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Contribution to the knowledge of the myrmecofauna of the Cefa Nature Park (North-Western Romania)

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Abstract

Myrmecological studies have been carried out in Romania since the last century, however, these lacked regularity. Due to their sporadic nature the checklist of the Romanian ant fauna cannot be considered completed. There are several regions that were understudied or not studied at all, such as the counties at the western border of Romania (Arad, Bihor, Satu Mare, Timiș). In the frame of the current study we present faunistic data from the Cefa Nature Park, Bihor county. Collections were carried out in five different habitat types – forest, forest edge (shrubs), dam, meadow, pasture – between April 2009 and March 2010. We identified a total of 19 ant species, all common species. This number is relatively low considering the large array of the studied habitat types, and the results of similar studies in similar areas.

Key words: ants, faunistics, Cefa Nature Park, Romania

Introduction

Ants can be found in great abundance in almost every habitat type and every region of the Earth. Based on this feature they can be used as bioindicators for monitoring purposes (Agosti et al., 2000, Vele et al. 2011). Changes occurring in the structure of ant communities are fair indicators of changes in habitat conditions (Majer 1996, Koivula et al. 2002, Holec and Frouz 2005, Ottonetti et al. 2006). Ant communities of different habitats within the same region vary to a considerable extent, and these differences are primarily determined by soil conditions and vegetation structure (see

Gallé 1990, Hoffman 2010). Habitat fragmentation can also influence the structure of ant communities due to decreased availability of food sources and suitable nesting sites, which can ultimately lead to diversity decline (Braschler and Baur 2003). In order to obtain reliable ecological data, however, thorough knowledge of the myrmecofauna is needed (Markó 2008a, Tăușan and Markó 2009, Csősz et al. 2011, Német et al. 2011).

Regular myrmecological studies in Romania were undertaken starting from the second half of the 20th century (Markó et al. 2006). The knowledge of the Romanian ant fauna is still deficient; the current species list is most likely incomplete, because there are many regions which were less or not investigated at all, such as regions from the Western part of Romania, Arad, Bihor, Satu Mare and Timiș counties. In the past decades intensive myrmecological research has been carried out, therefore the number of species on the Romanian checklist reached 103 in 2006 (Markó et al. 2006). And yet, this number was still considered low, since in other similar or neighbouring European countries there were significantly more species known (Markó et al. 2006). Since 2006 8 more ant species were added to the checklist (Markó 2008a, b, Ionescu-Hirsch et al. 2009, Moscaliuc, 2009, Czekes et al. 2012). Nevertheless, the current list of 111 species can still be considered as poor. Mainly species of cryptic and parasitic lifestyle as well as sub-Mediterranean species are missing from the list (Markó 2008a). In the frame of this article we present faunistic data regarding a poorly studied region: the Cefa Nature Park located in Western Romania, near the Hungarian border. The study is part of a more extensive biodiversity survey carried out in the Nature Park.

Materials and Methods

Study site

The Cefa Nature Park is stretching over 5002 ha and it is located near the North-Western border of Romania. The Nature Park has a common border with the Kőrös-Maros National Park in Hungary, the two parks form a cross-border protected area. The area of the Nature Park is characterized by a high diversity of habitats. The major habitat types are crops, dam-sides,

forests, meadows, salt marshes, ponds and water channels. In the frame of this study the ant fauna of five major habitat types were investigated.

Forest. – The woody vegetation is concentrated in the southern part of the park, being represented by Rădvani Forest and the neighbouring shrubs. It is a mixed deciduous forest consisting of *Quercus robur*, *Ulmus minor* and *Fraxinus excelsior*. The water table is generally high, mostly during spring.

Forest edge (shrubs). - The sampling site was near the forest site. Characteristic plant species of shrubs are: *Ligustrum vulgare*, *Prunus spinosa*, *Crataegus monogyna*, *Rhamnus frangula*.

Dam. - Dams are present all over the Nature Park, they are stretching between lakes and ponds used for intensive carp (*Cyprinus carpio*) breeding. Characteristic plant species of dams are: *Juncus gerardi*, *J. articulatus*, *Ranunculus repens*, *Mentha arvensis*, *Polygonum mite*, *Lycopus exaltatus*, *Rorippa sylvestris*, *Rumex stenophyllus*, *R. palustris*, *Polygonum hydropiper*, *Rorippa amphibia*, *Glyceria maxima*, *Oenanthe aquatica*, *Sparganium erectum*, *Iris pseudaccorus*, *Phragmites australis*, *Typha latifolia*, *T. angustifolia*.

