

The myrmecofauna (Hymenoptera: Formicidae) of Hungary: an updated checklist

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Abstract. The last checklist of Hungarian myrmecofauna was published at the end of the 1990s. Since then, several taxonomic and faunistic changes have occurred. The following article provides an updated checklist of Hungarian ants containing 126 species, five of which are found exclusively indoors. Six new species of the Hungarian myrmecofauna are reported (*Tennothorax albipennis*, *T. jailensis*, *Tetramorium* sp. D, *Tapinoma melanocephalum*, *Plagiolepis pallelescens*, and *P. ampeloni*), and a few species are deleted from the list. Finally, we offer a brief descriptive comparison of the Hungarian myrmecofauna with the ant fauna of the surrounding countries.

Keywords: ants, faunistics, checklist, Hungary, Europe.

Introduction

The myrmecofauna of central and eastern Europe is relatively well-known. Over the course of the past few decades several old checklists and faunistic monographs have been updated and new ones have been published for central and eastern Europe countries (e.g. Radchenko 1991, Seifert 2001, Czechowski et al. 2002, Steiner et al. 2002, Karaman 2004, Radchenko et al. 2004, Bračko 2006, 2007, Petrov 2006, Werner & Wieszik 2007, Karaman 2009, Lapeva-Gjonova et al. 2010). The last checklist of Hungarian ants was compiled in the late 1990s and reported 101 species (Gallé et al. 1998).

The myrmecofauna of present-day Hungary has been studied in considerable detail over the course of the last few centuries, and several checklists have been published since the mid 1800's. The first detailed checklist containing locations was published by Mayr (1856). He listed 40 species for the territory of present-day Hungary. His work was later updated toward the end of the 19th century (Mocsáry 1897) resulting in a checklist that contained 56 species for the territory of present-day Hungary. His work was followed by Somfai's (1959) monograph that listed 66 species. Thus, the number of species increased considerably in the last checklist of Hungarian ants (Gallé et al. 1998), due mostly to intensive myrmecological work during the second half of

the 20th century (e.g. Gallé 1969, 1972, 1979, Gallé & Szőnyi 1988, Csosz & Tartally 1998).

However, since publication of the most recent Hungarian checklist, many new taxa have been described (e.g. Seifert 2003, Schlick-Steiner et al. 2006, Csosz et al. 2007, Csosz & Schulz 2010), revived from synonymy (e.g. Csosz & Seifert 2003, Radchenko & Elmes 2009), or the validity of their status has been confirmed on the basis of new findings (Csosz & Markó 2004). Furthermore, several new myrmecological studies have been carried out reporting new ant species for the Hungarian fauna and new data regarding species already known (e.g. Csosz 2000, 2001, 2003, Csosz et al. 2002, Markó & Csosz 2002, , Tartally & Csosz 2004, Csosz & Markó 2005, Gallé et al. 2005, Csosz et al. 2007, Ionescu-Hirsch et al. 2009, Csosz & Schulz 2010). Consequently, there is need of an updated checklist of the Hungarian myrmecofauna such as the one presented here.

Materials and methods

The current species list was prepared by consulting major myrmecofaunistic papers for the territory of current Hungary, as well as other papers handling Hungarian data. The list of names was based on the catalogue by Bolton et al. (2006), as well as on the basis of currently available taxonomic literature (e.g. Czechowski et al. 2002, Seifert 2007, Radchenko & Elmes 2009). In some cases the Antbase search engine (Agosti & Johnson 2005)

was also used. Most species were collected in recent decades, but some records could not be verified by checking voucher specimens or by collecting from sample sites. Among respective species, those not recorded from surrounding countries or those with unclear taxonomic status at the time of publication were considered of uncertain occurrence in Hungary.

List of species

A total of 125 species were recorded from Hungary, including six new species: *Temnothorax albipennis*, *T. jailensis*, *Tetramorium* sp. D, *Tapinoma melanocephalum*, *Plagiolepis pallescens*, and *P. ampeloni*. Five species of exotic origin were recorded exclusively from indoors: *Hypoponera punctatissima*, *Monomorium pharaonis*, *Tetramorium bicarinatum*, *T. insolens*, and *Tapinoma melanocephalum*. Four species were considered of uncertain occurrence: *Myrmica sulcinodis*, *Camponotus sylvaticus*, *Formica aquilonia*, and *F. lugubris*, and were excluded from the list of Hungarian myrmecofauna.

