

Nine new ant species in the Romanian fauna (Hymenoptera: Formicidae): morphology, biology, and distribution

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Abstract

Nine new ant species for the Romanian fauna are presented including their morphological characteristics, biology, and distribution. Some of the species, like *Myrmica specioides*, *Leptothorax affinis*, *Leptothorax tuberum*, and *Tetramorium impurum*, are common in Central and Eastern Europe, nevertheless they were not recorded from Romania, due to their overlapping characteristics with some other common species. *Harpagoxenus sublaevis*, and *Formicoxenus nitidulus* are social parasites. *Myrmica lonae*, *Leptothorax clypeatus*, and *Lasius distinguendus* are relatively rare, poorly known species.

On the basis of this study 93 ant species are recorded from Romania, which number is still considered to be low.

Rezumat

Nouă specii de furnici (Hymenoptera: Formicidae) noi în fauna României: morfologie, biologie și distribuție

Nouă specii de furnici noi pentru mirmecofauna României sunt prezentate împreună cu caracterile morfologice specifice, precum și biologia și distribuția lor. Anumite specii, ca *Myrmica specioides*, *Leptothorax affinis*, *Leptothorax tuberum* și *Tetramorium impurum*, care sunt comune în Europa Centrală și de Est, au fost omise din fauna României datorită confundării lor cu alte specii comune. *Harpagoxenus sublaevis* și *Formicoxenus nitidulus* nu au fost semnalate până acum, probabil datorită faptului că sunt specii social-parazite. *Myrmica lonae*, *Leptothorax clypeatus* și *Lasius distinguendus* sunt însă specii relativ rare, a căror biologie și distribuție este puțin cunoscută.

Pe baza acestei studii mirmecofauna României conține 93 de specii actualmente, acest număr însă este considerat a fi o subestimare a numărului real de specii.

keywords: Formicidae, Romania, fauna, new species

Introduction

Any basic ecological study which handles more species supposes the knowledge of the local fauna. As such any study which clarifies the state of a fauna, should be welcome, and used in field or laboratory experiments, as a reliable source of information. In Romania there are still problems with the lack of faunistical data on various insect groups, and in this very case, on ants. There were very few myrmecologists who made considerable efforts to clarify the state of the Romanian myrmecofauna, like at the beginning of the XXth century MÜLLER, MOCSÁRY, and later on KNECHTEL, or from the '60s to the early '90s PARASCHIVESCU. He was the one who put up the reference list of the Romanian myrmecofauna (PARASCHIVESCU 1978), summing up 76 species. In the middle of the '90s PARASCHIVESCU began to work on a complex faunistical list, and on a key to the Romanian ant species, but unfortunately he passed away in 2001 before

succeeding in finishing it.

At this moment more than 80 ant species are known to exist on the territory of Romania. When comparing this number to the number of ant species of other Central European countries, like Hungary (over 100 species) (GALLÉ et al. 1998), Germany (over 120 species) (SEIFERT 1996), etc., it seems obvious, that the number of existing ant species in Romania is underestimated. We could say: it is not in the least known, when taking account of the high diversity of habitats in Romania.

In this paper a few new species are presented, some of which are known to be common in other Central and Eastern European countries. We consider that it is almost emergent to close up to the other European countries in faunistical knowledge. This emergency is even more emphasized by the great number of new European ant species described in the last decades.

Materials and Methods

All the species presented here were identified by the authors. One part of the presented material is deposited in the Natural History Museum of Sibiu, the other makes part of the authors' collection.

The identification of the species was carried out on the basis of the keys of COLLINGWOOD (1979), KUTTER (1977), RADCHENKO et al. (1997), and SEIFERT (1988, 1996).

All measurements made by the authors were taken on dry preparations using Olympus BX 40 microscope at 100x magnification. All data are given in μm , accuracy of the measurements is 5 μm . Measured characters were:

FR: maximum width of frontal carinae immediately posterior to the scape insertions;

HL: maximum head length in median line from the clypeus to posterior border of occiput. The head must be carefully turned until the maximum length is visible;

HW: maximum head width across the eyes;

ML-spin: mesosoma length. Measured as maximum distance from the anterior border of promesonotum to the tip of the propodeal spine;

ML-lobus: mesosoma length. Measured as maximum distance from the anterior border of promesonotum to the most posterior lower margin of lateral propodeal lobe. It has to be taken in lateral view;

SL: the maximum straight line of the scape length excluding the articular condylus;

MH: maximum mesosoma height;

CI: cephalic index, shows the ratio of the head measures (HL/HW), which characterizes the head's prolongation;

MI: mesosoma index, (ML-spin/MH) shows the mesosoma's prolongation.

