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RESEARCH ARTICLE

Mites of the family Zerconidae (Acari: Mesostigmata) from Southwestern Turkey, with description of three new species

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ASBTRACT: The diversity of zerconid mites was examined in the Marmaris National Park, which is located in Muğla province at southwestern Turkey, for a period of twelve months between May 2020 and April 2021. Ten Zerconidae species were found in the study area, three of which belonging to the genus *Prozercon* and remaining seven species belonging to the genus *Zercon*. Among them, three new species of the genus *Zercon*, *Z. dogani* **sp. nov.**, *Z. marmarisensis* **sp. nov.** and *Z. muglaensis* **sp. nov.** were described and illustrated. Also, altitute and habitat preferences of all zerconid mites collected from the study area were presented and a key to the species was given.

Keywords: Zerconids, altitude, habitat, preference, key, Marmaris National Park, Muğla Province.
Zoobank: https://zoobank.org/754FC691-F0A9-411F-970B-6E3A157549BE

INTRODUCTION

Mites of the family Zerconidae, briefly zerconids, occur only in the Holarctic region and colonize at different soil substrates. They are soil-inhabiting mites in the order Mesostigmata. In the light of literature records, Turkey is one of the well studied countries in terms of Zerconidae systematic and 131 species of zerconids have been recorded from this country so far (Bulut et al., 2021). Systematical and ecological studies are still ongoing on zerconids both in Turkey and the other zoogeographic areas in the Holarctic region, and some records were given by several acarologists in the recent years (Karaca, 2021; Kaczmarek et al., 2020, 2021; Marchenko, 2021, 2022; Moghimi et al., 2021; Urhan et al., 2021).

National parks are special areas for various scientific investigations, especially for botanist and zoologist, contain a wide variety of floral and faunal elements. Turkey is a rich country in terms of number of national parks with 44 national parks (Keçeci et al., 2021), including the Marmaris National Park which located in Köyceğiz and Marmaris counties of Muğla Province (southwestern Turkey). In the present study, Marmaris National Park (Muğla Province, southwestern Turkey) were selected for the reveal of species diversity of Zerconidae mites, and also altitudinal/habitat preferences of the specimens. According to literature records, up to now, no studies about zerconids have been performed in this area. So, field studies were conducted for 12 months in the Marmaris National Park, and different materials collected from this area, were examined. A species list for zerconid mites found in the study area were prepared, previous records of the species were noted, altitudinal/habitat preferences of the specimens were investigated, a key to all Zerconidae species were presented, and three new species of the genus *Zercon* were described.

MATERIALS AND METHODS

Soil, litter and moss samples, which include Zerconidae specimens, were collected from different habitats (especially from forestland areas) in the Marmaris National Park, Köyceğiz and Marmaris counties of Muğla Province, between May 2020 and April 2021. Sampling studies was carried out after obtaining legal permissions from the "Republic of Turkey Ministry of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks (72784983-488.04-51504)". Totally 591 samplings from 156 different sites were made in the study area.

Collecting, carrying, sorting, measuring and drawing processes as in Bulut et al. (2021). The following terminologies were used in identification processes for the specimens: Lindquist and Evans (1965), Johnston and Moraza (1991), Lindquist and Moraza (1998). A light microscope (Olympus CX41) was used for identification process of zerconid mites. Due to the light microscope used, it was not possible to discern pores, poroids, lyrifissures or pore-like structures as in a differential interference contrast microscope. Therefore, not all of these structures can be shown on the related figures.

The holotype and paratypes of the new species, as well as the other Zerconidae specimens were deposited in the Acarology Laboratory of the Department of Biology, Faculty of Science and Arts, Pamukkale University, Denizli, Turkey.

All measurements were given as micrometers (μm). Abbreviations of DN and PN were used for deutonymph and protonymph specimens, respectively.

RESULTS

After examinations of collected Zerconidae specimens from the research area, three *Prozercon* and seven *Zercon* species were identified. All the species were listed below,

and some information about each species, e.g. numbers of examined specimens, short descriptions for the known species, Turkish and the world distributions of the species, altitude and habitat preferences of the specimens were given in alphabetical order herein. Also, a key for the Zerconidae mites of the Marmaris National Park was presented. With the new species, the number of zerconid mites known from Turkey has increased to 134.

Family **Zerconidae** Canestrini, 1891

Genus ***Prozercon*** Sellnick, 1943

Type species: ***Zercon fimbriatus*** C. L. Koch, 1839

Prozercon bulgariensis Ujvári, 2013

This species was the second most abundant zerconid species in terms of number of individuals in the study area.

Materials examined: 92 females, 13 males, eight DN and one PN: soil, litter and moss samples under tree heather (*Erica arborea*) and Turkish pine (*Pinus brutia*), 36°47.459' N, 28°11.515' E, 140 m a.s.l., vicinity of İçmeler neighborhood, 17 May 2020. 14 females, three males and one DN: soil and litter samples under various plants (see Table 8), 36°47.069' N, 28°12.624' E, 156 m a.s.l., vicinity of İçmeler-Turunç road, 17 May 2020. 19 females, five males, 4 DN and one PN: soil, litter and moss samples under various plants (see Table 8), 36°45.641' N, 28°12.671' E, 533 m a.s.l., vicinity of Osmaniye neighborhood, 24 October 2020. 20 females: soil, litter and moss samples under various plants (see Table 8), 36°51.543' N, 28°16.663' E, 32 m a.s.l., vicinity of Sarıana shrine, 24 October 2020. 98 females: soil, litter and moss samples under various plants (see Table 8), 36°48.933' N, 28°17.661' E, 84 m a.s.l., vicinity of Nimara cave (Cennet island), 24 October 2020. 45 females and eight males: soil, litter and moss samples under various plants (see Table 8), 36°49.931' N, 28°18.910' E, 13 m a.s.l., vicinity of Aksaz neighborhood, 12 January 2021. 46 females, three males, nine DN and one PN: soil, litter and moss samples under various plants (see Table 8), 36°53.622' N, 28°17.776' E, 510 m a.s.l., vicinity of Aksaz military zone, 12 January 2021. 73 females, 13 males and one DN: soil, litter and moss samples under various plants (see Table 8), 36°51.074' N, 28°13.102' E, 240 m a.s.l., vicinity of Marmaris-Datça road, 13 March 2021. 202 females, 24 males and two DN: soil, litter and moss samples under various plants (see Table 8), 36°45.366' N, 28°13.532' E, 529 m a.s.l., vicinity of Bozburun-Osmaniye road, 13 March 2021. 152 females and 17 males: soil, litter and moss samples under various plants (see Table 8), 36°51.491' N, 28°32.512' E, 258 m a.s.l., vicinity of Büyükkaraağaç road, 28 April 2021. 184 females, 40 males and 12 DN: soil, litter and moss samples under various plants (see Table 8), 36°51.583' N, 28°32.290' E, 291 m a.s.l., vicinity of Ekincik neighborhood, 28 April 2021.

Short desription: On podonotum, setae *j2–6*, *z2*, *z4–5*, *s1* and *s4* short, smooth and needle-like. Setae *j1*, *z6, s5* and marginal setae (*z3*, *s2–3*, *s6*, *r2* and *r4–5*) pilose or plumose. On opisthonotum, great majority of setae elongated and pilose or plumose, including marginal seta *S1*. Remaining marginal setae (*R1–6*) short, smooth and needle-like. Setae *S3–5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *Z1* and *Z2*, *gdZ3* located between setae *J4* and *Z3*, closer to *Z3*. Dorsal cavities distinct and weakly developed. Anterior margin of ventrianal shield with one pair of setae (*JV1*), glands *gv2* absent. Posterolateral tips of peritrematal shield reach to level of setae *R1–2* (Ujvári, 2013; Urhan and Karaca, 2020).

Turkish distribution: Muğla (Urhan and Karaca, 2020).

Known distribution: Bulgaria (Ujvári, 2013), Turkey (Urhan and Karaca, 2020).

Prozercon tragardhi (Halbert, 1923)

Materials examined: One female and two males: moss samples, 36°48.940' N, 28°11.511' E, 43 m a.s.l., vicinity of İçmeler neighborhood, 17 May 2020. Seven females and two males: soil and litter samples under common myrtle (*Myrtus communis*), 36°47.459' N, 28°11.515' E, 140 m a.s.l., vicinity of İçmeler neighborhood, 17 May 2020. Eight females and two males: soil and litter samples under Turkish pine (*Pinus brutia*) and Aleppo oak (*Quercus infectoria*), 36°51.171' N, 28°12.625' E, 130 m a.s.l., vicinity of Yeşilbelde neighborhood, 17 May 2020. Three females and one PN: soil and litter samples under pink rock-rose (*Cistus creticus*), 36°51.014' N, 28°12.552' E, 124 m a.s.l., vicinity of Yeşilbelde neighborhood, 17 May 2020. 25 females and two males: soil, litter and moss samples under various plants (see Table 8), 36°45.366' N, 28°13.532' E, 529 m a.s.l., vicinity of Bozburun-Osmaniye road, 13 March 2021.

