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***Camponotus ruseni* n. sp. (Hymenoptera: Formicidae) – A Putative Second Parasitic Species of the Genus *Camponotus* Mayr**

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ABSTRACT: A putative parasitic species: *Camponotus (Tanaemyrmex) ruseni* n. sp., of the genus *Camponotus* is described from Turkey. The new species differs from all other *Tanaemyrmex* species by 5 toothed mandibles, presence of short hairs on the eyes, transversally concave propodeal dorsum that disrupts the convex appearance of the alitrunk and presence of the metanotal groove.

KEY WORDS: Ant fauna, taxonomy, *Camponotus*, new species, Turkey

The world ant fauna is represented by about 12,500 described species but only about 230 of them are parasites that depend on worker castes of other ant species during at least part of their life (Heinze and Kauffmann, 1993; Schulz and Sanetra, 2002; Buschinger, 2009). Among these, only one parasitic species, *Camponotus universitatis* Forel, 1890, is known to belong to the most prevalent and speciose genus (1580 species and subspecies) *Camponotus* Mayr, 1861. Forel (1890) described *C. universitatis* worker from France, but its queen and male were first described from the Iberian Peninsula by Tinaut *et al.* (1992). It is a threatened ant species (IUCN Red List status: Vulnerable D2). Host species for *C. universitatis* are *C. aethiops* Latreille, 1798 and *C. pilicornis* Roger, 1859 (Espadaler, 1981; Tinaut *et al.*, 1992). *C. universitatis* is a rare ant species and has only been recorded in a few studies from Southern Europe: France (Forel, 1890; Espadaler, 1981); Switzerland (Forel, 1904; Kutter, 1936); Italy (Würmli, 1969); Albania (Andoni, 1977) and Spain (Tinaut *et al.*, 1992). According to Radchenko (2007), *C. universitatis* is distributed only in Spain, France, Italy and Switzerland but he ignored a record from Albania of Andoni (1977). More recently, Lapeva-Gjonova and Kiran (2012) recorded this species from Southeast Bulgaria in the Strandzha (Istranca) Mountain region. Despite this recent record from Bulgaria and the fact that 35 other parasitic ant species (17 temporary and 18 permanent social parasitic ants) are known from Turkey (Kiran and Aktaç, 2007), *C. universitatis* has not yet been recorded from Turkey.

Here I describe a new, putatively parasitic *Camponotus* species collected in a *C. aethiops* nest in Turkey.

Materials and Methods

MATERIAL: Turkey, Kütahya-Gediz-Murat Dağı Hamamı-4 km S., 1462 m asl, 38°56'N 29°36'E, 14.07.2008 leg. C. KARAMAN.

The holotype and paratypes of the new species are deposited in Museum of Biology Department of the Trakya University, Edirne, Turkey (TU).

METHODS: Line drawings were prepared using Wacom Intous3 pen tablet and illustrations were prepared using Nikon D70s digital SLR camera with 105 mm macro lens and 2× teleconverter, and Combine-Z (2008) free software.

Measurements were made using an Olympus SZ51 stereomicroscope and Olympus dual-axis 24 mm U-OCMC stage micrometer and the various indices were calculated from these measurements.

MEASUREMENTS: HL—Head length, from anterior point of median lobe of clypeus to midpoint of occipital margin; HW—Head width, maximum width behind posterior margin of eyes; ED—Maximum diameter of eye; SL—Scape length, excluding basal condyle; CL—Maximum length of clypeus, including posterior lobes (if present); CW—Maximum width of clypeus between tentorial pits; AL—Alitrunk length, diagonal length of alitrunk laterally from antero-dorsal margin of alitrunk to posterior margin of lobe of metapleura; AH—Alitrunk height, from upper level of mesonotum to lower margin of mesopleura; HFL—Maximum length of hind femorae; HFW—Maximum width of hind femorae; HTL—Maximum length of hind tibiae; ScW—Maximum width of scutum; ScL—Maximum length of scutum.

Indices: CI (cephalic): $HL/HW \times 100$; SI1 (scape 1): $SL/HL \times 100$; SI2 (scape 2): $SL/HW \times 100$; CLI (clypeal): $CW/CL \times 100$; AI (alitrunk): $AL/AH \times 100$; HFI (hind femorae): $HFW/HFL \times 100$; HTI (hind tibiae): $HTL/HW \times 100$; ScI (scutum): $ScW/ScL \times 100$.

Systematics

Camponotus (Tanaemyrmex) rusei C. Karaman n. sp.