Survey of Species

Myrmica specioides BONDROIT, 1918

Diagnosis. Scape angled at the base with a weak carina at the bases. The frontal carina is not bent backward above the insertion of the scapes. The petiole is high, dome-like, the dorsal surface never meets the anterior profile in an angle. The posterior profile shows no abrupt step in its caudal slope to the postpetiolar junction. Its colour is red-dish yellow.

Note. This species can be confounded with *Myrmica scabrinodis* NYLANDER, 1846, or even

more with *Myrmica hellenica* FOREL, 1913. From *M. scabrinodis* it can be easily separated on the basis of its weaker antennal carina - which is clearly rounded, almost lobelike in the *M. scabrinodis*. The shape of the petiolar node also differs: whereas in *M. scabrinodis* its dorsal surface is flat, and it meets the anterior profile in a clear angle, in *M. specioides* the dorsal surface of the petiole is rounded, dome-like, never meets the anterior profile in a sharp angle.

M. hellenica is also easy to confuse with this species. However in this case the antennal carina of *M. specioides* is more prominent than in *M. hellenica*. Besides in *M. hellenica* the scape is curved angularly, and not clearly angled. The petiolar node has similar shape as in *M. specioides*. However, the frons is relatively narrower in *M. specioides* (HW/FR = 2.836, SEIFERT 1988), than in *M. hellenica* (HW/FR = 2.458, SEIFERT 1988), and the head is 'rectangular' (HL/HW = 1.000 resp. 1.023, SEIFERT 1988).

Biology. It is a typical xerothermous grassland species in Central Europe. It mainly inhabits open areas with low, herbaceous vegetation. SEIFERT (1988) found top densities of 48 nests/100 m². Nevertheless, in Romania there weren't recorded such high densities, but it seems, that where it occurs, it is frequent, and not in the least rare. Inhabits urban areas, too (SEIFERT 1988). Colonies rarely exceed a thousand individuals, several queens can be found per colony (RADCHENKO et al. 1997). Nests in soil. Nuptial flight takes place in August-September.

Distribution. It occurs all over in Europe, such as: Germany, Czech Republic, Slovakia, the Netherlands, Denmark, Sweden, Luxembourg, France, Southern England, Spain, Switzerland, Ukraine, Southern Russia (RADCHENKO et al. 1997, SEIFERT 1988), the territory of the former Yugoslavia, Turkey (European part), and Bulgaria (AGOSTI & COLLINGWOOD 1987).

In Romania there are few data on its distribution, though it is thought to be a frequent species on dry grasslands, pastures. Up to now there are data from the surroundings of Cluj-Napoca city (Fânațele Clujului, Cluj county) - pitfall-traps, during summer 1996, leg. MARKÓ, from pasture and thickets -, and from the surroundings of Sibiu city (Sibiu county) - 1 ♀, 1 ♂, 26.10.1945, leg. WORELL, collection of the Natural History Museum of Sibiu.

Myrmica lonae FINZI, 1926

Diagnosis. Formerly it was considered to be a variety or a subspecies of *M. sabuleti* MEINERT, 1860, but SEIFERT (1993) recognized it as bona spe-

cies. Since then it has been handled accordingly. Scape is strongly angled at the base, and it bears a horizontal, very large lobe at the base, clearly raised at scape level. The shape of this antennal lobe is almost quadrate, which is a clear distinctive character from its sibling species. The frontal carinae doesn't bend backwards above the insertion of the scapes. Its body is covered by strong rugosity. The petiole is high, dome-like, and striated throughout. Its colour is brownish-reddish.

