceratophysella cf.*borealis*	×	×	–	–	×	–	×	–	–	–
Ceratophysella gibosa	×	–	–	–	×	–	–	–	–	–
Hypogastrura purpurescen	×	×	×	–	–	–	–	–	×	–
Pseudachorutes sp.1	×	–	–	–	–	–	–	–	×	–
Pseudachorutes sp.2	×	×	–	–	–	–	–	×	–	–
Xenylla sp.	×	×	–	–	–	–	–	–	–	–
Anurophorus coiffaiti	×	–	×	–	–	–	×	–	–	–
Desoria neglecta	–	×	–	×	–	×	×	–	–	–
Desoria tigrina	×	–	×	×	–	–	–	–	–	–
Folsomia quadrioculata	×	×	×	–	–	–	–	–	–	×
Folsomides marchicus	×	×	×	–	–	–	–	–	–	×
Folsomides parvulus	×	×	×	–	–	–	–	–	–	×
Hemisotoma pontica	×	×	×	–	×	–	–	–	–	×
Isotoma iranica	×	×	–	–	–	–	–	–	–	–
Isotomiella minor	×	–	×	–	–	–	–	–	–	×
Parisotoma notabilis	×	×	×	–	–	–	–	–	–	–
Heteromurus major	×	×	–	–	–	–	–	–	–	–
Pseudosinella octopuncta	×	×	–	–	–	–	–	–	–	–
Sphaeridia pumilis	×	×	–	–	–	–	–	–	–	–
Sminthurus viridis	×	–	×	–	–	–	–	–	–	–
Sminthurinus elegans	×	×	–	–	–	–	–	–	–	–
Dicyrtoma grinbergsi	×	–	–	–	–	–	–	–	–	–
Dicyrtoma ghilarovi	×	–	–	–	–	–	–	–	–	–
Total species	23	16	10	2	4	1	3		3	5

Oak Forest, 2. Fruit garden (Apple, Plum, Walnut and Peach), 3. Pasture, 4. Pine forest, 5. Alfalfa farm, 6. Barberry, 7. Aglet Shrub, 8. Vegetable farm, 9. *Astragalus* ,10. Barley farm

Fig.1- Distribution of different species of Springtails in Lorestan province (scale bar in Km)

1: ***Ceratophysella stercoraria*****; 2:** ***Ceratophysella* cf.** ***borealis*****; 3:** ***Xenylla*** **sp.; 4:** ***Hypogastrura purpurescens*****; 5:** ***Anurophorus coiffaiti*****; 6:** ***Ceratophysella gibosa*****; 7:** ***Isotoma iranica*****; 8:***Pseudosinella octopunctata***; 9:***Pseudachoruts*** **sp.; 10:** ***Pseudachorutes*** **Sp2; 11:** ***Sphaeridia pumilis*****; 12:** ***Isotomiella minor*****; 13-***Desoria neglecta***; 14:***Desoria tigrina***; 15:** ***Folsomia quadrioculata*****; 16:** ***Folsomides marchicus*****; 17:** ***Folsomides parvulus*****; 18:** ***Heteromurus major*****; 19:** ***Parisotoma notabilis*****; 20***: Sminthurus viridis***; 21:** ***Hemisotoma pontic*****; 22:***Dicyrtoma grinbergsi***; 23:** ***Dicyrtoma ghilarovi*****; 24:** ***Sminthurinus elegans***

