

Orijinal araştırma (Original article)

**New data of the genus *Crematogaster* Lund,
1831 (Hymenoptera: Formicidae) in Crna Gora
(Montenegro), Part I: *Crematogaster scutellaris*
group of species**

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Summary

Taxonomy, morphology and the geographic distribution of four species of the *Crematogaster scutellaris* group of species, ant genus *Crematogaster*, in Crna Gora (Montenegro) are presented. Specimens were collected from various localities in Montenegro during the period 1977-2008. The synonymy, distribution, number of collected specimens and the collector are given for each species. Morphology of genitalia of *Crematogaster gordani* Karaman, 2008, and new information related to the discrimination of males of two sibling species, *C. gordani* and *Crematogaster schmidtii* (Mayr 1853) are given.

Key words: *Crematogaster*, Formicidae, taxonomy, Montenegro (Crna Gora).

Anahtar sözcükler: *Crematogaster*, Formicidae, taksonomi, Karadağ (Crna Gora).

Introduction

The genus *Crematogaster* includes worldwide distributed myrmicinae ants. The genus comprises 780 species and 85 subspecies belonging to 15 subgenera (Bolton et al., 2006). Most of the species are distributed in the tropical region, whereas some species groups have radiated in the temperate zones. The tropical species are mainly arboreal (Longino, 2003), and the temperate usually nest in the ground or beneath stones, and occasionally in dead wood or sedge (personal observations). The genus is a common element in most of the tropical, mediterranean and submediterranean fauna, and yet it has been a subject of few comprehensive studies. Such as the monographs of the species from the Palearctic region (Santschi, 1937) the North American *Crematogaster* s.s. (Buren, 1959, 1968) and the species from Costa Rica (Longino, 2003). Additional taxonomical and faunistic studies focused only on

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few species of *Crematogaster* distributed in various localities (Creighton, 1939; Bernard, 1978; Johnson, 1988; Onoyama, 1998; Deyrup & Cover, 2007).

The genus *Crematogaster* in Montenegro has been investigated by various authors. Müller (1923) cited two species, *Crematogaster ionia* Forel 1911 and *Crematogaster schmidtii* (Mayr, 1853a). Zimmermann (1934) described two new subspecies *Crematogaster scutellaris schmidtii atratula* [= *Crematogaster montenigrinus* Karaman, 2008] and *Crematogaster auberti savinae*, and registered *Crematogaster sordidula mayri* (Mayr, 1853b) [jun. syn. *Crematogaster sordidula* (Nylander, 1849)]. *C. jehovae* Forel, 1907 was cited for the first time by Collingwood & Petrov (1999) and Karaman (1999), both from Boka Kotorska Bay. Petrov (2000) registered *C. lorteti* Forel, 1910 (subgenus *Atopogyne*), and Karaman (2008) described new species *C. gordani* Karaman, 2008 from Montenegro.

The differences between the females of *C. schmidtii*, *C. scutellaris* and *C. ionia* are based solely on their colour. Due to the fact that the similar occurrence refers to workers, it is relevant to compare the morphology of their male genitalia. In this study we give general description of the male genitalia in two sibling species from Montenegro, *C. gordani* and *C. schmidtii*. Additionally, the taxonomy and the description of workers and females are presented for 4 species from Montenegro, as well as, their ecology.

Material and Methods

This study is based on specimens collected from various localities in central and southern Montenegro during the period 1977-2008. Specimens were collected mostly from the nests. In the case the nests were not found, solitary specimens were collected from the ground, the trees or shrubs. To investigate possible variation in morphology of each species across the Balkan area specimens were compared against those collected from Macedonia, Serbia, and Bosnia and Herzegovina.

For each species the synonymy, distribution, number of specimens of each cast and the collector are given. The distribution sites are arranged successively from the westernmost to easternmost. The localities cited by other authors (Müller, 1923; Soudek, 1925; Zimmermann, 1934; Petrov, 1995 and Collingwood & Petrov, 1999) are indicated as "Localities cited". All measurements were carried out with a micrometer apparatus attached to a stereoscopic microscope, and the values are given in μm (reading error: ± 0.005 mm). The total length (TL) is given in mm.