Short desription: On podonotum, seta *j5* short, smooth and needle-like, remaining setae pilose or plumose. On opisthonotum, great majority of setae elongated and pilose or plumose, excluding marginal setae. All marginal setae (*S1* and *R1–6*) short, smooth and needle-like. Setae *S3–5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *Z2* and *S2*, *gdZ3* located between setae *Z3* and *S4*, closer to *Z3*. Dorsal cavities distinct and weakly developed. Anterior margin of ventrianal shield with one pair of setae (*JV1*), glands *gv2* absent. Posterolateral tips of peritrematal shield reach to level of setae *R1–2* (Bilki, 2021).

Turkish distribution: Denizli, Erzurum, Giresun, İstanbul, Kırklareli, Kütahya, Tekirdağ (Bilki, 2021), Muğla (present study).

Known distribution: Austria, Czechia, England, Germany, Hungary, Iceland, Ireland, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, Ukraine (Bilki, 2021).

Prozercon yavuzi Urhan, 1998

Materials examined: 13 females: soil, litter and moss samples under Aleppo oak (*Quercus infectoria*) and lentisk (*Pistacia lentiscus*), 36°50.321' N, 28°21.535' E, 97 m a.s.l., vicinity of Aksaz neighborhood, 24 October 2020.

Short desription: On podonotum, seta *j5* short, smooth and needle-like, remaining setae pilose or plumose. On opisthonotum, great majority of setae elongated and pilose or plumose, including marginal setae *S1* and *R1*. Remaining

marginal setae (*R2–6*) short, smooth and needle-like. Seta *S4* absent. Setae *S3* and *S5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *Z2* and *S2*, *gdZ3* located between setae *J3* and *Z3–4*, closer to *Z3–4*. Dorsal cavities distinct and weakly developed. Anterior margin of ventrianal shield with one pair of setae (*JV1*), glands *gv2* absent. Posterolateral tips of peritrematal shield reach to level of setae *R1* (Urhan, 1998; Ujvári, 2008, 2011; Bilki, 2021; Bulut et al., 2021).

Turkish distribution: Aydın, Balıkesir, Denizli, İstanbul, Muğla (Bulut et al., 2021).

Known distribution: Turkey (Urhan, 1998), Greece (Ujvári, 2008, 2011).

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

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

Zercon colligans Berlese, 1920

This species was the third most abundant zerconid species in terms of number of individuals in the study area.

Materials examined: 102 females, 22 males, six DN and two PN: soil, litter and moss samples under various plants (see Table 8), 36°47.459' N, 28°11.515' E, 140 m a.s.l., vicinity of Marmaris-İçmeler road, 17 May 2020. 24 females, 12 males, one DN and one PN: soil, litter and moss samples under various plants (see Table 8), 36°54.151' N, 28°16.822' E, 355 m a.s.l., Marmaris-Muğla road junction, 12 January 2021. 21 females, four males and one DN: soil and litter samples under Turkish pine (*Pinus brutia*), 36°44.883' N, 28°15.533' E, 108 m a.s.l., vicinity of Kumlubük road, 13 March 2021. 43 females, 15 males and three DN: soil, litter and moss samples under various plants (see Table 8), 36°51.633' N, 28°33.175' E, 369 m a.s.l., vicinity of Ekincik-Sultaniye road, 28 April 2021. 112 females, 35 males, 11 DN and two PN: soil, litter and moss samples under various plants (see Table 8), 36°52.286' N, 28°29.421' E, 27 m a.s.l., vicinity of Büyükkaraağaç road, 28 April 2021.

Short desription: On podonotum, all setae short, smooth and needle-like, excluding seta *j1* and marginal setae. Seta *j1* and marginal setae (*s2–3*, *s6*, *r2* and *r4–5*) finely barbed. On opisthonotum, setae *J1–2*, *Z1–2* and *S2* short, smooth and needle-like. Setae *S3* and marginal setae (*S1* and *R1–6*) finely barbed. Remaining opisthonotal setae elongated, finely barbed with hyaline endings. Only setae *S5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *Z2* and *S3*, *gdZ3* located between setae *J4* and *Z4*. Dorsal cavities distinct and strongly developed. Anterior margin of ventrianal shield with one pair of setae (*JV1*), glands *gv2* present. Posterolateral tips of peritrematal shield reach to level of setae *S1* (Bilki, 2021; Bulut et al., 2021).

Turkish distribution: Afyonkarahisar, Artvin, Aydın, Balıkesir, Çanakkale, Denizli, Edirne, Erzurum, Giresun, İstanbul, Kırklareli, Kütahya, Tekirdağ, Uşak (Bulut et al., 2021), Muğla (present study).

Known distribution: Austria, France, Iran, Ireland, Italy, Russia, Sweden, Swiss, Turkey (Bulut et al., 2021).

Zercon inonuensis Urhan, 2007

Materials examined: One male: soil and litter samples under Turkish pine (*Pinus brutia*), 36°44.983' N, 28°13.956' E, 599 m a.s.l., vicinity of Bozburun-Osmaniye road, 13 March 2021.

Short desription: On podonotum, all setae short, smooth and needle-like, excluding seta *j1* and marginal seta *s6* which are finely barbed. Seta *s1* absent. On opisthonotum, setae *J1–5, Z1–2*, *S2–3* and marginal setae (*S1* and *R1–6*) short, smooth and needle-like. Setae *Z3–5* and *S4–5* elongated, finely barbed with hyaline endings. Setae *S4–5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *Z2* and *S3*, *gdZ3* located between setae *J4* and *Z4*, closer to *Z4*. Dorsal cavities distinct and strongly developed. Anterior margin of ventrianal shield with one pair of setae (*JV1*), glands *gv2* present. Posterolateral tips of peritrematal shield reach to level of setae *S1* (Urhan, 2007; Bilki, 2021).

Turkish distribution: Afyonkarahisar, Eskişehir, İstanbul, Kütahya (Bilki, 2021), Muğla (present study).

Known distribution: Turkey (Urhan, 2007).

Zercon quadricavum Urhan, 2001

This species was the most abundant zerconid species in terms of number of individuals in the study area.

Materials examined: 33 females, two males, eight DN and three PN: soil, litter and moss samples under various plants (see Table 8), 36°45.641' N, 28°12.671' E, 533 m a.s.l., vicinity of Turunç-Osmaniye road, 24 October 2020. 141 females, 42 males, 24 DN and two PN: soil, litter and moss samples under various plants (see Table 8), 36°54.092' N, 28°17.146' E, 407 m a.s.l., Marmaris-Muğla road junction, 12 January 2021. 223 females, 62 males, 20 DN and seven PN: soil, litter and moss samples under various plants (see Table 8), 36°50.737' N, 28°12.592' E, 161 m a.s.l., vicinity of Armutalan neighborhood, 13 March 2021. 231 females, 52 males, three DN and one PN: soil, litter and moss samples under various plants (see Table 8), 36°44.877' N, 28°14.700' E, 408 m a.s.l., vicinity of Kumlubük road, 13 March 2021. 307 females, 54 males, 18 DN and 11 PN: soil, litter and moss samples under various plants (see Table 8), 36°52.802' N, 28°19.250' E, 695 m a.s.l., vicinity of sawmill, 13 March 2021. 225 females, 76 males, 16 DN and three PN: soil, litter and moss samples under various plants (see Table 8), 36°54.331' N, 28°21.502' E, 664 m a.s.l., vicinity of Büyükkaraağaç and Aksaz neighborhoods, 28 April 2021.

Short desription: On podonotum, all setae short, smooth and needle-like, excluding seta *j1* and marginal setae *r5*, *s6* which are finely barbed. On opisthonotum, setae *J1–2*, *Z1–2*, *S2* and marginal setae *R2–6* short, smooth and needle-like. Setae *J3–5*, *Z3–5* and *S3–5* elongated, finely barbed with hyaline endings. Setae *J5* are in an almost horizontal position, and apical parts of theirs extend towards each

other. Although seta *S4* reaching to margin of opisthonotum, seta *S5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *Z3* and *S3*, *gdZ3* located between setae *J5* and *Z4*. Dorsal cavities distinct, large and strongly developed. Anterior margin of ventrianal shield with two pairs of setae (*JV1* and *ZV1*), glands *gv2* present. Posterolateral tips of peritrematal shield reach to level of setae *S1* (Urhan, 2001; Bilki, 2021).

