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ONE GENUS AND THREE SPECIES OF ANTS (HYMENOPTERA: FORMICIDAE) NEW FOR CROATIA

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From the last review of the ant fauna of Croatia (Bračko, 2006), three species and one genus of ants have been recorded for Croatia: *Camponotus tergestinus* Müller, 1921; *Lasius citrinus* Emery, 1922; and *Proformica pilosiscapa* Dlussky, 1969. Finding of the latter represents not just the first record of the genus *Proformica* Ruzsky, 1902 for Croatia, but also for the broader area of the neighboring countries. Here, we present data on the distribution and biology of all three species. The number of recorded species for Croatia is now 143.

Ants, Formicidae, Croatia, new records, *Proformica pilosiscapa, Camponotus tergestinus, Lasius citrinus*

A. JEŠOVNIK, J. BUJAN i G. BRAČKO. Jedan rod i tri vrste mrava (Hymenoptera : Formicidae) prvi nalazi za Hrvatsku. Entomol. Croat. Vol. 15. Num. 1-4: 113-122.

Od zadnje revizije vrsta mrava za Hrvatsku (Bračko, 2006), otkrivene su tri nove vrste i jedan novi rod mrava, a to su: *Camponotus tergestinus* Müller, 1921; *Lasius citrinus* Emery, 1922; i *Proformica pilosiscapa* Dlussky, 1969. godine. Pronalazak posljednjeg prvi je nalaz roda *Proformica* Ruzsky, 1902., za Hrvatsku, ali i za šire područje okolnih zemalja. Za sve tri vrste navodimo podatke o rasprostranjenosti i biologiji. Do sada su za Hrvatsku zabilježene 143 vrste.

Mravi, formicidae, Hrvatska, novi nalazi, *Proformica pilosiscapa, Camponotus tergestinus, Lasius citrinus*

Introduction

Ants, members of the family Formicidae, are an important part of terrestrial biodiversity. Ants are used as model organisms for a wide range of scientific

research - from studies in behavior, ecology and evolutionary biology to those in biochemistry and molecular biology. They have also proven to be good bio-indicators and have been used repeatedly in biodiversity assessment studies and conservation biology (Andersen, 1997; King et al., 1998; Agosti et al., 2000; Ottoneti et al., 2002; Stephens & Wagner, 2006).

The ant fauna of Croatia has not received much attention until recently. The majority of publications are more than 50 years old. The first comprehensive checklist of Croatian ants was published by Bračko (2006). He reported 140 species in 36 genera. That work was mostly based on a review of previously published data, inspection of entomological collections in Croatia, and to a smaller extent on the author's own collected material. The Croatian Myrmecological Society, a nongovernmental organization that has as its goal research into the diversity of Croatian myrmecofauna, started inventory studies in 2007. Here we report new findings of three ant species for Croatia, and present the biology of those species: *Camponotus tergestinus* Müller 1921, *Lasius citrinus* Emery, 1922 and *Proformica pilosiscapa* Dlussky, 1969. In addition, we present a new genus record for Croatia: *Proformica* Ruzsky, 1902.

Materials and Methods

Specimens were collected using pitfall traps or forceps and aspirator during field trips of the Croatian Myrmecological Society and a field study conducted by Lucija Šerić Jelaska (2005, 2010). All specimens were stored in 70% ethanol. For each collection site we recorded geographic coordinates, habitat type and elevation.

We identified all specimens using taxonomic keys in Müller (1923), Dlussky (1969), Agosti & Collingwood (1987), Atanassov & Dlussky (1992) and Seifert (2007). Voucher specimens of all species are deposited in the ant collection of the Croatian Myrmecological Society in Zagreb. In addition, voucher specimens of *C. tergestinus* and *P. pilosiscapa* are deposited in the entomological collection of the California Academy of Sciences, San Francisco, USA. Color images of *C. tergestinus* and *P. pilosiscapa* (Figs. 1. & 3.) were taken using JVC KY-F75 digital camera and Syncroscopy Auto-Montage software and obtained from www.antweb.org (photography: Erin Prado, courtesy of Brian Fisher). Color images of *L. citrinus* (Fig. 2.) were taken by the authors using JVC KY-F70B digital camera and AutoMontage Pro version 5.03.0018 BETA software.

