*Arthropoda Selecta 33(2):* 267–272 

# A new species of *spinibarbe* species-group of *Zodarion* (Araneae: Zodariidae) from Turkey

# Новый вид группы *Zodarion spinibarbe* (Araneae: Zodariidae) из Турции

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KEY WORDS: taxonomy, Aranei, Zodariinae, *spinibarbe* group, Anatolia.
КЛЮЧЕВЫЕ СЛОВА: таксономия, Aranei, Zodariinae, группа видов *spinibarbe*, Анатолия.

ABSTRACT. A new species, *Zodarion yigitakcai* sp.n. (♂♀) is described from Kahramanmaraş and Osmaniye provinces of Turkey. This contribution increases the total number of *Zodarion* species known from this country to 33. The distribution records of the new species and its comparative materials *Z. barbarae* Bosmans, 2009 and *Z. spinibarb*e Wunderlich, 1973 in Turkey are also mapped.

How to cite this paper: Coşar İ., Danışman T. 2024. A new species of *spinibarbe* species-group of *Zodarion* (Araneae: Zodariidae) from Turkey // Arthropoda Selecta. Vol.33. No.2. P.267–272. doi: 10.15298/arthsel.33.2.14

РЕЗЮМЕ. Новый вид *Zodarion yigitakcai* sp.n. (♂♀) описан из турецких провинций Кахраманмараш и Османие. Таким образом, общее число видов рода *Zodarion* в Турции увеличено до 33. Также даны сведения и карты новых находок *Z. barbarae* Bosmans, 2009 и *Z. spinibarb*e Wunderlich, 1973 в Турции.

## Introduction

The spider family Zodariidae Thorell, 1881 includes 1280 extant species globally in 90 genera and five subfamilies [WSC, 2024]. With 169 valid species, *Zodarion* is the second most diverse genus of the Zodariinae [WSC, 2024]. In Europe, the number of recorded species of this genus is 153 [Nentwig *et al*., 2024]. In Turkey, the family comprises 35 species in four genera. Most of them, 32 species, belong to *Zodarion* [Danışman *et al*., 2024]. Turkish species of *Zodarion* are relatively well studied particularly thanks to some recent publications [Bosmans, 2009; Coşar, 2021; Coşar, Danışman, 2021]. In this study, a new species of the *spinibarbe* species-group is described and illustrated. The distribution of the species is also mapped.

## Material and Methods

Materials were collected using a hand pooter. Digital images were taken with a Canon EOS 250D camera attached to Leica S8APO streomicroscope. Pictures were edited using Combine ZM and Photoshop CC 2019. The female copulatory organs were dissected, cleaned, and kept in lactic acid for 2–3 days. SEM micrographs were taken under high vacuum with a FEI / Quanta 450 FEG. The map showing the distribution of the species was generated using SimpleMappr (Shorthouse, 2010) (Fig 25). Specimens are deposited in the Arachnological Museum of Kırıkkale University (KUAM). All measurements are in millimetres. Leg measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus); measurements of leg segments were taken from the dorsal side. The following abbreviations are used: ALE — anterior lateral eye, AME — anterior median eye, Co — conductor, dMA — distal part of median apophysis, Em — embolus, FD — fertilization duct, MA — median apophysis, MH — median hood, PI — posteromedian incision, PLE — posterior lateral eye, PME — posterior median eye, RTA — retrolateral tibial apophysis, S — spermatheca.

## Taxonomy

### Family Zodariidae Thorell, 1881
### Genus *Zodarion* Walckenaer, 1826

Type species: *Enyo nitida* Audouin, 1826 from Egypt.

