Prozercon banazensis sp. nov. (Acari: Mesostigmata: Zerconidae), a new species of zerconid mite from Turkey, with a new record

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Abstract: In this study, Prozercon banazensis sp. nov. is described and illustrated from female and deutonymph specimens collected in Kütahya and Uşak provinces (Turkey). Morphological features of P. morazae Ujvári, 2011, which is a new record for the Turkish fauna, are also given with drawings. Information on habitat and distribution for each species is also provided.

Key words: Systematics, Prozercon, new species, new record, Turkey

1. Introduction
Zerconid mites are important members of the soil fauna and they colonize various soil substrates (Karaca and Urhan, 2015a). They are free-living and mostly associated with humus, soil, decomposed litter, leaf mold, plant parts, and mosses (Urhan, 2010a). These small predatory mites feed on the eggs, larvae, and nymphs of other mites and springtails (Shereef et al., 1984). At present, approximately 40 genera comprising more than 400 species are known worldwide. Only two genera, Prozercon and Zercon, have been recorded from Turkey. The genus Prozercon, based on the number of species in Turkey and worldwide, is the second richest genus in the family Zerconidae. To date, more than 60 species of this genus have been recorded from the West Palearctic. Of these, 29 species were known from Turkey (Karaca and Urhan, 2015b). With the new species and new record of zerconid mites, the number of recorded Prozercon species from Turkey has risen from 29 to 31. Previously, P. morazae was described by Ujvári (2011) on the basis of materials collected from Arkadia, Greece. The aim of this study is to contribute to the knowledge of the Turkish zerconid fauna.

2. Materials and methods
Litter, moss, and soil samples taken from Kütahya and Uşak provinces were brought to the laboratory in plastic bags. Mites were extracted using a Berlese funnel apparatus. They were then cleared with lactic acid and mounted in glycerin. Measurements and illustrations were made using a standard light microscope equipped with a drawing attachment (Olympus CX41 and DP25 camera). Finally, mites were fixed and stored in 75% ethanol. The examined materials are deposited at the Acarology Laboratory of Pamukkale University, Denizli (Turkey). Morphological terminology, idiosomal chaetotaxy, and poroidotaxy used in the descriptions follow those of Mašán and Fend'a (2004). All measurements are given as means, in micrometers.

3. Results
Family: Zerconidae Canestrini, 1891
Genus: Prozercon Sellnick, 1943
Type species: Zercon fimbriatus C.L. Koch, 1839
Prozercon banazensis sp. nov. (Figures 1A–1C)

Type materials: Holotype ♀. Mixed forest, Banaz district, Uşak Province, Turkey, 38°44.419′N, 29°45.443′E, 917 m, 17 August 2014. Samples from litter and soil under Juniperus sp. Paratypes: 16 ♀; same data as holotype.
2 ♀; Mixed forest, Center, Uşak Province, Turkey, 38°46.314′N, 29°12.579′E, 590 m, 2 March 2014, Samples from moss pads. 9 ♀; Mixed forest, Domanıç district, Kütahya Province, Turkey, 39°51.685′N, 29°27.972′E, 1460 m, 11 October 2014, Samples from litter and soil under Pinus sylvestris. 2 ♀; Mixed forest, Domanıç district, Kütahya Province, Turkey, 39°50.991′N, 29°31.395′E, 1400 m, 11 October 2014, Samples from litter and soil under Alnus sp. and moss pads. 1 ♀ and 1 deutonymph; same data above, samples from litter and soil under Fagus sp.

Female (Figure 1A). Length of idiosoma in holotype (excluding gnathosoma) 325, width 207. Measurements in 30 paratypes: mean length 322 (317–331), mean width 208 (203–215).

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Figure 1. *Prozercon banazensis*: A) Dorsal view of female, B) ventral view of female, C) dorsal view of deutonymph (Scale bar = 100 µm).
Dorsum (Figure 1A). Twenty pairs of different setae present on podonotum’s dorsal side: j-row with 6 pairs, z-row with 2 pairs, s-row with 5 pairs, r-row with 7 pairs. Two pairs of different setae present on podonotum’s ventral side: p-row with two pairs. On podonotum, all setae pilose or plumose (except seta j₁). Seta j₁ smooth and needle-like. Setae j₁₁, 1₂, z₁₂, s₁, r₁₂, and r₁₃ plumose. Remaining setae on podonotum (r₁, r₃, and r₅) densely pilose and brush-like. Twenty-one or 22 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 6 or 7 pairs. On opisthonotum, all setae pilose, plumose, or finely serrate. Setae J₁, 1₂, Z₁, 1₂, Z₀, S₁, and R₁₋₇ plumose. Setae Z₁ and S₂₋₃ elongated, phylliform, and finely serrate marginally (big majority of setae S and S₁ smooth). Setae J₁ and Z₁ unilateral plumose. Seta S₁ densely pilose and brush-like. Setae J₁₋₅, Z₁₋₂, and S₁ similar in appearance. Setae J₁ and Z₁ reach parallelly to tip edge of opisthonotum. Only setae J₅ and J₁ reaching base of the following seta in the series. Setae Z₁ and S₁ reaching beyond margin of opisthonotum.