Figure 1. *Camponotus tergestinus*, worker

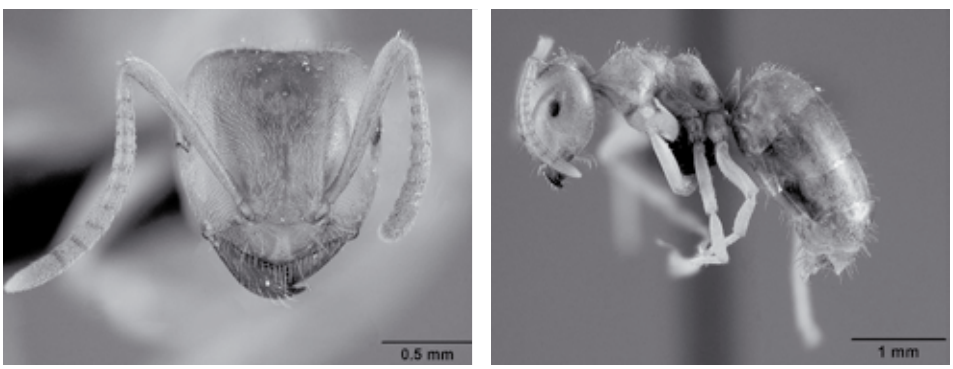

Figure 2. *Lasius citrinus*, worker

Figure 3. *Proformica pilosiscapa*, minor worker

Results and Discussion

1. Camponotus tergestinus Müller, 1921

The genus *Camponotus* Mayr, 1861 is the largest ant genus, numbering 1,058 described species (Bolton et al., 2007) and has a worldwide distribution. Nine species of *Camponotus* have previously been recorded for Croatia (Bračko, 2006). *Camponotus tergestinus* (Fig. 1) belongs to the *fallax* species group of the subgenus *Myrmentoma* Forel, 1912 (Radchenko, 1997). It is morphologically very similar to the more widespread *C. fallax* (Nylander, 1856), and the two species are considered closely related by Radchenko (1997).

Body coloration of *C. tergestinus* is black, while the legs are brownish-yellow. It can be easily distinguished from *C. fallax* by the angled appearance of the mesosoma in profile (rounded in *C. fallax*), and generally denser and longer standing hairs on the head and gaster (Ionescu-Hirsch et al., 2009).

Very little is known about the biology of *C. tergestinus*, and collection events are relatively rare. It has been associated with warm habitats and oak forests (Müller, 1923; Markó et al., 2009). The species' known distribution includes Italy (Poldi et al., 1995), one locality in Slovenia (Bračko, 2000), Hungary, Romania (Ionescu-Hirsch et al., 2009) and the European part of Turkey (Agosti & Collingwood, 1987).

A single worker of *C. tergestinus* was collected in September 2008, in Paklenica National Park, near Paklenički planinarski dom, mountain hut (N 44° 20′ 44″, E 15° 28′ 58″, 480 m). The habitat at the site was beech forest, which differs from previous findings of the species, usually associated with warm oak forests.

2. Lasius citrinus Emery, 1922

The genus *Lasius* Fabricius, 1804 is one of the most abundant ant genera in the Holarctic region (Wilson, 1955). *Lasius citrinus* is a member of the subgenus *Chthonolasius* Ruzsky, 1912, whose species are mostly subterranean, with a very low above-ground foraging activity (Seifert, 1988). All known species of *Chthonolasius* are temporary social parasites of ants of the subgenus *Lasius* s. str. However, they can also be hyper-parasitized by members of the subgenus *Dendrolasius* (Janda et al., 2004).

Lasius citrinus (Fig. 2) was first described as *Lasius bicornis* var. *citrina*, by Emery (1922), who named it after the strong citric smell of the live ants.

The name is considered a junior synonym of *Lasius affinis* (Schenk, 1852), and was used as a valid replacement name and raised to the species level by Seifert (1990).

Key features of *L. citrinus* are light yellow coloration, small eyes, short maxillary palps and narrow petiole that is distinctly dorsally incised. Hairs on the mesosoma and gaster are relatively long (Seifert, 2007).

Common nesting sites include soil, hollow trees or rotten logs (Seifert, 1990). In addition, Van Boven (1917) observed a *L. citrinus* colony in a large carton nest, a sponge like structure that ants build from chewed-up particles of wood, soil and sugary secretions (Hölldobler & Wilson, 1990). This ant is seldom collected and it is one of the rarest *Chtonolasius* species in European collections (Seifert, 1990).

Two specimens were collected using pitfall traps, in two localities of Medvednica Nature Park (N 45° 53′ 37″, E 15° 55′ 51″, 810 m; N 45° 53′ 52″, E 15° 55′ 50″, 660 m), and findings were published in Šerić Jelaska et al. (2010). Both localities are situated in a mountain forest, predominantly of beech and fir (Šerić Jelaska, 2005; Šerić Jelaska et al., 2010).

