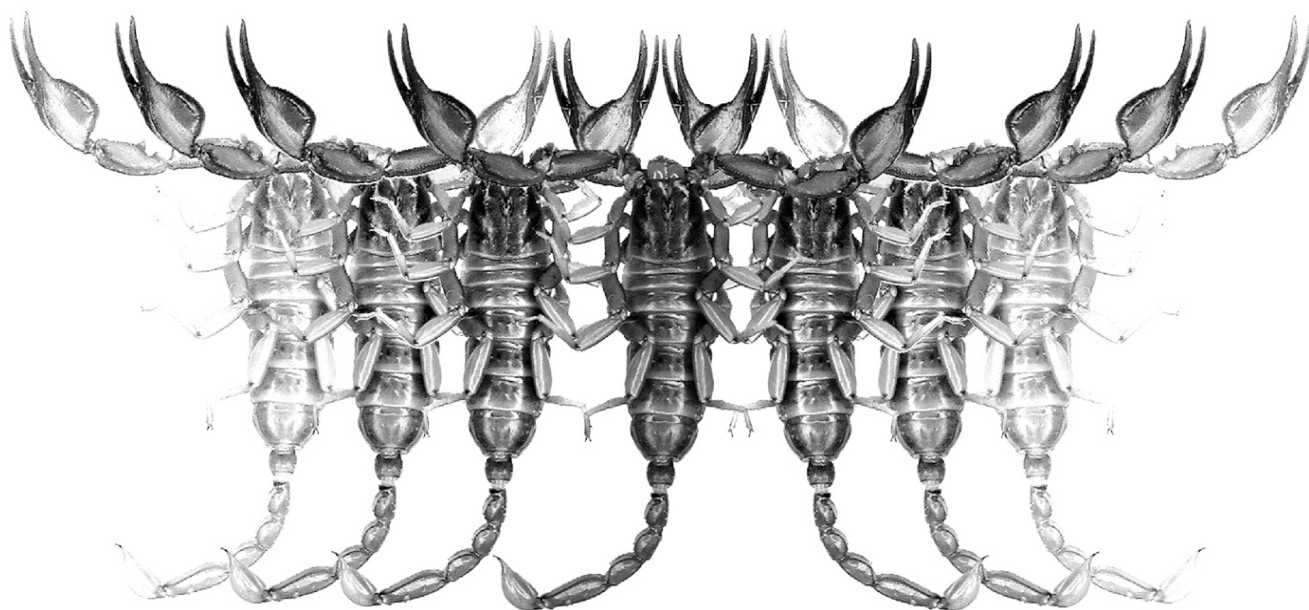


# ***Euscorpius***

**Occasional Publications in Scorpiology**



***Euscorpius gulhanimae*** sp. n.  
from the Konya Province, Turkey  
(Scorpiones: Euscorpiidae)

**Ersen Aydın Yağmur**

**August 2024 — No. 393**

# *Euscorpius*

## *Occasional Publications in Scorpiology*

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## *Euscorpius gulhanimae* sp. n. from the Konya Province, Turkey (Scorpiones: Euscorpiidae)

Ersen Aydın Yağmur

Manisa Celal Bayar University, Alaşehir Vocational School, Alaşehir, Manisa, 45600 Turkey;  
[ersen.yagmur@gmail.com](mailto:ersen.yagmur@gmail.com)

<http://zoobank.org/urn:lsid:zoobank.org:pub:96536A2C-A41F-4932-AADA-6FE7E31E39ED>

### Summary

A new species *Euscorpius gulhanimae* sp. n. is described from southern Turkey (Beyşehir District of Konya Province). It differs by trichobothrial numbers in *Pv* and *et* series; these numbers are the highest in all species of *Euscorpius* in Turkey. *E. gulhanimae* sp. n. has light greyish yellow mesosoma, dark reddish-brown chela and dark brown metasomal segments III-V; the new species is distinguished by this two-colored feature from all *Euscorpius* species. With this description, the known number of species in the family Euscorpiidae in Turkey is increased to 21.

### Introduction

The genus *Euscorpius* Thorell, 1876 is very common in southern Europe, Balkans, and Anatolia, and its species occupy diverse habitats from the sea level up to over 2,600 m a.s.l. (Tropea et al., 2015). Taxonomy of this genus in Turkey is complicated and remained unresolved for a long time. Intensive contributions have been made in the last 12 years on systematics and fauna of Euscorpiidae in Turkey, resulting in a significant increase of the number of species in this country, from 2 to 19 (Tropea & Yağmur, 2015, 2016a, 2016b; Tropea et al., 2012, 2014, 2015, 2016a, 2016b, 2024; Yağmur, 2021; Yağmur et al., 2013; Yağmur & Tropea, 2013, 2015, 2017). Tropea et al. (2015) reviewed the taxa of “*Euscorpius mingrelicus* complex”, and elevated *E. phrygius* Bonacina, 1980, *E. uludagensis* Lacroix, 1995, and *E. ciliciensis* Birula, 1898 to species level; besides, they synonymized *E. mingrelicus legrandi* Lacroix, 1995 with *E. phrygius* and *E. m. ollivieri* Lacroix, 1995, with *E. mingrelicus*. Tropea et al. (2017) reviewed *Euscorpius tauricus* (C. L. Koch, 1837) and synonymized *E. rahsenae* Yağmur et Tropea, 2013 with this species. Kovařík et al. (2019) elevated subgenus *Alpiscorpius* Gantenbein et al., 1999 to genus level and placed *A. mingrelicus*, *A. phrygius* and *A. uludagensis* under this genus; earlier, Fet et al. (2016) published a phylogenetic study on populations on *Alpiscorpius* in Turkey. The species of *Alpiscorpius* and *Euscorpius* are distributed within narrow areas or mountains in Turkey, with a high level of endemism.