DIAGNOSIS: In general aspect of body shape, *C. rusei* is similar to *C. truncatus* (Spinola, 1808) in the following ways: propodeal dorsum meets its declivity with a rounded angle as in *C. truncatus*, also the metanotal groove is always present, and propodeal dorsum is transversally concave as in minor workers of *C. truncatus* (Fig. 3A, B, C). In the new species the anterior margin of the clypeus forms a small subrectangular lobe beyond the genal margins, a character shared with subgenus *Tanaemyrmex*.

The new species is differentiated from its host species, *C. aethiops*, and from all other *Tanaemyrmex* species by 5 toothed mandibles; presence of short hairs on the eyes; the transversal concavity of the propodeal dorsum which disrupts the convex appearance of the alitrunk and presence of the metanotal groove. The transversal concavity of propodeal dorsum occurs in some *C. aethiops* samples deposited in TU and also in *C. oertzeni* as its characteristic. But the transversal concavity of the propodeal dorsum is variable in *C. aethiops* species.

C. rusei workers are differentiated from *C. universitatis* workers by 5 toothed mandibles; presence of metanotal groove; transversally concave propodeal dorsum; presence of short hairs on the eyes; absence of erect hairs on antennae, extensor surfaces of femorae and tibiae; males differ from *C. universitatis* males by wider head and 13-segmented antennae.

DESCRIPTION: ♀ major – (Measurements and indices in Tables 1 and 2) (Figs. 1a, 2A, 3A) Head longer than broad, lateral sides of head narrowed anterior to eyes, dorsal margin of the head slightly convex, anterior margin of clypeus straight forming subrectangular lobe beyond genal margins, posterior margin straight or slightly concave medially, clypeal carina well developed and prominent; mandibles

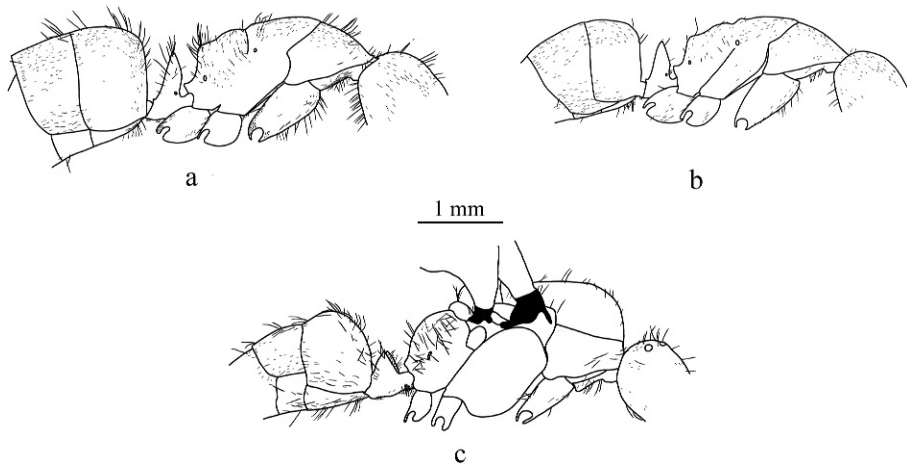


Fig. 1. *Camponotus ruseni* n. sp. alitrunk, petiole and gaster (in profile); a- worker major (holotype); b- worker minor; c- male.

with 5 teeth, eyes situated on posterior half of the head, and covered by short hairs; antennae 12-segmented; scape almost as long as head length, surpassing posterior margin of the head by 1/3 of its length, funiculus longer than scape. Alitrunk with slight metanotal groove; dorsum of propodeum transversally concave as in minor workers of *C. truncatus*; propodeal declivity almost straight; petiole thin, tapering to the apex seen in profile, basal part of its anterior face straight and upper part slightly convex; dorsal margin of petiole almost “Λ” shaped seen in front.



Fig. 2. *Camponotus ruseni* n. sp. head (in frontal); A- worker major (holotype); B- worker minor; C- worker major (scarce hair); D- male.