Measurements and Indices

Total length (**TL**): total length of the body, excluding appendages, in dorsal view;

Head width (**HW**): the maximum dorsal width of the head at eyes level;

Head length (**HL**): maximum dorsal full-face view length from the anteriormost margin of clypeus to the posterior margin of occiput;

Cephalic index (**CI**): $HW/HL \times 100$;

Scape length (**SL**): the maximum straight line length of the antennal scape excluding the basal constriction of the neck close to the condylar bulb;

Scape index (**SI**): $SL/HW \times 100$;

Ocellus length (**OL**): the maximum length of main ocellus in male;

Length of mesosoma (**LM**): the diagonal length of the mesosoma from the point at which the pronotum meets the cervical shield to the posterior base of the metapleuron;

Propodeal spine length (**PS**): lateral distance from the upper edge of propodeal spiracle to the tip of spine;

Petiole width (**PW**): the maximum width of the petiole, in dorsal view;

Postpetiole width (**PPW**): the maximum width of the postpetiole, in dorsal view;

Petiole Index (**PI**): $PW \times 100 / PPW$,

Postpetiole Index (**PPI**): $PPW \times 100 / HW$,

Pronotal Width (**PnW**): the maximum width of pronotum in dorsal view,

Distance Between the Tips (**DBT**): the maximum distance between the apices of propodeal spines,

A10, A9, A8, A3, A2, A1: length of named antennal segments.

Results

Six species and one subspecies from two subgenera, *Crematogaster* and *Orthocrema* are known from the territory of Montenegro. Within the subgenus *Crematogaster* (*Crematogaster*) Mayr, 1852, the most numerous group is *Crematogaster scutellaris* complex that includes *Crematogaster schmidtii* (Mayr, 1853); *Crematogaster ionia* Forel 1911; *Crematogaster gordani* Karaman, 2008 and *Crematogaster montenigrinus* Karaman 2008. Workers of this group are characterized by trapezoidal petiole in dorsal view and prominent keel that is dorsal on promesonotum. Second group, the *auberti* complex includes two species, *Crematogaster auberti savinae* Zimmermann, 1935 and *Crematogaster jehovae* Forel, 1907. In Montenegro the subgenus *Crematogaster* (*Orthocrema*) Santschi, 1918 is represented with one species, *Crematogaster sordidula* (Nylander, 1849).

Crematogaster Lund, 1831

Type genus: *Formica scutellaris*; by subsequent designation of Bingham, 1903: 124.

***Crematogaster* Lund, 1831**

Type subgenus: *Formica scutellaris*; by subsequent designation of Bingham, 1903: 124.

***Crematogaster schmidtii* (Mayr, 1853) (Figs.1A-1D)**

Acrocoelia schmidtii Mayr, 1853a: 149 [loc.typ. Kranjska=Carniole (Slovenia)]

Crematogaster scutellaris Schmidtii Müller, 1923: 72; Zimmermann, 1934: 23;

Crematogaster Schmidtii Emery, 1891:14;

Crematogaster schmidtii Agosti & Collingwood, 1987a: 54; 1987b: 272; Karaman, 2004: 86; Bračko, 2006: 136.

Material examined (Montenegro): Adriatic coast: 39 workers, Boka Kotorska Bay, Kamenari, 09.08.1988, leg. G. Karaman; 11 workers, Boka Kotorska Bay, Opatovo, 18.08.1991, leg. G. Karaman; 21 workers, Boka Kotorska Bay, Lepetane, on ivy (*Hedera helix* L.) and stone wall, 12.07.1992, leg. G. Karaman; 10 females, 12 males, Boka Kotorska Bay, Tivatska Solila, 09.10.1977, leg. G. Karaman; 19 workers, Pržno, 24.06.1995, leg. S. Pešić; 1 female, Lovćen Mnt., Brajići village, 16.11.1995, leg. G. Karaman; 3 workers, Luštica Peninsula, Oblatna, stone beach, 17.08.1998, leg. M. Karaman; 10 workers, Jaz, nest in sandy soil at the base of a shrub growing on the edge of beach, 12.05.2004, leg. M. Karaman; 9 workers, Skadar Lake, Rijeka Crnojevića, 13.05.1999, leg. G. Karaman; 39 workers, Skadar Lake, Virpazar, on a willow tree, 26.08.1983, leg. G. Karaman; 4 workers, Skadar Lake, Ivanina spila Cave, on shrubs at the entrance, 05.05.2003, leg. M. Karaman; 9 workers, Sveti Stefan, edge of pine forest, on a cliff above the sea, 09.06.1999, leg. M. Karaman; 7 workers, Miločer, on the olive tree, 14.09.2003, leg. M. Karaman; 5 workers, Gornji Štoj, sandy meadow with scarce vegetation, nest is at the base of a shrub, 02.06.2000, leg. M. Karaman; 11 workers, Ulcinj, Crveni brijeg, oak forest, nest is in the trunk of common reed, 12.06.2002, leg. M. Karaman; 22 workers, mouth of Bojana river, mixed forest of hornbeam, willow and tamarisk (*Tamarix ssp.*), nest is in the tree trunk, 18.06.2003, leg. M. Karamani (Total number of individuals: 209 workers, 11 females, 12 males).