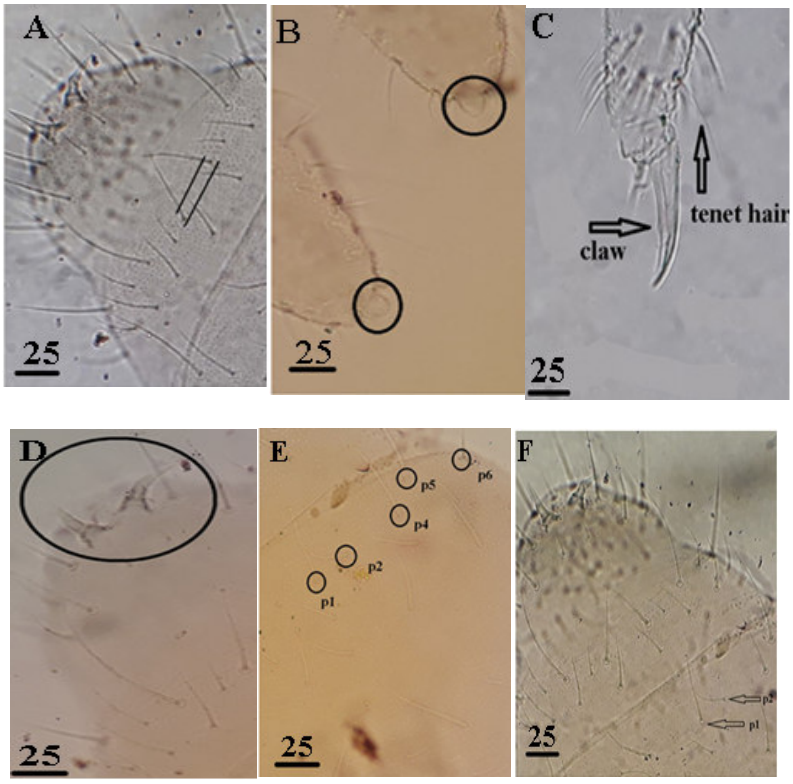

Fig. 1- Some features of *C.* cf. *borealis* (A-F) and *C. stercoraria* (G): A: granules between the p1 setae on Abd. V; B: Ant. VI; C: Tita III; D: Anal spines; E: abd IV; F: p1 and p2 seta on Abd IV; G: p1 and p2 seta on Abd IV and strongly granulated, wart-like hump on Abd V. scale bar in µm (Original).

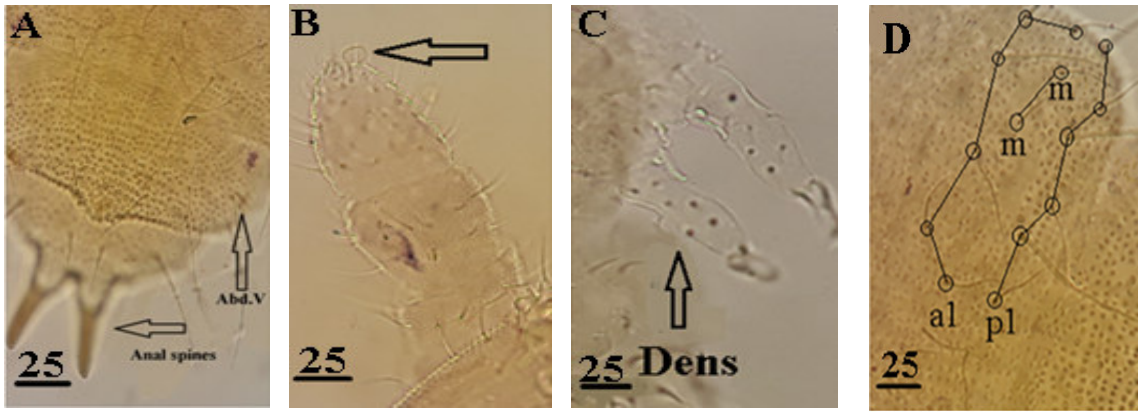

Fig. 3- *Ceratophysella gibosa* : A: Anal spines and tegumentary granulation on Abd V; B: apical bulb on Ant IV; C: seta on Dens; D: Abd IV and Showing p, m and a seta. Scale bar in µm (Original).