Turkish distribution: Denizli, Kütahya, Muğla, Uşak (Bilki, 2021).

Known distribution: Turkey (Urhan, 2001).

Zercon turcicus Urhan & Ayyıldız, 1994

Materials examined: Five females: soil and litter samples under kermes oak (*Q. coccifera*) and pink rock-rose (*Cistus creticus*), 36°51.773' N, 28°33.919' E, 348 m a.s.l., vicinity of Sultaniye and Ekincik neighorboods, 28 April 2021.

Short desription: On podonotum, all setae short, smooth and needle-like, excluding seta *j1* and marginal setae *s3*, *s6*, *r4–5* which are finely barbed. On opisthonotum, setae *J1–2* and *Z1–2* short, smooth and needle-like. Setae *S1–2* and marginal setae *R1–6* finely barbed. Setae *J3–5*, *Z3–5* and *S3–5* elongated, finely barbed with hyaline endings. Although seta *S4* reaching to margin of opisthonotum, seta *S5* reaching to beyond of opisthonotum. Pores *gdS2* located between setae *S3* and *S4*, *gdZ3* located between setae *J5* and *Z4*, closer to *Z4*. Dorsal cavities distinct and strongly developed. Anterior margin of ventrianal shield with two pairs of setae (*JV1* and *ZV1*), glands *gv2* present. Posterolateral tips of peritrematal shield reach to level of setae *S1* (Urhan and Ayyıldız, 1994; Karaca et al., 2017; Kavianpour et al., 2018; Bilki, 2021).

Turkish distribution: Afyonkarahisar, Aydın, Erzurum, Kırklareli (Bilki, 2021), Muğla (present study).

Known distribution: Turkey (Urhan and Ayyıldız, 1994), Iran (Karaca et al., 2017; Kavianpour et al., 2018).

Descriptions of new species

Zercon dogani sp. nov. (Figures 1-6)

Zoobank: https://zoobank.org/A1076749-388B-4640-9D5A-69858E921E38

Type material. Holotype (female), soil and litter samples under pink rock-rose (*Cistus creticus*) under Turkish pine (*Pinus brutia*), 36°47.459' N, 28°11.515' E, 140 m a.s.l., vicinity of Marmaris-İçmeler road (Marmaris County, Muğla Province), 17 May 2020. Paratypes: 41 females, 15 males, three DN and one PN, same data as holotype.

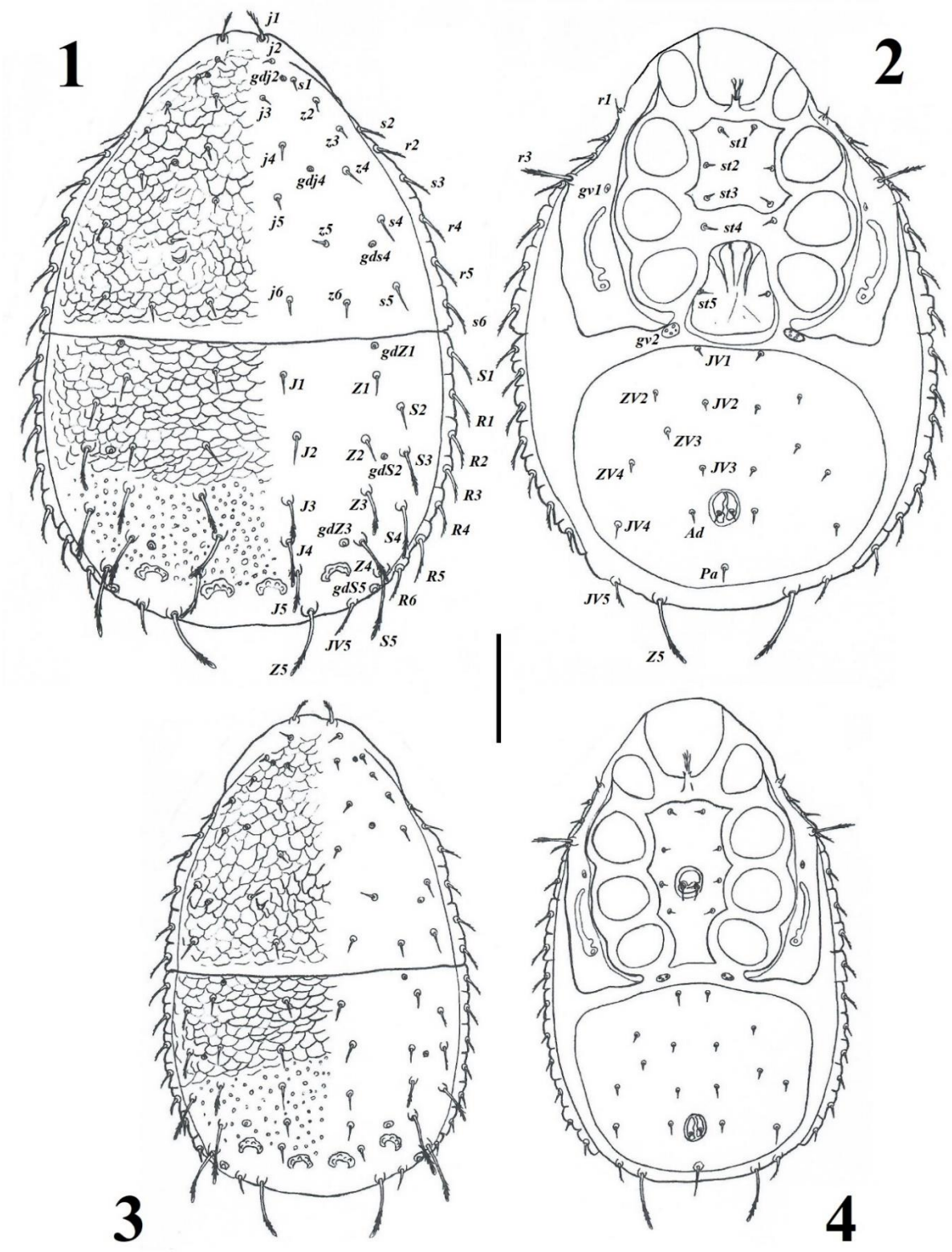
Diagnosis. Anterior margin of ventrianal shield with one pair of setae (*JV1*). All podonotal setae short, smooth and needle-like (except seta *j1* and marginal setae). Seta *j1* slightly elongated and finely barbed. Great majority of opisthonotal setae elongated, finely barbed with hyaline endings. Setae *Z5* and *S5* longer than other opisthonotal setae. Pores *gdS2* located between setae *Z2* and *S3*, *gdZ3* located between setae *J4* and *Z4*. Dorsal cavities distinct and strongly developed. Podonotum and anterior margin of opisthonotum covered with tile-like pattern, mid-area to posterior margin of opisthonotum covered by irregular punctate pattern.

Female (Figs 1-2) (n=10). Lengths (without gnathosoma) 395–419 and widths 269–284.

Dorsal side. (Fig. 1). Twenty pairs of setae present on podonotum: setae in *j* series with six pairs, *z* series with five pairs, *s* series with six pairs and *r* series with three pairs. Setae *j1*, *s2–3*, *s6*, *r2* and *r4–5* slightly elongated and finely barbed. Remaining podonotal setae short, equal in size, smooth and needle-like. Twenty one pairs of setae present on opisthonotum: setae in *J* series with five pairs, *Z* series with five pairs, *S* series with five pairs and *R* series with six pairs. Most of opisthonotal setae elongated, finely barbed with hyaline endings (except setae *J1–2*, *Z1–2*, *S2* and marginal setae). Setae *J1–2*, *Z1–2* and *S2* smooth and needle-like. Setae *J3–5*, *Z3–5* and *S2–5* elongated, finely barbed (two or three barbs apically) with hyaline endings. Setae *Z5* and *S5* longer than others, and reaching to beyond of opisthonotum. Setae *Z4* and *S4* reaching to margin of opisthonotum. Setae *J3–4* and *Z3* reaching the bases of the following seta. Seta *JV5* similar in length and shape to marginal *R* setae. All marginal setae (*S1* + *R1–6*) finely barbed without hyaline endings. The intervals between setae *Z5* and *Z5* 99–113, setae *Z5* and *JV5* 29–35, respectively. Average lengths of the opisthonotal setae and distances between setal bases within longitudinal *J*, *Z* and *S* rows are given in Table 1 for female, male, DN and PN specimens.