Inland: 9 workers, Valley of Zeta River, Tunjevo village, on shrubs, 06.05.2003, leg. M. Karaman; 78 workers, Podgorica, rocky shore of Morača River, 08.04.1982, leg. G. Karaman; 11 workers, Podgorica, nest is on a tree, in a mushroom (Polyporales), 24.07.2001, leg. M. Karaman; 30 workers, Podgorica, nesting between old clothes in a car garage, 11.04.2004; 3 workers, Podgorica, cherry tree, 07.04.2002, leg. M. Karaman; 31 workers, Podgorica, Piperi, on shrubs, 15.04.1984, leg. G. Karaman; 10 workers, Canyon of Morača

River, Smokovac, on shrubs, 12.08.2004, leg. M. Karaman; 4 workers, Kuči, Premići village, 18.10.2001, leg. M. Karaman; 6 workers, Canyon of Morača River, Ljuta village, 08.07.1989, leg. M. Karaman; 1 worker, Durmitor Mnt., 01.08.1982, leg. G. Karaman. (Total number of individuals: 183 workers)

Localities cited: Müller (1923): Risan, July 1908; Tivat, 1913; Zimmermann (1934): Sutorina, Igalo, Topla, Trebešin, Kameno, Savina, Zelenika and Budva, May 1931; Petrov (1995): Budva, no date.

Altitude: 0-800 m a.s.l.

Range: Northern bank of Mediterranean Sea and Black Sea, from Slovenia in the west to Ukraine in the east.

Ecology: It is the most common species of *Crematogaster* in the mediterranean and submediterranean part of Montenegro. During our field work we observed that colonies of *C. schmidtii* were active during the whole 24h period from may till september. Workers often tend aphids and form a line to the nest. Colonies are found at the base of trees and shrubs, in cavities of threes and sedges or in dead wood. When nests are disturbed workers emerge in great numbers and are very aggressive; they usually bite with mandibles and rarely exude quantities of liquid from the tip of the gaster.

Description

Workers: The head, thorax and petiole yellow-reddish. Postpetiole unicolor with abdomen – dark brown to black. Face of head is gently longitudinally striated, heavily structured between upper edge of mandible and lower margin of eye. Dorsally, thorax with strong rugulae, smooth and shiny portion restricted on infraspinal area. Promesonotal keel is well developed, propodeal suture strongly impressed. Propodeal spines long, straight, regularly tapering from base to tip. Their length is 2.3-2.5 times as long as their basal width. Whole body covered with appressed pubescence, these hairs are separated at their bases by a distance equal to the length of hairs. Scapes with abundant, long subdecumbent pubescence. Several outstanding long setae may be present on anterior border of clypeus, dorsal face of pronotum, petiole nodes and abdomen. Variability in general body colour of workers from different colonies is usual, from yellow-reddish to dark reddish head, thorax and petiole, dark brown to black postpetiole and gaster.

Measurements: TL 4.6mm, 4.0mm, 3.5mm, 3.2mm; HW 1119.25, 971.25, 943.50, 841.75; HL 1045.25, 915.75, 888.00, 814.00; CI 107.08, 106.06, 106.25, 103.41; SL 823.25, 749.25, 730.75, 647.50; SI 73.55, 77.14, 77.45, 76.92; LM 1147.00, 1017.50, 962.00, 915.75; PS 203.50, 180.37, 148.00, 129.50; A10 296.00, 259.00, 286.75, 212.75; A9 166.50, 148.00, 129.50, 138.75; A8 157.25, 115.63, 92.50, 120.25; DBT 545.75, 471.75,

388.50, 360.75; PW 388.50, 323.75, 342.25, 268.25; PPW 333.0, 296.00, 268.25, 231.25; PI 116.66, 109.37, 127.58, 116.00; PPI 29.75, 30.47, 28.43, 27.47; PnW 582.75, 518.00, 499.50, 416.25.

Females: Head reddish-brown, rest of the body dark brown. Head wider than pronotum. Mandibles with slight longitudinal rugulae. Masticatory border with five teeth. Apical tooth is the biggest, with sharp tip. Other teeth are smaller and subequal. Lower part of head longitudinally striated, upper part smooth and shining. Thorax, in lateral view, with straight dorsal edge, propodeum is long and narrow and drops steeply from the scutellum. In contrast with workers, thorax is not strongly sculptured dorsally, somewhat gentle striae may be developed. Meso- and metasternum faintly striated, episternum and pronotum smooth. Propodeal spines acute, triangular, the same length as their width at the base. Whole body with appressed, long pubescence. Antennae with suberected, and legs with appressed pilosity. Scarce, long, erected setae present on the anterior of the head, dorsally on scutum, scutellum, epinotum and petiole node. Abdominal tergites with moderately abundant erected setae at their posterior borders. Wings with yellow-brown shade, wing venation brown.