Meadow. - Most of the fields, with the exception of agricultural areas, are salty with characteristic halophile vegetation. Characteristic plant species are: *Juncus gerardi*, *Polygonum aviculare*, *Trifolium fragiferum*, *T. ornitopodioides*, *Aster tripolium* ssp. *pannonicus*, *Festuca pseudovina*, *Artemisia santonica* ssp. *monogyna*, *Poa bulbosa*, *Scleranthus anuus*, *Scorzonera cana*, *Plantago maritima*, *Gypsophila muralis*, *Statice gmelini*, *Peucedanum officinale*, *Cirsium brachycephalum*.

Pasture. - Pastures are grazed by cows and sheep, generally. Characteristic therophyte plant species of pastures are: *Lotus angustissimus, Matricaria recutita*, *Xanthium italicum*, *Polygonum aviculare.*

Sampling and data management

Sampling of the epigaeic ant communities was carried out by the administration of the Cefa Nature Park. Pitfall traps, plastic cups of 500 ml filled with 50 ml of antifreeze solution (alcohol & glycerin), were applied during sampling. Traps were checked on monthly basis, from April 2009 to March 2010. Unfortunately, during collection the resulting material was partially damaged, thus only a truncated ant fauna list could be obtained. Given the above sampling error there was no possibility for any further analysis regarding the structure of ant communities of different habitats.

Results

Altogether 19 ant species were identified (Table 1), all common ant species in Romania. The forest edge (15) and the meadow (10) seemed to retain the highest number of species, whereas the pasture (4) and the dam (4) had the lowest, probably due to intensive anthropogenic disturbance (Table 1).

Table 1. List of identified ant species.
***1. táblázat**: Azonosított hangyafajok listája.*

List of species	Forest	Forest edge (shrubs)	Dam	Meadow	Pasture
Dolichoderus quadripunctatus (L., 1771)	+				
Tapinoma erraticum (Latr., 1798)		+		+	
Tapinoma subboreale Seifert, 2012	+	+		+	
Myrmica rubra (L., 1758)	+				
Myrmica sabuleti Mein., 1861		+	+		
Myrmica scabrinodis Nyl., 1846		+	+	+	
Myrmica slovaca Sadil, 1952		+	+	+	
Myrmica specioides Bond., 1918		+			
Myrmecina graminicola (Latr., 1802)	+				
Tehmnothorax crassispinus (Karav., 1926)	+				
Tetramorium cf. caespitum (L., 1758)		+		+	
Formica cunicularia Latr., 1798	+	+		+	+
Formica rufibarbis Fabr., 1793		+		+	+
Lasius flavus (Fabr., 1782)		+		+	
Lasius fuliginosus (Latr., 1798)		+			
Lasius niger (L., 1758)	+	+	+	+	+
Lasius paralienus Seifert, 1992		+		+	+
Lasius platythorax Seifert, 1991		+			
Polyergus rufescens (Latr., 1798)		+			
Total no. of species	7	15	4	10	4

Subfamily Dolichoderinae

Dolichoderus quadripunctatus (Linnaeus, 1771)
It is a species distributed in Central, Southern and Eastern Europe, in Caucasus, and the southern part of Western Siberia (Czechowski et al. 2012). It is an arboricolous species, generally occurring in warm and sunny woodland areas. Nuptial flights occur in July (Czechowski et al. 2012). *Dolichoderus quadripunctatus* is a common species in Romania. This species was found only in the forest site.

Tapinoma erraticum (Latreille, 1798)
Generally, it is distributed in the southern part of Eastern Europe, in Central Europe, the north-western part of Africa, Asia Minor, Lebanon, Israel, Caucasus, and Central Asia. It is a thermophilous and semixerophilous species living in open, sunny and relatively dry habitats. Nuptial flights can be observed in June and July (Czechowski et al. 2012). *Tapinoma erraticum* is a common species is Romania.

Tapinoma subboreale Seifert, 2012
It can be found in Central and Southern Europe. It is a thermophilous and semixerophilous species living in open, sunny and relatively dry habitats. Nuptial flights occur in June (Czechowski et al. 2012). It is a common species in Romania.