Pores. (Fig. 1). On podonotum, pores *gdj2* located on the line connecting setae *j2–s1*, closer to *s1*. Pores *gdj4* located on the line connecting setae *j4–z4*. Pores *gds4* located on the line connecting setae *z6–s4*, closer to *s4*. On opisthonotum, pores *gdZ1* located above the insertions of setae *Z1*. Pores *gdS2* located on the line connecting setae *Z2–S3*. Pores *gdZ3* located on the line connecting setae *J4–Z4*, closer to *Z4*. Pores *gdS5* located below to the insertions of setae *S5*.

Ventral side. (Fig. 2). Chaetotaxy and shape of the peritrematal shields normal for the genus *Zercon*. Posterolateral tips of peritrematal shield reaching the level of setae *S1*. Peritrematal shield with two pairs of setae (*r1* and *r3*), seta *r1* short, smooth and needle-like, seta *r3* elongated and finely barbed apically. Peritremes similar to reverse comma. Sternal shield with three pairs of setae (*st1–st3*), epigynal shield with one pair of setae (*st5*), and one seta (*st4*) located between sternal and epigynal shields; all of them (*st1–st5*) short, smooth and needle-like. Glands *gv2* present between posterior section of epigynal shield and anterior section of ventrianal shield. Ventrianal shield with nine pairs of setae (*JV1–JV5*, *ZV2–ZV4* and *Ad*) and one single postanal seta (*Pa*); all of them short, smooth and needle-like (except seta *JV5*). Seta *ZV1* absent. Anterior margin of ventrianal shield with one pair of setae (*JV1*).



Figures 1-4. *Zercon dogani* sp. nov. **1.** Dorsal view of female, **2.** Ventral view of female, **3.** Dorsal view of male, **4.** Ventral view of male. Scale bar 100.

Male (Figs 3-4) (n=10). Lengths (without gnathosoma) 352–387 and widths 235–255. Chaetotaxy of idiosoma, location of pores on idiosoma and ornamentation of dorsal shields similar to the females (except setae *s2*, *r2*, *J3–J5*, *S2*, *R4–6* and *JV5*). Setae *s2*, *r2*, *R4–6* and *JV5* are finely barbed without hyaline endings in female specimens, they are smooth and needle-like in male specimens. In addition, setae *J3–J5* are finely barbed with hyaline endings in female specimens, they are smooth and needle-like in male specimens. Lastly, seta *S2* is smooth and needle-like in female specimens, this is finely barbed without hyaline endings in male specimens. The intervals between setae *Z5* and *Z5* 84–93, setae *Z5* and *JV5* 14–19, respectively. Deutonymph (Fig. 5) (n=3). Lengths 342–374, widths 233–254. On podonotum, setae *j1*, *s3* and *s6* slightly elongated and finely barbed. Remaining podonotal setae short, smooth and needle-like.

Table 1. Average lengths of opisthonotal setae and the distances between their insertions in *J*, *Z*, and *S* rows of *Zercon dogani* sp. nov.

Setae	♀	♂	DN	PN	Setae	♀	♂	DN	PN	Setae	♀	♂	DN	PN
J1	23	16	16	7	***Z1***	22	13	15	10	***S1***	28	16	20	6
J1–J2	61	38	38	26	***Z1–Z2***	58	38	41	32	***S1–S2***	58	17	45	15
J2	25	16	15	8	***Z2***	24	14	17	12	***S2***	25	21	20	20
J2–J3	45	39	36	24	***Z2–Z3***	30	30	22	18	***S2–S3***	40	32	23	24
J3	36	12	9	7	***Z3***	43	29	29	30	***S3***	33	24	26	24
J3–J4	35	30	23	18	***Z3–Z4***	39	29	29	21	***S3–S4***	48	35	36	28
J4	36	10	8	6	***Z4***	37	46	49	57	***S4***	40	32	39	36
J4–J5	32	18	16	18	***Z4–Z5***	67	53	74	40	***S4–S5***	49	42	42	34
J5	42	12	9	7	***Z5***	52	47	51	55	***S5***	45	51	48	43

On opisthonotum, setae *J1–5*, *Z1–2* and *R2–6* short, smooth and needle-like. Setae *S1–2*, *R1* and *JV5* finely barbed without hyaline ending. Setae *Z3–5* and *S3–5* finely barbed with hyaline ending. Although seta *Z4* reaching to margin of opisthonotum, setae *Z5* and *S4–5* reaching to beyond of opisthonotum. Location of idiosomal pores as in adults. The intervals between setae Z5 and Z5 89–94, setae *Z5* and *JV5* 18–21, respectively.

Protonymph (Fig. 6) (n=1). Length 292, width 181. On podonotum, setae *j1* and *s3* slightly elongated and finely barbed. Remaining podonotal setae short, smooth and needle-like. On opisthonotum, setae *J1–5*, *Z1–2 R1* and *JV5* short, smooth and needle-like. Setae *S2–3* finely barbed without hyaline ending. Setae *Z3–5* and *S4–5* finely barbed with hyaline ending. Although seta *S3* reaching to margin of opisthonotum, setae *Z4–5* and *S4–5* reaching to beyond of opisthonotum. All idiosomal pores are invisible. The intervals between setae Z5 and Z5 70, setae *Z5* and *JV5* 15, respectively.

Etymology. The name of the new species is dedicated in honour of the acarologist Prof. Dr. Salih Doğan (Erzincan Binali Yıldırım University, Turkey) for his valuable contributions to the Turkish acarofauna.

Remarks. *Zercon dogani* sp. nov. is quite similar to *Z. colligans* Berlese, 1920, *Z. cretensis* Ujvári, 2008 and *Z. turcicus* Urhan & Ayyıldız, 1994. The morphological distinguishing characters of these four species were given in Table 2.

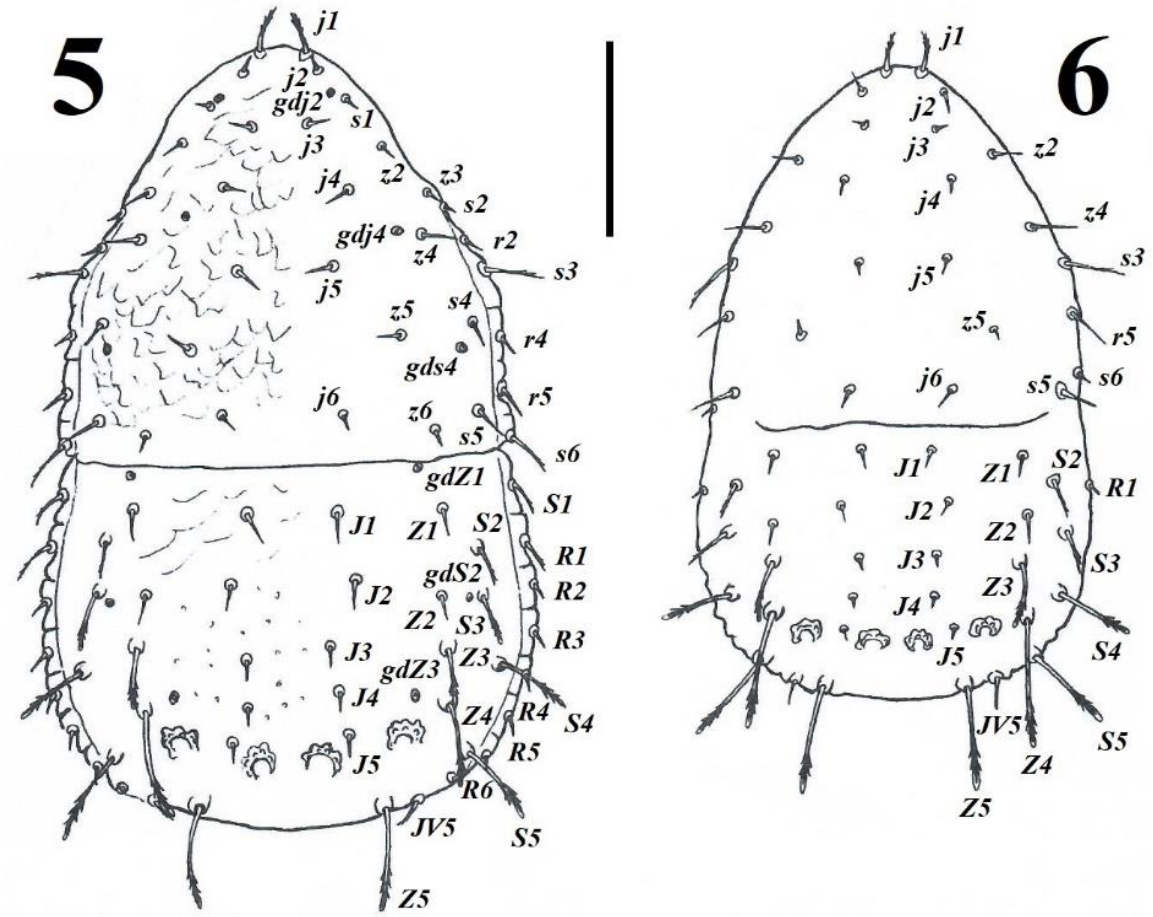
Zercon marmarisensis sp. nov. (Figures 7-10)

