

A new species of the genus *Camponotus* (Mayr) (Hymenoptera, Formicidae) from Turkey

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Received: 10.04.2017 • Accepted/Published Online: 24.07.2017 • Final Version: 21.11.2017

Abstract: A new species, *Camponotus praegracilis* Karaman et Kiran sp. nov. is described; it is a member of the subgenus *Tanaemyrmex*, from the most species-rich ant genus in Turkey. Some biological notes for the new species are also given. Diagnostic characters of the new species, distinguishing the new species from the most similar species, are also described.

Key words: Formicidae, *Camponotus praegracilis* sp. nov., Turkey, western Anatolia, biology

1. Introduction

Camponotus is the most species-rich genus of Formicidae, with 1017 species and 470 subspecies, and constitutes almost 10% of extant ant taxa (Bolton, 2017). *Camponotus* is also the most species-rich genus of Turkish ant fauna, with 49 taxa. Recent studies reported *Camponotus anatolicus* Karaman & Aktaş, *C. hirtus* Karaman & Aktaş, *C. honaziensis* Karaman & Aktaş, *C. rebecca* Forel, *C. ruseni* Karaman, and *C. universitatis* Forel as new species for science and the Turkish ant fauna, with most species found at high elevations of the western Anatolia mountains (Karaman, 2012; Karaman and Aktaş, 2013; Karaman et al., 2015; Salata and Borowiec, 2015). This region served as a refugia for ants through the long ice ages of the Pliocene and Pleistocene. Among these species, *C. anatolicus*, *C. hirtus*, *C. honaziensis*, and *C. rebecca* belong to the subgenus *Myrmentoma*, while *C. ruseni* and *C. universitatis* are parasitic species of the subgenus *Tanaemyrmex*. The presence of species of the subgenus *Myrmentoma* is not unexpected, because Radchenko (1997) mentioned that Anatolia (as Asia Minor), along with the Balkans and the Middle East, is one of the rather isolated centers for species diversity for the *C. lateralis* group. We think that this region may also be a candidate for a center for species diversity of the subgenus *Tanaemyrmex*.

Here we describe a new species belonging to the subgenus *Tanaemyrmex* of the genus *Camponotus* collected from high elevations of western Anatolia, together with some biological notes.

2. Materials and methods

The specimens of the new described species were collected either by pitfall traps (localities in Sivas) or by aspirator

(in other localities) in the field. The collection details of the new species are given in the Results section. Taxonomic studies were performed using an Olympus SZ51 stereomicroscope. The holotype is deposited in the collection of the Biology Department of the Trakya University, Edirne, Turkey; 111 workers, 2 queens, and 7 males are deposited in the collection of the Biology Department of Trakya University; 2 workers and 1 male are deposited in the Senckenberg Museum of Natural History, Görlitz; and 2 workers and 1 male are deposited in the Museum of Comparative Zoology at Harvard University, Cambridge, MA, USA.

Morphometrics

CL: maximum cephalic length in median line; ClyL: clypeal length, maximum length of clypeus in median line; ClyW: clypeal width, maximum width of clypeus between the tentorial pits; CS: cephalic size, $CS = (CL + CW)/2$; CW: maximum cephalic width including eyes; EL: maximum length of the eye over all structurally visible ommatidia; EW: maximum width of the eye over all structurally visible ommatidia; SL: scape length; maximum scape length excluding the articular condyle; MesH: mesosoma height from the upper level of mesonotum to lower margin of the mesopleuron; MesL: maximum mesosoma length between the anterior-most point of pronotal collar and ventroposterior point of the propodeal lobe; MNL: maximum mesonotal length in median line from above; MNW: maximum mesonotal width before the tegulae from above; PNW: pronotal width; maximum pronotum width in dorsal view; PW: maximum width of petiole from above; HFL: with the large diameter of posterior femur in visual plane, maximum length of posterior femur along

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its central axis; HFW: with the large diameter of posterior femur in visual plane, maximum width of posterior femur; HTL: with the large diameter of posterior tibia in visual plane, maximum length of posterior tibia along its central axis.

Digital images were prepared using a Nikon D70S Digital SLR camera with 3.2× microscope objectives, and Combine-Z (2008) free software. The images were cleaned up using Adobe Photoshop CS2.

3. Results

Camponotus praegracilis Karaman and Kiran sp. nov.