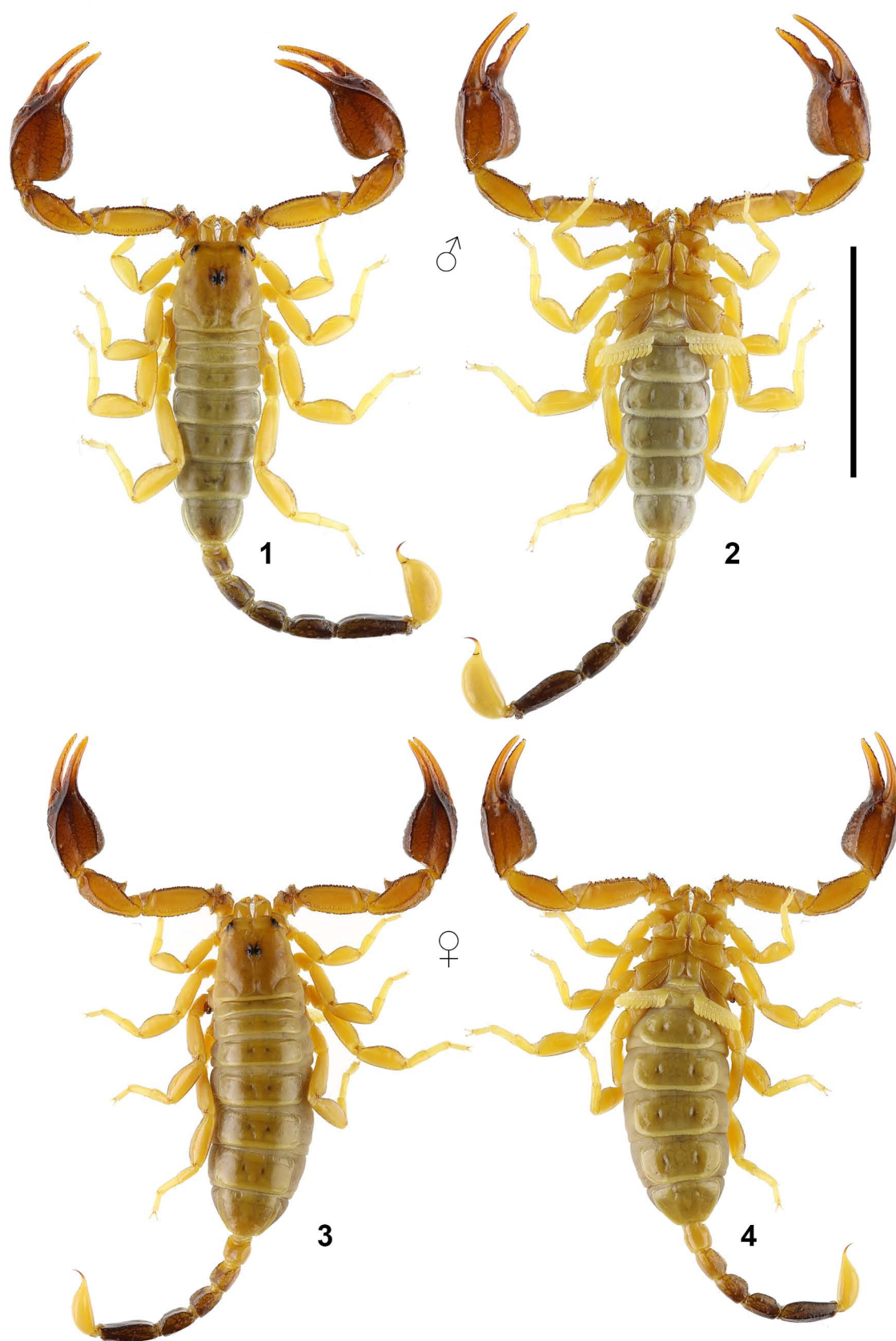
In this paper, *Euscorpius gulhanimae* sp. n. is described based on morphological analyses, increasing number of Euscorpiidae currently recognized in Turkey to 21 species.