COMMENTS. *Zodarion*, with 169 extant species, is the second largest genus of the family [WSC, 2024]. Based on the copulatory organs of the species currently considered in this genus, *Zodarion* does not appear to be monophyletic, as there are only two species morphologically similar to the generotype: *Z. luctuosum* (O. Pickard-Cambridge, 1872) and *Z. lutipes* (O. Pickard-Cambridge, 1872) [Zamani, Marusik, 2021]. *Zodarion* species distributed in Turkey are divided into nine species-groups based on the morphology of the copulatory organs; *aculeatum, germanicum, graecum, lutipes, morosum, pusio, rubidum, spinibarbe* and *thoni* groups [Bosmans, 2009]. The *spinibarbe* species-group, characterized by posteromedian incision of epigyne and the absence of a lateral projection of the tegulum, is currently represented by 14 extant species [Bosmans, 2009; WSC, 2024]. The *spinibarbe* species-group is represented in Turkey by nine species: *Zodarion barbarae* Bosmans, 2009, *Z. crewsae* Coşar, Danışman et Kunt, 2022, *Z. gaziantepense* Danışman et Coşar, 2021, *Z. kossamos* Bosmans, 2009, *Z. siirtense* Coşar, 2021, *Z. spinibarbe* Wunderlich, 1973, *Z. turkesi*


Figs 1–8. *Zodarion yigitakcai* sp.n., male holotype (1–4), female paratype (5–8): 1, 5 — habitus, dorsal view; 2, 6 — idem, ventral view; 3 , 7— ocular area, frontal view; 4, 8 — idem, dorsal view. Scale bars: 0.5 mm.

Рис. 1–8. *Zodarion yigitakcai* sp.n., голотип самец (1–4), паратип самка (5–8): 1, 5 — внешний вид, дорсально; 2, 6 — то же, вентрально; 3, 7 — глазная область, вид спереди; 4, 8 — то же, дорсально. Масштаб: 0,5 мм.

Coşar et Danışman, 2021, *Z. van* Bosmans, 2009 and *Z. yagmuri* Coşar et Danışman, 2021 [Danışman *et al*., 2024; WSC, 2024]. *Zodarion yigitakcai* sp.n. is a member of the *spinibarbe* species-group based on the shape of the median apophysis with pointed tip and slender basal part.