Biology. It is little known about the biology of this species, due to the current recognition of its separate status. It seems that it mainly inhabits forest margins and open marshlands. Its colonies contain several hundred workers, sometimes exceed one thousand. It nests under stones, or in soil, sometimes even in moss. RADCHENKO et al. (1997) suggest that it should be a boreo-montane species. In Romania it was recorded from a hilly region, and from a mountain river valley. We have no other data on its habitats in Romania.

Distribution. Recorded from southern Finland, southern Scandinavia, the Netherlands, Germany, Poland, western Ukraine, Austria, northern Italy, Croatia, Romania, the Sankt Petersburg district in Russia, the southern part of Western Siberia and northern Kazakhstan (RADCHENKO et al. 1997, SEIFERT 1996)

In Romania the only data on its presence is from Șerbota Valley (Valea Șerbotei, Făgărașului Mts.) - 1 ♀, 25.09.1920, leg. A. MÜLLER, collection of the Natural History Museum of Sibiu -, and from Tâmpa (Brașov county) - 1 ♀, leg. DEUBEL, collection of the Natural History Museum of Sibiu. Although RADCHENKO et al. (1997) mentions this species from Romania, we do not have any data on the precise location of the sampling site.

Formicoxenus nitidulus (NYLANDER, 1846)

Diagnosis. Scapes with 10 funiculus segments, the club is three-segmented, it is as long as the rest of the funiculus. The postpetiole bears a sharp, slender denticle. The body is shining, its colour is reddish yellow to dark brown.

Note. PARASCHIVESCU (1975) mentioned this species from the collection of the Natural History Museum of Sibiu, but then he didn't include it in his list of the Romanian ant species (1978). As such the authors of this study do not consider themselves to be the first identifiers of this species on the territory of Romania, however, this is the first paper which includes it in the Romanian myrmecofauna, and gives a brief characterization of this species.

Biology. It is a xenobiont species living in the mounds of red wood ants, especially in colonies of *F. pratensis*, *F. rufa*, *F. polyclena*, *F. truncorum*, and in those of *Coptoformica* species (e.g. *F. exsecta*). Nests may contain from 20 to 150 individuals, and sometimes more nests are found in a single host colony (COLLINGWOOD 1979, SEIFERT 1996). Monogynous. It leaves the host nest rarely. It feeds on the brood of the host species. Nuptial flight is in July-August.

We collected it by pitfall-trap on the territory of a *F. pratensis* supercolony. Presumably *F. pratensis* was its host species. The other specimen was also found in a *F. pratensis* nest.

Distribution. It is present in Denmark, and throughout Fennoscandia, locally in England, and in Scotland (COLLINGWOOD 1979), it can be found from Northern, and Western Europe to Eastern Europe (KUTTER 1977), also in Greece, and on the territory of the former Yugoslavia (AGOSTI & COLLINGWOOD 1987).

There are only three data on its presence in Romania. It was collected from the surroundings of Cluj-Napoca city (Fânațele Clujului, Cluj-Napoca) - 1 worker, 24.06.1996, leg. MARKÓ. Two additional data resulted from the revision of the ant collection of the Natural History Museum of Sibiu, as such from Tâlmăciu (Dealul Cetății, Sibiu County) - 9 worker, 1 ♀, 11.04.1920, leg. MÜLLER, 2 ♀, 27.03.1921, leg. MÜLLER (with *Formica pratensis*) -; and from Sibiu city (Sibiu county) - 1 ♀, 12.07.1944, leg. WORELL. We expect it to be found in more places by studying the colonies of red wood ants and those of *Coptoformica* species. It was omitted probably due to its parasitic lifestyle.

Harpagoxenus sublaevis (NYLANDER, 1852)

Diagnosis. Head is large, subrectangular, the frontal carinae are long, run parallel, reach far beyond the antennal insertion. The funiculus of the scapes consists of 10 segments with a 4-5 segmented club. The mandibles are broad, sharp, without any denticles. The petiole, and the postpetiole with well-developed ventral denticles.

Biology. It lives in obligate dulotic association with *Leptothorax acervorum* (FABRICIUS, 1793), *L. muscorum* (NYLANDER, 1846), and *L. gredleri* MAYR, 1855. It can be found from hilly regions up to mountain pastures, and marshlands. SEIFERT (1996) found 6-10 nests/100m², when the frequency of the host species was more than 200 nests/100m². The colony from Lacul Dracului marshland (Harghita Mts., Romania) contained more than 14 workers.

