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Faunistic notes on the cybaeid spiders of Turkey (Araneae: Cybaeidae)

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Abstract

Some recent inferences on cybaeid spiders of Turkey are presented, including new and interesting locality records for *Argyroneta aquatica* (Clerck, 1757) and the first record of *Cedicus israeliensis* Levy, 1996 from Turkey. Genitalia photographs are provided for both species together with comments on their habitats and distributions. Some taxonomic notes are also included for *C. israeliensis*. In addition, presence of *C. flavipes* Simon, 1875 in Cyprus Island is confirmed and genitalia photographs are presented for comparison..

Keywords: Anatolia, *Argyroneta aquatica*, *Cedicus*, Mediterranean, new record, water spider

INTRODUCTION

Presently regarded as a senior synonym of Argyronetidae Thorell, 1870, members of Cybaeidae Banks, 1892 are small to large-sized entelegyne, ecribellate araneomorph spiders, represented by 10 genera and 117 species worldwide [1-2]. The most characteristic attribute of the family is their closely located anterior spinnerets with short and hemispherical distal segments.

The family Cybaeidae is represented by two genera and three species in Turkey. One of these spiders is a rather popular species with an underwater life style *Argyroneta aquatica* (Clerck, 1757), while the other two species are *Cybaeus abchasicus* Charitonov, 1947 and *C. brignolii* Maurer, 1992 known from Black Sea region [3].

The purpose of this study is to present a new locality record for *A. aquatica* together with some habitat information and images of the male and female genitalia. Even though this species has previously been recorded in Turkey, the genital morphology from Turkish populations has never been figured before. Also, a species described from Israel, *Cedicus israeliensis* Levy, 1996, is recorded from Turkey for the first time and habitus photographs together with images of male and female genitalia are presented

MATERIALS AND METHODS

Specimens examined were collected from the Aegean, Central Anatolian and Mediterranean (Southern Anatolia) regions of Turkey using hand aspirators or by means of pitfall traps; and directly preserved in 70% ethanol for further examination (Fig 1). Species identifications were performed using Leica S8AP0 stereomicroscopes and are based on the genitalia drawings of De Blauwe [4] for *A. aquatica* and Levy [5] for *Cedicus israeliensis*. Measurements were taken according to Levy [5]. Digital images were taken with a Leica DFC295 digital camera, with 2–10 photographs taken within the same frame in different focal planes and montaged using Combine ZP image stacking software.

Habitat photographs for *A. aquatica* were taken with a Nikon D-7000 digital camera equipped with AF-S DX Nikkor 18-105mm f/3.5-5.6G ED VR lens; while an AF-S VR Micro-Nikkor 105 mm f/2.8G IF-ED lens together with a Sigma EM-140 DG Macro Flash is used for close up photography. Under water close up photographs of spiders were taken in a small aquarium. After arranging photographs with CS2 Photoshop software, plates were designed using Corel-DRAW X3 software.

Fig 1. Sampling localities ⋆ *A. aquatica*, new locality records ● Ditto, old locality records ■ *C. israeliensis*

SPECIES SURVEY

Genus *Argyroneta* Latreille, 1804
***Argyroneta aquatica* (Clerck, 1757)** Figs 2-3
Araneus aquaticus; Clerck [6]: 143, pl. 6, f. 8 (D♂).
Aranea a.; Linnaeus [7]: 623 (D).
A. a.; Simon [8]: 29, pl. 5, f. 3 (♂♀).
A. a.; Lehtinen [9]: 450, f. 268 (♂).
A. a.; de Blauwe [4]: 4, f. 1-3 (♂♀).
A. a. japonica; Ono [10]: 53, f. 4-7 (D♂♀).
A. a.; Marusik & Kovblyuk [11]: 121, f. 8.1-6 (♂♀).
For detailed synonym list see Platnick [2].

