

**Ants (Hymenoptera: Formicidae) of the “Sand Dunes of Foieni”
Protected Area and Its Surroundings (Satu Mare County,
Romania), and a New Species for the Romanian Fauna**

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Summary

Faunistic investigation of the “Sand Dunes of Foieni” protected area and its surroundings (Satu Mare County, N-W Romania) yielded records for 29 ant species, among which *Lasius psammophilus* is identified for the first time in Romania. Three main habitat types were studied: mixed forest, forest edge with sand dunes and sand grassland. The poorest habitat type is the sand grassland, where almost exclusively disturbance-tolerant species occur. The need for the enlargement of the small sand dune area, the only habitat for *L. psammophilus*, is emphasized.

Keywords: ants, *Lasius psammophilus*, new species, sand dunes, Romania

Introduction

The ant fauna of Central and Eastern European countries is relatively well-known today. The new wave of the European ant taxonomy in the last decades (e.g. Seifert 1992, Radchenko and Elmes 2003, Schlick-Steiner et al. 2006) resulted not just in the description of new species and elucidation of taxonomical problems but also in the renewal or creation of checklists and faunistic monographs Europe-wide. In the last decades several such works were published for Central and Eastern European countries (e.g. Atanassov and Dlusskij 1992, Gallé et al. 1998a, Karaman 1998, Czechowski et al. 2002, Steiner et al. 2002, Bračko 2006, 2007, Petrov 2006, Seifert 2007, Werner and Wiezik 2007). The checklist of the Romanian myrmecofauna was also updated just recently (Markó et al. 2006). Upon this checklist the Romanian

fauna currently contains 103 ant species, which is, however, considerably less than the fauna of other neighbouring countries (Markó et al. 2006). The Romanian known myrmecofauna is lacking mostly cryptic, sub-mediterranean and parasitic species, but there are also other quite common European species which were not yet reported from Romania, illustrating how insufficiently the fauna is known.

Although several publications contain data on the myrmecofauna of current Romania starting even from the middle of the 19th century (see Markó et al. 2006 for a review) most of these studies deal with the myrmecofauna of a wider region (e.g. Paraschivescu 1961, 1976, Cîrdei and Bulimar 1965, Markó 1997, 1999a). Relatively few studies focus on the myrmecofauna of restricted areas (e.g. Paraschivescu 1982, Markó 1999b, Csósz et al. 2001), or carry out structural analysis in order to reveal interspecific mechanisms standing at the base of ant community organization (Markó et al. 2004). Beyond the intrinsic values of such exhaustive studies comprehensive checklists of small areas constitute good starting points for local nature protection activities. Ants are also widely used as indicator group (see Agosti et al. 2000 for a review), thus such studies can be used for monitoring activities. Ultimately the knowledge of qualitative-quantitative composition of the local fauna and the distribution of species among different habitat types can serve as basis for future complex studies treating the relationship between local and regional biodiversity patterns (Agosti et al. 2000).

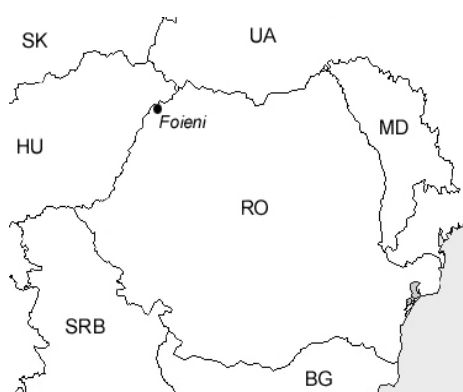


Fig. 1. Location of Foieni village in Romania.

1. ábra: Mezőfény földrajzi helyzete.

Satu Mare County, the North-Western corner of Romania, is one of the most neglected regions in Romania from myrmecofaunistic point of view. Only few data are available from the valley of Someș, nothing more (Markó 1999a). On the other hand the region houses lots of interesting areas worth of protection. One of such protected sites is the “Sand Dunes of Foieni” near Foieni village. In 2004 the enlargement of the protected area was initiated and for this reason an entomological survey was car-

ried out in the protected area and its surroundings. The collected myrmecological material is presented in the followings.

