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Two new species of zerconid mites (Acari: Zerconidae) from Giresun Province (Turkey)

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Abstract: In this study, 2 new species of zerconid mites, *Prozercon giresunensis* sp. nov. and *Prozercon murati* sp. nov., were collected from Giresun Province in Turkey and are described and illustrated on the basis of adult females.

Key words: Acari, Zerconidae, *Prozercon*, taxonomy, new species, Turkey

1. Introduction

Consisting of approximately 60 species worldwide, the genus *Prozercon* represents the second richest taxon of the family Zerconidae. The genus is known from Europe to western Asia (Ujvári, 2011). So far, 23 species have been recorded in Turkey (Urhan and Ayyıldız, 1992, 1996a, 1996b, 1996c, 1996d; Urhan, 1998, 1999, 2002, 2008, 2010). Species of *Prozercon* are free-living and associated with humus and soil, decomposed litter, leaf mold, plant parts, and mosses. As a contribution to the understanding of the acarine faunal richness of Turkey, 2 new species, *P. giresunensis* sp. nov. and *P. murati* sp. nov., are described here on the basis of material collected during a survey of the systematics of zerconid mites in Giresun Province (Turkey).

2. Materials and methods

Soil and litter samples were collected from the province of Giresun, Turkey. They were placed in plastic bags, labeled, and transferred to the laboratory. Samples were then placed in combined Berlese funnels, and mites were extracted for 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 the mites were separated under a stereomicroscope. They were placed in 60% lactic acid for clearing and mounted on permanent microscope slides using a glycerin medium. The examination and drawing of mites were carried out using an Olympus BX50 microscope. Morphological terminology used in the descriptions follows that of Sellnick (1958), Halašková (1969), Błaszak (1974), and Mašán and Fend'a (2004).

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3. Results and discussion

Family: ZERCONIDAE Berlese, 1892
Genus: *Prozercon* Sellnick, 1943
Type-species: *Zercon fimbriatus* C.L.Koch, 1839

3.1. *Prozercon giresunensis* sp. nov.

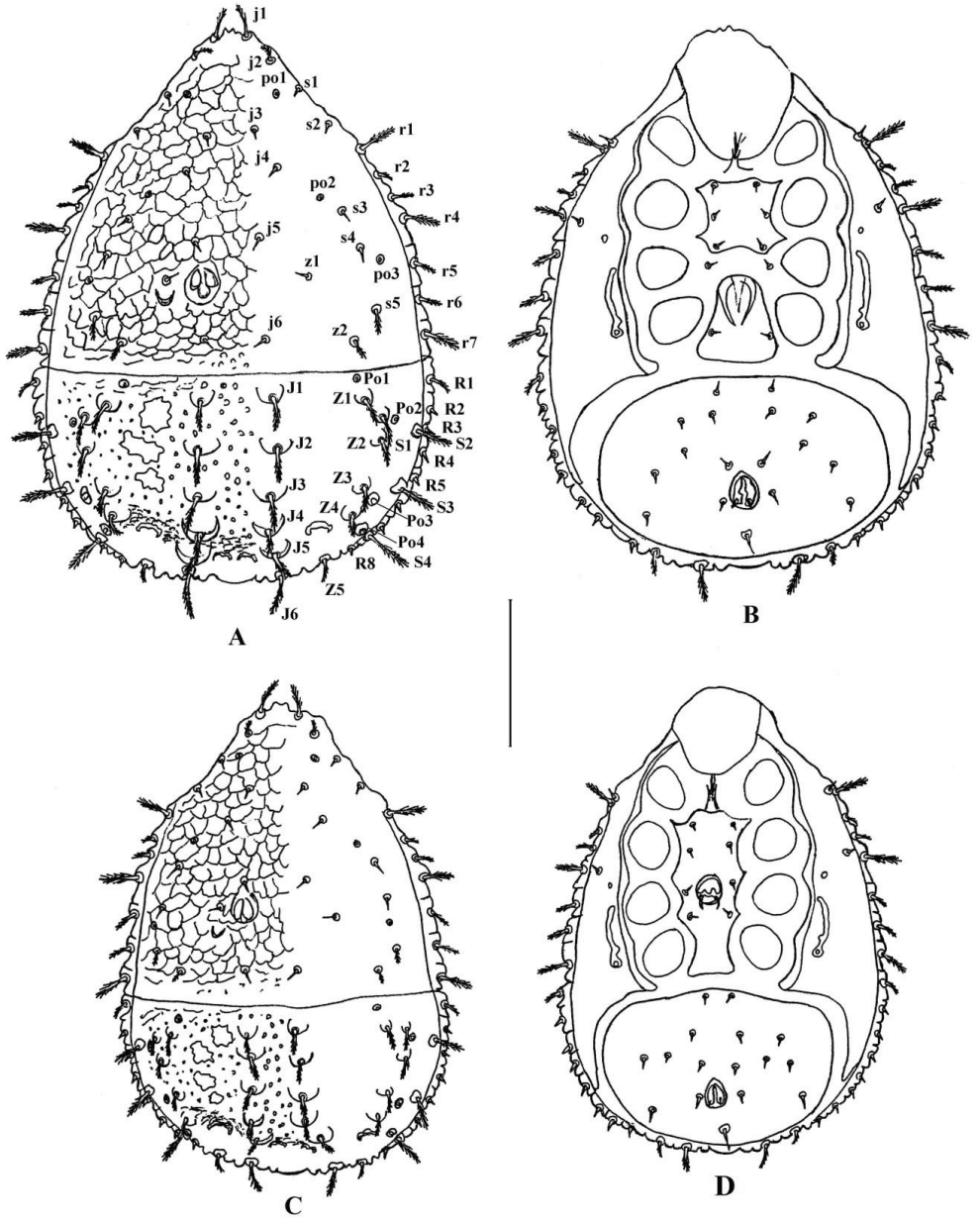
(Figures 1A–1D)

