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Zercon ostovani sp. nov. (Acari: Mesostigmata: Zerconidae) from Iran

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Abstract: *Zercon ostovani* sp. nov. is described and illustrated based on female specimens collected from Eram Botanical Garden in Fars Province, southwestern Iran. The similarities and differences between related species within the same genus are also discussed.

Key words: Acari, systematics, *Zercon*, new species, Iran

1. Introduction

Members of the family Zerconidae are poorly known in Iran (Nemati et al., 2018). Systematically, some mesostigmatic mite families (e.g., Ameroseiidae, Ascidae, Laelapidae, Macrochelidae, Parasitidae, and Phytoseiidae) have been extensively studied in Iran (Kamali et al., 2001), but not Zerconidae. Although more than 400 zerconid species are known from the Holarctic region (Marchenko, 2018), only 13 species of them have been recorded from Iran (Mohammad-Dustar-Sharaf et al., 2016; Karaca et al., 2017; Kavianpour et al., 2018). We describe a hitherto unknown species of the genus *Zercon* in this paper. With this new species, the number of zerconid mites species recorded in Iran rises to 14.

Litter and soil samples were collected in Fars Province in southern Iran, placed in plastic bags, labelled, and transferred to the laboratory. Samples were then put into combined Berlese funnels, and mites were extracted after 5–7 days according to the humidity of the samples. At the end of this process, the contents of the bottles were transferred to Petri dishes, and mites were separated under a stereomicroscope by using forceps. They were placed in 60% lactic acid for clearing and mounted on permanent microscope slides using a glycerine medium. The examination and drawing of the mites were carried out using an Olympus BX50 microscope with a DP25 camera. The examined holotype and paratypes were stored in 70% ethanol and deposited in the Acarology Laboratory of Islamic Azad University, Shiraz (Iran). Morphological terminology, idiosomal chaetotaxy, and poroidotaxy used in the descriptions follow those of Mašán and Fend'a (2004). All measurements are given in micrometers (µm).

Family: Zerconidae Canestrini, 1891

Genus: *Zercon* C. L. Koch, 1836

Type species: *Zercon triangularis* C. L. Koch, 1836

Diagnosis. Peritremal shields with blunt posterior ends posterior to coxa IV, bearing 2 types of setae: *p1* short and smooth, *p2* long, feathered or spiny. Area between peritremal shield and the edge of the podonotum large and weakly sclerotized. Adgenital shields present, with 2–5 opening valves. Opisthonotum with 7 or 8 pairs of marginal setae. Anterior margin of the ventrianal shield with 2 or 4 setae.

***Zercon ostovani* sp. nov.** (Figures 1–4)

Material: Holotype (♀). Eram Botanical Garden, Shiraz, Fars Province, Iran, 29°38.198′N, 52°31.573′E, 1569 m a.s.l., 01.IV.2014, collected by S. Javan, samples from litter and soil under red horse chestnut (Aesculus × carnea), an artificial hybrid between *A. pavia* (red buckeye) and *A. hippocastanum* (horse chestnut). – Paratypes: 4♀♀, same data as holotype.

Description: *Female* (Figures 1–4). Length of idiosoma of holotype (excluding gnathosoma) 507, width 376. Measurements of 4 paratypes: Mean length 504 (496–512), mean width 375 (368–380). – *Dorsal side* (Figures 1–2). Twenty pairs of different setae present on podonotum's dorsal side: *j*-row with 6 pairs, *z*-row with 2 pairs, *s*-row with 6 pairs, *r*-row with 6 pairs. Two pairs of different setae

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Figure 1. Habitus of *Zercon ostovani* sp. nov. under the stereomicroscope, dorsal view of female. Scale bar = 100 µm.