Study area, materials and methods

The “Sand Dunes of Foieni” protected area (code: 2677) lies near Foieni village in Satu Mare County, NW Romania, close to the Romanian-Hungarian border (Fig. 1). The protected area is a small sand dune area (ca. 10 ha), which is bordered by a relatively large forest and a sand grassland used for various agricultural purposes, mostly grazing (Fig. 2). A part of the surrounding forest (ca. 295 ha) and the sand grassland (ca. 118 ha) is Natura 2000 protected site. This complex of protected areas contains a mosaic of different habitats (Karácsonyi 1979, 2000, Rațiu et al. 2000). There are



Fig. 2. The “Sand Dunes of Foieni” protected area and its surroundings with the sampling sites: 1 – forest, 2 – the protected area (forest edge and sand dunes site), 3 – sand grassland, the arrow indicates the road, which separates the protected area from the grassland.

2. ábra. A mezőfényi védett homokdűnés terület és környéke a mintavételi területekkel: 1 – erdő, 2 – a mezőfényi védett homokdűnés (erdőszel és homokdűnés mintavételi terület), 3 – homokgyep (legelő), a nyíl a védett területet a legelőtől határoló földutat jelzi.

mixed oak forests (*Quercus robori-Carpinetum*, *Convallario-Quercetum roboris* and *Festuco rupicolae-Quercetum roboris*), which are only small remnants of the once large woodlands prevailing this region. Still, a remarkable number of characteristic forest species, as well as rare plant species inhabit these forests, e.g. *Convallaria majalis*, *Polygonatum latifolium*, *P. multiflorum*, *Lilium martagon*, *Iris aphylla*, *I. ruthenica*, *I. humilis*, *Platanthera bifolia*, *Listera ovata*, *Epipactis helleborine*, *Ornithogalum boucheanum*, *Cardamine bulbifera* (Karácsonyi 2000, Ghira pers. com.). The vegetation of the sand dunes belongs to the *Festuco vaginatae-Corynephorum* association, and it harbours rare plant species like *Corynephorus canescens*, *Carex supina*, *C. stenophylla*, *Jasione montana*, *Minuartia viscosa*, *Alyssum montanum* subsp. *gmelinii*, *Potentilla argentea*, *Pulsatilla pratensis* subsp. *hungarica*, *Helichrysum arenarium*, *Asparagus officinalis*, *Onosma arenaria* subsp. *arenaria*, *Anchusa officinalis*, *Chrysopogon gryllus*, *Erysimum difusum*, *Euphorbia seguieriana*, *Silene conica* (Karácsonyi 1979, 2000, Rațiu et al. 2000, Ghira pers. comm.). Between dunes and bordering areas there are xero-mesophilous and mesophilous grasslands, e.g. *Brometum tectorum*, *Cynodonti-Poëtum angustifoliae*, *Festucetum pratensis*, *Potentillo-Festucetum pseudovinae* etc. (Karácsonyi 2000).

During this study the above presented three main habitat types were studied: (1) the mixed oak forest, (2) the protected area, meaning the forest edge with sand dunes, and (3) the sand grassland. The ants were collected with pitfall traps (200 ml plastic cups) filled mostly with brine. Additionally vinegar and beer solutions was also used in some traps to attract specific insect groups. The traps were arranged in transects, the distance between them was approximately 10 m. The samplings were carried out during summer 2004. Twelve traps (ten with brine and two with vinegar solution) were put out in the forest between 07–31.08.2004. Ten traps (six with brine, three with vinegar, and one with beer solutions) were used for sampling at the forest edge between 08–26.08.2004. Additionally seven traps (five with brine and two with vinegar solution) were used for sampling in the sand grassland close to the forest edge between 08–26.08.2004. Some traps were destroyed during the sampling period by wild boars, but most of them were left intact.

Due to the inconsistency of sampling methods (three types of pitfalls were used), and the small number of traps the obtained data can serve only

for the faunistic characterization of the three main habitat types, and cannot be used for more complex ecological analyses.