Subfamily Myrmicinae

Myrmica rubra (Linnaeus, 1758)
Myrmica rubra is one of the most common Palaeartic *Myrmica* species, distributed in Europe and Asia from Portugal to Eastern Siberia and from northern Italy to the tundra zone. It occurs in mesophilous to very wet habitats, frequently in areas with anthropogenic disturbance. Nuptial flights take place in August and September (Radchenko and Elmes 2010). It is one of the most common *Myrmica* species in Romania (Czekes et al. 2012). This species was found only in the forest site.

Myrmica sabuleti Meinert, 1861
Myrmica sabuleti is a widely distributed ant species, it occurs from southern Norway and Sweden to Western Siberia, Spain, Italy and all the Balkans. It prefers forests and open habitats. Nuptial flights occur in August and September (Radchenko and Elmes 2010). It is one of the most common *Myrmica* species in Romania, yet there is little published data on its presence (Czekes et al. 2012).

Myrmica scabrinodis Nylander, 1846
Myrmica scabrinodis is a Euro-Siberian species. It occurs in Europe, East Siberia and Central Asia. It lives in moderately humid habitats, tolerates soil moisture but needs great insolation, avoiding only definitely xerothermal places. Nuptial flights take place in July and October (Radchenko and Elmes 2010). It is one of the most common species in Romania (Czekes et al. 2012).

Myrmica slovaca Sadil, 1952
Myrmica slovaca is a species with distribution from Central Europe to West Siberia and northern Kazakhstan. It is a termophilous species (Radchenko and Elmes 2010). Most probably this species has long been confused with *M. sabuleti* in Romania, thus, supposedly, this species is under-reported in Romania (Czekes et al. 2012).

Myrmica specioides Bondroit, 1918
This species is distributed in Central and Western Europe and northern part of the Balkan Peninsula, the Caucasus, Asia Minor, Iran, Turkmenistan, south of Western Siberia and northern Kazakhstan (Radchenko and Elmes 2010). This *Myrmica* species is the most xerophilous species in Central Europe. Nuptial flights take place in August and September (Radchenko 2010). In Romania it is a common species (Czekes et al. 2012).

Myrmecina graminicola (Latreille, 1802)
It is known from Europe, the north-western part of Africa, Caucasus, southern part of the Russian, Korean peninsula. It is a thermophilous species, mainly inhabiting light deciduous forests and gardens, but it may also live in open habitats. Nuptial flights occur in August or September (Radchenko and Elmes 2010). In Romania it is a common species.

Temnothorax crassispinus (Karavaiev, 1926)
Temnothorax crassispinus is widely distributed throughout deciduous forests in Europe, the eastern part of Central Europe, Eastern Europe, Crimea, Caucasus. It is a mesothermophilous species that inhabits mainly moderately dry coniferous and mixed forests (Czechowski et al. 2012). Nuptial flights occur in July and August (Czechowski et al. 2012). *T. crassispinus* is a very common species in Romania. This species was found only in the forest site.

Tetramorium cf. *caespitum* (Linnaeus, 1758)
It is a species with wide distribution, it can be found in the whole Palaearctic, and it is an invasive species is USA. *T. caespitum* is a semixerophilous species which inhabits mainly open, sun-exposed and dry places, sparsely covered with herbaceous vegetation; it is especially common in sandy soils in the plain region (Czechowski et al. 2012). Nuptial flights occur in June and July (Czechowski et al. 2012). In Romania it is a very common species.

Subfamily Formicinae

Formica cunicularia Lalreille, 1798
It is a very common species in Europe occurring also in Crimea and Caucasus and Asia Minor. It can be found in all types of habitats, in open areas, sandy dunes, meadows and pastures, forest glades, forest edges and dry forests (Czechowski et al. 2012). It is one of the most common species in Romania.

Formica rufibarbis Fabricius, 1793
It is a species with wide distribution, it can be found in Europe, southern part of Western Siberia, Asia Minor and the Caucasus. It inhabits open, dry and sun-exposed habitats (Czechowski et al. 2012). Nuptial flights occur in June and July (Czechowski et al. 2012). It is one of the most common species in Romania.

Lasius flavus (Fabricius, 1782)
It is a Transpalaearctic species of southern distribution. This species occurs in great densities in meadows and pastures. It is an eurytopic species, preferring open and sunny habitats (Czechowski et al. 2012). Nuptial flights

occur in July and August (Czechowski et al. 2012). It is a very common species in Romania.