Measurements: TL 9.0mm, 8.7mm, 8.3mm; HW 1628.00, 1595.44, 1725.68; HL 1448.92, 1432.64, 1465.20; CI 112.35, 111.36, 117.77; SL 1009.36, 1015.15, 1053.70; SI 62.00, 63.62, 61.05; OL 97.68, 120.25, 120.25; LM 3.16 mm, 3.05, 2.9mm; PS 257.00, 203.5, 203.5.

Males: Whole body dark brown, covered with short appressed pubescence. Apical tooth on mandibles is the largest and with a sharp tip, the second one is slightly smaller than the first one; the third and the fourth tooth are the least developed, very small and blunt (Fig. 1D). Several setae, shorter than in *Crematogaster gordani* Karaman, 2008, are present on external side of each mandible. All three ocelli are equal in size. Propodeal spines are not developed, propodeum bituberculate. Pronotum, scutum and scutellum smooth and shining, Mayers line is not prominent. One longitudinal line divides scutum into a left and a right part. This line finishes at a deep notch in the posterior border of scutum. Meso-, meta- and episternum faintly horizontally striated. Wings achromatic, and wing venation dark brown. External paramera (stipes) with numerous setae over entire external area. Subgenital plate triangular, with almost straight borders and blunt apex. Apex covered with about 40 setae. Penis valve with 10-12 teeth (Figs. 1A-C).

Measurements: TL 3.9mm, 3.9mm, 3.7mm; HW 693.75, 666.0, 675.25; HL 582.75, 545.75, 582.75; CI 119.04, 122.03, 115.87; SL 157.25, 138.75, 157.25; SI 22.66, 20.83, 23.29; OL 83.25, 83.25, 83.25; LM 1725.68, 1546.60, 1595.44; PS 0, 0, 0;

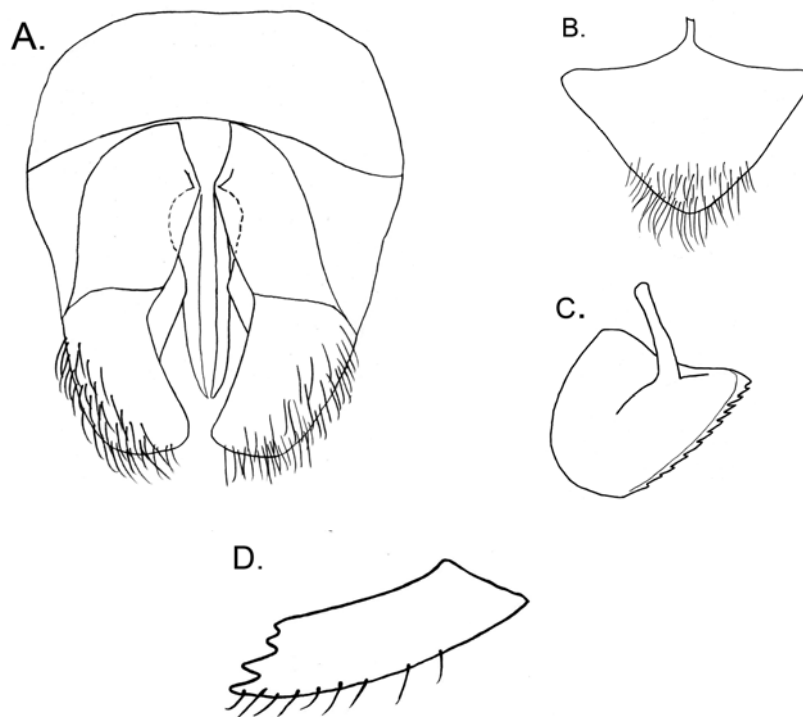


Figure 1. *Crematogaster schmidtii* (Mayr, 1853) male. Locality: Tivat, 09.07.1977: A: male genitalia - general postero-ventral view; B: subgenital plate; C: penis valve; D: mandible.

Taxonomical note: *Crematogaster schmidtii* (Mayr, 1853) was treated as a subspecies of *C. scutellaris* (Oliver, 1792) for a long time. Mayr (1853a) described *C. schmidtii* from the specimens collected in Kranjska region, Slovenia. Currently, the species is known from Slovenia (Cobelli, 1906; Bračko, 2000), Croatia (Bračko, 2006), and Romania and Bulgaria (Atanassov & Dlusskij, 1992). The field work done by the authors, confirmed the presence of the species in Bosnia and Herzegovina, Serbia, Montenegro and Macedonia. Ruzsky (1905) described *C. auberti karawaewi* from Ukraine, but this name is junior synonym of *C. schmidtii* (sensu Bolton et al., 2006).

