Philodromus musteri spec. nov. of the Philodromus aureolus group from Turkey (Araneae: Philodromidae)

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Philodromus musteri spec. nov. of the *Philodromus aureolus* group from Turkey (Araneae: Philodromidae)

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Abstract. *Philodromus musteri* **spec. nov.**, a member of the *Philodromus aureolus* group from the Mediterranean coast of south-west Turkey, is described from a male specimen. Photos, drawings, diagnosis and a complement to the determination key are provided.

Keywords: new species, running crab spiders, taxonomy

Zusammenfassung. *Philodromus musteri* spec. nov. aus der *Philodromus aureolus*-Gruppe aus der Türkei (Araneae: Philodromidae). *Philodromus musteri* **spec. nov.**, ein Vertreter der *Philodromus aureolus*-Gruppe, wird von der Mittelmeerküste im Südwesten der Türkei auf Basis eines Männchens beschrieben. Fotos, Zeichnungen, Diagnose und eine Ergänzung des Bestimmungsschlüssels werden vorgelegt.

The philodromid fauna of Turkey includes a fairly large number of species (i.e., 37 species according to Logunov & Kunt 2010; 38 species according to Danışman et al. 2019) but is still incompletely known. So far, 11 members of the *Philodromus aureolus* group – among the 15 known from the Mediterranean region (Muster & Thaler 2004) – have been recorded from Turkey (Danışman et al. 2019). *Philodromus musteri* **spec. nov.** thus constitutes the 12th species of the *aureolus* group for Turkey and the 16th member of the group in the Mediterranean region.

Material and methods

The male specimen described below was caught alive, immature and then raised in captivity to adulthood (molted on 21. Apr. and 19. May 2019). A second specimen, male, immature was also bred in captivity but without reaching the last moult.

For measurements, an eyepiece micrometer was used; all measurements are in mm. The measurement of the leg articles was done in dorsal view. Geographic coordinates are presented in the WGS 84 system; they were obtained using a smartphone's GPS. Terminology of the genital organs follows Muster & Thaler (2004).

For identification and diagnosis, we refer to Dondale & Redner (1976), Segers (1992), Kubcová (2004), Muster & Thaler (2004), Szita & Logunov (2008), Wunderlich (2012), Lecigne et al. (2019), Nentwig et al. (2020), Oger (2020). Nomenclature follows the World Spider Catalog (2020).

Abbreviations

AME-AME – distance between anterior median eyes; **CH** – clypeus height (below AME); **Co** – conductor; **CyL** – ventral length of cymbium; **CyP** – cymbial process; **CyW** – ventral width of cymbium; **dSDL** – descending part of sperm duct loop; **ITA** – intermediate tibial apophysis; **PL** – prosoma length; **PME** – posterior median eyes; **PLE** – posterior lateral eyes; **PME–PME** – distance between PMEs; **PME–PLE** – distance between PME and PLE; **PW –** prosoma width; **RTA** – retrolateral tibial apophysis; **VTA** – ventral tibial apophysis.

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***Philodromus musteri* spec. nov.** (Figs 1a-f, 2a-h, 3a-d)

Type material. Holotype: 1 ♂, TURKEY: province of Antalya, Kemer ditrict, Tekirova (30.55071°N, 36.52772°E, 3 m a.s.l.) (Fig. 4), undergrowth of a pine forest, on holly (*Ilex aquifolium*), beating, 18. Apr. 2019, leg. S. Lecigne (deposited in Senckenberg Museum Frankfurt). Remark: left palp detached.

Etymology. The species is named respectfully in honour of Christoph Muster, in consideration of all of his work particularly on philodromid spiders.

Diagnosis. With respect to the genital characters, the new species most closely resembles *Philodromus buchari* and *Philodromus lunatus*, but can be distinguished by the combination of the following characters: descending part of sperm duct loop directed towards the retrolateral corner of cymbium (white arrow, Fig. 2a, white arrow, Fig. 3a, dSDL); intertegular retinaculum not visible in ventral view; RTA robust, pointing outwards, distally truncated (Figs 2f, 3d), the borders straight (conspicuously in dorsal and ventral views); cymbial process (CyP) moderately protruding as a transparent, rounded lamella (Figs 2a, 3a).

Description. Measurements: total length 6.00; PL 2.80, PW 2.57, ratio PL/PW 1.09. CyL 1.24, CyW 0.8. CH 0.59. AME–AME = PME–PLE 0.24, PME–PME 0.44. Leg I total length 12.84, femur I 3.33, patella I 1.40, tibia I 3.27, metatarsus I 3.07, tarsus I 1.77. Femur IV 3.33, tibia IV 2.80.