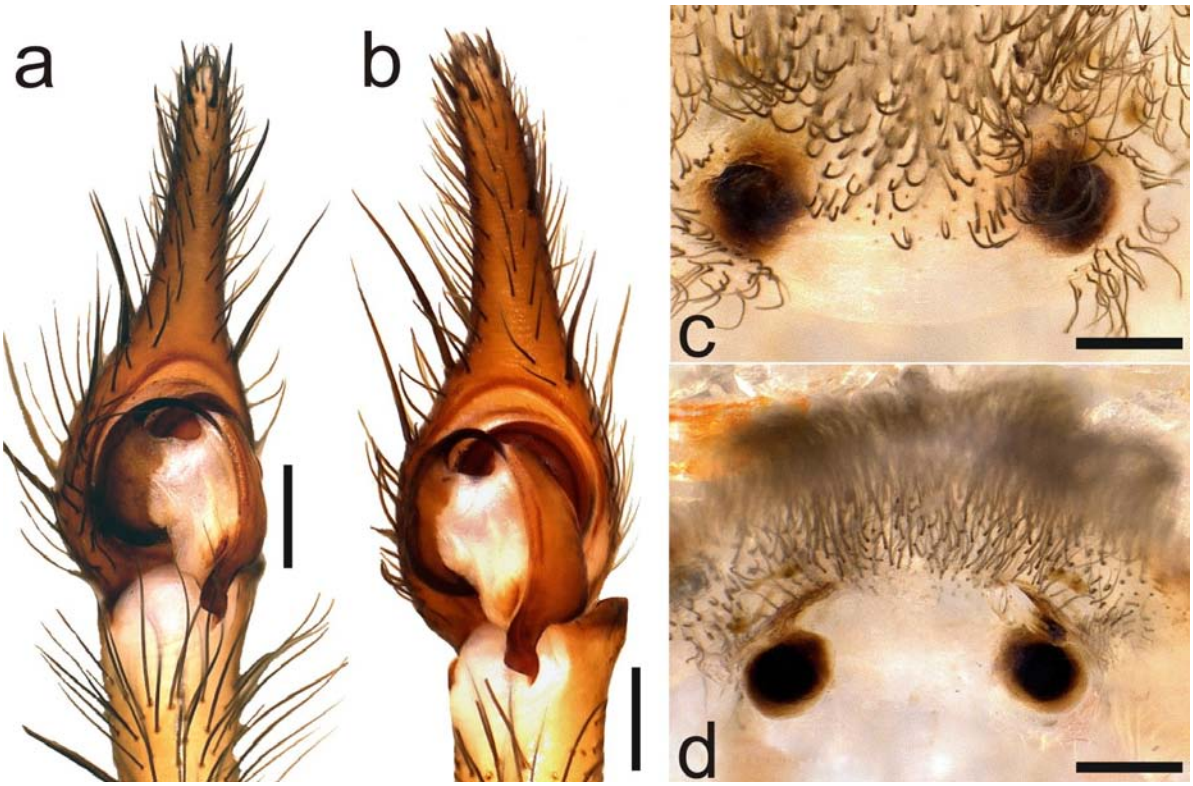

Fig 2. *Argyroneta aquatica* **a** male palp, ventral view **b** ditto, nearly ventral view **c** epigyne, ventral view **d** ditto, dorsal view **Scale lines a** 0.2 mm **b** 0.25 mm **c** 0.25 mm **d** 0.2 mm

Examined material

3♂♂ 6♀♀, Muğla Province, Milas District, Kıyıkışlacık Village (37° 17.19'N; 27° 35.362'E), 08.08.2011, leg. M. Elverici. Specimens collected or observed in a brackish water habitat, always in very shallow littoral zones; from their retreats found in macro algae or under stones.

Personal observations

Muğla Province, Milas District, Güllük Lagoon (37°16.346'N; 27°37.558'E), 15.08.2008, M. Elverici; Kırklareli Province, Demirköy District, İğneada Town, Mert Lake (41°51.455'N; 27°57.478'E), 09.10.2009, K.B.Kunt

Fig 3. Brackish habitat of *A. aquatica* in Kıyıkışlacık **a** view of the relatively less saline parts **b** thalli of *C. compressa* in shallow water **c** an adult female left its retreat and headed for surface for bubble exchange **d** adult male (at left) and female (at right) build retreats next to each other, interacting