Crematogaster scutellaris Olivier, 1792 is distributed in Italy, Austria, France, Iberian Peninsula and south Germany (Hölzel, 1966; Collingwood & Yarrow, 1969; Collingwood, 1978; Poldi et al., 1995; Seifert, 1996; Heller, 2004). The species is also found in Croatia on the island of Korčula (Bračko, 2006), and in the southeast Bosnia and Herzegovina on Baba Mtn (Fahringer, 1922). Cobelli (1906) cites *C. scutellaris* for Slovenia based on his collection of workers. However, the color pattern of the workers, reddish-brown head, thorax and petiole, and black abdomen, matches the description of *C. schmidtii*, hence the species remains unconfirmed for Slovenia. Petrov (2008) cite *C. scutellaris* for Montenegro, providing no locality data.

Crematogaster schmidti Mayr, 1853 and *C. scutellaris* are allopatric species. The transgression zone between the two species is the region from Slovenia (east slopes of Julian Alps) to the Adriatic coast of Croatia (Dalmatia), and the southeast Bosnia and Herzegovina. The two species do not hybridize because no intermediate forms have been found in the transgression zone [the territory of former Yugoslavia] (Atanassov & Dlusskij, 1992). Based on the current distribution of the two species, we are expecting *C. scutellaris* to be found in Slovenia, and rejecting the possibility of the same species being present in Montenegro.

***Crematogaster gordani* Karaman, 2008** (Figs. 2A-2D)

Crematogaster gordani Karaman, 2008: 6, 1-8, 16; plate 1:A-F, loc. typ. Podgorica, Crna Gora)

Crematogaster schmidti (part.), Karaman et al., 1998(1993): 46; Karaman, 2004: 86.

Material examined (Montenegro): *Adriatic coast*: 1 worker, Boka Kotorska Bay, Vrmac Mnt., entrance to Vilina pećina Cave, 28.07.1989, leg. G. Karaman;

Inland: 18 females, 64 males, 20 workers, Podgorica, rocky shore of Morača river, at the bottom of a cabin, 15.10.1985, leg. G. Karaman.

Altitude: 45-450 m a.s.l.

Range: Known only from central and southern Montenegro.

Ecology: We do not know much about ecology of this species. Specimens have been collected near the bank of Morača River, in Podgorica city, and the nest was in the ground of the wooden house. One worker, with entirely yellow body, that matches the description of the species, was collected in Boka Kotorska Bay (28. July 1989).

Description

Workers: The body is of general *scutellaris* shape. Head is with appressed pubescence; at the base these hairs are spaced by a distance slightly shorter than their length, except between the eyes where a distance is slightly longer than their length. Outstanding setae are present only on anterior margin of clypeus. Scapes are without erected setae, only pubescence is present. Mandibles longitudinally striated. Each mandible with 4 teeth including the longest apical and the blunt basal tooth. Mesopropodeal furrow deeply impressed. Propodeal spines long, straight and sharply pointed. Length of these spines is about 2.3-2.5 times the length of their basal width. Whole thorax rugose, with prominent dorsal keel on mesonotum. Pilosity with appressed pubescence, no outstanding setae. Petiole faintly sculptured, postpetiole smooth and shining. Gaster smooth, shining, with appressed pubescence. The base of the hairs spaced by a distance slightly longer than the length of hairs.

Several longer, erected setae present on posterior margin of each gaster tergite. The head, thorax, petiole and postpetiole dark yellow, abdomen slightly darker. Appendages of the same colour as thorax and head.

Measurements: TL 5.0mm, 4.7mm, 4.2mm; HW 1100.75, 1068.37, 989.75; HL 985.13, 1008.25, 929.63; CI 111.74, 105.96, 106.47; SL 814.00, 814.00, 772.38; SI 73.95, 76.19, 78.04; LM 1156.25, 1128.50, 1073.00; PS 166.5, 180.37, 148.00; A10 286.75, 305.25, 319.16; A9 166.5, 166.50, 157.25; A8 138.75, 124.87, 115.63; DBT 508.75, 518.00, 457.88; PW 388.50, 360.75, 342.25; PPW 342.25, 323.75, 300.63; PI 113.51, 111.43, 113.84; PPI 31.09, 30.30, 30.37; PnW 578.13, 518.00, 485.63.