### Methods, Material & Abbreviations

The specimens were collected at night on field trips with a 390 nm UV lamp and under stones in pine forests. The specimens were preserved in 96% alcohol. Photographs were taken by Canon EOS 7D. Stacking of pictures was made using Helicon Focus software. The focus stacking method is modified from the Canon-Cognisys system recommended by Brecko et al. (2014). The trichobothrial nomenclature was followed according to Vachon (1974). Morphological measurements are given in millimetres (mm) following Tropea et al. (2014). Morphological nomenclature follows Stahnke (1971), Hjelle (1990), and Sissom (1990); the chela carinae and dentition follows Soleglad and Sissom (2001); sternum terminology follows Soleglad and Fet (2003). The map showing the localities of the specimens was generated with the SimpleMappr <https://www.simplemappr.net/api> (Shorthouse, 2010).

Type specimens are deposited at the Zoology Museum of Alaşehir Vocational School, Manisa Celal Bayar University, Manisa, Turkey (AZMM).

*V*: trichobothrial series on pedipalp chela manus ventral surface (not including *Et1*); *Pv*: trichobothria on the ventral aspect of pedipalp patella; *Pe*: trichobothria on the external surface of pedipalp patella; *et*: external terminal; *est*: external subterminal; *em*: external median; *esb*: external suprabasal; *eb<sub>a</sub>*: external basal-a; *eb*: external basal; *db*: dorsal basal trichobothrium on fixed finger; *Dp*: pectinal teeth number; *L*: length; *H*: height; *Lchel*: chela length; *Wchel*: chela width (= *Wchel-A* of Tropea et al., 2014); *Lcar*: carapace length; *Wcar*: carapace width; *Lfem*: femur length; *Lpat*: patella length; *CarA/CarP* %: average ratio of distances from centre of median eyes to anterior and posterior margins of the carapace; *DD*: distal denticle; *MD*: median denticles; *OD*: outer denticles; *ID*: inner denticles; *IAD*: inner accessory denticles.



**Figures 1–4.** *Euscorpius gulhanimae* sp. n. **Figures 1–2.** Male holotype, dorsal (1) and ventral (2) views. **Figures 3–4.** Female paratype from Kurucaova Village, dorsal (3) and ventral (4) views. Scale bar: 10 mm.

Dimensions (mm)		<i>Euscorpius gulhanim</i> sp. n.	<i>Euscorpius gulhanim</i> sp. n.
		♂ holotype	♀ paratype
Carapace	L / W	3.97 / 3.87	3.99 / 3.96
Mesosoma	L	9.08	13.18
Tergite VII	L / W	1.95 / 2.51	1.77 / 3.05
Metasoma + telson	L	13.91	11.72
Segment I	L / W / D	1.26 / 1.28 / 1.07	1.21 / 1.20 / 1.08
Segment II	L / W / D	1.69 / 1.10 / 1.03	1.38 / 1.09 / 1.00
Segment III	L / W / D	1.86 / 1.03 / 1.01	1.57 / 1.02 / 0.93
Segment IV	L / W / D	2.09 / 0.98 / 0.99	1.75 / 0.94 / 0.90
Segment V	L / W / D	3.14 / 0.96 / 0.93	2.87 / 0.93 / 0.89
Telson	L / W / D	3.87 / 1.40 / 1.56	2.94 / 0.99 / 2.94
Pedipalp	L	14.12	14.06
Femur	L / W	3.54 / 1.31	3.51 / 1.27
Patella	L / W	3.63 / 1.40	3.66 / 1.49
Chela	L	6.95	6.89
Manus	W / D	2.76 / 2.03	2.67 / 2.10
Movable finger	L	3.95	3.75
<b>Total</b>	<b>L</b>	<b>26.96</b>	<b>28.89</b>

**Table 1.** Comparative measurements of adults of *Euscorpius gulhanimae* sp. n. Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).

## Systematics

### Family Euscorpiidae Laurie, 1896

#### *Euscorpius gulhanimae* sp. n.

(Figures. 1–36, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:86C9289C-9171-48C4-ABA1-19AD1C39F836>

TYPE LOCALITY AND TYPE DEPOSITORY. **Turkey**, Konya Province, Beyşehir District, Kurucaova Village, 3 km SW, 37°40'27"N 31°22'38"E, 1200 m a. s. l.; AZMM.

TYPE MATERIAL (114 specimens: 71♂43♀6juvs.). **Turkey**, Konya Province, Beyşehir District, Kurucaova Village, 3 km SW, 37°40'27"N 31°22'38"E, 1200 m a. s. l., 19 May 2010, 1♀ (paratype), leg. R. Kaya (AZMM/Sco-2012: 33), 11 June 2010, leg. E. A. Yağmur, 1♀ (paratype), (AZMM/Sco-2010:45), 14 June 2012, leg. E. A. Yağmur & O. Tutar, 1♂ (holotype, AZMM/Sco-2012:3), 2♂8♀ (paratypes, AZMM/Sco-2012:4-13), 14 June-25 August 2012, leg. E. A. Yağmur & O. Tutar, pitfall traps, 1♂ (paratype, AZMM/Sco-2012:14), 25 August-28 October 2012, leg. E. A. Yağmur, pitfall traps, 1♂ (paratype, AZMM/Sco-2012:15), 14 April 2016, leg. E. A. Yağmur, S. Örgel & S. Yaman, 8♀ (paratypes, AZMM/Sco-2016:33-40), 31 March-25 October 2017, leg. E. A. Yağmur, S. Örgel & S. Yaman, pitfall traps, 1♀1juv. (paratypes, AZMM/Sco-2017:13-14), 29 April-10 October 2018, leg. E. A. Yağmur, S. Örgel & S. Yaman, pitfall traps,