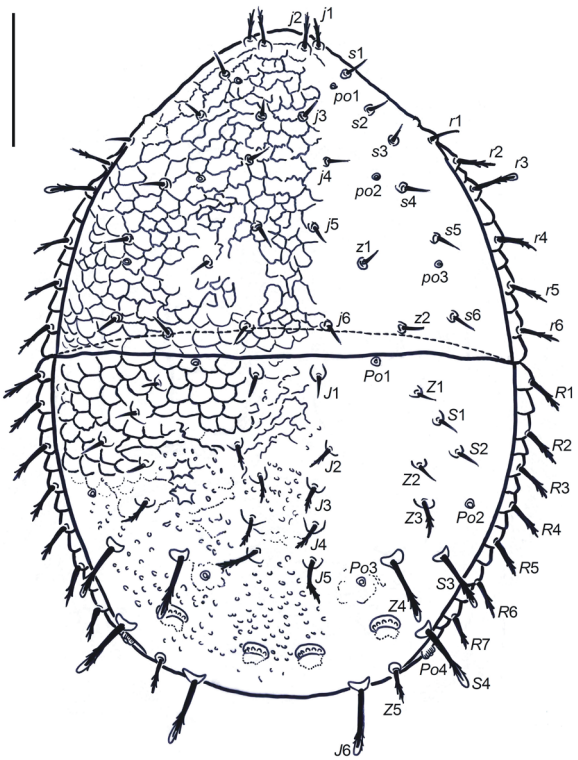

Figure 2. Dorsal view of female of *Zercon ostovani* sp. nov. Scale bar = 100 µm.

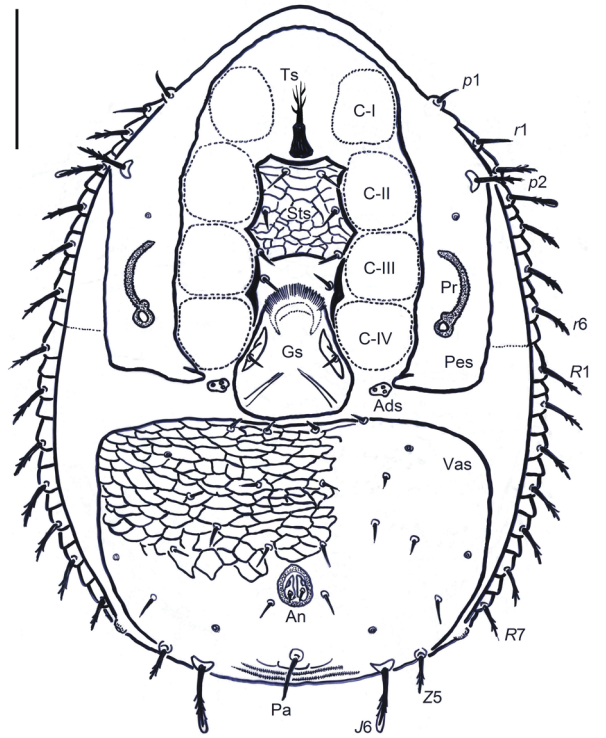

Figure 3. Ventral view of female of *Zercon ostovani* sp. nov. Abbreviations; Ts: tritosternum, Sts: sternal shield, Gs: genital shield, C: endopodal shield, Ads: Adgenital shield, Pr: peritrem, Pes: peritremal shield, Vas: ventroanal shield, An: anal orifice, Pa: postanal seta. Scale bar = 100 µm.

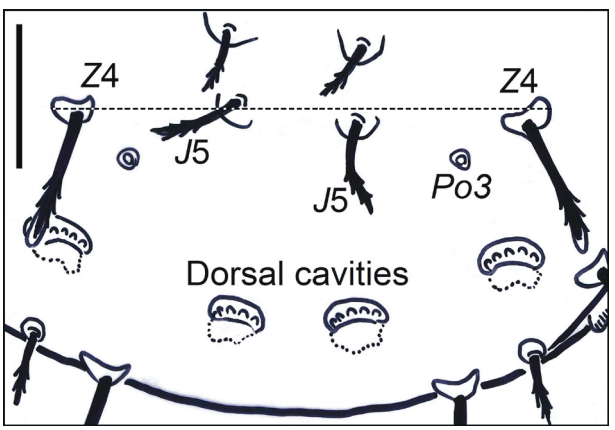

Figure 4. Locations of bases of setae *J5* and *Z4* on opisthonotum (female). Scale bar = 50 µm.