Females: Head with appressed pubescence, bases of these short hairs are spaced slightly closer than the length of hairs. Anterior margin of clypeus with erected setae. Ventral surface of head with dense erected J-shaped hairs. In frontal view, posterior (upper) half of the head is smooth and the frons is longitudinally striated. Median line from central ocellus to clypeus, as well as median part of clypeus, are smooth and shining. Lateral strips of clypeus weakly striated. Mandibles with five teeth; the apical tooth is the biggest, the second one is smaller, and the remaining three teeth are the smallest and subequal. Alitrunk pubescent, with individual erected setae on scutum and scutellum. Propodeal spines short, triangular, as long as their basal width. Pronotum, episternum and anterior part of mesosternum smooth and shining, posterior part of mesosternum, metasternum and propodeum longitudinally striated. Scutum and scutellum smooth and shining, both with appressed pubescence, distances between their bases are equal their length. Pilosity on abdominal tergites composed of appressed pubescence and long, erected scattered setae. Distance between single setae of pubescence is equal their length. Head, antennae, alitrunk, nodes and gaster brown with yellow shade. Legs clear yellow. Wings not completely achromatic, but with some yellow shade. Wing venation dark yellow to brown.

Measurements: TL 9.4mm, 9.2mm, 9.1 mm; HW 1584.66, 1660.56, 1646.40; HL 1399.44, 1416.36, 1481.76; CI 113.23, 117.24, 111.10; SL 963.75, 1040.85, 1111.32; SI 60.81, 62.68, 64.50; OL 101.75, 111.00, 101.75; LM 2531.34, 2551.92, 2634.24; PS 323.75, 249.75, 226.38.

Males: Head smooth without erected setae on dorsal surface. Clypeus, mandibles and ventral surface of head with several erected setae. Scape slightly longer than the first antennal segment. Mandible with 2-4 subequal teeth (fig. 2D). Numbered long setae present on external and masticatory sides. Scutum weakly reticulated, scutellum completely smooth and shining. Meso-, meta- and episternum faintly striated. Propodeal spines not prominent. Gaster smooth and shining, with appressed pubescence. Head and thorax dark yellow, nodes, gaster and appendages clear yellow. Wings without infuscation, veins

pale yellow. External paramera with 30-40 setae concentrated at the top. Sides of subgenital plate more rounded than those in *C. schmidtii*, with 30-40 setae at the top. Penis valve with 10-12 teeth (Figs. 2A-C).

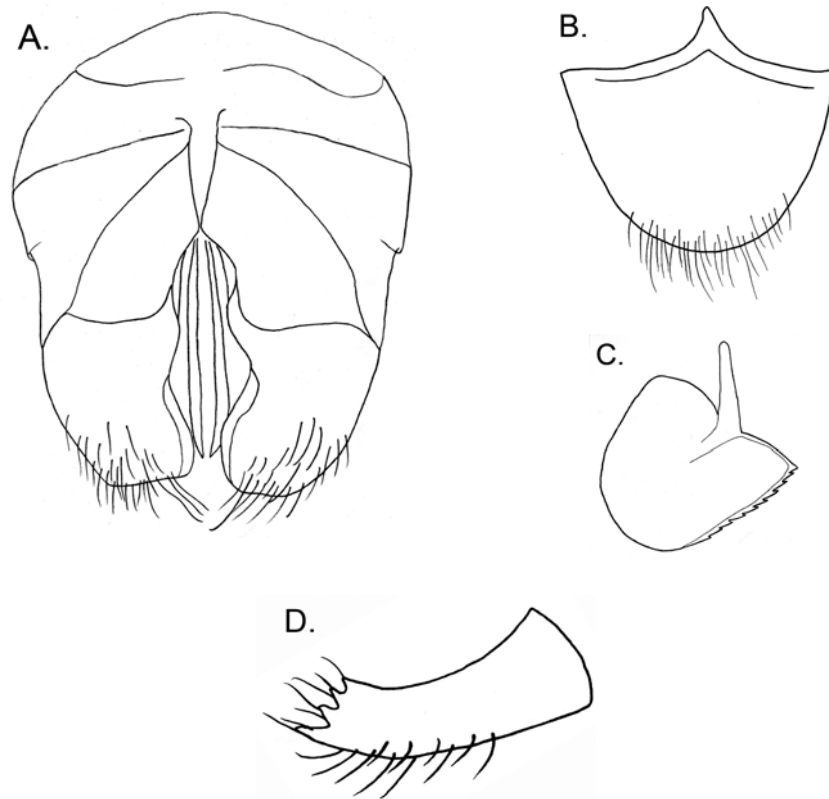


Figure 2. *Crematogaster gordani* Karaman, 2008, male. Locality: Podgorica, 15.10.1985. A: male genitalia, general postero-ventral view; B: subgenital plate; C: penis valve; D: mandible.