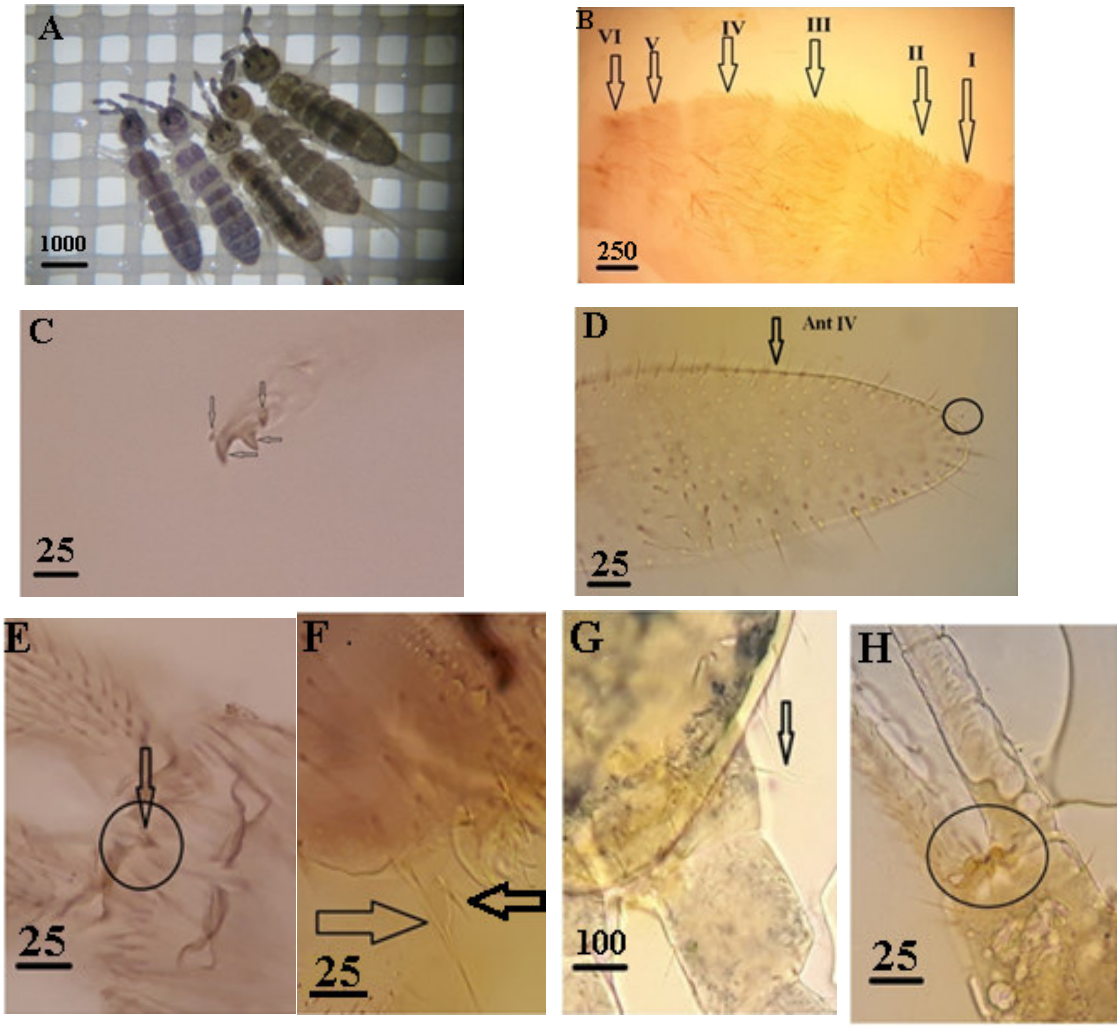

Fig. 4- ***Desoria. neglecta*** **A-F versus** ***Desoria tigrina*** **G-H: A: Body habitus; B: Abdomen ; C: Mucro; D: Ant IV; e: manubrial thickening; F: maxillary palp; G: maxillary palpand H: Manubrial thickening. Scale bar in µm (orginal).**

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فصلنامه تخصصی تحقیقات حشره‌شناسی
(علمی- پژوهشی)
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مطالعه پادمان در غرب ایران با معرفی سه گونه جدید برای ایران

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چکیده

دم‌فنری‌ها یکی از بیشترین جانوران خاک‌زی در اکثر اکوسیستم‌های زمینی می‌باشند. آن‌ها نقش اکولوژیکی در تشکیل، دینامیک و تکامل خاک‌بازی می‌کنند. آن‌ها همچنین با تجزیه و تنفس خاک، نقش مهمی در زنجیره غذایی دارند. در سال‌های اخیر، پادمان به‌عنوان نمونه‌ای از بندپایان، در تحقیقات پایه‌ای در اکولوژی خاک، مورد استفاده قرار گرفته و به‌عنوان موجودات آزمایشی برای سم‌شناسی محیطی خاک، استفاده شده‌اند. نتایج به‌دست آمده از فون پادمان در مناطق غربی ایران بسیار ضعیف است. این مطالعه در طول سال‌های ۲۰۱۷- ۲۰۱٦- در محدوده جغرافیایی استان لرستان انجام شد. ۱۳ زیستگاه مختلف و ۳۷ منطقه نمونه‌برداری از استان لرستان (غرب ایران) برای مطالعه فون پادمان، انتخاب شد. در هر زیستگاه، یک تا پنج نمونه از بستر برگ یا خاک، با بیل جمع‌آوری شد. نمونه‌ها به‌مدت ٤ تا ٥ روز توسط قیف برلیز، استخراج شده و در اتانول ۷۵ درصد نگهداری و سپس در محلول نسبیت شفاف‌سازی شدند. در نهایت، نمونه‌های پادمان در هویرقرار داده شدند. از کلیدهای معتبری برای توصیف گونه‌ها از جمله Fjellberg (2007)، Potapov (2002)، Thibaud و همکاران (۲۰۰٤) و Arbea و Kahrarian (۲۰۱۵) استفاده شد. در مجموع ۲٤ گونه از پادمان از ۱۸ جنس و ۸ خانواده در این تحقیق ثبت شد.

گونه‌های Ceratophysella cf. borealis, Desoria neglecta, و Dicyrtoma grinbergs برای فون ایران رکورد جدیدی می‌باشند. همچنین سه جنس Pseudachorutes, Xenylla و Anurophorus با گونه‌های *Anurophorus coiffaiti*, *Ceratophysella gibosa*, *Sphaeridia pumilis* و *Dicyrtoma ghilarovi* برای غرب ایران رکورد جدید می‌باشند.

واژه‌های کلیدی: استان لرستان، پادمان، *Ceratophysella cf. borealis, Desoria neglecta, Dicyrtoma grinbergsi*

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