The host was *Leptothorax acervorum*, and its nest contained also more than 15 individuals, and at least 7 queens. The density of the host species was very low: out of 23 sampled ant nests in peat-bogs (23 colonies/ca. 300 m²) only 3 colonies were of *L. acervorum*, including the parasitised one.

Workers forage outside the nest, they are capable of tending brood, however the colony depends on the host species. Monogynous, life-span of the queen can be 12-14 years (SEIFERT 1996). Nuptial flight takes place in June-August.

Distribution. It was recorded from Denmark, throughout Fennoscandia, but it is absent from the British Isles (COLLINGWOOD 1979), it is also present from the Pyrenees to Caucasus, from Northern Italy to Northern Norway (KUTTER 1977), and it also can be found on the territory of the former Yugoslavia (AGOSTI & COLLINGWOOD 1987).

Up to now it was identified only from two localities in Romania. Both data come from mountain marshlands. One specimen was collected in Fagul Rotund oligotrophe marshland (Apa, Roşie, Nemira Mts., Covasna county) - 1 worker, 20-27.07.1998, leg. MARKÓ, pitfall-trap -, where only *L. acervorum* nests were present, as potential host-species. The other data come from Harghita Mts., from Lacul Dracului oligotrophe marshland (Harghita county) - 14 workers, 06-13.08.2000, leg. MARKÓ -, where *L. acervorum* was its host.

Tetramorium impurum (FÖRSTER, 1850)

Diagnosis. Head is coarsely sculptured. It is very similar to its sibling species *T. caespitum* (LINNAEUS, 1758), as the surface of the first gaster tergite bears sparse microreticulate pattern. It can be distinguished by this species upon the coarsely sculptured dorsum of the petiole and postpetiole.

Biology. This species is considered to be a boreal element, but it also occurs in lowlands, and towns in Northern Europe. *T. impurum* was found in the Eastern Carpathians, as well as in towns in hilly regions. It seems to be more xerophilous than *T. caespitum*, and it is probably monogynous (RADCHENKO et al. 1998).

Distribution. It is known from Switzerland, Germany, Poland (RADCHENKO et al. 1998), and from the coast of the Adriatic Sea (KUTTER 1977). Probably it occurs everywhere in the Carpathians.

We have few data on its presence in Romania. Some specimens are present in the collection of the Natural History Museum of Sibiu collected from the city of Sibiu (Sibiu county) - 5 workers, 14.06.1946, leg. WORELL (*Leptothorax tuberum* det. WORELL),

coll. WORELL / 12 workers, 12.04.1952, leg. WORELL, coll. WORELL / 5 workers, 30.03.1952, leg. WORELL, coll. WORELL. It was also recorded from Stana Valley (Stana, Sălaj county) - 01.03.2001, meadow, leg Csósz et al. (Csósz et al. in print) -, and from Stânceni (Mureş County, Gurghiu Mts.) - 1 ♀, spruce-forest clearcut, 17.08.2001, leg. MARKÓ. It is probably more widespread in Romania, as it seems on the basis of the scarcity of data.

Leptothorax affinis MAYR, 1855

Diagnosis. Funiculus has 11 segments. Antennal club is darker than the rest of the funiculus. Propodeal spines are very long and slender. The head is nearly as broad as long (cephalic index of workers: 1.046, n=24). Frontal carinae run subparallel. Its colour is often dark red or brown.

Biology. Arboreal species, nests in twigs or under barks. It forms small colonies with 100-300 individuals. The nuptial flight is usually in July, and August. It is worth to mention, that *L. affinis* MAYR is the secondary host species of the parasitic ant *Epimyrma ravouxi* (ANDRÉ, 1896), besides the *L. unifasciatus* (LATREILLE, 1798) which is the main host species in the Carpathian basin.

Distribution. It is almost entirely a European species. It is fairly common in the Carpathian basin. It occurs in forests, as well as in semicultural areas, parks or gardens.