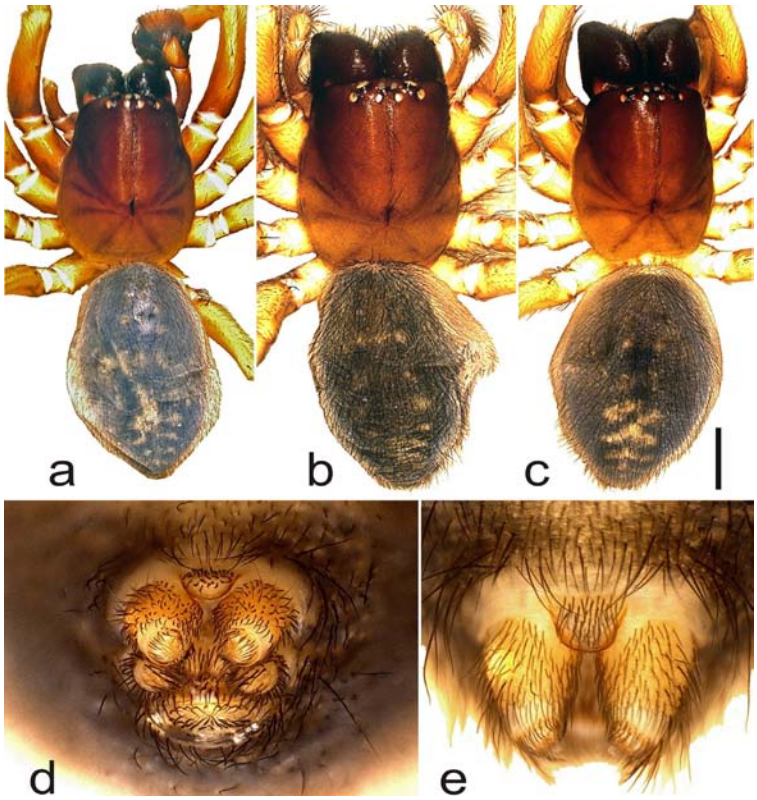

Fig 4. *Cedicus israeliensis* **a** habitus, male **b, c** ditto, female **d** colulus, nearly posterior view **e** ditto, ventral view **Scale line a, b, c** 0.5 mm

Older records

Bolu Province [12; page 500]; Konya Province [13; page 133]; Afyon Province, Denizli Province and Kayseri province [14; pages 774-775).

Comments

With a Palaearctic zoogeographical distribution, *A. aquatica* also has records in close proximity to Turkey, such as from Azerbaijan, Bulgaria, Armenia and Georgia. In her first checklist on the Turkish araneofauna, Karol [15] mentioned a record of this species given by Rouzsky [16] from Turkey but without specifying any locality data. Topçu et al. [13] have cited this record and stated that they have confirmed the presence of *A. aquatica* from Turkey with 4 female specimens they collected in Konya province. However, previously Brignoli [12] had written that he had collected *A. aquatica* from Lake Abant for the first time in Turkey and emphasized that Karol's record might have been based on a misunderstanding [12; page 500]. As a matter of fact, paper in concern (see Rouzsky [16]) was on the fauna and flora of Ozero-Karachi thermal springs located in Chany Town of Novosibirsk Oblast (Russia Federation).

Following Brignoli [12], Topçu et al. [13] and Seyyar & Demir [14] extended the known distribution of this species with new locality records and contributed to the knowledge of ecological preferences of Turkish populations with the habitat descriptions they provided.

In accordance with the present data, *A. aquatica* is recorded from the coastal line of the Aegean region of Turkey and from Thrace for the first time. By considering the presence of this species in Bulgaria and locality records given by Seyyar & Demir [14], our records are not surprising.

Our specimens from Kıyıkışlacık Village were collected in a slightly unusual habitat however, with respect to other records given above. Specimens were collected in a brackish habitat of very shallow waters emerging from a source and running along about ten meters and then meeting the saline water, and forming a very small lagoon at the sea shore. Specimens could only be collected or observed very close to the source, in waters with lowest salinity values of 4.2‰ were recorded. Marine algae *Cystoseira compressa* was abundant, covering the bottom around the source; and specimens often observed in their retreats build in these algae or under sides of drown stones covered with these algae. See Fig 3 for habitat images.