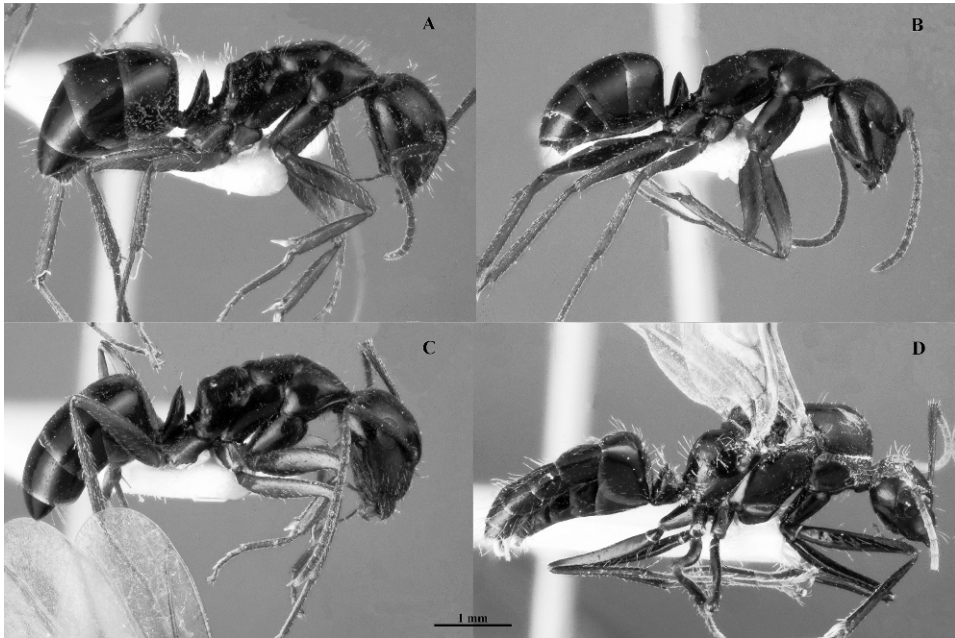


Fig. 3. *Camponotus ruseni* n. sp. alitrunk, petiole and gaster (in profile); A- worker major (holotype); B- worker minor; C- worker major (scarce hair); D- male.

Table 1. Measurements for holotype and the range of measurements (mm) for paratype workers and males (n: number of paratypes).

	<i>C. ruseni</i> n. sp. ♀ major (n = 7)			<i>C. ruseni</i> n. sp. ♀ minor (n = 7)		<i>C. ruseni</i> n. sp. male (n = 7)	
	Holotype	Mean	Range	Mean	Range	Mean	Range
HL	1.48	1.47	1.40–1.53	1.27	1.23–1.33	1.21	1.18–1.25
HW	1.25	1.21	1.10–1.28	1.00	0.93–1.08	1.08	1.05–1.11
ED	0.43	0.43	0.43–0.45	0.39	0.38–0.40	0.46	0.45–0.49
SL	1.48	1.45	1.43–1.50	1.33	1.30–1.38	1.32	1.28–1.35
CL	0.48	0.44	0.38–0.50	0.37	0.35–0.40	0.33	0.31–0.35
CW	0.68	0.65	0.58–0.70	0.59	0.55–0.63	0.50	0.48–0.53
AL	2.25	2.16	2.02–2.28	1.94	1.85–2.04	2.49	2.39–2.68
AH	1.21	1.25	1.18–1.34	1.09	1.05–1.13	1.75	0.55–0.83
HFW	0.33	0.34	0.33–0.36	0.31	0.30–0.33	0.25	0.24–0.25
HFL	1.70	1.69	1.63–1.75	1.53	1.48–1.58	1.82	1.78–1.88
HTL	1.85	1.83	1.70–1.88	1.63	1.58–1.70	1.84	1.80–1.88
ScW	-	-	-	-	-	1.33	1.30–1.38
ScL	-	-	-	-	-	1.42	1.38–1.48

HL—Head length; HW—Head width; ED—Maximum diameter of eye; SL—Scape length; CL—Maximum length of clypeus; CW—Maximum width of clypeus between tentorial pits; AL—Alitrunk length; AH—Alitrunk height; HFL—Maximum length of hind femorae; HFW—Maximum width of hind femorae; HTL—Maximum length of hind tibiae; ScW—Maximum width of scutum; ScL—Maximum length of scutum. See Materials and Methods for details of how measurements were made.

Table 2. Indices for holotype and the range of indices for paratype workers and males (n: number of paratypes).

	<i>C. ruseni</i> n. sp. ♀ major (n = 7)			<i>C. ruseni</i> n. sp. ♀ minor (n = 7)		<i>C. ruseni</i> n. sp. male (n = 7)	
	Holotype	Mean	Range	Mean	Range	Mean	Range
CI	118	122	118–127	128	123–132	112	110–114
SI1	100	99	97–102	105	104–108	108	107–113
SI2	118	121	116–130	134	128–141	122	119–126
CLI	142	148	140–153	159	150–167	152	136–164
AI	186	174	153–188	178	168–193	141	133–144
HFI	19	20	19–21	20	19–21	13	13–14
HTI	148	152	147–161	164	158–176	170	168–174
ScI	-	-	-	-	-	106	104–112

CI (cephalic); SI1 (scape 1); SI2 (scape 2); CLI (clypeal); AI (alitrunk); HFI (hind femorae); HTI (hind tibiae); ScI (scutum). See Materials and Methods for details of how indices were calculated.