Type material: Holotype ♀. Turkey, Giresun, Şebinkarahisar, mixed forest, 40°17′28.10″N, 38°28′19.85″E, 1215 m, 27 March 2011, collected by M. Öztaş. Samples from litter and soil under *Pinus sylvestris*. Paratypes: 10 ♀♀, 1 ♂; same data as holotype. Holotype and paratypes are deposited in the Department of Biology of Pamukkale University, Denizli, Turkey.

Diagnosis: Posterolateral tips of peritrematal shields reaching the bases of marginal setae R_5 or R_6. Margin of opisthonotum with 8 pairs of setae. Setae j1, r1, r4, and r7 markedly elongated, densely plumose, brush-like, and apically rounded; setae j2, z2, s5, r2, r3, r5, and r6 pilose or plumose; other podonotal setae short, smooth, and needle-like. Setae J_1–J_5, Z_1–Z_5, and S_1 plumose; setae J_6 and S_2–S_4 densely plumose, brush-like, and apically rounded. Setae J_1 not reaching bases of setae J_2. Setae R_1 plumose, the remainder in this row short and smooth. Dorsal cavities distinct, sclerotized, equal in size and form.

Description: *Female*.

Dorsum (Figure 1A). Length of idiosoma in holotype 343 µm, width 241 µm. Measurement of 10 paratypes: length 335–350 µm, width 233–250 µm. Ornamentation of dorsal shields shown in Figure 1. Dorsal cavities distinct, sclerotized, equal in size and form.



Figures 1. *Prozercon giresunensis* sp. nov. Female: A) dorsal view, B) ventral view. Male: C) dorsal view, D) ventral view. Scale bar = 100 μm.