We expect future studies will extend the known distribution of this species towards the Black Sea and eastern Anatolian regions of Turkey.

Genus *Cedicus* Simon, 1875

***Cedicus israeliensis* Levy, 1996** Figs 4-5

C. i.; Levy [5]: 120, f. 135-140 (D♂♀).

Examined material

1 ♂, Kahramanmaraş Province, Pazarcık District, c. 5 km south of Narlı Town (37°19.196'N; 37°10.27'E), 07.03.2008, under stones, leg. E.A.Yağmur & A. Bozardış; 1 ♂ 2♀♀, Mersin Province, Mut District, Sertavul Pass (36°53.829'N; 33°16.107'E), 19.09.2010, under stones, leg. S. Zonstein; 11 ♂♂ 3 ♀♀, Mersin Province, Mut District, Sertavul Pass (36°53.836'N; 33°16.183'E), 19.09-10.12.2010, pitfall traps, leg. R.S.Özkütük

Measurements

[♂ (n= 10) / ♀ (n=5)]. total length 7.90-7.52; carapace length 3.40-3.25, width 2.48-2.35, index 1.37-1.38; clypeal index 1.60-1.10; anterior-lateral eyes 0.18-0.15, anterior-median eyes 0.11-0.09, posterior-lateral eyes 0.12-0.12, posterior-median eyes 0.09-0.08; leg lengths I 7.92-7.16, II 7.28-6.24, III 6.52-5.56, IV 8.80-7.88; patella-tibia index 0.92-0.83

Description

Body coloration and abdominal patterns almost the same in both sexes (Fig 4a-c). Males larger than females. Chelicerae dark brown: males have 6-7 promarginal teeth, 4-5 retromarginal teeth; females have 7-8 promarginal teeth, 5 retromarginal teeth. Ocular region of carapace dark brown (narrower and darker in males), thoracic region relatively light coloured. Median eyes small; anterior eyes relatively closer to each other. Distance between posterior lateral eyes greater than distance between anterior lateral eyes. Fovea present, distinct and longitudinal. Labium and gnathocoxae dark brown, with cream coloured apices. Sternum yellowish brown, with brown edges. Legs brownish. Leg formula IV, I, II, III. Proximal segments from femur to tarsus darker in colour. Scopulae absent. Tarsi with three pectinate claws. Main claws have 9-10, middle hook has 1-2 teeth. Abdomen greyish brown dorsally and laterally. At the ventral, epigynal region particularly lighter in colour. Entire surface covered with blackish setae.

Colulus present and large (Fig 4d-e). Abdomen pattern sometimes chevron-shaped through the posterior, but usually with irregular and amorphous patterns, yellowish in colour and much more apparent in females. Patellar and tibial apophyses well developed and strongly sclerotized in males. Embolus broader basally, circular and with a bifurcate tip. Conductor distinct, shovel-shaped. Apical part wide (Fig 5a). Epigyne like a strongly chitinized plate, middle part tetragonal and flattened. A strongly sclerotized lobe present parallel to the epigastric furrow (Fig 5d).

Comments

According to Platnick [2] the genus *Cedicus* is represented by 5 species distributed from the Mediterranean to Japan. Among these, as species reported from the far east, *C. dubius* Strand, 1907 (Japan) and *C. pumilus* Thorell, 1895 (Myanmar), were described only from females and as they are distributed in non-arid regions (unlike the other species), we agree with Marusik & Guseinov [17] that those species may belong to a different genus. Moreover, Lehtinen [9] went a step further, by also stressing that *C. dubius* and *C. pumilus* might belong to a different family. Another Mediterranean species of the genus, *C. flavipes* Simon, 1875 (type locality Syria) is also known from Lebanon, Cyprus Island and Syria (Fig 6). In the original description of the species, Simon [8] stated that specimens were collected in the mountainous regions of Syria. Levy [5] also reported the only male specimen he had collected in Israel from 1800 m of altitude on Hermon mountain.