Head densely reticulate, almost semi dull; alitrunk and gaster finely reticulate, shiny. Genae with 3–5 erect hairs; occipital corners at least with a few short erect hairs, dorsal margin of the head, clypeus and mandibles with abundant erect hairs; ventral surface of head with erect hairs; scape with abundant, thick appressed pubescence only, without erect hairs; mesonotum with at least 6 erect hairs, pronotum, postero-lateral sides of propodeum and first gastral tergite with abundant erect hairs, other tergites with a few erect hairs; femorae and tibiae with abundant, thick decumbent pubescence, in some specimens femorae with a few erect hairs, tibiae with only thick decumbent pubescence.

Whole body black, in some specimens pronotum reddish brown, mandibles ferruginous, scape dark reddish brown, legs light reddish brown.

♀ minor – (Measurements and indices in Tables 1 and 2) (Figs. 1b, 2B, 3B) Worker minor similar to that worker major with some little differences: scape surpassing posterior margin of the head by 1/2 of its length; head finely reticulate and semi dull; occipital corners with 1–2 short erect hairs or at least with subdecumbent hairs; dorsum of alitrunk with 3 erect hairs; dorsum of petiole with 1–2 erect hairs; the basal portion of first gastral tergite near petiole with 3 erect hairs, other gastral tergites bare.

♂ – (Measurements and indices in Tables 1 and 2) (Figs. 1c, 2D, 3D) Head slightly longer than wide, lateral sides of the head almost parallel anterior to eyes, dorsal margin of the head semicircular; anterior margin of clypeus forms subrectangular lobe beyond genal margins, straight, its posterior margin concave, clypeal carina prominent; eyes situated slightly to posterior half of the head and covered by short hairs; antennae 13-segmented, scape longer than head length and surpassing posterior margin of the head by 2/5 of its length; scutellum higher than scutum, prescutum low; propodeum rather convex, propodeal declivity longer than its dorsal surface; anterior face of petiole slightly convex, posterior face almost straight, dorsal margin broadly concave seen in front. Gena bare or at most with one short erect hair; occipital corners bare; medial part of dorsal margin of the head with 8–10 erect hairs; anterior margin of clypeus with 3–4 long setae and 2–3 short erect hairs; ventral surface of head with 2–4 long decumbent hairs; scape bare; scutum with a few pairs of erect hairs; lateral sides of scutellum with long hairs; dorsal surface of propodeum and propodeal declivity bare, lateral sides of propodeum with abundant,

long erect hairs; anterior face, lateral sides, and dorso-lateral margin of petiole with abundant, long erect hairs; gaster with sparse erect hairs; tibiae with thin, long erect hairs and abundant short decumbent pubescence. Whole body slightly reticulates, but shiny.

Whole body black; funicular segments yellow, except for brownish black first segment; wings yellowish, veins and pterostigma brown.

♀ – Unknown.

TYPE MATERIAL: Holotype ♀ (TU): Turkey, Kütahya-Gediz-Murat Dağı Hamamı-4 km S., 1462 m asl, 38°56'N 29°36'E, 14.07.2008 leg. C. KARAMAN.

PARATYPES: 13 ♀♀, 7 ♂♂, from same nest as holotype.

ETYMOLOGY: The name is derived from the author's father's name, Ruşen.

REMARKS: The new, putative parasitic species was collected under a small stone from the same nest with *C. aethiops* in a very old *Pinus nigra* Arnold forest. While collecting individuals from nest, I saw the queen but was not able to catch it. At first glance, workers of *C. rusei* were similar to minor workers of *C. aethiops* but could be distinguished by presence of the metanotal groove. Also *C. rusei* is smaller and more slender than its host species. Alitrunk, petiole and gastral hairs of *C. rusei* are quite variable: seven workers were covered by a few erect hairs on alitrunk, petiole and gaster (Figs. 1b, 3B, C) while another seven specimens were covered by more abundant hairs, as in the holotype worker (Figs. 1a, 3A). Therefore, the state of body hair is not a dependable character for describing and differentiating the new species.