Zoobank: https://zoobank.org/FBA0E854-EA89-4BE0-AB5D-EC2339DA7C91

Type material. Holotype (female), soil and litter samples under Aleppo oak (*Quercus infectoria*), evergreen oak (*Q. ilex*) and pink rock-rose (*Cistus creticus*), 36°53.571' N, 28°18.312' E, 550 m a.s.l., vicinity of Beldibi neighborhood (Marmaris County, Muğla Province), 12 January 2021. Paratypes: Seven females and 15 males, same data as holotype. Six females: soil and litter samples under *Sarcopoterium spinosum* (thorny burnet), 36°47.459' N, 28°11.515' E, 140 m a.s.l., vicinity of Marmaris-İçmeler road, 17 May 2020. 20 females and one male: soil, litter and moss samples under Turkish pine (*Pinus brutia*), pink rock-rose (*Cistus creticus*) and kermes oak (*Q. coccifera*), 36°47.437' N, 28°12.885' E, 27 m a.s.l., vicinity of İçmeler neighborhood, 17 May 2020. 11 females: soil and litter samples under Turkish pine (*Pinus brutia*), carob (*Ceratonia siliqua*) and kermes oak (*Q. coccifera*), 36°48.933' N, 28°17.661' E, 84 m a.s.l., vicinity of Nimara cave (Cennet island), 24 October 2020. One female and two males: soil and litter samples under pink rock-rose (*Cistus creticus*) and oriental sweetgum (*Liquidambar orientalis*), 36°50.245' N, 28°20.292' E, 137 m a.s.l., vicinity of Aksaz military zone, 12 January 2021. One female and four males: soil and litter samples under evergreen oak (*Q. ilex*) and laurel (*Laurus nobilis*), 36°51.002' N, 28°17.208' E, 15 m a.s.l., vicinity of Aksaz military zone, 12 January 2021.

Diagnosis. Anterior margin of ventrianal shield with one pair of setae (*JV1*). All podonotal setae short, smooth and needle-like (except seta *j1* and marginal setae). Seta *j1* slightly elongated and finely barbed. Great majority of opisthonotal setae elongated, finely barbed with hyaline endings. Setae *Z5* and *S5* longer than other opisthonotal setae. Pores *gdS2* located between setae *Z2* and *S3*, *gdZ3* located between setae *J5* and *Z4*. Dorsal cavities distinct and strongly developed. Podonotum and anterior margin of opisthonotum covered with tile-like pattern, mid-area to posterior margin of opisthonotum covered by irregular punctate pattern.

Female (Figs 7-8) (n=10). Lengths (without gnathosoma) 453–486 and widths 338–378.



Figures 5-6. *Zercon dogani* sp. nov. **5.** Dorsal view of deutonymph, **6.** Dorsal view of protonymph. Scale bar 100.

Dorsal side. (Fig. 7). Twenty pairs of setae present on podonotum: setae in *j* series with six pairs, *z* series with five pairs, *s* series with six pairs and *r* series with three pairs. Setae *j1*, *s2–3*, *s6*, *r2* and *r4–5* slightly elongated and finely barbed. Remaining podonotal setae short, equal in size, smooth and needle-like. Twenty one pairs of setae present on opisthonotum: setae in *J* series with five pairs, *Z* series with five pairs, *S* series with five pairs and *R* series with six pairs. Most of opisthonotal setae elongated, finely barbed with hyaline endings (except setae *J1*, *Z1*, *S1–2* and marginal setae). Setae *J1* and *Z1* short, smooth and needle-like. Setae *S1–2* and *R1–6* finely barbed without hyaline endings. Setae *J2–5*, *Z2–5* and *S3–5* elongated, finely barbed (two or three barbs apically) with hyaline endings. Setae *Z5* and *S5* longer than others, and reaching to beyond of opisthonotum. Setae *Z4* and *S4* reaching to margin of opisthonotum. Setae *J3–4* and *Z3* reaching the bases of the following seta. Seta *JV5* similar in length and shape to marginal *R* setae. All marginal setae (*S1* + *R1–6*) finely barbed without hyaline endings. The intervals between setae *Z5* and *Z5* 103–114, setae *Z5* and *JV5* 29–36, respectively. Average lengths of the opisthonotal setae and distances between setal bases within longitudinal *J*, *Z* and *S* rows are given in Table 3 for female and male specimens.

Pores. (Fig. 7). On podonotum, pores *gdj2* located on the line connecting setae *j3–s1*, closer to *s1*. Pores *gdj4* located on the line connecting setae *j4–z4,* closer to *z4*. Pores *gds4* located on the line connecting setae *z6–s4*, closer to *s4*. On opisthonotum, pores *gdZ1* located above the insertions of setae *Z1*. Pores *gdS2* located on the line connecting setae *Z2–S3*. Pores *gdZ3* located on the line connecting setae *J4–Z4*, closer to *Z4*. Pores *gdS5* located between setae *S5* and *JV5*.

Ventral side. (Fig. 8). Posterolateral tips of peritrematal shield reaching the level of setae *S1–R1*. Postanal seta as the longest on the ventrianal shield. Remaining all ventral characters as in female specimens of ***Zercon dogani*** sp. nov.

Male (Figs 9-10) (n=10). Lengths (without gnathosoma) 355–373 and widths 233–251. Chaetotaxy of idiosoma, location of pores on idiosoma and ornamentation of dorsal shields similar to the females (except setae *s2*, *r2* and *R4–6*). Although all of these setae are finely barbed without hyaline endings in female specimens, they are smooth and needle-like in male specimens. The intervals between setae Z5 and Z5 86–94, setae *Z5* and *JV5* 18–23, respectively.

Immature stages. Not found.

Etymology. The specific epithet '*marmarisensis*' refers to the Marmaris County (Muğla Province) where the new species was collected.

Remarks. *Zercon marmarisensis* sp. nov. is quite similar to *Z. colligans* Berlese, 1920, *Z. denizliensis* Urhan, 2011 and *Z. marinae* Ivan & Călugăr, 2004. The morphological distinguishing characters of these four species were given in Table 4.

Table 2. Morphological distinctive characters among *Z. dogani* sp. nov., *Z. colligans*, *Z. cretensis* and *Z. turcicus*.