Subfamily Proceratiinae

Proceratiini

Proceratium melinum (Roger, 1860)
= *Sysphincta fialai* Kratochvil, 1944: Somfai (1959)

Subfamily Ponerinae

Ponerini

Cryptopone ochracea (Mayr, 1855)
= *Cryptopone ochraceum*: Csősz (2003)
Hypoponera punctatissima (Roger, 1859): Gallé et al. (1998)
= *Ponera punctatissima*: Somfai (1959)
Ponera coarctata (Latreille, 1802): Mayr (1856)
Ponera testacea Emery, 1895: Csősz & Seifert (2003)

Subfamily Myrmicinae

Dacetini

Pyramica argiola (Emery, 1869)
= *Epitritus argiolus*: Mocsáry (1897)
Pyramica baudueri (Emery, 1875)
= *Strumigenys baudueri*: Somfai (1959)
= *Smithistruma baudueri*: Gallé et al. (1998)

Myrmicini

Manica rubida (Latreille, 1802): Gallé et al. (1998)
= *Myrmica rubida*: Mayr 1855
= *Myrmica* (*Neomyrma*) *rubida*: Somfai (1959)
Myrmica constricta Karavajev, 1934
= *Myrmica hellenica* Finzi, 1926: Gallé et al. (2005)

Myrmica deplanata Ruzsky, 1905: Somfai (1959)
Myrmica gallienii Bondroit, 1920: Csősz & Tartally (1998)

Myrmica karavajevi (Arnoldi, 1930)
= *Sifolinia karavajevi*: Gallé et al. (1998)
= *Sifolinia faniensis* (van Boven, 1970): Gallé (1979)

Myrmica lobicornis Nylander, 1846: Mocsáry (1897)
Myrmica lonae Finzi, 1926: Tartally & Csősz (2004)
Myrmica rubra (Linnaeus, 1758): Csősz & Tartally (1998)
= *Myrmica laevinodis* Nylander, 1846: Mayr (1856)
= *Myrmica microrubra* Seifert, 1993: Csősz et al. (2002)

Myrmica ruginodis Nylander, 1846: Mayr (1855)
Myrmica rugulosa Nylander, 1849: Mocsáry (1897)
Myrmica sabuleti Meinert, 1861: Somfai (1959)
Myrmica scabrinodis Nylander, 1846: Mayr (1855)
= *Myrmica rugulosoides* Forel, 1915: Gallé (1967)
Myrmica schencki Viereck, 1903: Gallé (1986a)
Myrmica slovacica Sadil, 1952 - *M. slovacica* has been generally misidentified as *M. salina* in central Europe, while *M. salina* occurs closest in Kazakhstan (Radchenko & Elmes 2009).
= *Myrmica salina* Ruzsky, 1905: Csősz & Tartally (1998)

Myrmica specioides Bondroit, 1918: Gallé (1975)
= *Myrmica sancta* Karavaiev, 1926: Gallé (1972b)

Myrmica vandeli Bondroit, 1920: Tartally & Csősz (2004)

Myrmecini

Myrmecina graminicola (Latreille, 1802): Somfai (1959)
= *Myrmecina latreillei* Curtis, 1829: Mayr (1856)

Pheidolini

Aphaenogaster subterranea (Latreille, 1798): Mocsáry (1897)
Messor structor (Latreille, 1798): Somfai (1959)
= *Atta structor*: Mayr (1855)
= *Aphaenogaster structor*: Mocsáry (1897)
= *Messor rufitarsus* (Fabricius 1804): Gallé (1986b)

Stenammini

Stenamma debile (Foerster, 1850): Csősz (2000)
= *Stenamma westwoodii* Westwood, 1839: Somfai (1959)

Crematogastrini

Crematogaster schmidti (Mayr, 1853): Gallé et al. (1998)