We have data on its presence in Romania from the ant collection of the Natural History Museum of Sibiu. These individuals were collected from Guşteriţa-Sibiu (Sibiu, Sibiu county) - 9 workers, 2 ♀, 24.09.1922, leg. MÜLLER / 1 worker, 27.04.1924, leg. MÜLLER -, from Cozia Mts., Turnu Roşu Passage - 5 workers, 04.06.1922, leg. MÜLLER -, from Cisnădie (Sibiu county) - 6 workers, 16.08.1925, leg. MÜLLER / 2 ♀, 1 ♂, 20.08.1925, leg. MÜLLER -, and from Tâmpa (Braşov county) - 1 ♀, leg. DEUBEL. It was also collected in Stana Valley (Stana, Sălaj county) -, 01.03.2001, leg Csósz et al. (Csósz et al. in print) - from trees. It is suspected to be frequent in oak forests, and everywhere in Romania, with the exception of high mountain regions.

Leptothorax clypeatus (MAYR, 1853)

Diagnosis. Funiculus with 11 segments. Antennal club is as pale as the rest of the funiculus. Clypeus is bicarinate with shallow concavity in-between. Propodeal spines are long and strong. The head, and the alitrunk are dark red or brownish red, the gaster is almost black.

Biology. It is an arboricol species, nests in twigs, stems or under barks. It forms small colonies with a few hundred members. It often can be found in the frame of garden gates, in dead worm-eaten woods, and in trees on flood area. Nuptial flight is usually in late July, and August.

Distribution. The distribution of this species is still poorly known. So far it has been recorded from Germany (SEIFERT pers.comm., and one nest series from Zeil, Kapellenberg, Bavaria, 22.07.2001. leg. Csősz), Bulgaria (AGOSTI & COLLINGWOOD 1987), South Moravia (Czech Republic) (SEIFERT 1996), Hungary (GALLÉ et al. 1998). It seems to be a rare species in the Carpathian basin, but it can be found everywhere.

The only Romanian record of this species is from Cisnădie (Sibiu county) - 1 worker, 24.07.1922, leg. MÜLLER - in the collection of the Natural History Museum of Sibiu.

Leptothorax tuberum (FABRICIUS, 1775)

Diagnosis. The funiculus of the scapes with 11 segments. Antennal club is darker, than the rest of the funiculus. Propodeal spines are short, and triangular in profile. The head is clearly longer, than broad (cephalic index of workers: 1.11, n=21). Frontal carinae run parallel. Alitrunk is often red or medium brown.

Note. *L. tuberum* (FABRICIUS) is easy to confuse with its sibling species, *L. nigriceps* MAYR, 1855.

Hereunder some distinctive characters are added for distinction between *L. nigriceps* and *L. tuberum*.

Colour: *L. nigriceps* is commonly darker, than its sibling species. Head of *L. tuberum* is light to dark brown, alitrunk is brownish yellow. At least the middle part of femora of the *L. nigriceps* is brown, while in *L. tuberum* it is entirely dark yellow. Gastral tergites of *L. nigriceps* are brown except for the first tergite, which is yellow at the base. In *L. tuberum* almost the entire first gaster tergite is yellow, or brownish yellow.

Sculpture: Head of *L. nigriceps* is strongly striated longitudinally, including the frons. Dorsum of mesosoma is strongly sculptured longitudinally. Alitrunk of *L. tuberum* is gently striated longitudinally; at least the middle part of the frons is smooth and shining. Dorsum of mesosoma is gently sculptured.

Moreover the metrical data of both species could help in distinguishing the two species:

Metrical data of 21 *L. tuberum* workers: HL:

628, HW: 567, FR: 216, SL: 449, ML-spin: 660, ML-lobus: 738, MH: 330, CI: 1.11, HW/FR: 2.63, MI: 2.00 (Csősz 2001).

Metrical data of 7 *L. nigriceps* workers: HL: 615, HW: 558, FR: 220, SL: 455, ML-spin: 698, ML-lobus: 760, MH: 318, CI: 1.10, HW/FR: 2.79, MI: 2.20 (Csősz 2001).