Diagnosis: *Camponotus praegracilis* Karaman et Kiran sp. nov. is a member of the subgenus *Tanaemyrmex* and is similar to *C. aethiops* (Latreille), the most prevalent species of the genus in Turkey, but can be differentiated by the absence of a row of spiny bristles on the inner margin of the hind tibia, bare genae, sides and posterolateral corners of head or genae with 1–3 setae. The new species is also similar to *C. andrius* Dalla Torre, *C. oertzeni* Forel, and *C. sannini* Tohmé & Tohmé, but can be differentiated from these species by the absence of a row of spiny bristles on the inner margin of the hind tibia and absence of erect setae on genae, which are present in the other 3 species. The new species is similar to *C. jaliensis* Dalla Torre and *C. shaqualavensis* Pisarski due to the absence of a row of spiny bristles on the inner margin of the hind tibia, but can be distinguished from these species by having bare genae, lateral sides, and posterolateral corners of the head, or at most with 1–3 setae on genae. Additionally, the new species is similar to *C. ionius* Emery, which is distributed generally in western Anatolia, because of the bare genae, and can be distinguished by its slender mesosoma, dilute imbricate sculpture, and shiny body, as well as by the absence of dense, short, and semierect setae on the hind tibiae, and the appressed, dense, and long pubescence on the gaster.

Etymology: The epithet *praegracilis* of the new species is from the Latin language, and refers to the petite body of workers and queens.

Material examined:

Holotype: Isparta-Yalvaç-Özgüney village (1550 m), 38°15'57"N, 31°18'05"E, 29 Jun. 2011, 11/0841, major ♀, leg. K. KIRAN and V. AKSOY.

Paratypes: Same locality as holotype, 11/0841, 11 ♀♀, 3 ♂♂; **Sivas-Ulaş-Demircilik** village (1620 m), 39°27'57"N, 37°06'42"E, 13 Aug. 2010, 10/1728b, 50 ♀♀; **Ulaş-Gürpınar** village (1539 m), 39°21'36"N, 37°10'07"E, 13 Aug. 2010, 10/1730f, 1 ♀; **Konya-Yunak** (1287 m), 38°40'20"N, 31°42'29"E, 14 Jun. 2011, 11/0586 and 11/0588, 37 ♀♀; **Afyon-Çay-Karamıkkaracaören** village (1254 m), 38°31'51"N, 30°56'19"E, 14 Jun. 2011, 11/0611b and 11/0622, 18 ♀♀; leg. K. KIRAN and V. AKSOY.

Descriptions

Morphometrics of workers: CL: 1.42 (1.22–2.10), ClyL: 0.44 (0.33–0.85), ClyW: 0.62 (0.51–0.90), CS: 1.27 (0.96–2.05), CW: 1.12 (0.82–2.00), EL: 0.40 (0.32–0.49), EW: 0.32 (0.28–0.39), HFL: 1.56 (1.32–2.10), HFW: 0.32 (0.27–0.48), HTL: 1.58 (1.37–2.10), MesL: 2.07 (1.73–2.73), MesH: 1.06 (0.85–1.44), PNW: 0.92 (0.73–1.32), PW: 0.43 (0.32–0.65), SL: 1.41 (1.24–1.73), ClyL/ClyW: 0.70 (0.62–0.97), ClyL/CS: 0.35 (0.31–0.42), ClyW/CS: 0.50 (0.41–0.55), CL/CS: 1.13 (1.02–1.18), CL/CW: 1.30 (1.05–1.44), CW/CS: 0.87 (0.82–0.98), EL/CS: 0.32 (0.23–0.37), EL/EW: 1.24 (1.13–1.38), HFL/CS: 1.30 (0.96–1.47), HFW/CS: 0.26 (0.21–0.29), HFL/HFW: 4.96 (4.10–5.68), HFL/HTL: 0.99 (0.85–1.03), HTL/CS: 1.32 (0.99–1.62), MesH/CS: 0.85 (0.62–0.96), MesL/CS: 1.67 (1.32–1.86), MesL/MesH: 1.95 (1.78–2.15), PNW/CS: 0.74 (0.63–0.87), PW/CS: 0.34 (0.27–0.37), SL/CS: 1.15 (0.81–1.33).