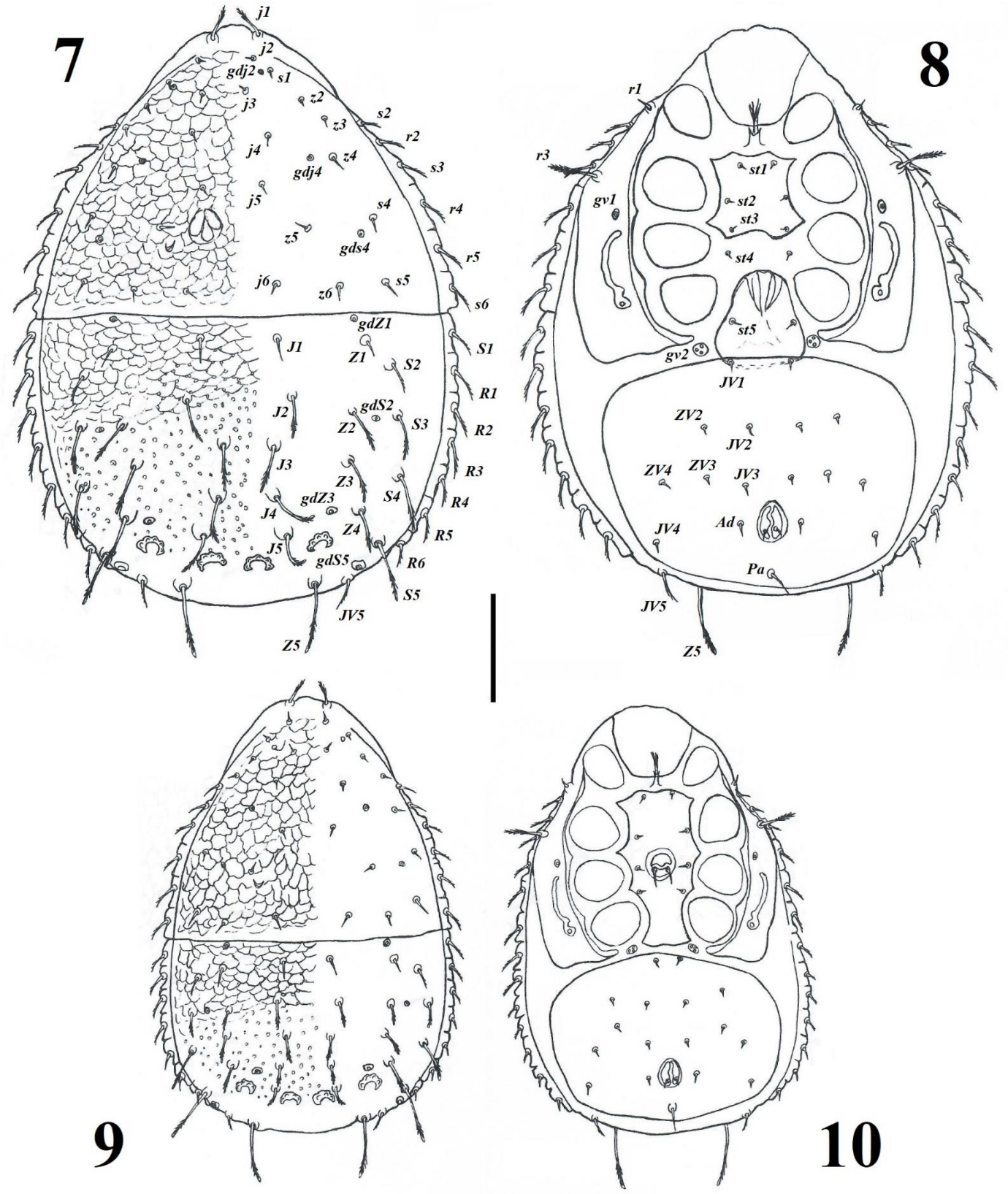
Characters	***Z. dogani*** sp. nov.	***Z. colligans*** Berlese, 1920	***Z. cretensis*** Ujvári, 2008	***Z. turcicus*** Urhan & Ayyıldız, 1994
Seta *j2*	short and smooth	short and smooth	short and smooth	finely barbed
Setae *J3–J5, Z3–Z5* and *S3–S5*	elongated, finely barbed with hyaline ending	short, finely barbed with hyaline ending	elongated, finely barbed, broadened apically	elongated, finely barbed with hyaline ending
Seta *S2*	short and smooth	short and smooth	elongated and smooth	short and finely barbed
Seta *S4*	reaching the margin of opisthonotum	not reaching the margin of opis-thonotum	reaching the margin of opisthonotum	reaching the margin of opisthonotum
Marginal setae on opisthonotum (*S1* and *R* setae)	finely barbed	*S1* and *R1–R2* finely barbed, *R3–R6* smooth	broadened apically	finely barbed
Anterior margin of ventrianal shield	with 2 setae	with 2 setae	with 2 setae	with 4 setae

Table 3. Average lengths of opisthonotal setae and the distances between their insertions in *J*, *Z*, and *S* rows of *Zercon marmarisensis* sp. nov.

Setae	♀	♂	Setae	♀	♂	Setae	♀	♂
J1	22	15	***Z1***	24	16	***S1***	31	24
J1–J2	55	33	***Z1–Z2***	57	36	***S1–S2***	71	42
J2	35	19	***Z2***	38	18	***S2***	28	19
J2–J3	43	30	***Z2–Z3***	37	23	***S2–S3***	41	28
J3	41	19	***Z3***	39	26	***S3***	40	21
J3–J4	41	24	***Z3–Z4***	39	25	***S3–S4***	52	31
J4	42	21	***Z4***	42	34	***S4***	43	34
J4–J5	35	18	***Z4–Z5***	84	62	***S4–S5***	56	36
J5	34	18	***Z5***	52	47	***S5***	48	49

Table 4. Morphological distinctive characters among *Z. marmarisensis* sp. nov., *Z. colligans*, *Z. denizliensis* and *Z. marinae*.

Characters	***Z. marmarisensis*** sp. nov.	***Z. colligans*** Berlese, 1920	***Z. denizliensis*** Urhan, 2011	***Z. marinae*** Ivan & Călugăr, 2004
Marginal setae on podonotum (*s2–s3*, *s6*, *r2* and *r4–r5*)	finely barbed	*s2–s3* and *r2* short, *r4–r5* and *s6* finely barbed	finely barbed	with hyaline ending
Setae *J2* and *Z2*	finely barbed with hy-aline ending	short and smooth	short and smooth	short and smooth
Seta *S2*	finely barbed	short and smooth	finely barbed	short and smooth
Seta *JV5*	finely barbed	finely barbed	finely barbed	with hyaline ending
Marginal setae on opisthonotum (*S1* and *R* setae)	finely barbed	*S1* and *R1–R3* finely barbed, *R4–R6* smooth	finely barbed	with hyaline ending
Anterior margin of ventrianal shield	with 2 setae	with 2 setae	with 4 setae	with 2 setae



Figures 7-10. *Zercon marmarisensis* sp. nov. **7.** Dorsal view of female, **8.** Ventral view of female, **9.** Dorsal view of male, **10.** Ventral view of male. Scale bar 100.

Zercon muglaensis sp. nov. (Figures 11-14)

Zoobank: https://zoobank.org/3B901AE6-8AAF-4CD9-8BD0-0DC80F8243C0

Type material. Holotype (female), soil, litter and moss samples under kermes oak (*Q. coccifera*), oriental sweetgum (*Liquidambar orientalis*) and olive (*Olea europaea*), 36°51.603' N, 28°13.259' E, 123 m a.s.l., vicinity of Yeşilbelde neighborhood (Marmaris County, Muğla Province), 13 March 2021. Paratypes: 16 females and five males, same data as holotype. Five females and two males: soil and litter samples under kermes oak (*Quercus coccifera*), Aleppo oak (*Q. infectoria*) and Turkish pine (*Pinus brutia*), 36°44.877' N, 28°14.700' E, 408 m a.s.l., vicinity of Kumlubük road, 13 March 2021. 11 females and one male: soil and litter samples under kermes oak (*Quercus coccifera*) and Turkish pine (*Pinus brutia*), 36°45.289' N, 28°15.735' E, 41 m a.s.l., vicinity of Kumlubük road, 13 March 2021. Five females and seven males: soil and litter samples under Turkish pine (*Pinus brutia*), 36°53.068' N, 28°18.912' E, 715 m a.s.l., vicinity of sawmill, 13 March 2021.

Diagnosis. Anterior margin of ventrianal shield with one pair of setae (*JV1*). All podonotal setae short, smooth and needle-like (except seta *j1* and marginal setae). Seta *j1*, s3, s6 and *r4–5* slightly elongated and finely barbed. Great majority of opisthonotal setae elongated, finely barbed without hyaline endings. Setae *Z5* and *S5* with hyaline endings, longer than other opisthonotal setae. Pores *gdS2* located between setae *Z2* and *S3*, *gdZ3* located between setae *J4* and *Z4*. Dorsal cavities distinct and strongly developed. Podonotum and anterior margin of opisthonotum covered with tile-like pattern, mid-area to posterior margin of opisthonotum covered by irregular punctate pattern.

Female (Figs 11-12) (n=10). Lengths (without gnathosoma) 441–454 and widths 322–346.