## *Zodarion yigitakcai* **sp.n.**
Figs 1–20.

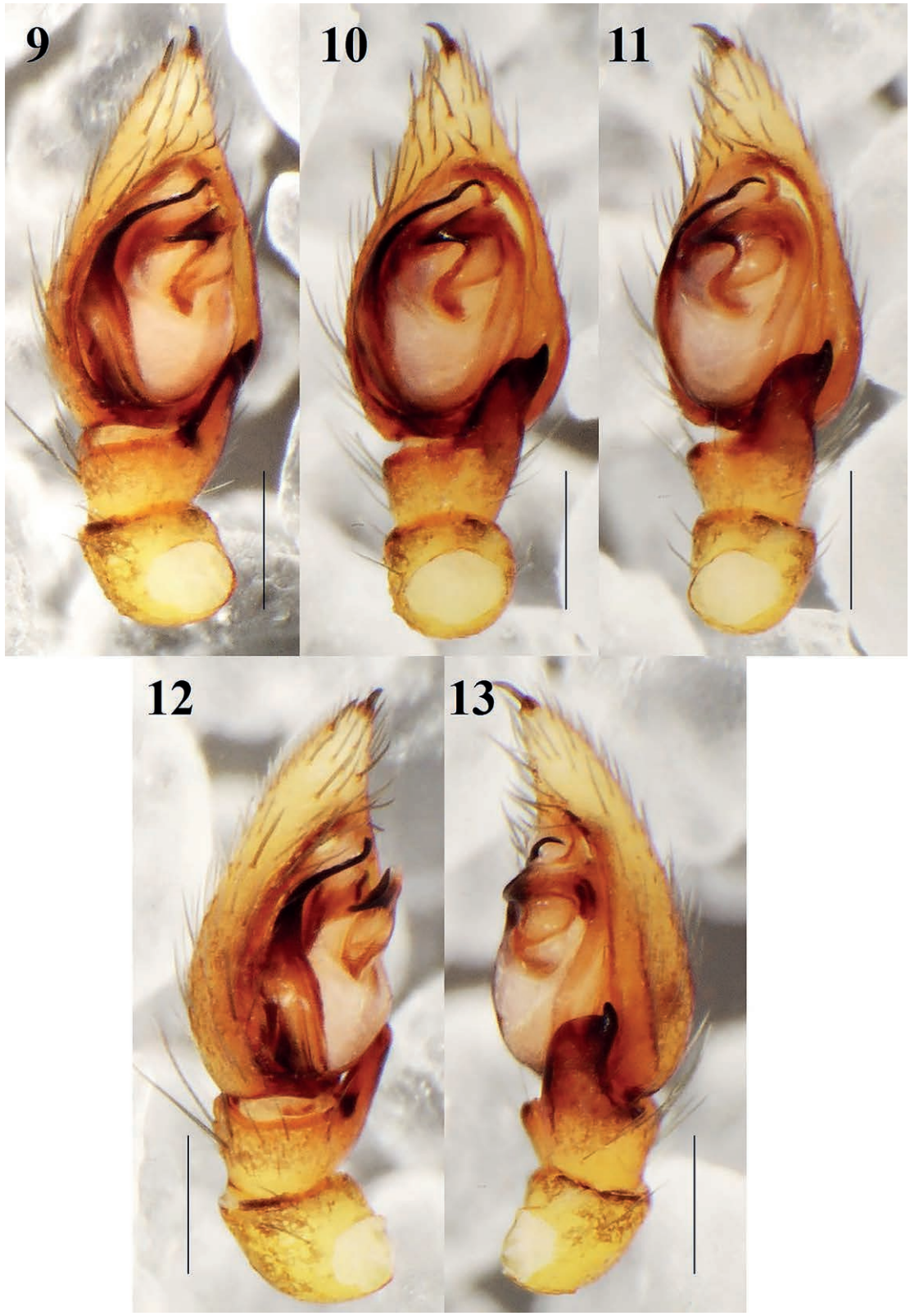
TYPE MATERIAL: Holotype ♂ (KUAM-ZOD-2021/25) and paratypes 1♂ 1♀, Kahramanmaraş Prov., Andırın Dist., 37°38′39″N 36°25′51″E, 1313 m, stony field near scrub, 22.05.2021, İ. Coşar and T. Danışman leg. Paratypes: 1♂, 2♀♀, Osmaniye Prov., Kadirli Dist., Maksutoluğu Plateau, 37°41′42″N 36°12′55″E, 1497 m, from stony area. 22.05.2021, İ. Coşar and T. Danışman leg.

COMPARATIVE MATERIAL: *Zodarion barbarae* (Figs 21–22), 2♂♂, Burdur Prov., Bucak Dist., 37°23′26″N 30°32′26″E, 938 m, 10.09.2019, stony field near scrub, İ. Coşar leg.

*Zodarion spinibarbe* (Figs 23–24), 1♂, Antalya Prov., Gazipaşa Dist., 36°13′12″N 32°22′36″E, 147 m, stony field near scrub, 29. 04.2016, K.B. Kunt leg.