Results and discussion

Altogether 536 ant individuals (521 workers, 13 queens and 2 males) were collected, which represent 29 ant species (Table 1), among which *Lasius psammophilus* Seifert, 1992 is a new species for the Romanian myrmecofauna. Upon this the number of known ant species from Romania becomes 104.

L. psammophilus is an oligotope of dry thin grasslands, particularly those on sandy substratum, one of the most numerous ant species on continental and coastal eolian sand dunes. It is also known from dry chalk grasslands (Blacker and Collingwood 2002). In Foieni it was found at the forest edge, in the protected sand dune area in a *Festuco vaginatae-Corynephorretum* association, which is usually the typical habitat for this species in Central Europe (Seifert 1992). As *L. psammophilus* is a common species of sandy areas in Hungary (Gallé et al. 1998a, b) its occurrence in Romania is not a unexpected at all. In North-Western Romania several sandy areas like the sand dunes of Foieni are known (Karácsonyi 1979), where this species could also be present. *L. psammophilus* could also occur on other sandy areas in Southern and South-Eastern Romania, which were not studied up to now. It builds totally underground nests with entrances on the bottom of crater-like hollows; the vertical galleries reach down to 120 cm, the horizontal ones stretch over 10–30 cm under the surface (Seifert 1992, Markó and Czechowski 2004). Colonies are monogynous, yet they often occupy multiple-nest systems composed of several interconnected nest units, each with its own entrance (see Brian et al. 1965, Markó and Czechowski 2004). *L. psammophilus* feeds on honeydew of root aphids and also by scavenging and preying upon small insects. It is generally non-aggressive outside its nest, therefore it could be considered to be a submissive species. Nevertheless when defending food sources it can behave aggressively even succeeding in driving away more aggressive species like *Formica cinerea* Mayr, 1853 (see Markó and Czechowski 2004). For this reason it is considered to apply a plastic competitive strategy (Markó and Czechowski 2004). Morphologically *L. psammophilus* is characterized by a generally lighter colour than its sister species, *L. paralienus* and *L. alienus*. It is easy to tell apart from these

Table 1. List of ant species identified from “Sand Dunes of Foieni” protected area and its surroundings.

1. táblázat: A Mezőfényi védett homodűnékről és környékéről gyűjtött hangyafajok jegyzéke.

SPECIES	Mean no. of workers (\pm SD) and/ or total number of sexuals		
	mixed forest	sand dune	sand grassland
Subfamily Dolichoderinae			
<i>Dolichoderus quadripunctatus</i> (Linnaeus, 1771)	0.22 (0.44) 1 ♀	1 ♀	–
<i>Liometopum microcephalum</i> (Panzer, 1798)	0.22 (0.67)	4.83 (8.54)	–
<i>Tapinoma ambiguum</i> Emery, 1925	–	1.17 (2.4)	–
Subfamily Myrmicinae			
<i>Myrmecina graminicola</i> (Latreille, 1802)	1 ♀	–	–
<i>Myrmica rubra</i> (Linnaeus, 1758)	0.78 (0.83)	–	0.5 (1.22)
<i>Myrmica ruginodis</i> Nylander, 1846	0.22 (0.67)	–	–
<i>Myrmica sabuleti</i> Meinert, 1861	0.11 (0.33)	–	–
<i>Myrmica scabrinodis</i> Nylander, 1846	–	–	11.17 (27.35)
<i>Myrmica schencki</i> Viereck, 1903	–	1.17 (2.86)	–
<i>Solenopsis fugax</i> (Latreille, 1798)	–	0.17 (0.41)	0.17 (0.41) 1 ♀, 2 ♂♂
<i>Stenammina debile</i> (Förster, 1850)	0.11 (0.33)	–	–
<i>Temnothorax crassispinus</i> (Karavajev, 1926)	1.78 (2.91)	0.17 (0.41) 1 ♀	–
<i>Temnothorax affinis</i> (Mayr, 1855)	–	0.17 (0.41)	–
<i>Temnothorax parvulus</i> (Schenk, 1852)	–	0.17 (0.41)	–
<i>Tetramorium cf. caespitum</i>	–	9.17 (5.34)	0.17 (0.41)
Subfamily Formicinae			
<i>Camponotus fallax</i> (Nylander, 1856)	0.11 (0.33)	–	–
<i>Camponotus truncatus</i> (Spinola, 1808)	0.11 (0.33)	–	–
<i>Formica cunicularia</i> Latreille, 1798	–	0.17 (0.41)	1 (1.26)
<i>Formica fusca</i> Linnaeus, 1758	0.11 (0.33)	10.17 (13.88)	–
<i>Formica rufibarbis</i> Fabricius, 1793	–	0.17 (0.41)	0.17 (0.41)
<i>Formica sanguinea</i> Latreille, 1798	–	–	0.17 (0.41)