Lasius fuliginosus (Latreille, 1798)
It is a Palaearctic species distributed in Europe, Caucasus, south part of Western Siberia, northern Kazakhstan, Russian part of Far East, northeastern China, Korea and Japan. It is a dendrophilous species, an oligotope of deciduous forests but it can be found in mixed or even coniferous forests (Czechowski et al. 2012). Nuptial flights occur from May to October (Czechowski et al. 2012). It is a very common species in Romania. This species it was found only at the forest edge.

Lasius niger (Linnaeus, 1758)
It is most probably a Transpalaearctic species distributed from the Atlantic to the Pacific Ocean; its actual range is especially in the eastern parts of the Palaearctic (Czechowski et al. 2012). Nuptial flights occur from July to August (Czechowski et al. 2012). It is a very common species in Romania.

Lasius paralienus Seifert, 1992
It is distributed from Western and Central Europe to Asia Minor, but most probably its range is wider. *L. paralienus* is an oligotope of dry grasslands, especially those on limestone substrate, but also on sandy and loess substrate as well (Czechowski et al. 2012). Nuptial flights occur in August (Czechowski et al. 2012). *Lasius paralienus* is a very common species in Romania.

Lasius platythorax Seifert, 1991
It is a species with wide distribution, it can be found from the Atlantic to the Pacific Ocean (Czechowski et al. 2012). Probably a Transpalaearctic species, it lives in moderately humid habitats, tolerates soil moisture. It inhabits all types of forest as well as bogs and fens, and usually avoids open, sun-exposed sites Nuptial flights occur from July to August (Czechowski et al. 2012). It a common species in Romania. This species was found only at the forest edge.

Polyergus rufescens (Latreille, 1798)
It is distributed in Central and South Europe, the southern part of Eastern Europe, Caucasus, Western Siberia and Northern Kazakhstan. It is an obligatory social parasite (slave-maker) totally dependent on its host,

which are species of the subgenus *Serviformica* (Czechowski et al. 2012). Nuptial flights occur July and in August (Czechowski et al. 2012). It is a common species in Romania, although not very frequent. This species was found only at the forest edge.

Conclusions

The 19 ant species identified by us indicate a relatively poor fauna of the Cefa Nature Park, since currently there are 111 ant species known in Romania (Markó et al. 2006, Markó 2008a,b, Ionescu-Hirsch et al. 2009, Czekes et al. 2012). Markó (2008a) conducted a similar study near Foieni, Satu Mare county, involving similar habitats as in Cefa Nature Park (mixed forest, sand dunes at the forest edge, grasslands), still a total of 29 species were identified during his study, more than we identified in the Cefa Nature Park. In the frame of a similarly small-scale study carried out in the surroundings of Sibiu city there were also more species identified, a total of 23 (Tăușan and Markó 2009). If we take into consideration that even on abandoned old fields of the Transylvanian Lowland a total of 22 species were identified (Német et al. in prep.), then the number of ant species from the Cefa Nature Park and surroundings can indeed be regarded as very small.

Based on the above data, and on the fact that the vast majority of identified species were common Romanian species, we can state that the ant species list of Cefa Nature Park is poor and, most probably, incomplete thus, further investigations are needed.

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Adatok a Cséffa Natúrpark hangyafaunájához

Összefoglaló

Mürmekológiai kutatásokra Erdélyben és Romániában már az elmúlt században sor került, viszont nélkülözték a rendszerességet. Szórványos kutatások következtében Románia, és ezen belül Erdély területén található fajok listája nem nevezhető teljesnek, hiszen számos olyan régió létezik, amelyet alig vagy egyáltalán nem kutattak, mint például Románia nyugati határ menti részei Arad, Bihar, Szatmár, valamint Temes megye hangyafaunájáról keveset tudunk.

Jelen vizsgálatunkat a Cséffa Natúrpark (*Parcul Natural Cefa*, Bihar megye) területén gyűjtött anyagok alapján készítettük. Öt különböző élőhely típusban – kaszáló, legelő, erdő, erdőszél, töltés – került sor talajcsapdás mintavételezésre a Natúrpark igazgatósága által 2009 április és 2010 március között. A begyűjtött anyag egy része válogatás során károsodott, így a a rendelkezésünkre kerülő anyag csak egy bizonyos része volt felhasználható meghatározásra, s ennek következtében csak egy szelektív fajlista készülhetett el. Összesen 19 hangyafajt azonosítottunk amelyek mind közönségesek Románia területére nézve. Az élőhelyek változékonyságához viszonyítva relatíve szegényes közösségnek mondható.