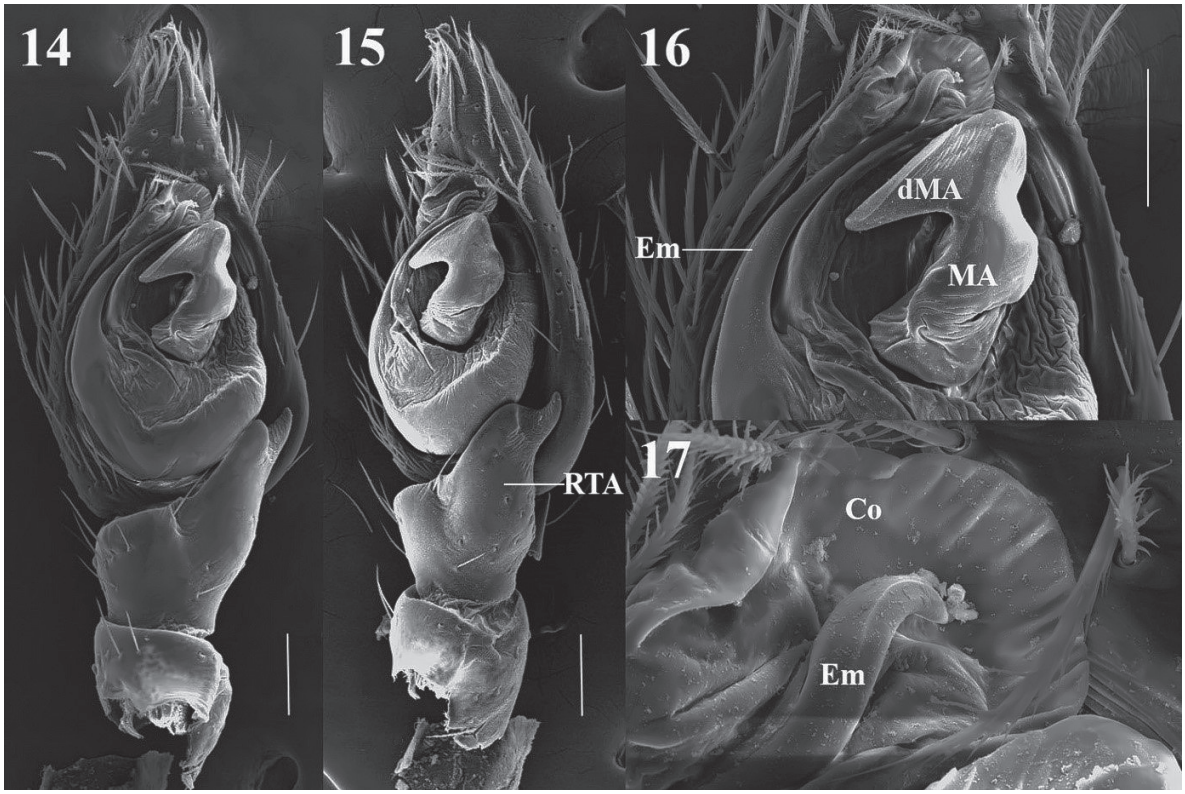
ETYMOLOGY. The species is named in honor of Yiğit Akca, a deceased son of author's friends Nesrin Akca and Candoğan Akca (Ankara, Turkey).

DIAGNOSIS. The male of *Zodarion yigitakcai* sp.n. resembles those of *Z. barbarae* and *Z. spinibarbe*, but can be distinguished from them by having a long, blunt tibial apophysis with a curved pointed tip, relatively longer than that of congeners (cf. Figs 15, 22 and 24). It also differs from similar species in the gradually narrowing of the distal part of the median apophysis (*dMA*) (cf. Figs 16, 21–24). In *Z. barbarae* and *Z. spinibarbe* the epigynal cavity is triangular, while in females of the new species it is elliptical (Fig. 19, see arrow). Furthermore, the epigynal posteromedian incision is narrower than in other speices of this group, the length of the incision in the new species is approximately as long as the spermatheca (Fig. 20, see