During our research on the spider fauna of Turkey we have never encountered this species. However, we have had the opportunity to collect one specimen for both sexes at Selvilitepe in Northern Cyprus Island (1 ♂ 1 ♀, 35°19.615'N; 33° 8.923'E, 13.03.2011, under stones, leg. E.A.Yağmur, S. Anlaş & B. Keskin). Thus, we have confirmed the presence of this species on Cyprus Island and by recording specimens from the highest altitudes of the Beşparmak Mountains at Selvilitepe, have also confirmed the relatively high altitude habitats of this species (Fig 7a).

The type locality of *C. israeliensis* is Mount Carmel in the northern part of Israel. Levy [5] in his comments on natural

history of this species described the habitat requirements as mesic, semi-arid, and generally in favor of typical Mediterranean landscapes. Both localities we have recorded this species from are located in the middle and eastern Mediterranean parts of Turkey and so fit with the habitat descriptions of Levy [5] (Fig 7b). Considering the known distribution of *C. flavipes*, it is likely that this species also occurs in Turkey. The two species can easily be distinguished from each other by the structure of their genitalia. Besides the morphological differences of the patellar apophysis in males, *C. israeliensis* has a wider embolar base, a bifurcate tip of the embolus (knob-shaped in *C. flavipes*) and in females the fovea of the epigynal plate getting wider through the epigastric furrow are very characteristic and easy to use for identification purposes (Fig 6).

RESULTS AND DISCUSSION

Based on our new locality records, the known distribution range of *A. aquatica* has been extended at the west side of the Sinop-İskenderun line; and *A. aquatica* is recorded from a lagoon habitat in Turkey for the first time. In addition, the number of cybaeid spider species in Turkey is raised to 4, together with *C. israeliensis*.

The taxonomic status of the genus *Cedicus* has been debated by several authors. Most recently, Marusik & Guseinov [17] raised two sub-genera to generic level and many species were transferred into those new genera by these authors. However, according to Platnick [2] the placement of the genus in the family is still questionable. Therefore, to report a member from this taxonomically problematic genus from Turkey, which was previously only known from its type locality and its close vicinities is very exciting for us. Considering the localities and habitat types in which specimens of *C. israeliensis* were collected, we can say that this species might have a distribution towards the western Mediterranean region of Turkey.

During recent years, new records of spider species (previously known as native to Israel) from the Turkish Mediterranean region have been rather common. Some additional examples are *Lipocrea epeiroides* (O.P.-Cambridge, 1872) [Araneidae], *Uroctea thaleri* Rheims, Santos & van Harten, 2007 [Oecobiidae], *Pisaura consocia* (O. P.-Cambridge, 1872) [Pisauridae], *Neospintharus syriacus* (O. P.-Cambridge, 1872) [Theridiidae]. This may suggest the presence of a bridge between Anatolia, Syria, Lebanon and Israel, with Mediterranean climate and conditions, isolated from the arid and limiting effects of deserts. Genetic similarities and genetic diversity investigations between these regions would form an interesting focus for future research.

Acknowledgment

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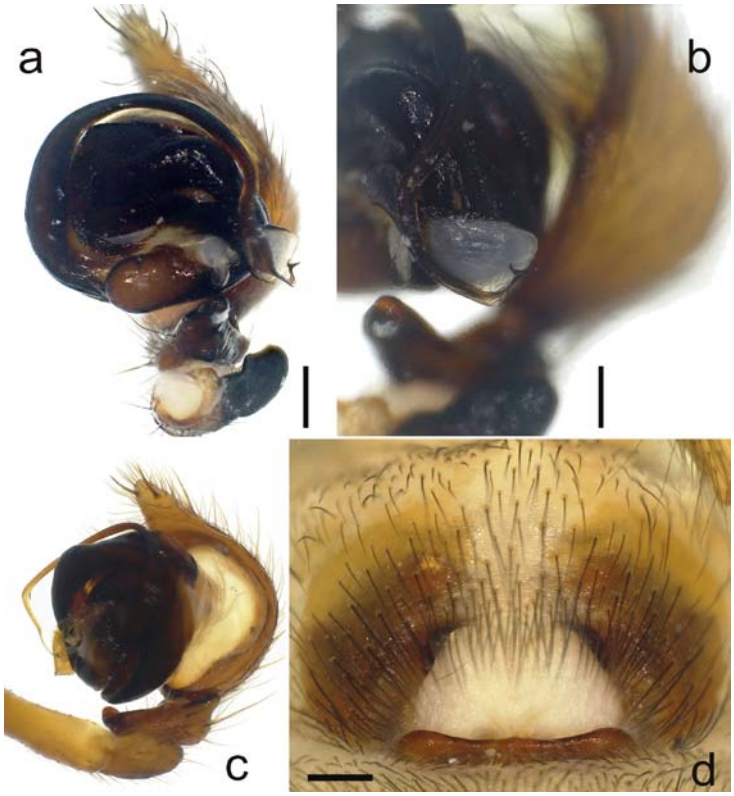