Major worker (Figures 1 and 2):

In full face view, head trapezoidal, sides almost straight and rounding to the straight posterior margin. Eyes moderate in size (EL/CS: 0.237), occupying almost



Figures 1 and 2. *Camponotus praegracilis* Karaman et Kiran sp. nov., major worker: 1 – head in full face view; 2 – body in profile.

one-quarter of the side of the head. Posterior margin of clypeus slightly concave medially. Clypeal carina present. Antennal scape short (SL/CS: 0.821), surpassing rear border of head. Mandible subtriangular, masticatory margin with 6–7 teeth. Pronotum wide, almost two-thirds of head width; mesonotum narrowing posteriorly; metanotal groove slightly impressed or vestigial; dorsal surface of propodeum longer than declivitous surface and joining by rounded angle. Hind tibia same length or slightly longer than hind femur (HFL/HTL: 0.99). In profile, petiolar node compressed and tapered anteroposteriorly; anterior margin convex, posterior margin almost straight, dorsal margin broadly convex.

Head, mesosoma, and petiolar node with shiny imbricate sculpture; gastral tergite finely imbricate. Mandible smooth and shiny with sparse punctures. Genae, sides, and posterolateral corners of head bare, or genae with only 1–3 short, erect setae restricted to near border of clypeus. Mandibles with dense short erect setae. Scape with sparse and depressed pubescence. Long, erect setae present as follows: 1 pair on mesonotum and ventral surface of head (sometimes ventral surface of head bare); 3 pairs on vertex of head; 3–4 pairs on clypeus; 2 pairs on pronotum and propodeum; 2 rows on middle and end of all gastral tergites. Hind femur and tibia bare, inner surface without row of bristles; if present, only distal portion with 2–3 bristles, hind tibia slightly depressed laterally.

Head brownish red, posterior half darker, pronotum reddish brown, rest of mesosoma brown, petiole and gaster dark brown, mandibles and scape red, funicular segments yellowish red, legs yellow.

Minor worker (Figures 3 and 4):

In full face view, head elongate and distinctly longer than wide, posterior margin slightly convex, sides slightly convex and subparallel but slightly diverging posteriorly. Eyes located at posterior half of head. Posterior margin of clypeus medially concave. Mandible triangular, masticatory

margin with 6 teeth. Antennal scape longer than head length, and extends on posterior border of head almost half of its length in full face view. Scape with sparse and depressed pubescence.

Dorsum of mesosoma forms an arch. Pronotum narrower than head width. Dorsal surface of propodeum longer than declivitous surface and joining by an obtuse angle. In profile, anterior and dorsal margin of petiolar node convex posterior margin straight.

Head, mesosoma, petiolar node, and gaster shiny and finely imbricate. Genae, sides, and posterolateral corners of head bare, occasionally genae with 1 short, erect seta. Ventral surface of head with 2 erect setae. Dorsum of pronotum, mesonotum, propodeum, and petiole with 2 pairs of long and erect setae. Gaster with sparse erect setae. Anterior half of head yellowish, posterior half reddish brown, mandibles red, antennae yellowish red, pronotum reddish brown, legs yellow, rest of head, mesosoma except pronotum, petiole brown, gaster black.

Male (Figures 5 and 6):

CL: 0.95 (0.92–1.00), ClyL: 0.28 (0.28–0.29), ClyW: 0.38 (0.35–0.40), CS: 0.91 (0.88–0.93), CW: 0.86 (0.83–0.88), EL: 0.38 (0.38–0.39), EW: 0.31 (0.29–0.32), HFL: 1.54 (1.46–1.61), HFW: 0.20 (0.18–0.22), HTL: 1.45 (1.34–1.42), MesL: 2.07 (1.98–2.15), MesH: 1.30 (1.22–1.41), MNL: 1.63 (1.51–1.70), MNW: 1.03 (0.98–1.07), PW: 0.42 (0.37–0.50), SL: 1.07 (1.02–1.15), ClyL/ClyW: 0.75 (0.70–0.79), ClyL/CS: 0.31 (0.30–0.32), ClyW/CS: 0.41 (0.39–0.43), CL/CS: 1.06 (1.03–1.08), CL/CW: 1.13 (1.07–1.18), CW/CS: 0.94 (0.92–0.97), EL/CS: 0.42 (0.41–0.44), EL/EW: 1.26 (1.19–1.33), HFL/CS: 1.69 (1.65–1.74), HFW/CS: 0.22 (0.21–0.24), HFL/HFW: 7.77 (7.11–8.25), HFL/HTL: 1.06 (1.04–1.09), HTL/CS: 1.59 (1.52–1.66), MesH/CS: 1.42 (1.31–1.51), MesL/CS: 2.27 (2.21–2.36), MesL/MesH: 1.60 (1.53–1.71), MNL/CS: 1.79 (1.71–1.86), MNW/CS: 1.13 (1.10–1.15), MNW/MNL: 0.63 (0.61–0.65), PW/CS: 0.46 (0.41–0.54), SL/CS: 1.18 (1.13–1.23).