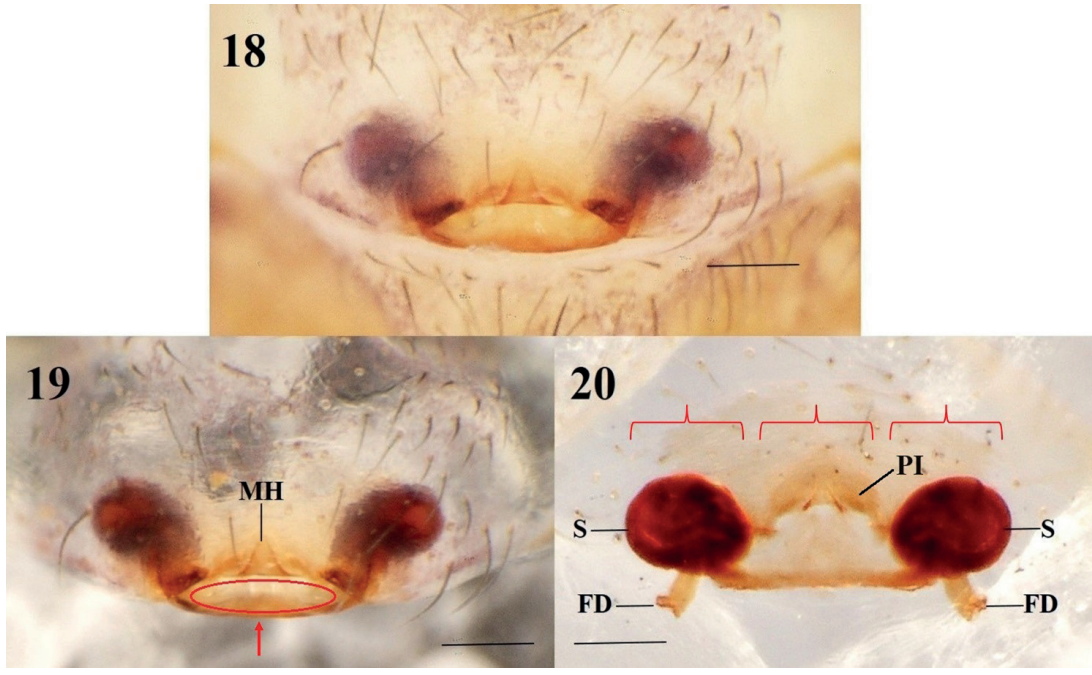

Figs 9–13. *Zodarion yigitakcai* sp.n., palp of the male holotype: 9 — prolateral view; 10 — ventral view; 11 — retrolateral view; 12–13 — lateral views. Scale bars: 0.2 mm.

Рис. 9–13. *Zodarion yigitakcai* sp.n., голотип самец, пальпа: 9 — пролатерально; 10 — вентрально; 11 — ретролатерально; 12–13 — латерально. Масштаб: 0,2 мм.