present on podonotum's ventral side: *p*-row with 2 pairs. On podonotum, setae *j*1–2, *r*2, and *r*4–6 finely barbed. Seta *r*3 finely barbed with hyaline ending. All of remaining setae (*j*3–6, *z*1–2, *s*1–6, and *r*1) are short, smooth, and needlelike on podonotum. Seta *j*2 reaching beyond anterior margin of podonotum. Twenty-two pairs of different setae present on opisthonotum's dorsal side: *J*-row with 6 pairs, *Z*-row with 5 pairs, *S*-row with 4 pairs, *R*-row with 7 pairs. On opisthonotum, setae *J*1, *Z*1–2, and *S*1–2 similar in appearance, all of them short, smooth, and needlelike. Setae *J*2–5, *Z*3, *Z*5, and *R*1–7 finely barbed without hyaline ending. Setae *J*6, *Z*4, and *S*3–4 similar in appearance and length, all of them elongated, finely barbed, with hyaline ending. Only seta *J*4 reaches the base of the next seta in the following series. There is a large area between setae *J*5 and dorsal cavities. Setae *S*1–2 not reaching margin of opisthonotum. Seta *S*3 reaches margin of opisthonotum, but seta *S*4 reaches beyond opisthonotum. Marginal *R* setae similar to *r* setae on podonotum, slightly elongated, finely barbed, without hyaline ending. The distances between setae *J*6–*J*6 and *J*6–*Z*5 are 126 μm and 30 μm, respectively. – *Pores*. Location of pores is shown in Figure 2. Three pairs of pores presented on podonotum. Pores *po*1 on line connecting *j*3 and *s*1 (closer to *s*1), *po*2 on line connecting *j*4 and *s*4 (closer to *s*4), *po*3 located between *s*5 and *s*6 (closer to *s*5). Podonotum covered by reticulate pattern. Four pairs of pores present on opisthonotum. Pores *Po*1 located anteromedially to base of *Z*1, *Po*2 on line connecting *Z*3 and *R*4, *Po*3 located between *J*5 and *S*4 (closer to *J*5), *Po*4 located below seta *S*4. Opisthonotal shield with a distinct reticulate pattern in the anterior region and punctate pattern in the posterior region. Dorsal cavities general size and appearance saddlelike, well sclerotized, and axes parallel to that of the body (Figure 4). – *Ventral side* (Figure 3). Shape, chaetotaxy of ventral shields, and shapes of peritremes typical for genus *Zercon*. Setae *p*1 short, smooth, and needlelike, seta *p*2 slightly elongated and finely barbed. Lateral ends of peritremal shield reach setae *R*1–2. Adgenital shields present, with 3 opening valves. Ventroanal shield with 9 pairs of setae. Anterior margin of ventroanal shield with 4 setae; postanal seta is single. All of them short, smooth, and needle-like. – Average lengths of opisthonotal setae and distances between setae within longitudinal rows of female specimens: see Table 1.

Male and immature stages. Unknown.

Differential diagnosis. *Zercon ostovani* sp. nov. is closely related to *Z. embersoni* Błaszak, 1985, *Z. kackaricus* Urhan and Ekiz, 2002, *Z. orszaghorum* Mašán and Fend'a, 2004, and *Z. peltatus* C. L. Koch, 1836. The distinguishing characters of these 5 related species of the genus *Zercon* are shown in Table 2. Unlike other species in the genus *Zercon* (except for a few species), seta *J*5 shows a rare feature: bases of seta *J*5 located on the same horizontal line with the bases of seta *Z*4 (Figure 4).

Etymology. The new species is named in honor of Iranian acarologist Prof. Dr. Hadi Ostovan for his valuable research at Islamic Azad University of Shiraz.