2♂2♀ (paratypes, AZMM/Sco-2018:204-207), 21 August 2020, leg. E. A. Yağmur & S. Örgel, 60♂10♀ (paratypes, AZMM/Sco-2020:125-194); Beyşehir District, Kurucaova Village, around İnöğü Cave, 37°40'31"N 31°22'15"E, 1259 m a. s. l., 27 June 2010, leg. E.A. Yağmur, 5♀3juvs. (paratypes, AZMM/Sco-2010:34-41); Beyşehir District, Hacı Akif Island, 37°37'31"N 31°29'00"E, 1177 m a. s. l., 11 June 2010, leg. E. A. Yağmur, 1♂2juvs. (paratypes, AZMM/Sco-2010:42-44); Beyşehir District, Dumanlı Plateau, 37°28'59"N 31°20'21"E, 1603 m a. s. l., 20 November 2016, leg. E. A. Yağmur, S. Örgel & S. Yaman, 1juv. (paratype, AZMM/Sco-2016:41); Beyşehir District, road of Dumanlı High Plateau, 37°40'41"N 31°21'53"E, 1237 m a. s. l., 2 July 2022, leg. E. A. Yağmur & Ö. Sipahioğlu, 3♂8♀ (paratypes, AZMM/Sco-2022:142-152).

ETYMOLOGY. The specific epithet is a patronym, dedicated to Gülhanım Yağmur, wife of the author, for her support in his studies.

DIAGNOSIS. A small *Euscorpius* species, total length 26.96–28.89 mm. Carapace reddish yellow. Tergites light greyish yellow in male, light reddish yellow in females. Chela dark reddish brown. Metasomal segment I dark yellow, II dark yellow with brown marbling, III-V dark brown with brownish yellow marbling. Telson dark yellow. Number of trichobothria on pedipalp manus ventral surface is 4 ( $V_{1-3}+Et_1$ ). Trichobothrium *et* on fixed finger is located distally to the notch of the fixed finger; *est* is located above the notch, slightly moved in distal area; and *dsb* is located proximally





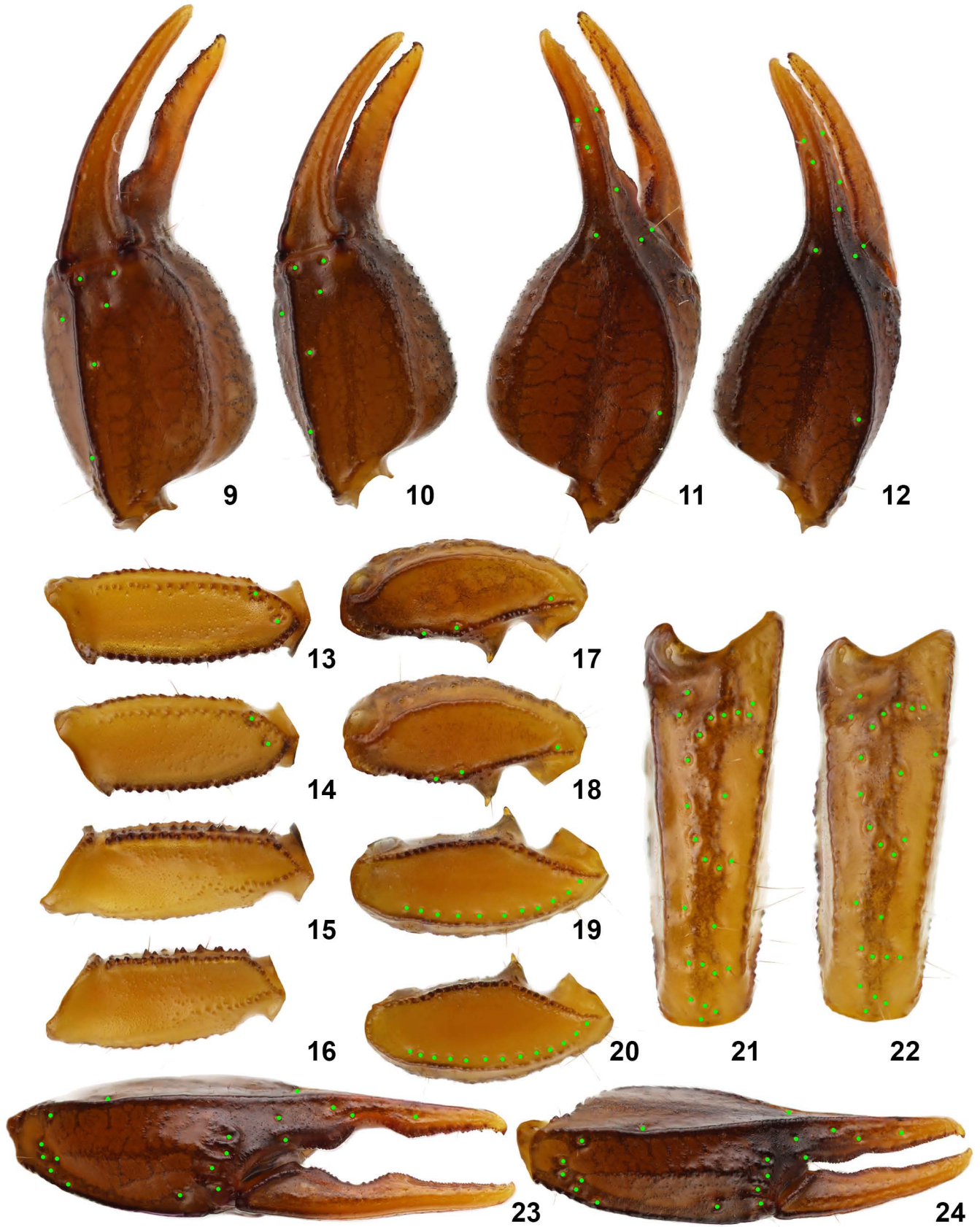
**Figures 5–8.** *Euscorpius gulhanimae* sp. n. **Figure 5, 7.** Carapace, male holotype (5) and female paratype from Kurucaova Village (7). **Figure 6, 8.** Sternoplectinal area, male holotype (6) and female paratype from Kurucaova Village (8).