Measurements: TL 4.0mm, 4.0mm, 3.8mm; HW 721.50, 703.00, 666.00; HL 610.50, 592.00, 582.75; CI 118.18, 118.75, 114.28; SL 111.00, 138.75, 138.75; SI 15.38, 19.73, 20.83; OL 83.25, 74.00, 74.00; LM 1465.20, 1465.20, 1286.12; PS 0, 0, 0.

***Crematogaster ionia* Forel, 1911**

Crematogaster scutellaris var. *ionia* Forel, 1911: 340 (loc. typ. Turska);

Crematogaster scutellaris *Schmidtii* var. *ionia* Müller, 1923: 72; Soudek, 1925: 16;

Crematogaster scutellaris schmidtii ionia Zimmermann, 1934: 23;

Crematogaster ionia Agosti & Collingwood, 1987b: 272.

Material examined (Montenegro): Adriatic coast: 1 worker, Boka Kotorska Bay, Trojica hill, mixed deciduous forest, nest is under the stone, 10.09.1998, leg. M. Karaman; 3 workers, Ulcinj, pine forest, 08.05.1998, leg. M. Karaman; 2 workers, Gornji Štoj (Ulcinj), sandy meadow with scarce vegetation, nest is under the shrub, 06.10.1999, leg. M. Karaman. (Total number of individuals: 6 workers)

Localities cited: Müller (1923): Zelenika; Soudek (1925): Zelenika, summer 1922. and 1923; Zimmermann (1934): Budva, May 1931.

Altitude: 0-230 m a.s.l.

Range: Northern and eastern bank of Mediterranean Sea including islands in Aegean Sea [Forel, 1911, 1913; Emery, 1915; Wheeler & Mann, 1916; Müller, 1923; Santschi, 1926, 1934, 1937; Legakis, 1983; Collingwood 1993].

Ecology: There are only scarce data about the ecology of this species. We found them in mixed and pine forests, nesting under the stones or in humus, at the base of shrubs. Other authors (Forel, 1911; Müller, 1923; Zimmermann, 1934) found this species mostly in tree cavities. Workers are generalized omnivores.

Description

Workers: TL= 4.2-5.0 mm. Body sculpture and hairiness are the same as in *C. schmidtii*. Exception is the frontal triangle which is not completely smooth, but striated with 3-4 longitudinal striae. The head, thorax, appendages and petiole nodes dark reddish to brown, the head occiput and the first segment of the funiculus dark brown. Gaster dark-brown to black.

Measurements: TL 5.0mm, 4.9mm, 4.8mm; HW 1147.0, 1117.95, 989.75; HL 1063.75, 989.45, 948.12; CI 107.83, 112.98, 104.39; SL 823.02, 835.25, 758.6; SI 71.77, 74.71, 76.64; LM 1271.87, 1182.2, 1036; PS 231.25, 185.00, 171.13; A10 314.5, 333.0, 272.87; A9 171.13, 180.38, 161.87; A8 124.87, 134.12, 111.00; DBT 592.0, 518.0, 444.00; PW 411.63, 411.63, 333.00; PPW 337.62, 323.75, 291.37; PI 121.92, 127.14, 114.29; PPI 29.43, 28.96, 29.44; PnW 578.14, 568.87, 499.25.

***Crematogaster montenigrinus* Karaman, 2008 (Fig. 3)**

Crematogaster montenigrinus Karaman, 2008: 14, figs: 13-16, plate 1: G-I;

Crematogaster scutellaris schmidtii atratula Zimmermann, 1934: 24 (loc.typ. Manastir Savina, Boka Kotorska);

Crematogaster scutellaris schmidtii (sic!) var. *atrata* Santschi, 1937: 311;

Crematogaster scutellaris subsp. *schmidtii* var. *atrata* Bolton, 1995: 148.

Material examined (Montenegro): Adriatic coast: 2 workers, Boka Kotorska Bay, Lepetane, 18.08.1985, leg. G. Karaman; 1 worker, mouth of

Bojana River, mixed forest of hornbeam, willow and tamarisc, 16.07.2004, leg. M. Karaman. (Total number of individuals: 3 workers)

Localities cited: Zimmermann (1934): Savina (Herceg-Novci), numbered workers on and under the bark of a tree, 16.05.1931.

Altitude: 1-40 m a.s.l.

Range: Adriatic coast of Montenegro. Zimmermann (1934) collected the workers near the Monastery Savina (Boka Kotorska Bay), and we found this species in Lepetane (Boka Kotorska Bay) and at the mouth of Bojana River.