Nine workers of the host species, *C. aethiops* were collected with *C. rusei* from the same nest. These workers were identified using the keys of Agosti and Collingwood (1987) and Radchenko (1996). The individuals of these two species tried to enter the same nest entrance under the stone while collecting. The transversal concavity of propodeum, which disrupts the convex appearance of the alitrunk of *C. rusei*, is also seen in its host species. This character was also seen in some specimens of *C. aethiops* that collected from different localities of Turkey and deposited in TU. This character is admitted as a variation of the host species and also the old specimens were identified as *C. aethiops*. Moreover, the legs and antennae of workers of the host species are light red to dark reddish in color.

Discussion

Social parasitism can be divided into two categories: temporary social parasitism and permanent social parasitism (dulosis and inquilinism) (Hölldobler and Wilson, 1990; Schulz and Sanetra, 2002). After mating, temporary social parasite queens invade host species nests and kill host queens where the host workers rear the parasite's brood. Host workers are then replaced by the parasites which are able to live independently. On the other hand, permanent parasite ant species live in their host nests for all of their life stages. Dulotic ant species are slave-makers and their workers specialize in raiding host nests to capture larvae and pupae to provide new slaves. Inquilines are generally workerless species which either kill or tolerate the queen of host species (Hölldobler and Wilson, 1990; Schulz and Sanetra, 2002).

Although *C. universitatis* do not possess all the features of inquilinistic species, they show several parallelisms with inquilinism: small body sizes of males and females; presence of intercastes or ergatogynes; reduced funicular segments numbers (in males). On the other hand, other characters of inquilines, like reduced wing



Fig. 4. South European Mountain Belt. ◆: Type locality of *C. rusei*; ★: Distribution of *C. universitatis*. Dotted line = over 1000 m, black regions = over 2000 m altitude. WAM: Western Anatolian Mountains. Based on Hewitt, 1999.

venation, absence of worker caste and pupoid males are missing in *C. universitatis* (Tinaut *et al.*, 1992). Despite the absence of some inquiline-like characters, *C. universitatis* is considered as an inquiline species by Hölldobler and Wilson (1990) and Buschinger (2009).

From the characters mentioned above, *C. rusei* shares only small body sizes. *C. rusei* also does not share presence of intercastes or ergatogynes, reduced funicular segment numbers (in males), and reduced wing venation, pupoid males, or absence of worker caste. Therefore, to make a definitive conclusion about the parasitic status of *C. rusei*, more studies are needed, especially dealing with the biology of the species. We thus classify *C. rusei* as a putative parasitic species pending further investigation.

The mountainous peninsulas of Southern Europe (Iberian, Apennine and Balkan) and Turkey constitute the southern portion of the great South European Mountain belt (Pyrenees, Alps, Transylvanians, Carpathians, and Caucasus). These mountains are oriented from west to east (Fig. 4). These peninsulas and mountain belts served as refuges for flora and fauna during the Pliocene and Pleistocene glacial and interglacial periods (Hewitt, 1999). Consequently, this geographic location is accepted as a speciation center for most of the plant and animal species (Çıplak, 2003).

Hölldobler and Wilson (1990) mentioned that in Europe the permanent parasitic species (especially the inquilines) occur mostly in mountainous and arid regions. Southern Europe has uniquely appropriate geography for this kind of habitat. The distributional range of *C. universitatis*, which ranges along the mountain belt mentioned above, further substantiates the hypothesis of Hölldobler and Wilson.

Turkey, besides serving as a species refugium, serves as a junction for three biodiversity hotspots - the Caucasus, Irano-Anatolian, and Mediterranean. Turkey's highly variable topography, habitat types, and climate (Şekercioğlu *et al.*, 2011) support a high degree of ant diversity. Three hundred and six ant taxa have been recorded from Turkey so far (Kıran and Karaman, 2012). Among these, 38 taxa (34 species and 4 subspecies) are members of the genus *Camponotus*, which is the most speciose genus in Turkey (Karaman, in prep.) and of which *C. aethiops* is the most

prevalent species of the genus. In spite of the prevalence of *C. aethiops*, *C. universitatis*, a parasitic species of the genus has not been recorded from Turkey, although it is found in neighboring Bulgaria (Lapeva-Gjonova and Kiran, 2012).

The new, putatively parasitic species *C. rusei*, that is herein described from a *C. aethiops* nest from Murat Mountain range in the Western Anatolian Mountain chain connecting the Southern Europe Mountain belt with the Taurus Mountains of southern Turkey (Fig. 4) may prove to be the second parasitic species of *Camponotus* and the first known from Turkey.

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