Colour. Prosoma orange-brown, metadiscus lighter (Fig. 1e), border with dense white hairs. Eyes surrounded by a narrow white ring, area between the two ocular lines covered with white hairs and extending rearwards between PME and PLE (Fig. 1a, c). Clypeus, chelicerae and legs uniformly pale yellowish brown, coxa and basal parts of femora of similar colour as prosoma in contrast to remaining part of legs (shades more visible on living specimen, Fig. 1a), legs covered with white hairs. Sternum pale yellow. Labium orange. Opisthosoma densely covered with metallic hairs, greenish in front and on the sides, golden brown on cardiac mark as well as on the rear part, the latter is bordered on both sides by two lines of fine white spots converging towards the spinnerets; at the front, two tufts of long white hairs (Fig. 1a), ventrally paler with a wide whitish band extending from the epigastric furrow and narrowing to spinnerets.

Pedipalp (Figs 2-3)**.** Tibial apophyses: VTA, trapeziform, its distal margin oblique; ITA short but broad-based and clearly rounded distally (Figs 2h, 3a), tapered in retro-ventrolateral

Fig. 1: *Philodromus musteri* **spec. nov.** male holotype. **a-b.** dorsal view; **c.** lateral view; **d.** ventral view; **e.** prosoma, dorsal view; **f.** prosoma, dorso-frontal view (a, c: living specimen; b, d-f: ethanol preserved specimen) (photos a, c-f: S. Lecigne; b: P. Oger)

view (Figs 2c, 3b); RTA robust, pointing outwards, distally truncated (Figs 2, 3d), the ventral (black arrow, Fig. 2a) and dorsal (white arrow, Fig. 2g) borders straight. Cymbium asymmetrical, markedly widened prolaterally; cymbial process moderately protruding as a transparent, rounded lamella. Tegulum, subcircular, prolateral side with projection, visible in ventro-prolateral view (white arrow, Fig. 2e); retrolateral tegular projection barely developed; intertegular retinaculum discreet, visible in ventro-retrolateral view (Fig. 2d). Descending part of sperm duct loop pointing to retrolateral corner of cymbium (white arrow, Fig. 2a). Embolus, sickle-shaped, regularly curved, embolar base weakly thickened on its inner side, originating near mid-half of tegulum.

Female. Unknown.

Distribution and habitat. Only known from the type locality (Tekirova, Phaselis archeological site) (Fig. 4); undergrowth of a pine forest, in the branches of a holly (*Ilex aquifolium*).

Determination key

The determination key for males to species of the *Philodromus aureolus* group in the Mediterranean region, proposed by Muster & Thaler (2004), can be adopted in the number 5 and can be complemented between the numbers 12 and 13 as follows to include the new species and *Philodromus azcursor* from Azerbaijan. Remarks: amended or added text is shown in **bold**; *P. bonneti* was not included (see Muster & Thaler 2004).

5 Embolus long, originating **clearly** at proximal half of tegulum (**Muster & Thaler 2004:** Fig. 6) . . . . . *P. lunatus*
- Embolus shorter, originating at anterior **or mid**-half of tegulum 6

12 Dorsal border of RTA straight to convex **(Fig. 3g) 12a**
- Dorsal border of RTA concave (**Muster & Thaler 2004:** Fig. 5) 13

12a Cymbium asymmetrical, conspicuously widened prolaterally; descending part of sperm duct loop pointing to retrolateral corner of cymbium (Fig. 3a) ***P. musteri***
- **Cymbium narrow, only slightly enlarged prolaterally; descending part of sperm duct loop pointing to prolateral corner of cymbium (Muster & Thaler 2004:** Fig. 13) **12b**

12b Retrolateral tegular projection weakly developed; intertegular retinaculum visible in ventral view; embolar base thickened (Muster & Thaler 2004: Fig. 13) *P. fuscolimbatus*
- **Retrolateral tegular projection markedly developed; intertegular retinaculum not visible in ventral view; embolar base almost not marked (Logunov & Huseynov 2008: Fig. 1)** . . . . . ***P. azcursor***

Discussion

Philodromus musteri **spec. nov.** has the characters distinguishing members of the *Philodromus aureolus* group (Dondale & Redner 1976: 129, Wunderlich 2012: 37, Fig. 22, Lecigne et al. 2019: 39, Tab. I), particularly the genital characters. Distinctive is a stiff membrane (conductor) on which the embolus of the male rests and a stout and curved seta on the tegulum (the intertegular reticulanum according to Braun 1965) (Dondale & Redner 1976). Wunderlich (2012) also mentioned an asymmetrical cymbium widened prolaterally, a palpal tibia with three apophyses and most often the base of the embolus thickened (inconspicuous for the new species).