Ecology: During the 20 years long investigation of the ant fauna of the Adriatic coast, we found only three workers, all of them either in or near the scarce hornbeam forest. We did not find any nest, and hence nothing is known about the establishment of colonies.

Description

Workers: Head, frontally, smooth and shining, with whitish appressed pubescence, hairs as long as distance between their bases. Antennal scapes with dense, appressed pilosity. Mandibles paler than the rest of the head, longitudinally striated, each bearing 3-4 teeth. Sculpture of thorax weak, with sparse, appressed silvery setae. Propodeal spines long, acute, tips gently upward; the length of spines about 2,5 times their basal width. Mesonotum dorsally with distinct longitudinal keel. Mesopropodeal furrow deeply impressed. Petiole trapezoid, and typical for the *scutellaris* complex. Abdominal tergites entirely with longitudinally oriented, appressed, long, whitish setae; length of setae twice the distance between their bases. Whole body, including appendages, dark brown to black. Base of gaster, around the joint edge, is brighter, the rest of the abdomen is black. Workers of *Crematogaster montenegrinus* Karaman, 2008 are morphologically well separated from all other species of *Crematogaster scutellaris* complex in Southern Europe by the shortest total body length and lowest PPI. Female and male are unknown.

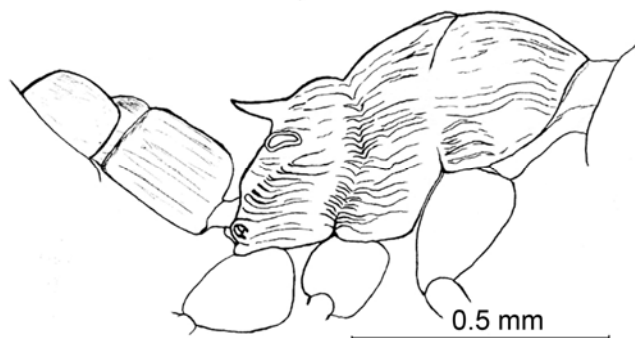


Figure 3: *Crematogaster montenegrinus* Karaman, 2008 worker, thorax and petiole nodes, lateral view. Locality: Bojana River, 16.07.2004.

Measurements: TL 3.1mm, 3.0mm, 2.9mm; HW 786.25, 693.75, 740.00; HL 749.25, 647.50, 693.75; CI 104.94, 107.14, 106.66; SL 629.00, 564.25, 434.75; SI 80.00, 81.33, 58.75; LM 897.25, 758.50, 814.00; PS 115.62, 111.00, 120.25; A10 259.00, 254.37, 268.25; A9 124.87, 124.88, 120.25; A8 97.12, 92.5, 92.50; DBT 383.87, 319.12, 379.25; PW 286.75, 259.00, 296.00; PPW 254.37, 222.00, 259.00; PI 112.73, 116.66, 114.28; PPI 32.35, 32.00, 35.00; PnW 444.0, 407.0, 434.75.

Discussion

Our study shows the importance of the investigation of taxonomical characters of males, especially the male genitalia. Male ants provide the most valuable characters for delimiting genera and species. The level of difference in male genitalia between species is much higher than the difference found between the females or workers of different species. Thus, the values of the CI, SI, PI and PPI show no significant difference between the workers of *C. schmidtii* (Mayr, 1853), *C. gordani* Karaman, 2008 and *C. ionia*, Forel 1911 and can hardly aid in their identification. However, the male genitalia of *C. schmidtii* and *C. gordani* exhibit clear differences. It must be noted that there are clear morphological differences between the females of these two species. Due to the fact that the differences between the females of *C. schmidtii*, *C. scutellaris* (Oliver, 1792) and *C. ionia* are based solely on their colour, it is relevant to compare the morphology of their male genitalia.

Özet

Crna Gora (Karadağ)'da *Crematogaster* cinsi Lund, 1831 (Hymenoptera: Formicidae) yeni bilgi: Bölüm I: *Crematogaster scutellaris* tür grubu

Bu çalışmada, *Crematogaster* cinsi karıncaların, *Crematogaster scutellaris* grubunun dört türünün taksonomisi, morfolojisi ve Crna Gora (Karadağ)'daki coğrafi dağılımı sunulmuştur. Örnekler 1977–2008 yılları arasında Karadağ'ın değişik yörelerinden toplanmıştır. Her türün sinonimleri, dağılımı, toplanan bireylerin sayısı ve toplayan kişilere ait bilgiler verilmiştir. *Crematogaster gordani* Karaman, 2008'nin genital morfolojisi ve iki benzer tür olan *C. gordani* ve *Crematogaster schmidtii* (Mayr, 1853) erkeklerinin ayrımı ile ilgili yeni bilgiler verilmiştir.

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