Fig 5. *C. israeliensis* **a** male palp, ventral view **b** ditto, tip of embolus **c** male palp of Israeli specimen **d** Epigyne, ventral view **Scale lines a, d** 0.25 mm **b** 0.1 mm

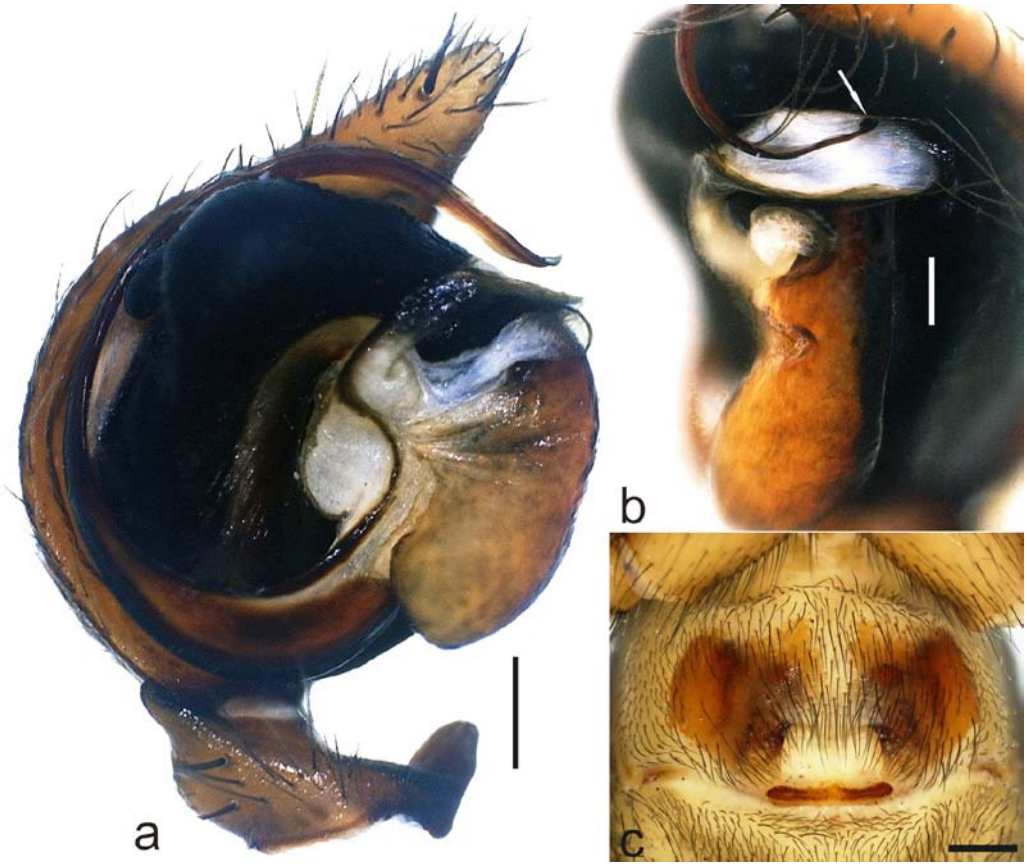

Fig 6. *Cedicus flavipes* from Cyprus Island **a** male palp, ventral view **b** ditto, tip of embolus **c** Epigyne, ventral view **Scale lines a, c** 0.25 mm **b** 0.1 mm

Fig 7. Collecting localites **a** *C. flavipes*, Cyprus Island **b** *C. israeliensis*, Turkey

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