Pores (Figure 1A). Three different pores present on podonotum. Pores p₀₁ under base of s₂, p₀₂ on line connecting j₁ and s₁, closer to s₁, p₀₃ located between s₁ and s₂, closer to s₂. Podonotum covered by reticulate pattern. Four different pores present on opisthonotum. Pores P₀₁ located antero medial to base of Z₁, P₀₂ outside line connecting Z₁ and S₁, closer to Z₁, P₀₃ located between J₁ and Z₀, closer to Z₀, P₀₄ outside line connecting S₁ and S₂. Opisthonotum covered by relative small and irregular pits. Dorsal fossae uniform and weakly sclerotized.

Venter (Figure 1B). Ventral shields’ shape, chaetotaxy, and the shapes of peritremes typical for genus Prozercon. Setae p₁ and p₂ short, smooth, and needle-like. Lateral ends of peritremal shield reach R₄. Adgenital shields absent. Ventroanal shield with 8 pairs of setae. Anterior margin of ventroanal shield with 2 setae and postanal seta is 1. All of them short, smooth, and needle-like.

Deutonymph (Figure 1C). Idiosoma (excluding gnathosoma) in one specimen; length 260, width 193.

Dorsal side, ventral side, shapes of setae on idiosoma, sculpture of podonotum and opisthonotum, and size and appearance of dorsal cavities basically similar to those of female (except podonotal setae J₁₋₅, z₁₋₂, s₁, and opisthonotal setae J₁₋₅). Although in female specimens these setae are finely or densely plumose, in deutonymphs these setae are short and smooth.

Pores (Figure 2). On podonotum, pores p₀₁ under base of s₁, p₀₂ inside line connecting j₁ and s₁, p₀₃ inside line connecting s₁ and s₂, closer to s₂. On opisthonotum, pores P₀₁ located anterolaterally to bases of Z₁, P₀₂ outside line connecting Z₁ and S₁, P₀₃ connecting between J₁ and S₁, near base of S₁. Average lengths of opisthonotal setae and distances between setae within longitudinal rows of female specimens and deutonymph: see Table 1.

Remarks. Prozercon banazensis sp. nov. is closely related to P. erdogani Urhan, 2010. The distinguishing characters of these two related species of the genus Prozercon are shown in Table 2.

Etymology. The specific name “banazensis” reflects the name of the Banaz district (Uşak, Turkey), where the new species was collected.

Prozercon morazae Ujvári, 2011
(Figures 2A–2C)

Materials: 1 ♀ and 1 ♂; Mixed forest, surroundings of Sofça village, Center, Kütahya Province, Turkey, 39°36.658’N, 30°09.243’E, 909 m, 5 May 2014, Samples from litter and soil under Quercus sp. and Juniperus sp. 8 ♀♀, 1 ♂ and 1 protonymph; mixed forest, closer to Sabuncupınar village, Center, Kütahya Province, Turkey, 39°34.433’N, 30°06.015’E, 901 m, 5 May 2014, Samples from litter and soil under Pinus nigra and moss pads. 2 ♀♀; same data above, samples from litter and soil under Crateagus sp.

Female (Figure 2A). Idiosoma (excluding gnathosoma) in the 11 specimens; mean length 339 (330–356), mean width 226 (219–231).

Dorsum (Figure 2A). Twenty pairs of different setae present on podonotum’s dorsal side: j-row with 6 pairs, z-row with 2 pairs, s-row with 5 pairs, r-row with 7 pairs. Two pairs of different setae present on podonotum’s ventral side: p-row with two pairs (seta p₁ presented on dorsal figure, above seta r₁, seta p₂ visible on ventral view). On podonotum, all setae pilose or plumose (except seta j₁). Seta j₁ smooth and needle-like. Setae J₁, 1₂, J₁₋₅, Z₁₋₂, S₁, and R₁₋₅ plumose. Remaining setae on podonotum (r₁, r₃, and r₅) densely pilose and brush-like. 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, all setae pilose, plumose, or thorn-like. Setae J₁₋₅, Z₁₋₃, S₁₋₃, and R₁₋₅ densely plumose. Setae J₁ and S₁ densely pilose and brush-like. All marginal R setae short, smooth, and thorn-like (except seta R₁). Setae J₁₋₅, Z₁₋₃, and S₁ similar in appearance. Only setae J₁ reaching base of the following seta in the series. Setae J₁, Z₄, and S₁ reaching beyond margin of opisthonotum.