Setae (Figure 1A). On podonotum, 20 pairs of differently formed setae present: j-setal row with 6 pairs of setae, z-setal row with 2 pairs, s-setal row with 5 pairs, and r-setal row with 7 pairs. Podonotal setae j1, r1, r4, and r7 markedly elongated, densely plumose, brush-like, and apically rounded; setae j2, z2, s5, r2, r3, r5, and r6 pilose or plumose; other podonotal setae short, smooth, and needle-like. On opisthonotum, 23 pairs of setae present: J-setal row with 6 pairs of setae, Z-setal row with 5 pairs, S-setal row with 4 pairs, and R-setal row with 8 pairs. Opisthonotal setae J_1–J_5, Z_1–Z_5, and S_1 plumose; setae J_6 and S_2–S_4 densely plumose, brush-like, and apically rounded. Setae J_1 with tips not reaching bases of setae J_2. Setae J_2 reaching bases of setae J_3 (as well as setae J_3 and J_4). Setae J_5 reaching posterior margin of opisthonotum. Insertions of setae J_6–J_6 situated 61–68 μm apart. Setae Z_2 not reaching bases of setae Z_3. The distance between setae Z_5 and J_6 is 26–30 μm. Setae R_1 plumose, the remainder in

this row short and smooth. Lengths of opisthonotal setae and distances between setae within longitudinal rows are depicted in Table 1.

Pores (Figure 1A). On the podonotum, pores po1 located at the medial bases of setae s1. Pores po2 lie on the line connecting setae s3–j4, closer to s3. Pores po3 on the lateral line connecting setae s4–s5. On the opisthonotum, pores Po1 located anteroparaxially to the bases of setae Z_1. Pores Po2 lie on line connecting setae S_1–S_2, closer to S_1, or on the lateral line connecting setae S_1–Z_2. Pores Po3 situated between setal rows Z and S, lateral line connecting setae Z_3–Z_4, closer to Z_3. Pores Po4 lie on a line connecting setae S_4–Z_4.

Venter (Figure 1B). Chaetotaxy and shape of the peritrematal shields typical for the genus. Adgenital shields and pores gv2 absent. Anterior margin of the ventrianal shield with 2 setae.

Allotype: *Male* (Figures 1C and 1D). Idiosoma length 286 µm, width 195 µm. Setae, pores, and sculpturing pattern of the podonotum and opisthonotum same as in female. Distance between setae J_6 and J_6 58 µm. Distance between setae Z_5 and J_6 23 µm. Lengths of opisthonotal setae and distances between setae within longitudinal rows shown in Table 1.

Remarks: *Prozercon giresunensis* sp. nov. is closely related to *P. balikesirensis* Urhan, 2008; *P. dominiaki* Błaszak, 1979; and *P. dramaensis* Ujvári, 2011. The distinguishing characters of the 4 related species of the genus *Prozercon* are given in Table 2.

Etymology: This species is named after its type locality, Giresun (Turkey).

3.2. *Prozercon murati* sp. nov.

(Figures 2A–2D)

Type material: Holotype ♀. Turkey, Giresun, Tirebolu, Örenkaya village, mixed forest, 40°57′56.03″N, 38°51′37.76″E, 49 m, 21 November 2010, collected by M. Öztaş. Sample from litter and soil under *Corylus avellana* and *Alnus* sp. Paratypes: 11 ♀♀, 2 ♂♂, from the same sample. Holotype and paratypes are deposited in the Department of Biology of Pamukkale University, Denizli, Turkey.

Diagnosis: Posterolateral tips of peritrematal shields reaching bases of marginal setae R_6 or R_7. Margin of opisthonotum with 8 pairs of setae. Setae j1, r1, r4, r6, and r7 markedly elongated, densely plumose, brush-like, and apically rounded; setae j5 short, smooth, and needle-like; other podonotal setae pilose or plumose. Setae J_1–J_5 and Z_1–Z_4 pilose; setae J_6 and S_4 densely plumose, brush-like, and apically rounded. Setae S_1 short and smooth. Setae S_2 and S_3 short, pilose, and reaching lateral margin of opisthonotum. Setae R_1–R_8 and Z_5 pilose. Dorsal cavities distinct, sclerotized, equal in size and form.

Description: Female. Dorsum (Figure 2A). Length of idiosoma in holotype 308 µm, width 227 µm. Measurement of 11 paratypes: length 299–316 µm, width 218–234 µm. Ornamentation of the dorsal shields is shown in Figure 2A. Dorsal cavities are distinct, sclerotized, equal in size and form.