- Crematogaster scutellaris* (Olivier, 1792): Mayr (1861)
- Crematogaster sordidula* (Nylander, 1849): Mayr (1861)
- Solenopsidini**
- Monomorium pharaonis* (Linnaeus, 1758): Somfai (1959)
- Solenopsis fugax* (Latreille, 1798): Mayr (1856)
- Formicoxenini**
- Formicoxenus nitidulus* (Nylander, 1846): Somfai (1959)
- Harpagoxenus sublaevis* (Nylander, 1849): Somfai (1959)
- Myrmoxenus ravouxi* (André, 1896)
= *Epimyрма goesswaldi* Menozzi, 1930: Gallé & Szőnyi (1988)
= *Epimyрма ravouxi*: Csősz & Tartally (1998)
- Cardiocondyla elegans* Emery, 1869
= *Cardiocondyla sahlbergi* Forel, 1913: Gallé et al. (1998) [erroneous determination]
- Leptothorax aceroorum* (Fabricius, 1783): Somfai (1959)
- Leptothorax gredleri* Mayr, 1855: Somfai (1959)
- Leptothorax muscorum* (Nylander, 1846): Somfai (1959)
- Temnothorax affinis* (Mayr, 1855)
= *Leptothorax affinis* Mayr, 1855: Somfai (1959)
- Temnothorax albipennis* (Curtis, 1854): **new record**, 8 workers, Budapest, Hűvösvölgy, 10.04.1907. leg. Szabó
- Temnothorax clypeatus* (Mayr, 1853)
= *Leptothorax clypeatus*: Somfai (1959)
- Temnothorax corticalis* (Schenck, 1852)
= *Leptothorax corticalis*: Somfai (1959)
- Temnothorax crassispinus* (Karavajev, 1926)
= *Leptothorax nylanderi*: Mayr (1856)
= *Leptothorax slavonicus* Seifert, 1995: Csősz & Tartally (1998)
- Temnothorax interruptus* (Schenck, 1852)
= *Leptothorax interruptus*: Mayr 1855: Mocsáry (1897)
= *Leptothorax tuberum* var. *interruptus*: André 1881: Somfai (1959)
- Temnothorax jailensis* (Arnoldi, 1977): **new record**, 1 worker, Budapest, Rupp-hegy, 05.30.2002. leg. Nagy
- Temnothorax nigriceps* (Mayr, 1855)
= *Leptothorax nigriceps* Mayr, 1855: Csősz (2001)
- Temnothorax parvulus* (Schenck, 1852)
= *Leptothorax parvulus* (Schenck, 1852): Somfai (1959)
- Temnothorax rabaudi* (Bondroit, 1918)
= *Leptothorax rabaudi* Bondroit, 1918: Barrett (1970)
- Temnothorax sordidulus* (Müller, 1923)
= *Leptothorax sordidulus*: Csősz (2001)
- Temnothorax tuberum* (Fabricius, 1775)
= *Leptothorax tuberum*: Mayr 1855: Mayr (1861)
- Temnothorax unifasciatus* (Latreille, 1798)
= *Leptothorax unifasciatus*: Mayr (1856)
= *Leptothorax tuberum* var. *unifasciatus*: André 1881: Somfai (1959)
- Tetramoriini**
- Anergates atratulus* (Schenck, 1952): Mocsáry (1897)
= *Tetramorium atratulum*: Mayr (1856)
- Strongylognathus testaceus* (Schenck, 1952): Mayr (1856)
- Tetramorium bicarinatum* (Nylander, 1846): Mocsáry (1897)
- Tetramorium caespitum* (Linnaeus, 1758): Mayr (1855)
- Tetramorium ferox* Ruzsky, 1903: Radchenko (1977)
- Tetramorium hungaricum* Rösler, 1935
= *Tetramorium caespitum hungaricum* Rösler, 1935: 78. Rösler (1935)
= *Tetramorium hungaricum*: Rösler (1951)
- Tetramorium impurum* (Förster, 1850): Csősz et al. (2002)
- Tetramorium insolens* (Smith, 1861)
- Tetramorium moravicum* Kratochvíl, 1941
= *Tetramorium rhenanum*: Schulz 1996: Gallé et al. (1998)
= *Tetramorium moravicum*: Csősz et al. (2007)
- Tetramorium semilaeve* (André, 1881): Gallé et al. (1998)
= *Tetramorium simillimum* (Smith, 1851): Gallé et al. (1998) [erroneous determination]
- Tetramorium* sp. C Schlick-Steiner et al., 2006: Schlick-Steiner et al. (2006)
- Tetramorium* sp. D Schlick-Steiner et al., 2006: **new record**, 6 workers, Vértesboglár, legelő, 12.10.2007, leg. Csősz; 6 workers, Vértesboglár, legelő, 18.05.2008, leg. Csősz)
- Tetramorium* sp. E Schlick-Steiner et al., 2006: Schlick-Steiner et al. (2006)
- Subfamily Dolichoderinae**
- Dolichoderini**
- Dolichoderus quadripunctatus* (Linnaeus, 1771): Mocsáry (1897)
= *Hypoclinea quadripunctata*: Mayr (1855)
- Liometopum microcephalum* (Panzer, 1798): Mocsáry (1897)
= *Formica austriaca* Mayr, 1853: Mayr (1855)