to the notch. Patella: ventral (*Pv*): 11/13; patella external (*Pe*):  $et = 7/8$ ,  $est = 4/4$ ,  $em = 4/4$ ,  $esb = 2/2$ ,  $eb_a = 4/4$ ,  $eb = 4/4$ . Pectinal teeth number (*Dp*) is from 8 to 12, usually 10–11 in males and 7–11 usually 8–9 in females. Chela with a well-developed notch on fixed finger and lobe on movable finger in male, less distinct in females. Average  $L_{chel}/W_{chel}$  ratio = 2.518 in male and 2.580 in females. Dorsal patellar spur well developed. Femur slightly shorter than patella;  $L_{fem}/L_{pat}$  ratio = 0.975 in male, 0.959 in female. The most surfaces carapace shagreened with some smooth patches and a

triangular area between median eyes and lateral eyes smooth. Several minute granules along the anterior lateral area behind the lateral eyes present; anterior margin straight and granulate laterally. Carapace slightly longer than wide; the ratio  $L_{car}/W_{car} = 1.025$  in male and 1.007 in female; average  $CarA\% = 41.77\%$  of the carapace.

**DESCRIPTION ( $\sigma^7$ ).** **Coloration** (Figs. 1–4). Carapace reddish yellow, around median with eyes brown dots, around lateral eyes and between median eyes black. Tergites matt, light





**Figures 9–24.** *Euscorpius gulhanimae* sp. n., pedipalp segments of male holotype and female paratype. Chela of male holotype, ventral (9), dorsal (11) and external (23) views. Chela of female paratype, ventral (10), dorsal (12) and external (24) views. Femur of male holotype, dorsal (13) and ventral (15) views. Femur of female paratype, dorsal (14) and ventral (16) views. Patella of male holotype, dorsal (17), ventral (19) and external (21) views. Patella of female paratype, dorsal (18), ventral (20) and external (22) views. Trichobothrial pattern is indicated by green circles.

greyish yellow in male; brilliant, light reddish yellow in females. An overlap area between carapace and segment I and posterior margins of tergites with lighter bands. Sternites brilliant, light greyish yellow in male; brilliant, reticular light reddish yellow in females. Posterior margins of sternites with lighter bands. Pedipalp: Femur brilliant dark yellow, dorsal internal and ventral internal carinae reddish black, dorsal external and external median carinae reddish brown. Patella reticular yellowish brown, dorsal internal and ventral internal carinae reddish black. Chela dark reddish brown with reddish black carinae, manus dark brown reticulations. Fingers reddish yellow to dark yellow. Coxa and sternum reddish yellow, pectines and genital operculum whitish/light brownish; chelicerae dark yellowish with reticulation. Metasomal segment I dark yellow, II dark yellow with brown marbling, III-V dark brown with brownish yellow marbling. Telson shiny dark yellow with dark reddish aculeus tip. Legs dark yellow.