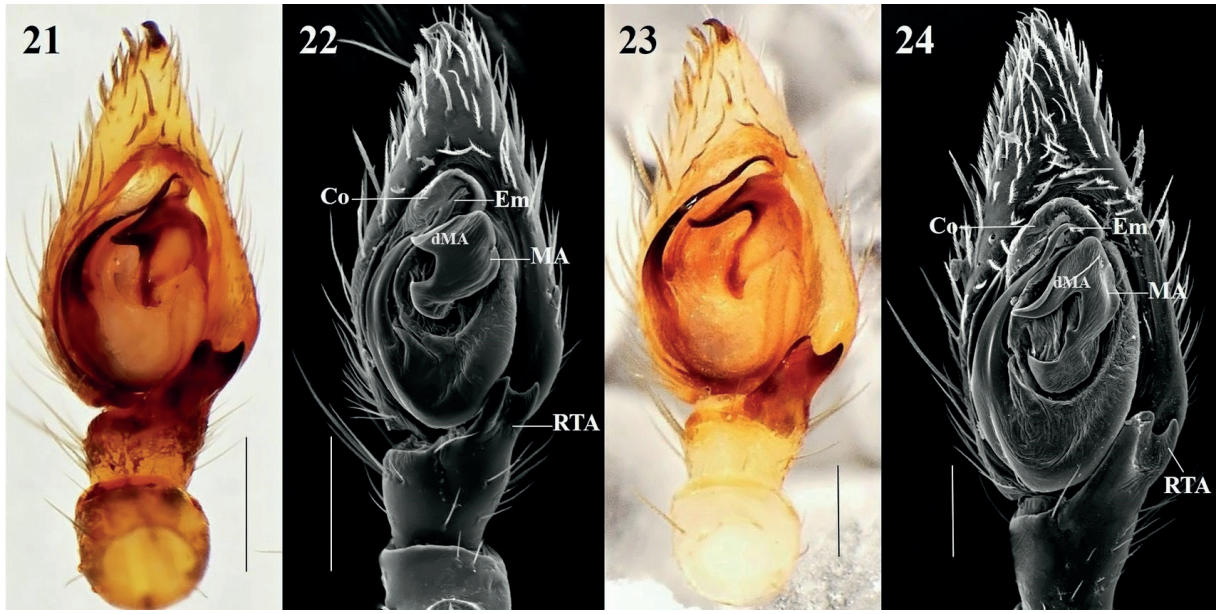

Figs 14–17. *Zodarion yigitakcai* sp.n., SEM images of the palp of the male holotype: 14 — ventral view; 15 — retrolateral view; 16 — embolus and median apophysis, ventral view; 17 — embolus and conductor's tip, ventral view. Abbreviations: Co — conductor, dMA — distal part of median apophysis, Em — embolus, MA — median apophysis, RTA — retrolateral tibial apophysis. Scale bars: 0.1 mm.

Рис. 14–17. *Zodarion yigitakcai* sp.n., голотип самец, пальпа, СЭМ: 14 — вентрально; 15 — ретролатерально; 16 — эмболюс и медианный вырост, вентрально; 17 — эмболюс и вершина кондуктора, вентрально. Сокращения: Co — кондуктор, dMA — дистальная часть медианного выроста, Em — эмболюс, MA — медианный вырост, RTA — ретролатеральный вырост голени. Масштаб: 0,1 мм.




Figs 18–20. *Zodarion yigitakcai* sp.n., epigyne of the paratype: 18 — intact, ventral view; 19 — macerated, ventral view; 20 — idem, dorsal view. Abbreviations: FD — fertilization duct, MH — median hood, PI — posteromedian incision, S — spermatheca. Scale bars: 0.1 mm.

Рис. 18–20. *Zodarion yigitakcai* sp.n., паратип самка, эпигина: 18 — интектная, вентрально; 19 — мацерированная, вентрально; 20 — то же, дорсально. Сокращения: FD — оплодотворительный канал, MH — срединный капюшон, PI — задне-срединный надрез, S — сперматека. Масштаб: 0,1 мм.




Figs 21–24. *Zodarion barbarae* and *Z. spinibarbe*, palps: 21–22 — Z. *barbarae*, ventral view; 23–24 — *Z. spinibarbe*, ventral view (22 and 24, SEM images). Abbreviations: Co — conductor, dMA — distal part of median apophysis, Em — embolus, MA — median apophysis, RTA — retrolateral tibial apophysis. Scale bars: 0.2 mm.

Рис. 21–24. *Zodarion barbarae* и *Z. spinibarbe,* пальпы: 21–22 — Z. *barbarae,* вентрально; 23–24 — *Z. spinibarbe,* вентрально (22 и 24 — СЭМ). Сокращения: Co — кондуктор, dMA — дистальная часть медианного выроста, Em — эмболюс, MA — медианный вырост, RTA — ретролатеральный вырост голени. Масштаб: 0,2 мм.

brackets), whereas in *Z. barbarae* and *Z. spinibarbe* the length of the incision is about 1.5 times the length of the spermatheca.