Dorsal side. (Fig. 11). Twenty pairs of setae present on podonotum: setae in *j* series with six pairs, *z* series with five pairs, *s* series with six pairs and *r* series with three pairs. Setae *j1*, *s3*, *s6* and *r4–5* slightly elongated and finely barbed. Remaining podonotal setae short, equal in size, smooth and needle-like. Twenty one pairs of setae present on opisthonotum: setae in *J* series with five pairs, *Z* series with five pairs, *S* series with five pairs and *R* series with six pairs. Most of opisthonotal setae elongated, finely barbed without hyaline endings (except setae *J1*, *Z5* and *S5*). Setae *J1* short, smooth and needle-like. Setae *Z1*, *S1–2* and *R1–6* shorter than other opisthonotal setae, finely barbed without hyaline endings. Setae *J2–5*, *Z2–4* and *S3–4* elongated, finely barbed (two or three barbs apically) without hyaline endings. Setae *Z5* and *S5* longer than others, elongated, finely barbed (two barbs apically) with hyaline endings, and reaching to beyond of opisthonotum. Setae *J5*, *Z4* and *S4* reaching to margin of opisthonotum. Setae *J2–4*, *Z2–3* and *S2–3* reaching the bases of the following seta (Setae *J3–4* and *Z3* reaching beyond the bases of the following seta). Seta *JV5* similar in length and shape to marginal *R* setae. All marginal setae (*S1* + *R1–6*) finely barbed without hyaline endings. The intervals between setae *Z5* and *Z5* 101–112, setae *Z5* and *JV5* 28–34, respectively. Average lengths of the opisthonotal setae and distances between setal bases within longitudinal *J*, *Z* and *S* rows are given in Table 5 for female and male specimens.

Pores. (Fig. 11). On podonotum, pores *gdj2* located on the line connecting setae *j2–s1*, closer to *s1*. Pores *gdj4* located on the line connecting setae *j5–z3*. Pores *gds4* located on the line connecting setae *z6–s4*, closer to *s4*. On opisthonotum, pores *gdZ1* located above the insertions of setae *Z1*. Pores *gdS2* located on the line connecting setae *Z2–S3*. Pores *gdZ3* located on the line connecting setae *J4–Z4*, closer to *Z4*. Pores *gdS5* located below to the insertions of setae *S5*.

Ventral side. (Fig. 12). Posterolateral tips of peritrematal shield reaching the level of setae *S1*. Postanal seta as the longest on the ventrianal shield. Remaining all ventral characters as in female specimens of ***Zercon dogani*** sp. nov. and ***Z. marmarisensis*** sp. nov.

Male (Figs 13-14) (n=10). Lengths (without gnathosoma) 347–363 and widths 242–251. Chaetotaxy of idiosoma, location of pores on idiosoma and ornamentation of dorsal shields similar to the females (except setae *s2*, *Z1*, *S2* and *R4–6*). Although all of these setae are finely barbed without hyaline endings in female specimens, they are smooth and needle-like in male specimens. Additionally, seta *J5* reaching to margin of opisthonotum in female specimens, it is not reaching to margin of opisthonotum in male specimens.

The intervals between setae Z5 and Z5 89–96, setae *Z5* and *JV5* 14–20, respectively.

Immature stages. Not found.

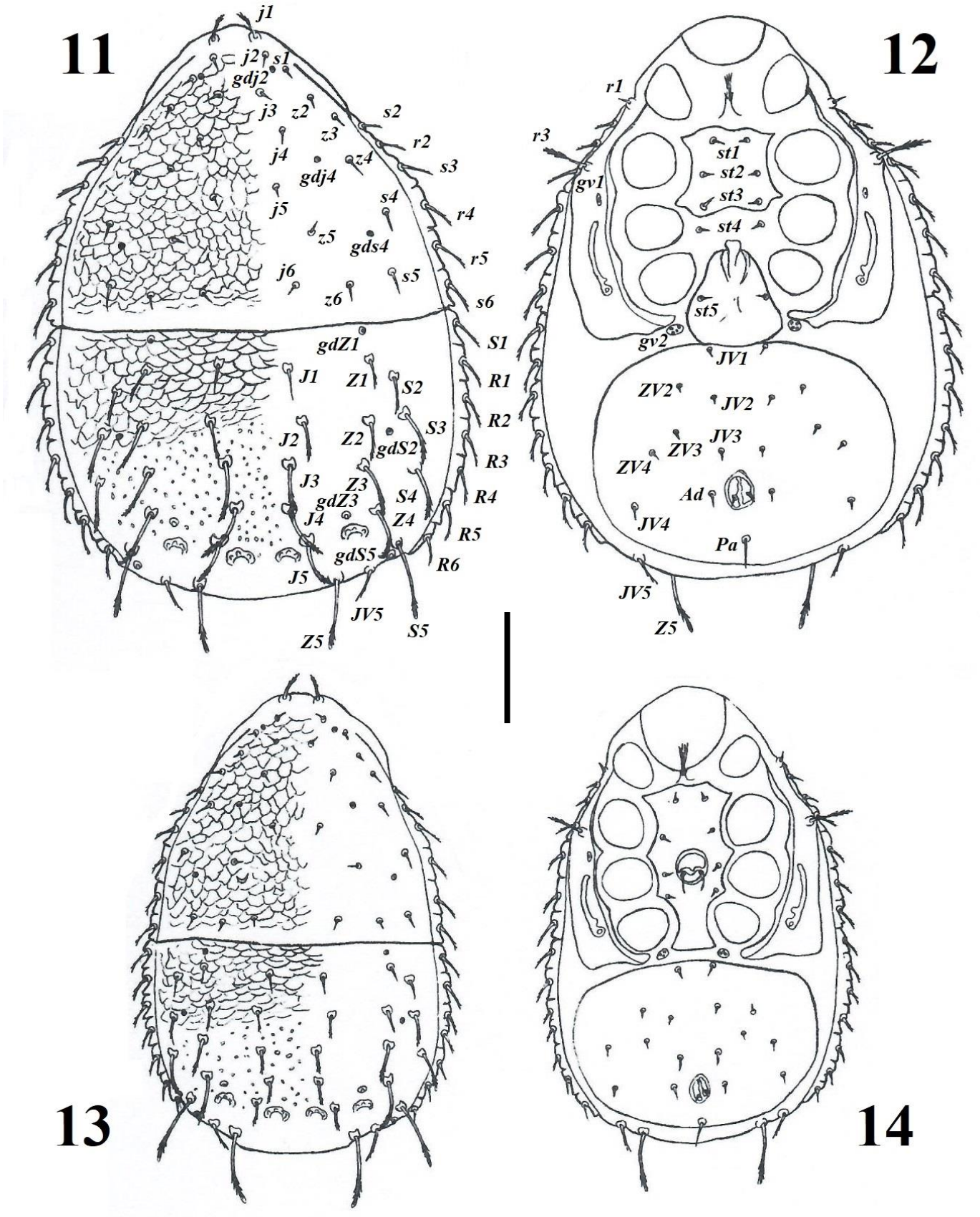
Etymology. The specific epithet '*muglaensis*' refers to the Muğla Province where the new species was collected.

Remarks. *Zercon muglaensis* sp. nov. is quite similar to *Z. denizliensis* Urhan, 2011, *Z. marinae* Ivan & Călugăr, 2004 and *Z. plumatopilus* Athias-Henriot, 1961. The morphological distinguishing characters of these four species were given in Table 6.

Altitude preferences of Zerconidae specimens in the study area

All materials of zerconid mites were collected from suitable forestland areas at the altitude from 4 to 973 m a.s.l. All sampling areas were divided according to 100 meters elevation ranges. After identification processes in the laboratory, the altitudinal distribution results of the *Prozercon* and *Zercon* species were marked in Table 3.

According to Table 7, *P. yavuzi* was only found at 0–100 m a.s.l., *Z. dogani* sp. nov. was only found at 100–200 m a.s.l. and *Z. turcicus* sp. nov. was only found at 300–400 m a.s.l. *P. bulgariensis* and *Z. quadricavum* were almost found at all altitudinal zones, from 0 to 1000 m a.s.l. Remaining species have no clear preference in terms of altitudinal ranges.



Figures 11-14. *Zercon muglaensis* sp. nov. **11.** Dorsal view of female, **12.** Ventral view of female, **13.** Dorsal view of male, **14.** Ventral view of male. Scale bar 100.

Table 5. Average lengths of opisthonotal setae and the distances between their insertions in *J*, *Z*, and *S* rows of *Zercon muglaensis* sp. nov.