SPECIES	Mean no. of workers (\pm SD) and/ or total number of sexuals		
	mixed forest	sand dune	sand grassland
<i>Lasius balcanicus</i> Seifert, 1988	–	0.17 (0.41)	– 2 ♀♀
<i>Lasius brunneus</i> (Latreille, 1798)	1.11 (2.32)	–	–
<i>Lasius fuliginosus</i> (Latreille, 1798)	–	0.17 (0.41)	–
<i>Lasius niger</i> (Linnaeus, 1758)	–	8.5 (17.01)	0.83 (1.33)
<i>Lasius paralienus</i> Seifert, 1992	–	1.5 (3.67)	20.83 (31.59) 6 ♀♀
<i>Lasius platythorax</i> Seifert, 1991	1.89 (2.32)	0.17 (0.41)	–
<i>Lasius psammophilus</i> Seifert, 1992	–	2 (4.43)	–
<i>Polyergus rufescens</i> (Latreille, 1798)	–	–	0.17 (0.41)

two species based on different morphometrical characters (see Seifert 1992). As operative character for mass-identification the higher number of standing setae between the propodeal spiracle and the metapleural gland can be used when occurring together with *L. alienus*, and its much lighter colour compared to the dark brown *L. paralienus*. It is currently known from Central and Northern Europe: Sweden (Seifert 1992), Finland (e.g. Markó and Czechowski 2004, Czechowski et al. 2005), Denmark (Seifert 1992), England (Seifert 1992, Blacker and Collingwood 2002), Poland (Czechowski et al. 2002), Germany (Seifert 1992), France (Seifert 1992), Czech Republic (Werner and Wiezik 2007), Slovakia (Werner and Wiezik 2007), Hungary (Gallé et al. 1998a), Croatia (Bračko 2006), Slovenia (Bračko 2007), Switzerland (Seifert 2007), Austria (Steiner et al. 2002), Ukraine (Radchenko 2007), Russia (Radchenko 2007), Belgium (Radchenko 2007), Bulgaria (Radchenko 2007), and the Netherlands (Radchenko 2007).

Twelve species were found in the forest (Table 1). The most frequent species were *Lasius platythorax* and *Temnothorax crassispinus*, followed by *Myrmica rubra* and *Lasius brunneus*; they are all typical forest or tree-dwelling species in plain regions in Romania. The presence of *Liometopum microcephalum* is worth noticing. This, mainly oak-dwelling species, is not rare generally in this part of Europe, still few records are known from Romania.

The number of species was the highest at the forest edge-sand dune sampling site, where typical forest species co-occur with sand dune species; altogether 17 species were collected here (Table 1). The most common were

Tetramorium cf. *caespitum*, *Lasius niger* and *F. fusca*. *L. psammophilus* was found only here, as well as *M. schencki* and *Tapinoma ambiguum*. Some typical tree-dwelling species also occurred in the collected material; they could forage occasionally on the sand surface near the forest edge: *Liometopum microcephalum*, *Temnothorax affinis*, *T. parvulus*, and *Lasius fuliginosus*.

The species number was the lowest on the sand grassland: 11 species were recorded here (Table 1). Intriguingly *Lasius psammophilus* was totally absent from this habitat, whereas the most frequent species was *L. paralienus*, a disturbance-tolerant species, indicating that the grassland could be severely disturbed, which could also explain the low species number. The absence of *L. psammophilus* on the other hand can be explained, besides potential competitive exclusion by *L. paralienus*, by the much higher vegetation cover on the sand grassland (see Gallé et al. 1998b, Czechowski et al. 2005). *Myrmica scabrinodis*, *Formica sanguinea* and *Polyergus rufescens* occurred only here in the studied area.