There is also an identification problem with *L. tuberum* and *Leptothorax albipennis* (CURTIS 1854). This latter species is very similar in colour and other characters to *L. tuberum*, but the sculpture of the head could help in separating them. Dorsum of head in *L. tuberum* is with heterogenous, mainly longitudinal rugae, while the head of *L. albipennis* is always covered with homogenous, mainly reticulate rugae.

Although PARASCHIVESCU (1975) mentioned this species from the collection of the Natural History Museum of Sibiu, but he didn't include it in his list of the Romanian ant species (1978). As such the authors of this study do not consider themselves to be the first identifiers of this species on the territory of Romania, however, this is the first paper which includes it in the Romanian myrmecofauna, and gives a brief characterization of this species.

Biology. This species characteristically nests in small, single-queened colonies under stones. According to KUTTER (1977), and SEIFERT (1996) it is a facultatively polygynous species. It occurs in grasslands, as well as in semicultural areas, like parks or gardens. *L. tuberum* often forms hybrids with *L. albipennis*. The estimated hybrid frequency is 6,4 % (SEIFERT 1999).

Distribution. It is an entirely European species. It occurs in Bulgaria, Turkey, Yugoslavia, Greece (AGOSTI & COLLINGWOOD 1987), Germany (SEIFERT 1996), Central Europe (KUTTER 1977), it is distributed from Spain to Caucasus (COLLINGWOOD 1979). *L. tuberum* is not too common in Hungary, but it can be found everywhere (Csősz 2001).

So far in Romania it has been recorded from Făgăraș Mts. - 5 worker, 18.06.1929, leg. MÜLLER (*Leptothorax acervorum* det. MÜLLER), collection of the Natural History Museum of Sibiu -, as well as from Stana Valley (Stana, Sălaj county) - 01.03.2001, meadow, leg. Csősz et al. (Csősz et al. in print). It is suspected to be widely distributed in Romania.

Lasius distinguendus (EMERY, 1916)

Diagnosis. The dorsal crest of the petiolar scale is emarginated in frontal view. The scape is frequently less flattened. The extensor profile of

hind tibia is covered normally with a few standing hairs, nest means: 2-8 subdecumbent or suberect hairs per tibiae. The scape is shorter than the head length (SL/HL: 0.869) (SEIFERT 1988).

Biology. Its typical habitats are xerothermous grasslands or steppes. Its major host species is probably *Lasius alienus* (FÖRSTER, 1850). It constructs high mounds in the grasslands. Flight period is from July to September.

Distribution. It is a European species, known from Italy, Spain, France, Switzerland, Austria, Germany, Poland, Czech Republic, Slovakia, Ukraine, Yugoslavia, Bulgaria, Greek, Turkey (AGOSTI & COLLINGWOOD 1987, SEIFERT 1988), Hungary (GALLÉ et al. 1998), and Armenia (SEIFERT 1988).

The only Romanian data is from Stana Valley (Stana, Sălaj county) - 01.03.2001, leg. Csősz et al. (Csősz et al. in print) -, where it was collected from grasslands.

Comments

On the basis of this study some additional data are obtained on the myrmecofauna of Romania. Up to now 84 species were reported from the territory of Romania (MARKÓ 1999). By presenting the above 9 species, the list of occurring ant species sums 93. It is obvious that this number must be higher in reality, as the majority of the Romanian ant species is common throughout Europe, and, although the southern part of Romania, and especially the Black Sea Coast has a clear submediterranean character, the number of Balkanic or submediterranean species is low. This state of matter is expected to change in the future by carrying out more faunistical studies.

Acknowledgements

We wish to thank to dr. Mariana PASCU, who kindly helped us with our work at the Natural History Museum of Sibiu. We are also indebted to dr. prof. László GALLÉ, for his help, and his advices on the manuscript.

A part of the data presented (on *Harpagoxenus sublaevis*, partly on *Myrmica specioides*, and also on *Formicoxenus nitidulus*) were obtained from field studies carried out by the Eco Studia Society, Cluj, Romania. Data referring to the *Leptothorax affinis*, and *Leptothorax tuberum* were partially obtained in the frame of the myrmecological field-studies of the Department of Ecology, University of Szeged, Szeged, Hungary.

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Received: 15.03.2002

Accepted: 7.06.2002

Printed: 24.06.2002