**Carapace** (Figs. 5, 7). The most surfaces of carapace shagreened with some smooth patches and a triangular area between median eyes and lateral eyes smooth. Several minute granules present along the anterior lateral area, at behind the lateral eyes; anterior margin straight and slightly crenulate; posterior lateral, posterior median end anterior median furrows present; two pairs of lateral eyes (anterior eye slightly larger), and a pair of median eyes present. Median eyes situated distally of the mid-point; length from centre of median eyes to anterior margin is 41.60 % of the carapace length in male, is 41.81 % in female.

**Pectines** (Figs. 6, 8). Teeth numbers 11/11 in male, 7/11 in females; 8/9 middle lamellae present; several microsetae on proximal area of teeth, marginal lamellae, middle lamellae, and fulcra.

**Genital operculum** (Figs. 6, 8). The genital operculum is formed by two longitudinally separate subtriangular sclerites; genital papillae distinct and distally protruding; a few microsetae present.

**Sternum** (Figs. 6, 8). Pentagonal in shape, type 2; similar length and width, with a deep posterior emargination.

**Pedipalps** (Figs. 9–24). Coxa and trochanter with tuberculate carinae, tubercles conical with rounded apex. Femur: Dorsal internal and ventral internal carinae strong with coarse and rounded granules; dorsal external carinae strong with moderate spaced granules; external median carinae serrulate; ventral external carinae rounded, formed by spaced medium granules, well-formed only in the proximal 1/3; interior median carinae indistinct, formed by marked and spaced conical tubercles varying in size; dorsal intercarinal spaces finely granular with several small granules; ventral intercarinal spaces granulated with varying sized granules and smooth patches. Patella: Dorsal internal and ventral internal carinae strong with medium and rounded fixed granules; dorsal external and ventral external carinae strong, rough to bumpy without granules; dorsal intercarinal surface finely granular; ventral intercarinal surface smooth but along to ventral internal carinae finely granular, internal surface granular. Dorsal patellar spur

well-developed. Chela: Chela with a well-developed notch on fixed finger and lobe on movable finger in male, less distinct in females; Chelal carina *D1* strong and smooth to rough in male, slightly rougher in females; *D4* is rounded and slightly rough; *V1*, strong, rounded and smooth; *V3* rounded, finely granular in male, more granular in females; external carina granulated, present on distal 1/2; dorsal intercarinal surface rough with several fine granules, ventral surface smooth with fine granules, external surface rough with several variable-sized granules, internal surface densely granular with variable-sized conical granules.

**Chelicerae** (Figs. 5, 7). Typical *Euscorpium* chela finger dentition. Smooth and shiny, with slight marbling, with slight darker apical portion of denticles. Movable finger: the dorsal distal denticle is smaller than the ventral distal denticle; ventral margin smooth with brush-like setae on the inner part; movable finger with five denticles: one large distal, one medium and one small subdistal, one large median and a small basal. Fixed finger with four denticles: one distal, one subdistal, one median and one basal, the last two in a fork arrangement; the internal surface with brush-like setae.

**Trichobothria**. Chela: Trichobothria on the pedipalp manus ventral surface is  $4/4 (V_{1,3} + Et_1)$ ; trichobothrium *et* on fixed finger is located distally to the notch of the fixed finger; *est* is located above the notch, slightly moved in distal area; *dsb* is located proximally to the notch. Patella: patella ventral (*Pv*): 11/12; patella external (*Pe*): *et* = 7/8, *est* = 4/4, *em* = 4/4, *esb* = 2/2, *eb<sub>a</sub>* = 4/4, *eb* = 4/4. Femur: Trichobothrium *d* is nearly at the same level to trichobothrium *i*, while trichobothrium *e* is distal to both *d* and *i*, and trichobothrium *e* is situated on dorsal external carina but is shifted toward its dorsal surface.

**Mesosoma** (Figs. 1–4). Tergites shagreened in male, glossy and smooth in females; sternites glossy and finely punctuated; small spiracles inclined to about 45° downward towards outside.

**Metasoma** (Figs. 25–32). Dorsal carinae moderate on segments I–IV with low and spinoid, spaced granules, on distal area slightly more distinct; smooth and rounded on segment V; ventrolateral carinae absent on segments I–II, obsolete on segments III–IV, with small, moderate and spaced minute granules on segment V; ventromedian carina absent on segments I–IV, obsolete on segment V. Intercarinal spaces smooth, but dorsal and lateral surfaces with several fine granules.

**Telson** (Figs. 33–34). Vesicle a bit elongated and bulging, surface smooth, with ventral setae in different size, especially near the vesicle/aculeus juncture in male; elongated but not bulging in females. Aculeus short and abruptly curved.

**Legs** (Fig. 35). Legs with two pedal spurs without tarsal spur. Tarsal ventral row of leg III with 10/10 stout spinules of increasing size from proximal to distal direction, terminate with a pair of spinules. 4 lateral pairs of tarsal setae adjacent to the ventral spinules row. Granulation well evident on dorsal and ventral surfaces of leg femora, mostly marked and dark ventrally.