Table 1. Lengths of opisthonotal setae and longitudinal distances between them in *Prozercon giresunensis* sp. nov. (measurements in µm).

	♀♀	♂		♀♀	♂		♀♀	♂
S_1	17–20	14	**Z_1**	18–20	17	**J_1**	23–25	16
↕	21–28	17	↕	28–34	22	↕	28–30	22
S_2	22–26	21	**Z_2**	14–21	14	**J_2**	25–27	17
↕	37–39	35	↕	28–31	24	↕	30–33	20
S_3	25–29	21	**Z_3**	15–18	14	**J_3**	22–26	13
↕	36–42	27	↕	17–21	18	↕	24–27	19
S_4	27–32	24	**Z_4**	10	12	**J_4**	12–15	14
			↕	25–32	30	↕	12–14	15
			Z_5	14–17	11	**J_5**	10–12	14
						↕	9–13	18
						J_6	24–26	19

Table 2. Distinguishing characters of 4 related species of the genus *Prozercon*.

	P. giresunensis sp. nov.	*P. balikesirensis*	*P. dominiaki*	*P. dramaensis*
Setae j2–j6, z1, z2, and s1–s5	j2, z2, and s5 pilose or plumose; others short and smooth	z2 and s5 pilose or plumose; others short and smooth	j3–j5 and s3 short and smooth; others plumose	Short and smooth
Setae J_1, Z_1, and S_1	Plumose	Plumose	Plumose	Short and smooth
Setae S_3	Present	Absent	Present	Present
Setae J_2	With tips reaching the bases of setae J_3	With tips not reaching the bases of setae J_3	With tips reaching the bases of setae J_3	With tips not reaching the bases of setae J_3
Number of R-setae	8	7	8	7
Pores Po2	Lie on a line connecting setae S_1–S_2, closer to S_1	Medial line connecting setae S_1–Z_2	Medial line connecting setae S_1–Z_2	Line on a line connecting setae S_1–Z_2, closer to S_1
Pores Po3	Situated between setal rows Z and S, lateral line connecting setae Z_3–Z_4, closer to Z_3	Situated between setal rows Z and J, lie on line connecting setae Z_4–J_4, closer to Z_4	Situated between setal rows Z and J, lie on line connecting setae Z_3–J_1, closer to Z_3	Situated between setal rows Z and J, medial line connecting setae Z_3–Z_4
Pores Po4	Lie on line connecting setae S_4–Z_4	Lie on line connecting setae S_4–Z_5	Situated at medial bases of seta S4	Lie on line connecting setae S_4–Z_5