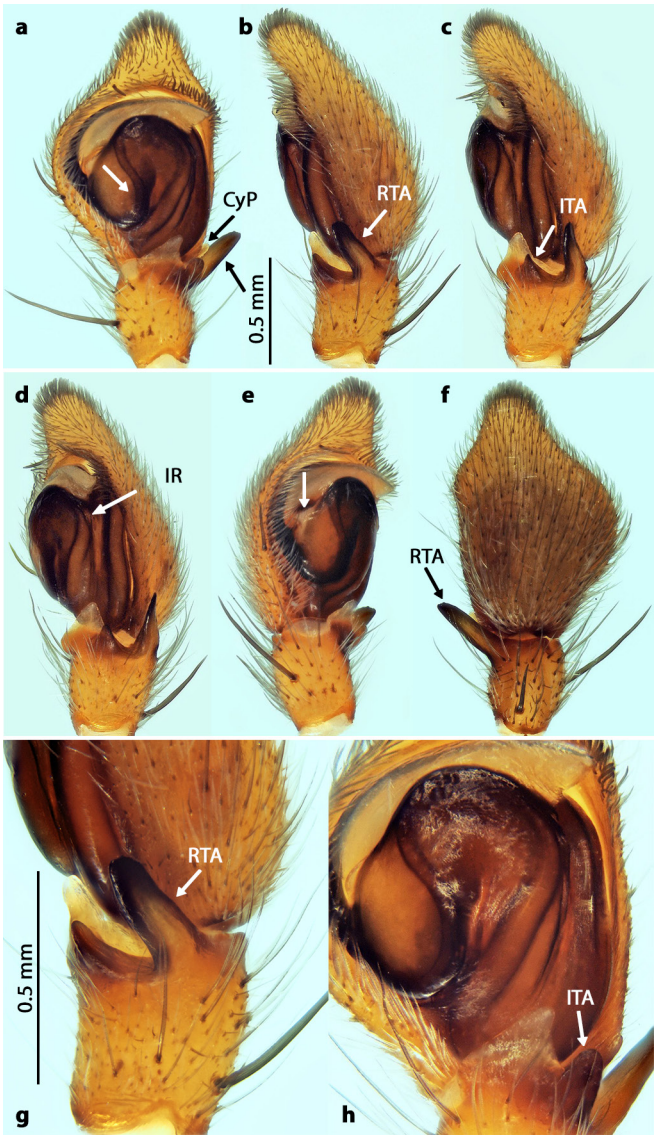

Fig. 2: *Philodromus musteri* **spec. nov.** male holotype: **a.** pedipalp, ventral view (white arrow: orientation of the dSDL; black arrow: ventral border of RTA); **b.** id., retrolateral view; **c-d.** id., retro-ventrolateral view; **e.** id., ventro-prolateral view (white arrow: prolateral projection of the tegulum); **f.** id., dorsal view **g.** tibial apophysis, retrolateral view (white arrow: dorsal border of RTA); **h.** bulbus, ventral view, tegulum (photos: P. Oger). Abbreviations: **CyP**, cymbial process; **IR**, intertegular retinaculum; **ITA**, intermediate tibial apophysis; **RTA**, retrolateral tibial apophysis

The *Philodromus aureolus* group is rich in species. Since its creation by Chyzer & Kulczyński (1891), many species and subspecies related to this group have been described while introducing at the same time some taxonomic confusion. Thereafter, further works, notably Kubcová (2004), have clarified the situation. Furthermore, Muster & Thaler (2004) updated the list of the species of the *P. aureolus* group known from the western Palaearctic region and the Mediterranean, and at the same time specified the nature of genitalia characters as criteria for differentiation. These works enabled the study of the specimen found at Tekirova.

The discovery of this new species can probably be explained by the absence or lack of surveys on the site but also in this area of the province of Antalya. However, it cannot be excluded that the species has already formerly been collected and misidentified. It presents similarities with respect to genital structure with *P. praedatus* O. Pickard-Cambridge, 1871 but is rather closely related to *P. lunatus* and *P. buchari*, even if none of these two species shows the same combination (see Diagnosis).

Distribution. *Philodromus lunatus* appears to be mainly spread out in the eastern Mediterranean (Muster & Thaler 2004) while *P. buchari* and *P. praedatus* show a much wider range; *P. buchari* occurs in Europe as far as Turkey, *P. praedatus* is widespread in the western Palaearctic region and occurs in the Mediterranean area as far as Azerbaijan. However, the latter has not been yet mentioned from Turkey (Danışman et al. 2019). Fig. 4 shows the distribution in Turkey, by provinces, of two of these three closely related species.