DESCRIPTION. Male (holotype). Habitus as in Figs 1–4. Measurements: Total length 2.9. Carapace 1.4 long, 1.0 wide. Abdomen 1.5 long, 1.0 wide. Ocular area length 0.45. Chelicerae 0.45 long, 0.25 wide. Sternum 0.85 long, 0.65 wide. Clypeus height 0.23. Eye sizes and inter-distances: AME 0.1, ALE 0.07, PME 0.05, PLE 0.07, AME–AME 0.05, AME–ALE 0.02, AME–PLE 0.05, AME–PME 0.07, PME–PME 0.17, PME–PLE 0.02, PLE–ALE 0.02, PLE-PLE 0.3, ALE-ALE 0.4. Leg lengths: I: 4.8 (1.25, 0.35, 1.05, 1.20, 0.95); II: 3.5 (1.05, 0.35, 0.90, 1.10, 0.50); III: 3.95 (1.05, 0.35, 0.75, 1.20, 0.60); IV: 5.20 (1.45, 0.50, 1.35, 1.15, 0.75). Carapace yellowish brown, with dispersed blackish pattern, blackish brown around AME (Figs 1, 4). Clypeus wide, yellowish brown, with dark markings in middle. Chelicerae yellowish, anterior half and medially darker, delimiting anteriorly yellow circular patch, dorso-medially with long, dark strong setae (Fig. 3). Sternum light yellow, with long setae, edges dark (Fig. 2). Abdomen dorsally black, covered with short, dark setae, ventrally light yellow, with long setae (Fig. 1). Spinnerets whitish (Fig. 2). Femur brown, other segments yellow and with short dark setae (Figs 1–2).

Palp: Femur length/width ratio 3.0, patella length/width ratio 1.15, cymbium about 1.5 times longer than femur. Retrolateral tibial apophysis long (almost 2 times longer than tibia), narrowing abruptly towards tip and terminally blunt. Tegulum flat, not protruding in lateral view. Distal part of median apophysis (*dMA*) gradually narrowing, pointed and bird-beak-shaped, its base thin and curved. Embolus thick at base, medially long and curved along its course, originating at 9 o'clock position, tapered toward the tip and slightly curved distally (Figs 9–17).

Female (KUAM-ZOD-2021/26). Habitus as in Fig 5-8. Measurements. Total length 4.80. Carapace 1.80 long, 1.25 wide. Abdomen 3.0 long, 2.1 wide. Ocular area long 0.50. Epigyne wide 0.40. Chelicerae 0.65 long, 0.35 wide. Sternum long 1.0, wide 0.80. Clypeus height 0.25. Eye sizes and inter-distances: AME 0.12, ALE 0.07, PME 0.07, PLE 0.1, AME–AME 0.07, AME–ALE 0.02, AME–PLE 0.07, AME–PME 0.1, PME–PME 0.2, PME–PLE 0.02, PLE–ALE 0.07, PLE-PLE 0.4, ALE-ALE 0.3. Leg lengths: I: 5.35 (1.35, 0.45, 1.20, 1.35, 1.0); II: 4.55 (1.15, 0.45, 1.05, 1.20, 0.70); III: 4.35 (1.15, 0.45, 0.90, 1.10, 0.75); IV: 5.65 (1.5, 0.55, 1.40, 1.25, 0.95). Carapace yellowish brown, with dispersed blackish pattern, blackish brown around AMEs (Figs 5, 8). Clypeus wide, yellowish brown, with dark markings in middle. Chelicerae yellowish, anterior half and medially darker, delimiting anteriorly yellow circular patch, dorso-medially with long, dark setae (Fig. 5). Sternum light yellow, with long setae, edges dark (Fig. 6). Abdomen dorsally with reticulated dark brown pattern and tiny yellow spots, covered by short, dark setae (Fig. 5). Spinnerets whitish (Fig. 6). Femur brown, other segments yellow and with short dark setae (Figs 5–6).

Epigyne: Epigynal cavity elliptic (Fig 19, see arrow). Posteromedian incision (*PI*) length subequal to spermathecal length. Median hood equilateral triangle shaped, small, anteriorly. Spermathecae oval, relatively large, separated by 1.2 times their lenght (Fig. 18-20).

DISTRIBUTION. Known only from two nearby localities in Kahramanmaraş and Osmaniye Provinces (Fig. 25).