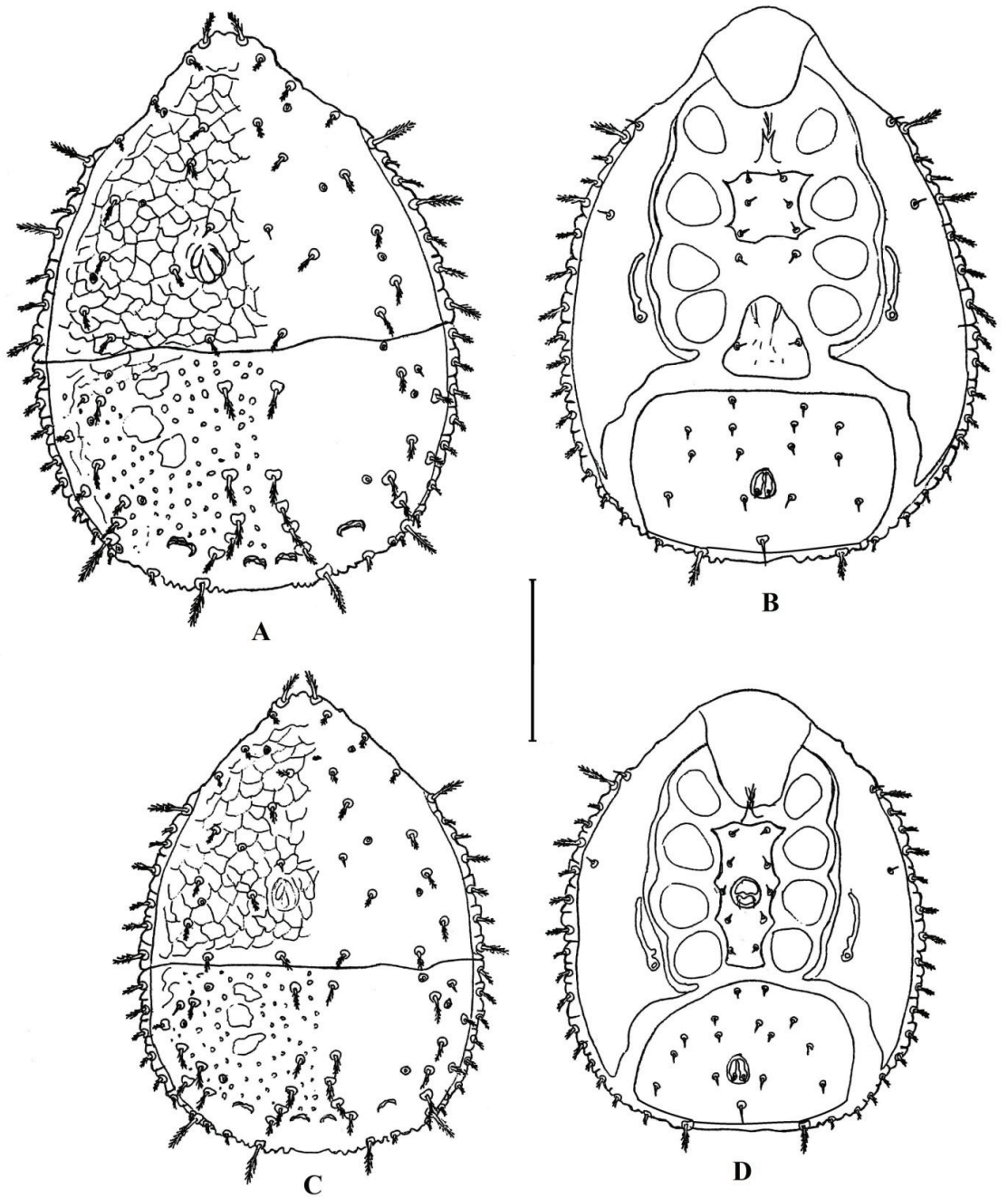
Setae (Figure 2A). On podonotum, 20 pairs of differently formed setae present: j-setal row with 6 pairs of setae, z-setal row with 2 pairs, s-setal row with 5 pairs, and r-setal row with 7 pairs. Podonotal setae j1, r1, r4, r6, and r7 markedly elongated, densely plumose, brush-like, and apically rounded; setae j5 short, smooth and needle-like; other podonotal setae pilose or plumose. On opisthonotum, 23 pairs of setae present: J-setal row with 6 pairs of setae, Z-setal row with 5 pairs, S-setal row with 4 pairs, R-setal row with 8 pairs. Opisthonotal setae J_1–J_5 and Z_1–Z_4 pilose; setae J_6 and S_4 densely plumose, brush-like, and apically rounded. Setae S_1 short and smooth. Setae S_2 and S_3 short, pilose, and reaching lateral margin of opisthonotum. Setae R_1–R_8 and Z_5 pilose. Setae J_1 with tips not reaching bases of setae J_2. Setae J_2 reaching bases of setae J_3 (as well as setae J_3 and J_4). Setae J_5 not reaching posterior margin of opisthonotum. The insertions of setae J_6–J_6 situated 69–75 µm apart. Setae Z_2 not reaching bases of setae Z_3. Setae Z_4 reaching bases of setae S_4. The distance between setae Z_5 and J_6 is 23–27 µm. Lengths of opisthonotal setae and distances between setae within longitudinal rows listed in Table 3.