**Figures 25–35.** *Euscorpius gulhanimae* sp. n., metasoma and telson. **Figures 25–26.** Lateral view metasoma, female paratype (25) and male holotype (26). **Figures 27–28.** Ventral view metasoma, female paratype (27) and male holotype (28). **Figures 29–30.** Metasoma V of male holotype, lateral (29) and dorsal (30) views. **Figures 31–32.** Metasoma V of female paratype, lateral (31) and dorsal (32) views. **Figures 33–34.** Lateral view of telson, male holotype (33) and female paratype (34).



Figure 35. Right legs I–IV of *Euscorpius gulhanimae* sp. n.

**Trichobothrial and pectinal teeth count variation:** Variation observed in 114 studied specimens (71♂43♀) is given below. Pectinal teeth, males (n = 71): 8/8 (1), 8/9 (1), 9/9 (4), ?/11 (1), ?/12 (1), 10/10 (18), 10/11 (10), 11/11 (27), 11/12 (7); in total, 8 in 2.14 %, 9 in 5.00 %, 10 in 35.71%, 11 in 51.42 % and 12 in 5.71 %; mean = 10.53, SD = 0.7719

Pectinal teeth, females (n = 43): 7/7 (1), 7/8 (1), 8/8 (20), 8/9 (8), 9/9 (7), 9/10 (1), 10/10 (3), 10/11 (1), 11/11 (1); in total, 7 in 3.48 %, 8 in 56.97 %, 9 in 26.74 %, 10 in 9.30 %, 11 in 3.48 %; mean = 8.52, SD = 0.8550.

Pedipalp patella, ventral trichobothria *Pv* (n = 114): 9/13 (1), 10/11 (1), 11/11 (8), 11/12 (22), 11/13 (2), 12/12 (46), 12/13 (18), 12/14 (1), 13/13 (14), 13/14 (1); in total, 9 in 0.43 %, 10 in 0.43 %, 11 in 17.98 %, 12 in 58.33 %, 13 in 21.92 % and 14 in 0.87 %; mean = 12.03, SD = 0.7015.

Pedipalp patella, external trichobothria *Pe* (n = 114): *et* = 7/7 (8), 7/8 (20), 8/8 (75), 8/9 (6), 9/9 (5); in total, 7 in 15.78 %, 8 in 77.19 % and 9 in 7.01 %; mean = 7.91, SD = 0.4704; *est* = 4/4 (114); *em* = 4/4 (114); *esb* = 2/2 (114); *eb<sub>a</sub>* = 4/4 (114); *eb* = 4/4 (114).

**AFFINITIES.** In *E. gulhanimae* sp. n., the trichobothrial series *em* = 4 on the pedipalp patella external surface, whereas *em* = 3 in *A. istanbulensis*, *A. mingrelicus*, *A. phrygius*, *A. uludagensis*, *E. arikani*, *E. ciliciensis*, *E. hakani*, *E. honazicus*, *E. idaeus* and *E. sultanensis*.

In *E. gulhanimae* sp. n., the trichobothrial series *Pv* = 11–14 on the pedipalp patella ventral surface and *et* = 7–9 on the pedipalp patella external surface whereas *Pv* = 6–10 and *et* = 5–7 in *E. aladaglarensis*, *E. avcii*, *E. koci*, *E. lesbiacus*, *E. lycius* and *E. tauricus* and *Pv* = 9–13 and *et* = 6–8 in *E. alanyaensis* and *E. gocmeni*.