Figures 3 and 4. *Camponotus praegracilis* Karaman et Kiran sp. nov., minor worker: 3 – head in full face view; 4 – body in profile.



Figures 5 and 6. *Camponotus praegracilis* Karaman et Kiran sp. nov., male: 5 – head in full face view; 6 – body in profile.

In full face view, head elongate and longer than wide, posterior margin convex, sides diverging posteriorly. Eyes large (EL/CS: 0.44) and strongly protruding, situated in the middle of sides of head. Ocelli well developed. Clypeal carina well developed. Posterior margin of clypeus concave medially. Mandibles vestigial, masticatory margin without teeth. Pronotum narrow, scutum raised over pronotum, prescutum depressed, scutellum higher than scutum, scutum almost 1.2 times wider than head width. Dorsal surface of propodeum longer than declivitous surface and joining by rounded angle. Hind femur longer than hind tibia. Anterior surface of petiole slightly convex, posterior surface straight, dorsal surface slightly concave medially seen from behind. Subgenital plate margin straight.

All body with finely and shiny imbricate sculture. Genae, sides, and posterolateral corners of head, and dorsal surface of propodeum bare, 3–4 pairs of long, erect setae present between ocelli and on clypeus. Dorsal surface of petiole and gaster with long, fine, erect setae. Inner surface of tibia without row of bristles; occasionally 1 or 2 bristles present, but never form a row. Gaster with sparse and short pubescence.

Whole body brown, legs and scape dark brown. Body soft, surface not sclerotized.

Queen (Figures 7 and 8):

CL: 1.88 (1.88–1.89), ClyL: 0.56 (0.54–0.59), ClyW: 0.77 (0.76–0.78), CS: 1.77 (1.76–1.77), CW: 1.66 (1.63–1.67), EL: 0.58 (0.57–0.59), EW: 0.47 (0.46–0.48), HFL: 2.06 (2.04–2.10), HFW: 0.48 (0.48–0.49), HTL: 2.11 (2.10–2.12), MesL: 3.23 (3.15–3.31), MesH: 1.91 (1.81–2.04), MNW: 1.64 (1.63–1.65), MNL: 2.51 (2.49–2.54), PW: 0.88 (0.88), SL: 1.62 (1.59–1.65), ClyL/ClyW: 0.72 (0.69–0.75), ClyL/CS: 0.32 (0.31–0.33), ClyW/CS: 0.44 (0.43–0.44), CL/CS: 1.06 (1.06–1.07), CL/CW: 1.14 (1.12–1.16), CW/CS: 0.94 (0.93–0.94), EL/CS: 0.33 (0.32–0.33), EL/EW: 1.22 (1.21–1.24), HFL/CS: 1.17 (1.15–1.19), HFW/CS:

0.27 (0.27–0.28), HFL/HFW: 4.30 (4.20–4.41), HFL/HTL: 0.98 (0.97–0.99), HTL/CS: 1.19 (1.18–1.20), MesH/CS: 1.08 (1.03–1.15), MesL/CS: 1.83 (1.78–1.86), MesL/MesH: 1.69 (1.62–1.73), MNL/CS: 1.42 (1.41–1.44), MNW/CS: 0.93 (0.92–0.93), MNW/MNL: 0.65 (0.64–0.66), PW/CS: 0.50 (0.50), SL/CS: 0.92 (0.89–0.93).

In full face view, head elongate and longer than wide, slightly diverging posteriorly, posterior margin convex, sides straight and subparallel. Eyes large and protruding, occupying one-third of head. Posterior margin of clypeus concave medially. Mandibles triangular, masticatory margin armed with 6–7 teeth. Antennal scape almost as long as head width, surpasses posterior cephalic border by almost half of scape length. Mesosoma wider than head width. Pronotum narrow, dorsal surface of scutum straight and raised over pronotum, prescutum shallow between scutum and scutellum, scutellum slightly higher than scutum. Dorsal surface of propodeum shorter than declivitous surface and its joining broadly convex. Hind femur and tibia almost same length. In lateral view, petiolar node scalelike; anterior margin slightly convex and posterior margin almost straight; dorsal margin straight.