Pores (Figure 2A). On the podonotum, pores po1 lie on the line connecting setae s1–j3, but closer to s1. Pores po2 lie on the posterior line connecting setae s3–j4, closer to s3. Pores po3 lie on line connecting setae s4–s5. On the opisthonotum pores, Po1 located anterior to the bases of setae Z_1. Pores Po2 are located on the posterior line connecting setae Z_1–S_2, or on the line connecting setae S_1–Z_2, closer to S_1. Pores Po3 situated between setal rows Z and J, on the line connecting setae Z_3–J_2, and closer to Z_3. Pores Po4 located posteromedial to bases of setae S_4.

Venter (Figure 2B). Chaetotaxy and shape of the peritrematal shield typical for the genus. Adgenital shields and pores gv2 absent. Anterior margin of the ventrianal shield with 2 setae.

Allotype: *Male* (Figures 2C and 2D). Idiosoma length 250–260 µm, width 175–195 µm. Setae, pores, and sculpturing pattern on podonotum and opisthonotum same as in female. Distance between setae J_6 and J_6 60–64 µm, distance between setae Z_5 and J_6 18–21 µm. Lengths of opisthonotal setae and distances between setae within longitudinal rows shown in Table 3.

Remarks: *Prozercon murati* sp. nov. is closely related to *P. boyacii* Urhan & Ayyildiz, 1996; *P. mersinensis* Urhan, 1998; and *P. yavuzi* Urhan, 1998. The distinguishing characters of the 3 related species of the genus *Prozercon* are given in Table 4.



Figures 2. *Prozercon murati* sp. nov. Female: A) dorsal view, B) ventral view. Male: C) dorsal view, D) ventral view. Scale bar = 100 µm.

Table 3. Lengths of opisthonotal setae and longitudinal distances between them in *Prozercon murati* sp. nov. (measurements in μm).

	♀♀	♂♂		♀♀	♂♂		♀♀	♂♂
S_1	5–7	4–5	Z_1	14–22	13–17	J_1	20–23	17–20
↕	30–36	25–28	↕	38–41	28–33	↕	47–48	34–40
S_2	12–15	11–14	Z_2	15–18	13–15	J_2	18–23	16–19
↕	36–42	30–34	↕	24–30	19–25	↕	23–25	19–22
S_3	10–14	9–12	Z_3	15–18	11–14	J_3	15–17	12–15
↕	34–37	27–33	↕	20–24	15–18	↕	16–18	14–17
S_4	30–32	24–27	Z_4	14–18	12–15	J_4	14–15	13–15
			↕	32–38	30–32	↕	12–15	10–14
			Z_5	5–9	4–7	J_5	8–11	8–10
						↕	15–20	14–18
						J_6	23–25	21–22

Table 4. Distinguishing characters of 3 related species of the genus *Prozercon*.

	P. murati sp. nov.	*P. boyacii*	*P. mersinensis*	*P. yavuzi*
Setae j2–j6, z1, z2, and s1–s5	j5 smooth; others pilose	Smooth	z2 and s5 pilose; others smooth	j5 smooth; others pilose
Setae S_1	Smooth	Smooth	Smooth	Plumose
Setae S_2 and S_3	Pilose	Short and smooth	Pilose	Setae S_2 densely plumose, brush-like, and apically rounded; setae S_3 absent
Number of R-setae	8	8	8	6
Shape of R-setae	Pilose	R_1–R_5 pilose; other R-setae smooth, thorn-like	R_1–R_5 pilose; other R-setae smooth, thorn-like	R_1 pilose; other R-setae smooth, thorn-like
Setae J_2	With tips reaching bases of setae J_3	With tips not reaching bases of setae J_3	With tips not reaching bases of setae J_3	With tips not reaching bases of setae J_3
Pores Po3	Lie on line connecting setae Z_3–J_2, closer to Z_3	Lie on line connecting setae Z_4–J_2, closer to Z_4	Lie on line connecting setae Z_3–J_3, closer to Z_3	Lie on line connecting setae Z_4–J_2, closer to Z_4
Peritrematal shield	Extending to level of setae R_6–R_7	Extending to level of setae R_5	Extending to level of setae R_3–R_4	Extending to level of setae R_2–R_3

Etymology: This species is named in honor of Murat Öztaş, who collected the samples.

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