3. Proformica pilosiscapa Dlussky, 1968

The genus *Proformica* comprises 25 valid species, and has an uneven Palearctic distribution, excluding North Africa (Agosti, 1994; Bolton et al., 2007; Guénard et al., 2010). *Proformica* ants typically live in open habitats and are one of the dominant ant genera in dry steppe and semi-desert habitats of Central and Western Asia (Dlussky, 1969; Pfeiffer, 2003). They are well adapted to live in harsh environments: they are effective predators, fast and agile, and can hunt for prey over a very large territory. Some species have a replete caste, individuals with the role of storing food in their enlarged crop, which allows the colony to survive prolonged periods without food (Dlussky, 1969; Agosti, 1994; Fernandez et al., 1994). Colony size is relatively small with up to a few hundred individuals (Agosti, 1994).

Most species of *Proformica* are considered to be polymorphic. Besides repletes, workers are usually present in two relatively distinct forms, minors and majors (Dlussky, 1969; Dlussky, 1981; Marikovsky, 1979). Minor workers of the genus are recognizable because of their smaller size and an elongated, narrow head (Fig. 3). However, intermediates (workers whose size is in between minors and majors) have also been found for some species. In a study of polymorphism

in *Proformica* by Fernandez et al. (1994) allometric analyses have not confirmed truly distinct morphs.

A number of papers were published on the ecology and behavior of the high-mountain species *P. longiseta* Collingwood, 1978 from Spain (Fernández et al., 1994; Fernández Escudero et al., 1998; Tinaut et al., 1999). Also, some studies have been done on the biology of *P. mongolica* (Emery, 1901) (Tarabinski, 1979) and *P. epinotalis* Kuznetsov-Ugamsky, 1927 (Dlussky, 1981)

Very little information on *P. pilosiscapa* is available in the literature. Body color is black, and the gaster and mesosoma are covered with thick standing hairs. The clypeus has longitudinal striae. The gaster and mesosoma have a glossy appearance, although the mesosoma is slightly punctuated laterally (Dlussky, 1969). It was recorded in Armenia, Georgia, Azerbaijan and Bulgaria. This species is also listed and described in the Bulgarian ant key (Atanassov & Dlussky, 1992), but no data are presented about its biology. This is the first record of the genus *Proformica* for Croatia and also for the broader area of the neighboring countries.

Twenty-six individuals were collected in May 2010 by pitfall traps on a mesophilic meadow in Mokro polje, near Knin (N 44° 05′ 39″; E 16° 01′ 55″, 225 m). In October of the same year we visited the same locality, where we found a nest, and collected 75 workers. Despite our efforts no males or queens were found. The nest had a small mound on the surface, mostly consisting of freshly excavated soil particles in between grass blades. Ants did not display aggressive behavior towards our intrusion, and were not very fast, unlike other observations of the genus (Dlussky, 1969). However, the air temperature was low, which is often associated with a decrease in ant activity (Andersen, 1992; Hulbert et al., 2008), so that is one possible explanation. We also did not observe or collect any repletes, although this does not mean that this species does not possess them. It is worth noting that the type locality in Armenia was at an elevation of 2,200 m, while collection sites both in Bulgaria and Croatia were at much lower altitudes.

We have some reservations regarding the identity of the *P. pilosiscapa*. The genus *Proformica* needs to be revised and extant keys are incomplete. Therefore, absolute confidence in our identification would come from comparison with the type specimen, which was not possible for this study. However, according to the original description and *Proformica* key in Dlussky (1969) and a key for Bulgarian *Proformica* (Atanassov & Dlussky, 1992) our specimens can be identified as *P. pilosiscapa*.

The total number of ant species for Croatia is 143, and the number of recorded genera is 37. In a comparison with neighboring countries, that number is higher than for Slovenia (132) (Bračko, 2007) or Hungary (101) (Gallé et al., 1998), but lower than Italy (226) (Poldi et al., 1995) and Bulgaria (163) (Lapeva-Gjonova et al., 2010). Research into Croatian myrmecofauna in the last century was sparse, mostly focusing on the Mediterranean part of the country (Emery 1915; Müller, 1923; Soudek, 1925). There are fewer records from the continental part (Durbešić, 1984). Most of the Croatian territory, including the mountain region (Velebit, Lika and Gorski Kotar) and the Pannonian plain, has never been surveyed for ant fauna. Existing records from these regions are mostly the result of random sampling. Due to the high diversity of under-sampled habitats in Croatia a greater number of ant species is expected. For that reason we believe further systematically planned research would be beneficial.

Moreover, we suggest another carefully designed field study in the known habitat of *P. pilosiscapa* with a systematic sampling of nests in surrounding localities, including complete nest series containing reproductive individuals. This would give insight into the biology of this species, and the neglected, yet fascinating, genus *Proformica*.

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