Head and mesosoma with shiny imbricate sculture; gaster finely imbricate. Genae, sides, and posterolateral corners of head and propodeum bare. Long, erect setae: 1 pair on scutum and dorsal margin of petiole, 2 pairs above the lateral ocelli and on scutellum, and few on gaster.

Head dark brown, anterior half of head and mandibles yellow, antennae reddish yellow, pronotum reddish brown, rest of mesosoma and petiole dark brown, first gastral segment reddish brown, and rest of gaster brown.

Biology:

The new species was collected from steppe environments or cultivated *Pinus nigra* Arnold and *Cedrus libani* Rich. forests surrounded by steppe habitats, showing that the new species generally prefers arid or semiarid



Figures 7 and 8. *Camponotus praegracilis* Karaman et Kiran sp. nov., queen: 7 – head in full face view; 8 – body in profile.

habitats. All nests were under stones. We recorded queens and males on 29 June; thus, we assume that the mating season would have started soon and cover the first half of July. The Isparta-Yalvaç-Özgüney locality has steppe-type characteristics, and few stones were determined as possible nest sites for ants. Ants in this locality were sampled by pitfall traps; *Camponotus piceus* (Leach), *Cataglyphis aenescens* (Nylander), *Formica cunicularia* Latreille, *Lasius bombycina* Seifert & Galkowski, and *Proformica striaticeps* (Forel) were recorded in the traps. The Sivas-Ulaş-Demircilik locality also has a steppe-type habitat surrounded by wheat fields. This locality was also sampled by means of pitfall traps; *C. piceus*, *Cataglyphis aenescens*, *Messor structor* (Latreille), *Plagiolepis taurica* Santschi, *P. striaticeps*, and *Tetramorium cheketti* Forel were collected in the traps. The Konya-Yunak site is characterized by a *Pinus nigra* forest patch surrounded by steppe habitats; *Camponotus aethiops* (Latreille), *C. piceus*, *Cataglyphis aenescens*, *C. nodus* (Brullé), *M. structor*, *Plagiolepis taurica*, *Tapinoma simrothi* Krausse, *Tapinoma* sp., *Temnothorax semiruber* (André), *Tetramorium cheketti*, and *Tetramorium* sp. were recorded. The Afyon-Çay-Karamıkkaracaören locality is characterized by a *Cedrus libani* forest patch surrounded by wheat fields; *Aphaenogaster balcanica* (Emery), *Bothriomyrmex communistus* Santschi, *Camponotus aethiops*, *C. oertzeni* Forel, *C. piceus*, *Cataglyphis nodus*, *C. viaticoides* (André), *Crematogaster sordidula* (Nylander), *Messor* sp., *M. structor*, *M. wasmanni* Krausse, *Pheidole* cf. *pallidula*, *Plagiolepis pallescens* Forel, *P. pygmaea* (Latreille), *Strongylognathus kervillei* Santschi, *Tapinoma erraticum* (Latreille), *Tetramorium flavidulum* Emery, and *T. galatica* Menozzi (according to Borowiec et al., 2015) were collected.

4. Discussion

The geographical position of Anatolia, which acts as a junction point for 3 biodiversity hotspots—the Caucasus,

Irano-Anatolian, and Mediterranean—has led to the formation of very high animal diversity with its complex palaeogeographical past, heterogeneous topography, and climate (Şekercioğlu et al., 2011; Kaya et al., 2014).

During the Pleistocene glacial cycles, the regions of Iberia, Italy, and the Balkans, as well as North Africa, served as refugia for species moving from northern areas. The founder populations moved from these southern refugial areas during the hot interglacial periods to reestablish the biodiversity of northern areas. Many scientists think that Anatolia was an important Pleistocene glacial refugium (Çıplak, 2004; Kaya et al., 2012).

The heterogeneous topography of Anatolia may have caused vertical range changes of species through the effects of the Pliocene and Pleistocene climatic fluctuations. During the hot interglacial periods, populations that adapted to cold conditions would have been isolated and may have withdrawn to the peaks of high mountains or 'sky islands'; this characteristic of Anatolia may perhaps have caused the formation of the shelter system itself (Çıplak, 2004; Şekercioğlu et al., 2011; Çıplak et al., 2015).