Setae	♀	♂	Setae	♀	♂	Setae	♀	♂
J1	26	16	***Z1***	27	14	***S1***	21	20
J1–J2	46	33	***Z1–Z2***	43	34	***S1–S2***	73	31
J2	38	20	***Z2***	36	20	***S2***	28	24
J2–J3	37	30	***Z2–Z3***	33	20	***S2–S3***	39	32
J3	45	25	***Z3***	42	26	***S3***	42	28
J3–J4	38	25	***Z3–Z4***	38	31	***S3–S4***	37	28
J4	45	20	***Z4***	42	37	***S4***	44	39
J4–J5	28	24	***Z4–Z5***	69	49	***S4–S5***	54	45
J5	37	21	***Z5***	55	53	***S5***	53	50

Table 6. Morphological distinctive characters among *Zercon muglaensis* sp. nov., *Z. denizliensis*, *Z. marinae* and *Z. plumatopilus.*

Characters	***Z. muglaensis*** sp. nov.	***Z. denizliensis*** Urhan, 2011	***Z. marinae*** Ivan & Călugăr, 2004	***Z. plumatopilus*** Athias-Henriot, 1961
Seta *j2*	short and smooth	short and smooth	short and smooth	finely barbed
Seta *J2*	elongated with hyaline ending	short and smooth	short and smooth	with hyaline ending
Setae *J3–J5*	elongated, finely barbed	elongated, finely barbed with hyaline ending	elongated, finely barbed with hyaline ending	elongated, finely barbed with hyaline ending
Setae *Z2–Z4*	elongated, finely barbed	Z2 short and smooth, *Z3–Z4* elongated, finely barbed with hyaline ending	Z2 short and smooth, *Z3–Z4* elongated, finely barbed with hyaline ending	elongated, finely barbed with hyaline ending
Seta *JV5*	finely barbed	finely barbed	with hyaline ending	finely barbed
Setae *S2–S4*	elongated, finely barbed	*S2–S3* finely barbed, *S4* with hyaline ending	*S2* short and smooth, *S3–S4* with hyaline ending	with hyaline ending
Anterior margin of ventrianal shield	with 2 setae	with 4 setae	with 2 setae	with 2 setae

Table 7. Altitude preferences of zerconid mites in the Marmaris National Park (Muğla).

	0–100[1]	100–200	200–300	300–400	400–500	500–600	600–700	700–800	800–900	900–1000
P. bulgariensis	+	+	+	+	+	+	+	+		+
P. tragardhi	+	+				+				
P. yavuzi	+									
Z. colligans	+	+	+	+			+	+		
Z. dogani sp. nov.		+								
Z. inonuensis						+			+	
Z. marmarisensis sp. nov.	+	+	+		+			+		
Z. muglaensis sp. nov.	+	+	+		+			+		
Z. quadricavum	+	+	+	+	+	+	+	+		+
Z. turcicus				+						

[1] Altitudes in m a.s.l.

Habitat preferences of Zerconidae specimens in the study area

All materials of zerconid species were collected from 156 sites in the study area and the following 24 habitat types, mostly tree species, were noted: Aleppo oak (*Quercus infectoria*), broom (*Genista sandrasica*), carob (*Ceratonia siliqua*), common juniper (*Juniperus communis*), common myrtle (*Myrtus communis*), evergreen oak (*Q. ilex*), Greek strawberry tree (*Arbutus andrachne*), holy bramble (*Rubus sanctus*), kermes oak (*Q. coccifera*), laurel (*Laurus nobilis*), mastic (*Pistacia lentiscus*), moss (unspecified), oleaster-leafed pear (*Pyrus elaeagrifolia*), oriental sweetgum (*Liquidambar orientalis*), olive (*Olea europaea*), pink rock-rose (*Cistus creticus*), shrub (*Sytrax officinalis*), strawberry tree (*Arbutus unedo*), terebinth (*Pistacia terebinthus*), thorn (*Paliurus spina-christi*), thorny burnet (*Sarcopoterium spinosum*), tree heather (*Erica arborea*), Turkish pine (*Pinus brutia*) and wattles (*Acacia* sp.). Habitat preferences of the *Prozercon* and *Zercon* species were marked in Table 8.

According to Table 8, *P. bulgariensis* and *Z. quadricavum* were found in samples taken from 21 and 20 different habitat types, respectively. On the other hand, *Z. inonuensis* was found only in Turkish pine (*Pinus brutia*) habitat, *Z. dogani* sp. nov. was found only in pink rock-rose (*Cistus creticus*) and Turkish pine (*Pinus brutia*) habitats, *Z. turcicus* was found only in pink rock-rose (*Cistus creticus*) and kermes oak (*Q. coccifera*) habitats. Specimens of *Z. marmarisensis* sp. nov. and *Z. muglaensis* sp. nov. were exactly found in the same habitats. In addition, the most richness habitats in terms of species diversity of zerconids are follow: Turkisk pine, moss, pink rock-rose and Aleppo oak. In contrary of these richness habitats, only one specimens of zerconid mites were found in the following habitats: strawberry tree, broom, laurel and thorn.

Key to Zerconidae species in the study area (based on adult females)

1 Peritrematal seta *r3* short and smooth; there is no gap between peritremal shield and the edge of the podonotum; adgenital shield and pore *gv2* absent; the anterior margin of ventrianal shield always with two setae (seta *ZV1* absent) …….. genus ***Prozercon*** Sellnick, 1943…….. **2**

1′ Peritrematal seta *r3* elongated, feathered, or spiny; there is a clear gap between peritremal shield and the edge of the podonotum; adgenital shield and pore *gv2* present; the anterior margin of ventrianal shield with two or four setae ..... genus ***Zercon*** C. L. Koch, 1836 …… **4**

2 Setae *S1* and *R1–6* short and smooth ..... ***P. tragardhi*** (Halbert, 1923)

2′ Seta *S1* finely barbed, setae *R2–6* short and smooth..... **3**

3 Seta *S4* present…..... ***P. bulgariensis*** Ujvári, 2013

3′ Seta *S4* absent …… ***P. yavuzi*** Urhan, 1998

4 Anterior margin of ventrianal shield with two setae **5**

4′ Anterior margin of ventrianal shield with four setae ... **9**

5 Setae *J3–5* finely barbed without hyaline ending ..... ***Z. muglaensis*** sp. nov.

5′ Setae *J3–5* smooth or finely barbed with hyaline endings **6**

6 Setae *J3–5* smooth ..... ***Z. inonuensis*** Urhan, 2007

6′ Setae *J3–5* finely barbed with hyaline endings **7**

7 Seta *J2* with hyaline ending ... ***Z. marmarisensis*** sp. nov.

7′ Seta *J2* short and smooth **8**

8 Setae *Z4* and *S4* not reaching to margin of opisthonotum …….. ***Z. colligans*** Berlese, 1920

8′ Setae *Z4* and *S4* reaching to margin of opisthonotum ..... ***Z. dogani*** sp. nov.

9 Seta *J5* lies parallel to horizontal axis of idiosoma, dorsal cavities strongly developed..***Z. quadricavum*** Urhan, 2001

9′ Seta *J5* lies parallel to vertical axis of idiosoma, dorsal cavities weakly developed …….. …….. ***Z. turcicus*** Urhan & Ayyıldız, 1994

Authors' contributions

Kamil Bilki: Investigation, collection of specimens (lead), methodology (equal), writing-original draft (supporting), preservation. **Raşit Urhan:** Funding acquisition, methodology (equal), project administration, supervision (lead), collection of specimens (supporting), identification, illustration. **Mehmet Karaca:** Data curation, formal analysis, methodology (equal), supervision (supporting), writing-original draft (lead), writing-review & editing, collection of specimens (supporting).

Statement of ethics approval

Not applicable.

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Conflict of interest

No potential conflict of interest was reported by the authors.

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Table 8. Habitat preferences of zerconid mites in the Marmaris National Park (Muğla).

	P. bulgariensis	*P. tragardhi*	*P. yavuzi*	*Z. colligans*	*Z. dogani* sp. nov.	*Z. inonuensis*	*Z. marmarisensis* sp. nov.	*Z. muglaensis* sp. nov.	*Z. quadricavum*	*Z. turcicus*
Acacia sp.				+					+	
Arbutus andrachne	+			+					+	
Arbutus unedo	+									
Ceratonia siliqua	+			+						
Cistus creticus	+	+		+	+				+	+
Erica arborea	+			+					+	
Genista sandrasica	+									
Juniperus communis	+								+	
Laurus nobilis	+									
Liquidambar orientalis	+			+			+	+	+	
Moss (unspecified)	+	+	+	+			+	+	+	
Myrtus communis		+							+	
Olea europaea	+						+	+	+	
Paliurus spina-christi									+	
Pinus brutia	+	+		+	+	+	+	+	+	
Pistacia lentiscus	+		+						+	
Pistacia terebinthus	+								+	
Pyrus elaeagrifolia	+								+	
Quercus coccifera	+						+	+	+	+
Q. ilex	+			+					+	
Q. infectoria	+		+	+			+	+	+	
Rubus sanctus	+								+	
Sarcopoterium spinosum	+			+					+	
Sytrax officinalis	+								+	

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