- Tapinoma erraticum* (Latreille, 1798): Mayr (1855)
Tapinoma madeirense Forel, 1895
 = *Tapinoma ambiguum* Emery, 1925: Gallé (1986a)
Tapinoma melanocephalum (Fabricius, 1793): **new record**, 6workers, Budapest, Váci út 56-58. 03.05.2009. leg. Csósz
- Bothriomyrmex menozzii* Emery, 1925: Markó & Csósz (2002)
Bothriomyrmex meridionalis (Roger, 1863): Somfai (1959)
- Subfamily Formicinae**
- Plagiolepidini
- Plagiolepis ampelsoni* (Faber, 1969): **new record**, 17 queens, 4 males, Budapest, Budatétény, 07.15.2005. leg. Csósz
Plagiolepis pallescens Forel, 1889: **new record**, 4 workers, Budapest, Mátyás-hegy, 02.04.1926. leg. Szabó-Patay; 1 worker, Budapest, 14.04.1918. leg. Szabó
Plagiolepis pygmaea (Latreille, 1798): Mocsáry (1897)
 = *Tapinoma pygmaeum*: Mayr (1855)
Plagiolepis taurica Santschi, 1920
 = *Plagiolepis vindobonensis* Lomnicki, 1925: Somfai (1959)
Plagiolepis xene Staercke, 1936: Gallé & Szőnyi (1988)
- Camponotini
- Camponotus aethiops* (Latreille, 1798): Mocsáry (1897)
 = *Formica aethiops*: Mayr (1855)
 = *Camponotus marginatus* Latreille, 1798: Mocsáry (1897)
Camponotus atricolor (Nylander, 1849) [sensu Seifert 1996]: Seifert (1996)
Camponotus fallax (Nylander, 1856): Gallé (1981)
 = *Camponotus caryae* var. *fallax* (Nylander, 1856): Somfai (1959)
 = *Camponotus caryae* (Fitch 1855): Gallé (1966)
Camponotus herculeanus (Linnaeus, 1758): Mocsáry (1897)
Camponotus lateralis Olivier, 1792: Mocsáry (1897)
 = *Formica lateralis* Olivier, 1792: Mayr (1855)
Camponotus ligniperda (Latreille, 1802): Mocsáry (1897)
Camponotus piceus (Leach, 1825): Gallé (1979)
 = *Camponotus lateralis* var. *piceus* (Leach, 1825): Somfai (1959)
Camponotus tergestinus Müller, 1921: Ionescu-Hirsch et al. (2009)
- Camponotus truncatus* (Spinola, 1808): Mocsáry (1897)
Camponotus vagus (Scopoli, 1763): Mocsáry (1897)
 = *Formica pubescens* Fabricius, 1775: Mayr (1856)
 = *Formica ligniperda*: Mayr (1855)
- Lasiini
- Prenolepis nitens* (Mayr, 1853): Gallé et al. (1998)
 = *Tapinoma nitens*: Mayr (1856)
 = *Prenolepis imparis* var. *nitens*: Mocsáry (1897)
Lasius alienus (Förster, 1850): Mocsáry (1897)
 = *Formica aliena* Förster, 1850: Mayr (1855)
Lasius balcanicus Seifert, 1988: Csósz & Tartally (1998)
Lasius bicornis (Förster, 1850): Somfai (1959)
Lasius brunneus (Latreille, 1798): Mocsáry (1897)
Lasius carnolicus Mayr, 1861: Gallé & Szőnyi (1988)
Lasius citrinus Emery, 1922: Csósz & Markó (2005)
 = *Lasius bicornis* var. *affinis* Schenck, 1852: Mocsáry (1918)
 = *Lasius affinis* Schenck, 1852: Somfai (1959)
Lasius distinguendus (Emery, 1916): Csósz et al. (2002)
Lasius emarginatus (Olivier, 1792): Mocsáry (1897)
Lasius flavus (Fabricius, 1782): Mocsáry (1897)
 = *Formica flava* Fabricius, 1782: Mayr (1856)
Lasius fuliginosus (Latreille, 1798): Mocsáry (1897)
 = *Formica fuliginosa* Latreille, 1798: Mayr (1855)
Lasius jensi Seifert, 1982: Csósz et al. (2002)
Lasius meridionalis Bondroit, 1920: Csósz & Tartally (1998)
Lasius mixtus (Nylander, 1846): Mocsáry (1897)
Lasius myops Forel, 1894: Gallé et al. (1998)
 = *Lasius flavus* var. *myops* Forel, 1894: Somfai (1959)
Lasius neglectus Van Loon, Boomsma et Andrásfalvy, 1990: Van Loon et al. (1990)
Lasius niger (Linnaeus, 1758): Mocsáry (1897)
 = *Formica nigra* Linnaeus, 1758: Mayr (1855)
Lasius paralienus Seifert, 1992: Csósz & Tartally (1998)
Lasius platythorax Seifert, 1991: Csósz & Tartally (1998)
 = *Formica brunnea* Latreille, 1798: Mayr (1856)
 = *Formica timida* Förster, 1950: Mayr (1856)
Lasius psammophilus Seifert, 1992: Csósz & Tartally (1998)
Lasius umbratus (Nylander, 1846): Mocsáry (1897)
 = *Formica umbrata* Nylander, 1846: Mayr (1856)
- Formicini
- Cataglyphis aenescens* (Nylander, 1849): Gallé et al. (1998)