As mentioned above, many new *Camponotus* species of the Turkish ant fauna have recently been recorded from the high mountainous region of western Anatolia. The recorded species and their localities are shown in Figure 9. This figure provides strong evidence for the Pliocene and Pleistocene refuge role of western Anatolia, especially for *Camponotus*. This region also served as a refugia for the genus *Anterastes* (Orthoptera, Tettigoniinae) and *Troglophilus* (Orthoptera, Troglophilinae) which are distributed in areas of western Anatolia over 1500 m a.s.l. (Çıplak, 2004; Kaya et al., 2013). Furthermore, we are sure that a large number of new free-living and especially parasitic ant species are waiting to be discovered from high elevations of this region of Anatolia.

Kiran and Karaman (2012) published the first checklist of Turkish ants, and reported a total of 306 taxa (286

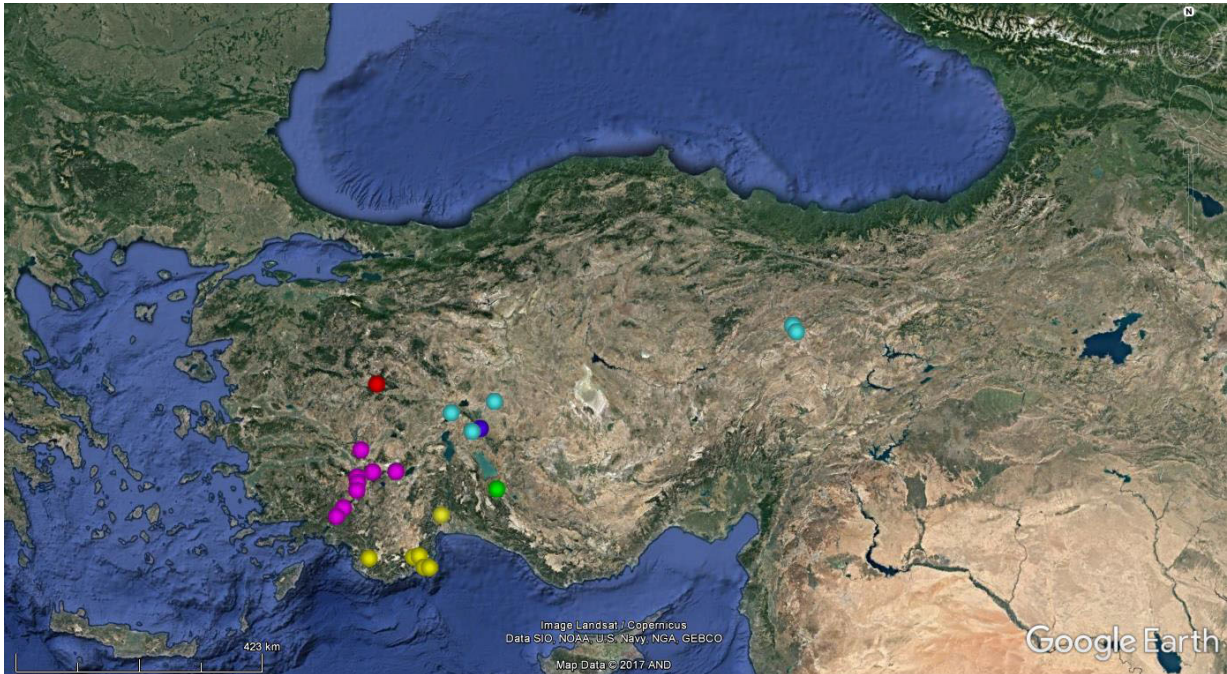


Figure 9. Distribution of the species recorded from western Anatolia: ●: *Camponotus praegracilis* Karaman et Kiran sp. nov., ●: *Camponotus hirtus*, ●: *Camponotus universitatis*, ●: *Camponotus honaziensis*, ●: *Camponotus anatolicus*, ●: *Camponotus ruseni*.

species and 20 subspecies). Additional records have increased this number to 363 taxa (Kiran and Karaman, in press), indicating that the Turkish ant fauna is much richer than expected. The ant genus *Camponotus*, with its 49 taxa, constitutes more than 13% of the ant fauna of Turkey. With the record of the new species, *C. praegracilis* Karaman et Kiran sp. nov., presented in this study, the number of species belonging to the genus *Camponotus* has increased to 50.

Nomenclatural acts: This work and the nomenclatural acts it contains have been registered in ZooBank. The

ZooBank Life Science Identifier (LSID) for this publication is: <http://zoobank.org/urn:lsid:zoobank.org:pub:6B496DD9-53EF-453E-A270-188C5FA0D791>.

Acknowledgments

This study was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK, Project No. 109T088). This study was previously presented as a poster presentation at the 23rd National Biology Congress, 2016, Gaziantep, Turkey.

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