Four other immature/subadult specimens of the *P. aureolus* group were collected during the survey, two of which probably represented the new species. No other species of this group has been recorded within the same site or in its vicinity. Nevertheless, it is very likely, in view of its distribution, that *P. lunatus* may also be present there (see Fig. 4).

Other species of the *Philodromus aureolus* group. As evidence that the knowledge of this group is still incomplete, *P. azcursor*, another species close to *P. buchari* and *P. cespitum* (Walckenaer, 1802), has been recently described from Azerbaijan (Logunov & Huseynov 2008). It has been added to the updated determination key (see above).

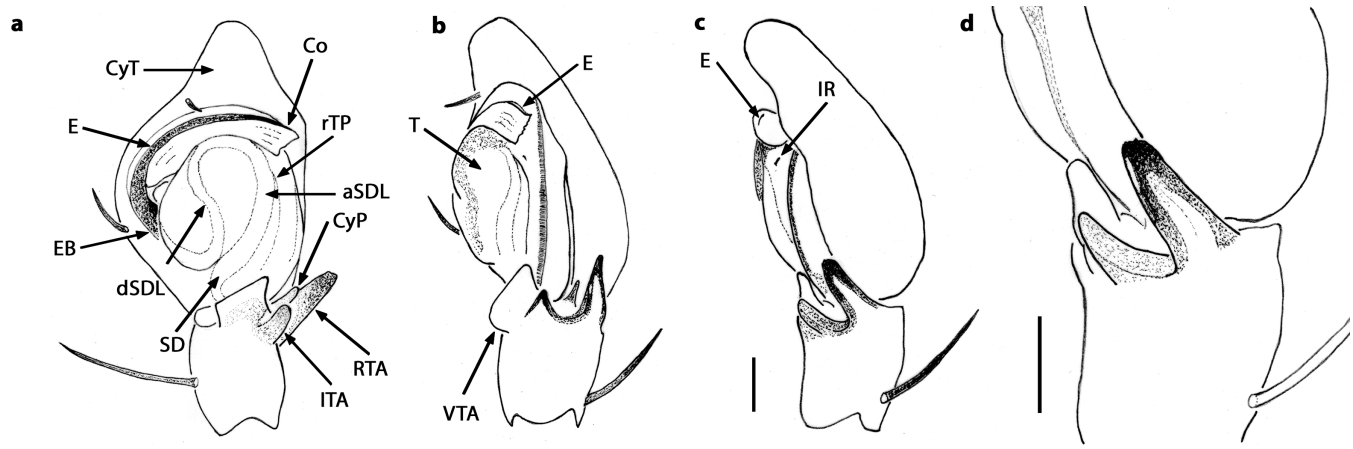

Fig. 3: *Philodromus musteri* **spec. nov.** male holotype: **a.** Palp, ventral view; **b.** Id., ventro-retrolateral view; **c.** Id., retrolateral view; **d.** Tibial apophyses, retrolateral view. Scale lines = 0.2 mm. Abbreviations: **aSDL**, ascending part of sperm duct loop; **Co**, conductor; **CyP**, cymbial process; **CyT**, cymbial tip; **dSDL**, descending part of sperm duct loop; **E**, embolus; **EB**, embolar base; **IR**, intertegular retinaculum; **ITA**, intermediate tibial apophysis; **RTA**, retrolateral tibial apophysis; **rTP**, retrolateral tegular projection; **SD**, sperm duct; **T**, tegulum; **VTA**, ventral tibial apophysis (drawings: S. Lecigne)

Fig. 4: Geographical location of *Philodromus musteri* **spec. nov.**, locus typicus (●) and location by province of three other species of the *Philodromus aureolus* group: *P. bonneti* (○), *P. buchari* (□), *P. lunatus* (✧), based on Demir (2008) and Logunov & Kunt (2010) (source: https://d-maps.com)

Philodromus bonneti Karol, 1968 is a reportedly endemic species known so far only from northwest Turkey (Bursa) and only from the male. It was described by Karol (1968) as belonging to the *Philodromus aureolus* group and recognized as such by Muster & Thaler (2004), but could not be traced at the Paris museum. The authors state that this species resembles *P. lunatus* with respect to characters of the male palpal organ. However, several details actually suggest that some structures have been schematized in the figures, i.e. simple, conical shape of several apophyses (RTA, ITA), unfigured descending part of sperm duct loop, schematic conductor contour and the unfigured intertegular reticulanum, at least in retrolateral view.

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