## Discussion

Considering the recent studies, the number of species belonging to the Zodariidae in Turkey has reached 35 [Danışman *et al*., 2024]. With the new species introduced in this study, this number increased to 36. Compared to neighboring countries such as Armenia (2), Azerbaijan (8), Bulgaria (13), Greece (43), Georgia (5) and Iran (23) [Zamani, 2023; Nentwig *et al*., 2024], many more new species/records are expected from Turkey. Considering

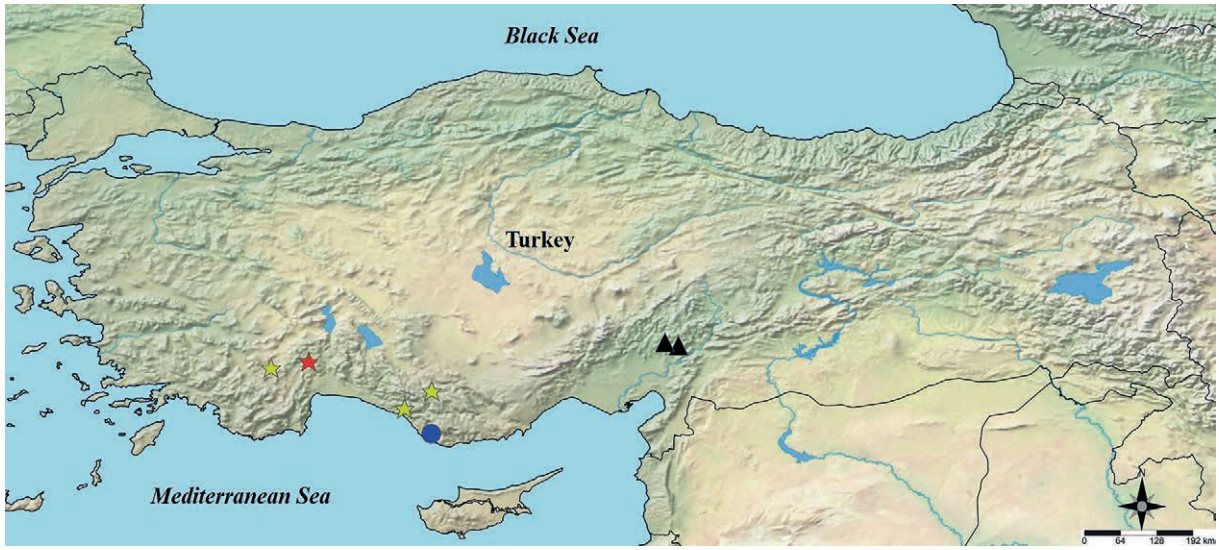



Fig. 25. Distribution records of *Zodarion barbarae* (red star: author's record, yellow star: Özkütük [2022]), *Z. spinibarbe* (blue circle) and *Z. yigitakcai* sp.n. (black triangle).

Рис. 25. Распространение *Zodarion barbarae* (красная звездочка: данные авторов, желтая звездочка: Özkütük [2022]), *Z. spinibarbe* (синий кружок) и *Z. yigitakcai* sp.n. (черный треугольник).

that spider diversity in some regions of Turkey has not been fully investigated, the number of Turkish zodariid species is estimated to be much higher. More faunistic studies as well as detailed taxonomic research should be carried out, especially in regions such as the Black Sea, Eastern Anatolia and Southeastern Anatolia, which have not been studied so far by most arachnologists.

**Disclosure statement.** No potential conflict of interest was reported by the authors.

**Acknowledgements.** We wish to thank the Hitit University Scientific and Technological Research Center (HUBTUAM) for SEM facilities. This work was supported by Scientific Research Projects Coordination Unit of Kırıkkkale University, Project number 2021, 055. We also thank Arnaud Henrard (Tervuren, Belgium), Kadir Boğaç Kunt (Eskişehir, Turkey) and Yuri M. Marusik (Magadan, Russia) for helpful comments on improving the manuscript. Alireza Zamani (Turku, Finland) provided valuable comments to this manuscript and kindly corrected the English of the final draft.

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*Responsible editor K.G. Mikhailov*