Pores (Figure 2A). Three different pores present on podonotum. Pores p₀₁ under base of s₁, p₀₂ on line connecting s₁ and s₂, closer to s₂, p₀₃ inside line connecting s₁ and s₂, closer to s₂. Podonotum covered by reticulate pattern. Four different pores present on opisthonotum. Pores P₀₁ located anterolaterally to bases of Z₁, P₀₂ on line connecting Z₁ and S₁, P₀₃ inside line connecting Z₁ and Z₀, P₀₄ located between Z₁ and S₁, closer to Z₁. Opisthonotum covered by relative extensive and irregular pits. Dorsal fossae uniform and weakly sclerotized.

Venter. Chaetotaxy and poroidotaxy of ventral shields typical for genus Prozercon. Setae p₁ and p₂ (peritremal setae) short, smooth, and needle-like. Lateral ends of
Figure 2. Dorsal views of Prozercon morazae: A) Female, B) male, C) protonymph (scale bar = 100 µm).
peritremal shield reach $R_5$. Adgenital shields absent (an important feature of the genus *Prozercon*). Ventroanal shield with 8 pairs of setae. Anterior margin of ventroanal shield with 1 pair of setae, and postanal seta is 1. All of them short, smooth, and needle-like. The shapes of peritremes are typical for the genus *Prozercon*.

Male (Figure 2B). Idiosoma (excluding gnathosoma) in the 2 specimens; mean length 290 (288–292), mean width 190 (189–190).

Dorsal side, ventral side, shapes of setae on idiosoma, sculpture of podonotum and opisthonotum, and size and appearance of dorsal cavities basically similar to those of female.

Pores (Figure 2B). On podonotum, pores $p_0$, near base of $s_1$, $p_3$, inside line connecting $s_i$ and $s_j$, closer to $s_j$, $p_3$, on line connecting $z_2$ and $s_j$, closer to $s_j$. On opisthonotum, pores $P_0$, located near base of $Z_1$, $P_2$ on line connecting $Z_1$ and $Z_2$, closer to $Z_2$, $P_3$, inside line connecting $Z_2$ and $z_3$, $P_4$, near base of $Z_5$. Protonymph (Figure 2C). Idiosoma (excluding gnathosoma) in one specimen; length 215, width 148.

Dorsal side, ventral side, shapes of setae on idiosoma, and sculpture of podonotum and opisthonotum basically similar to those of female and male (except opisthonotal setae $j_3–5$). Although setae $j_3–5$ are densely plumose in the female and male, they are short, smooth, and needle-like in the protonymph.

Pores (Figure 2C). On podonotum, only pores $p_0$, visible, located near the base of seta $j_1$. On opisthonotum, only pores $P_0$, visible, located anterolaterally to bases of seta $Z_1$.

Average lengths of opisthonotal setae and distances between setae within longitudinal rows of female and male and protonymph: see Table 3.
Remarks. In type specimens, the number of setae $R$ varies between 5 or 7 pairs, but in the Turkish specimens these setae are 7 pairs. In Turkish female specimens, seta $J_1$ does not reach the base of seta $J_2$, but in type specimens it reaches. The lateral ends of peritremal shields reach $R_7$ in Greek specimens, but in our specimens these shields’ lateral ends reach $R_5$.

4. Discussion
Most Turkish specimens’ setal and morphological characters are very similar to those of type specimens of *P. morazae*. The lengths and widths were compared on the basis of the available literature (Table 4). According to Table 4, the Turkish *P. morazae* specimens are approximately the same size as type specimens. Furthermore, the different positions of pores may be a result of geographical variation in Zerconidae members.

On the other hand, nine species of the genus *Prozercon* were recorded from different habitats (especially northern and northeastern regions of country) of Greece by Ujvári in 2011. Six of the species, namely *P. achaeanus*, *P. bulbiferus*, *P. dramaensis*, *P. graecus*, *P. morazae*, and *P. norae*, were proved to be new to science. Three further species (*P. carpathofimbriatus*, *P. carsticus*, and *P. yavuzi*) were recorded for the first time from Greece. Of them, *P. bulbiferus*, *P. graecus*, *P. carpathofimbriatus*, and *P. yavuzi* were already known from Turkey. In addition to these species, one new record (*P. morazae*) is reported from Turkey herein. Most probably, the other 4 species known from Greece are expected to be found in northwestern Turkey in the following investigations.

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This study was financially supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK), project number 113Z717.

### Table 3. Lengths of opisthontal setae and the distances between their bases in J-, Z-, and S- rows of *Prozercon morazae*.

<table>
<thead>
<tr>
<th>Seta</th>
<th>F</th>
<th>M</th>
<th>PN</th>
<th>Seta</th>
<th>F</th>
<th>M</th>
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F: female, M: male, PN: protonymph.

### Table 4. Length and width intervals of idiosoma of *Prozercon morazae*.

<table>
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<th>Prozercon morazae</th>
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<td>258 × 194</td>
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F: female, M: male, PN: protonymph.
References