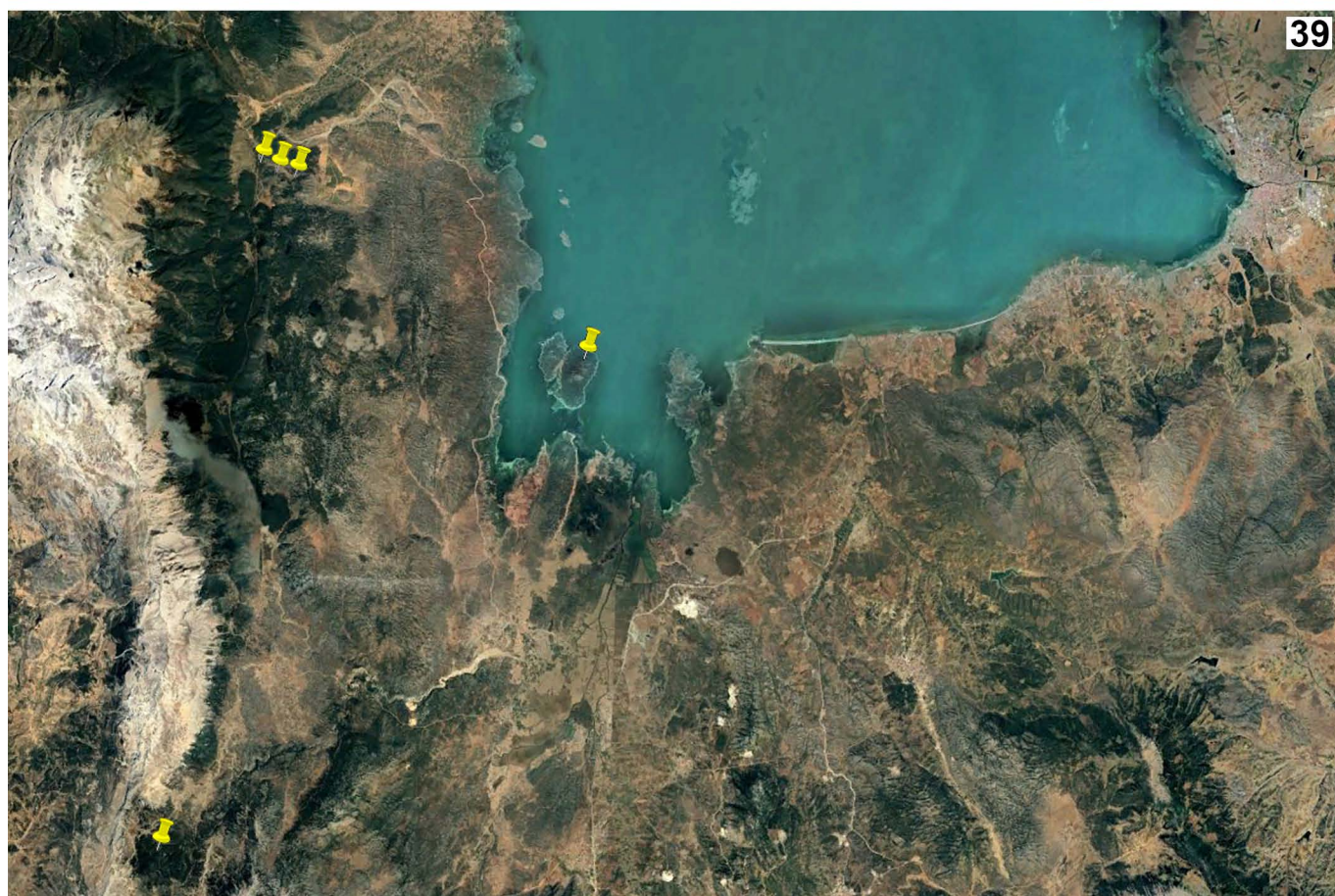
*E. gulhanimae* sp. n. differs from all species of *Euscorpius* in trichobothrial numbers in *Pv* and *et* series; these numbers are the highest in all species of *Euscorpius* in Turkey. Only *E. alanyaensis* and *E. gocmeni* have close numbers to *E. gulhanimae* sp. n. *Pv* series number rarely reaches 14 in *E. gulhanimae* sp. n. but never reaches this number in *E. alanyaensis* and *E. gocmeni*. In *E. gulhanimae* sp. n., *Pv* = 12 in 58.33 % and 13 in 21.92 %, whereas it is 12 in 50 % and 13 in 8.33 % in *E. gocmeni* and 12 in 2.50 %; in *E. alanyaensis*,





Figures 36–37. In vivo habitus of *Euscorpius gulhanimae* sp. n. Male paratype (36) and female paratype (37).





**Figures 38–39:** **Figure 38.** A map of distribution of *Euscorpius gulhanimae* sp. n. Blue circle indicates type locality; red circles indicate localities. **Figure 39.** Close up views of the localities in Google Earth.





**Figures 40.** Habitats where the specimens of *Euscorpius gulhanimae* sp. n. were collected.



number 13 was not detected. *E. gulhanimae* sp. n. differs distinctly in terms of *Pv* numbers from *E. alanyaensis*.

*E. gulhanimae* sp. n. has higher number trichobothria in *et* series than *E. gocmeni*. In *E. gulhanimae* sp. n., *et* = 7 in 15.78 %, 8 in 77.19 % and 9 in 7.01 % in *E. gulhanimae* sp. n., it is 6 in 2.78 %, 7 in 36.11 %, 8 in 61.11 % in *E. gocmeni*.

All *Euscorpius* species are uniformly colored but color of *E. gulhanimae* sp. n. has light greyish yellow mesosoma, dark reddish-brown chela and dark brown metasomal segments III–V. *E. gulhanimae* sp. n. is distinguished by this two-colored feature from all *Euscorpius* species.

**GEOGRAPHIC RANGE AND ECOLOGY.** The detected distribution area of *Euscorpius gulhanimae* sp. n. is restricted by Dedegöl Mountains in the west and north and Beyşehir Lake in the east. It was also found at the Hacı Akif Island in Beyşehir Lake. This species could be distributed until Taurus Mountains in the south, but southern distribution area is not clear; it could be a relict species with more localities in the south.

The collection localities in Kurucaova and Dumanlı are cool and humid, with a mixed forest of black pine and fir trees. The habitat includes rocks that covered by moss due to humidity. The specimens are abundant in the forests under rocks inside the leaf litter; some specimens were observed in rock crevices during the night field trip. The Hacı Akif Island is also a very humid place, covered with bushes and oak trees.

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