Conclusions

Lasius psammophilus is a common European species of sand dunes. The fact that it was found in Romania only now shows clearly how insufficiently the myrmecofauna is known. There are other common European species yet unidentified in Romania, which could be detected in the near future from this genus, mostly from the subgenus *Chthonolasius*. Furthermore the identification of more new species is expected, especially from among those with cryptic lifestyle.

The relatively high number of ant species identified in this small region, almost one third of the Romanian myrmecofauna, indicates a considerably rich regional species pool. On the other hand both species rich habitats, the forest and the sand dune area, are threatened by several factors: oak tree cuttings in the case of the forest, introduction of invasive plant species (e.g. *Populus* spp. [Márk-Nagy pers. com.]) in both cases, etc. Unfortunately sand dune areas of North-Western Romania are all reduced in size (Karácsonyi 1979, Rațiu et al. 2000), thus they are all exposed to such threats. On the other hand the sand grasslands, which, along agricultural areas, occupy the majority of the region, are species poor habitats and harbour mostly disturbance-tolerant ant species like *Lasius paralienus*. Such

species, as *L. niger* and *L. paralienus* already dominate the sand dunes of Foieni (see Table 1). **Thus besides the protection of the sand dunes, the intensive management of the sand grassland would be required, in order to enlarge the sand dune area if possible.** Otherwise, due to its reduced size and its peculiar shape (see Fig. 1), the “Sand Dunes of Foieni” protected area will become more and more invaded by disturbance-tolerant ant species from the sand grassland, potentially supported by ongoing succession in the ecotone zone, and ultimately the „Sand Dunes of Foieni” will loose its characteristic sand dune ant species, like *L. psammophilus*.

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**A mezőfényi védett homokdűnés és környékének hangyafaunája
(Hymenoptera: Formicidae), valamint egy Romániára
nézve új hangyafaj bemutatása**

Összefoglaló

Románia hangyafaunája meglehetősen gyengén ismert az elmúlt évtizedekben közölt számos faunisztikai tanulmány ellenére is. Jelenleg 103 hangyafaj előfordulása bizonyított az ország területén, mindez azonban messze elmarad attól a számtól, ami a szomszédos országok hangyafaunájának ismeretében várható. Az alulkutatottság mellett ugyanakkor jellemző az ország területének gyenge vagy hiányos lefedettsége, vagyis számos olyan régiója van Romániának, ahonnan majdnem semmiféle adat sem áll rendelkezésünkre. Ilyen terület az ország észak-nyugati sarka, Szatmár megye is. Nemrég a mezőfényi (*Foieni*, Szatmár megye) védett homokdűnésen és a környező területen egy talajcsapdás faunisztikai felmérésre került sor, amelynek célja a kisméretű, csupán kb. 10 hektáros védett terület kiterjesztése volt. A felmérés során begyűlt anyagból 29 hangyafajt azonosítottunk, többek között a faunára új *Lasius psammophilus*-t. A *L. psammophilus* tipikus nyílt homokos területeket kedvelő faj, Európában kifejezetten gyakori a kontinentális homokdűnéken. Az a tény, hogy eddig Romániában nem azonosították pontosan a romániai hangyafauna nem kielégítő ismertségét mutatja. A mezőfényi felmérés során három élőhelytípust tanulmányoztuk: vegyes erdő, erdőszéli homokdűnés és homokgyep. Míg az első két élőhely hangyafaunája viszonylag gazdag, addig a homokgyepet szegényes hangyafauna jellemezi, amely elsősorban zavarástűrő vagy -kedvelő fajokból áll. Mivel ugyanezek a fajok a védett homokdűnés területen is nagy mennyiségben előfordulnak, felmerül annak veszélye, hogy, amennyiben a homokgyepet intenzív természetvédelmi kezelésnek nem vetik alá elérve ezzel a homokdűnés terület kiterjesztését, a homokdűnék tipikus fajai, köztük a *L. psammophilus*, idővel eltűnhetnek a területről.