Table 1. Lengths of opisthonotal setae and the distances between their bases in *J*, *Z*, and *S* rows of *Zercon ostovani* sp. nov. (values as mean, in micrometers).

Seta	♀♀	**Seta**	♀♀	**Seta**	♀♀
J1	17	***Z1***	13	***S1***	17
J1–J2	54	***Z1–Z2***	63	***S1–S2***	33
J2	20	***Z2***	15	***S2***	20
J2–J3	28	***Z2–Z3***	28	***S2–S3***	82
J3	22	***Z3***	26	***S3***	46
J3–J4	33	***Z3–Z4***	49	***S3–S4***	61
J4	24	***Z4***	50	***S4***	53
J4–J5	26	***Z4–Z5***	80		
J5	35	***Z5***	26		
J5–J6	109				
J6	54				

Table 2. Comparison of characters of *Zercon ostovani* sp. nov., *Z. embersoni*, *Z. kackaricus*, *Z. orszaghorum*, and *Z. peltatus*. After data in C. L. Koch (1836), Błaszak (1985), Urhan and Ekiz (2002), and Mašán and Fend'a (2004).

	***Zercon ostovani* sp. nov.**	***Zercon embersoni*** Błaszak, 1985	***Zercon kackaricus*** Urhan and Ekiz, 2002	***Zercon orszaghorum*** Mašán and Fend'a, 2004	***Zercon peltatus*** C. L. Koch, 1836
Seta *j*2	finely barbed	smooth	smooth	finely barbed	smooth
Seta *r*3	finely barbed with hyaline ending	finely barbed without hyaline ending	smooth	densely barbed without hyaline ending	finely barbed without hyaline ending
Setae *J*1 and *Z*1	smooth	smooth	finely barbed	finely barbed	smooth
Setae *J*4 and *J*5	finely barbed without hyaline ending	finely barbed with hyaline ending	finely barbed without hyaline ending	densely barbed without hyaline ending	finely barbed without hyaline ending
Bases of seta *J*5	located on connecting line of setae *Z*4–*Z*4	located on connecting line of setae *Z*4–*Z*4	located below connecting line of setae *Z*4–*Z*4	located above connecting line of setae *Z*4–*Z*4	located above connecting line of setae *Z*4–*Z*4
Seta *Z*4	finely barbed with hyaline ending, not reaching margin of opisthonotum	finely barbed with hyaline ending, reaching margin of opisthonotum	finely barbed with hyaline ending, reaching beyond opisthonotum	densely barbed without hyaline ending, reaching beyond opisthonotum	finely barbed without hyaline ending, reaching margin or beyond opisthonotum
Seta *S*2	smooth, not reaching margin of opisthonotum	finely barbed with hyaline ending, reaching margin of opisthonotum	finely barbed without hyaline ending, not reaching margin of opisthonotum	densely barbed without hyaline ending, reaching beyond opisthonotum	smooth, not reaching margin of opisthonotum
Seta *S*3	finely barbed with hyaline ending, reaching slightly beyond opisthonotum	finely barbed with hyaline ending, reaching beyond opisthonotum	finely barbed without hyaline ending, not reaching margin of opisthonotum	densely barbed without hyaline ending, reaching beyond opisthonotum	finely barbed without hyaline ending, reaching beyond opisthonotum
Marginal *R* setae	finely barbed	finely barbed	*R*1–4 finely barbed, *R*5–7 smooth	smooth	Smooth
Pore *Po*2	between setae *Z*3 and *R*4	between setae *Z*2 and *S*2	between setae *Z*2 and *S*2	between setae *Z*2 and *S*2	between setae *Z*2 and *S*2
Size of dorsal cavities	same size	same size	same size	inner pair about 2× larger than outer pair	same size

Nomenclatural acts: This work and the nomenclatural acts it contains have been registered in ZooBank. The ZooBank Life Science Identifier (LSID) for this publication is: http://zoobank.org/urn:lsid:zoobank. org:pub:31C50A99-3E70-4364-BC6E-3C33548B1C13.

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