- = *Formica cursor* Fonscolombe, 1846: Mayr (1856)
 = *Myrmecocystus cursor*: Mocsáry (1897)
 = *Cataglyphis cursor aenescens*: Gallé (1972a)
Cataglyphis nodus (Brullé, 1832): Gallé et al. (1998)
 = *Monocombus viaticus* (Fabricius, 1787): Mayr (1855)
 = *Formica viatica*: Mayr (1856)
 = *Cataglyphis viaticus* var. *orientalis* Forel, 1895: Mocsáry (1897)
 = *Myrmecocystus bicolor* (Fabricius, 1793): Somfai (1959)
 = *Cataglyphis bicolor nodus* (Brullé, 1832): Gallé (1979)
Formica cinerea Mayr, 1853: Somfai (1959)
Formica clara Forel, 1886
 = *Formica glauca* Ruzsky, 1895: Gallé et al. (2005)
Formica cunicularia Latreille, 1798: Mayr (1856)
 = *Formica fusca glebaria* Nylander, 1846: Gallé (1972)
Formica exsecta Nylander, 1846: Mayr (1856)
Formica fusca Linnaeus, 1758: Mayr (1856)
Formica fuscocinerea Forel, 1874: Csósz et al. (2002)
Formica gagates Latreille, 1798: Mayr (1855)
Formica pratensis Retzius, 1783: Mocsáry (1897)
 = *Formica congerens* Nylander, 1846: Mayr (1856)
 = *Formica rufa pratensis*: Somfai (1959)
Formica polyctena Förster, 1850: Gallé (1979)
Formica pressilabris Nylander, 1846: Radchenko 1997
Formica rufa Linnaeus, 1761: Mocsáry (1897)
Polyergus rufescens (Latreille, 1798): Mayr (1856)
Formica rufibarbis Fabricius, 1793: Mocsáry (1897)
 = *Formica cunicularia* Latreille, 1798: Mocsáry (1897)
 = *Formica fusca* var. *glebaria* Nylander, 1846: Somfai (1959)
 = *Formica fusca glebaria* Nylander, 1846: Gallé (1972)
Formica sanguinea Latreille, 1798: Mayr (1856)
Formica truncorum Fabricius, 1804: Somfai (1959)
 = *Formica truncicola* Nylander, 1846: Mayr (1856)

Species of doubtful occurrence

Myrmica sulcinodis Nylander, 1846. Mocsáry (1897) mentioned this species from the plains near Rákospalota, Hungary. This species does not occur in lowlands (100-200 m a.s.l.) in central Europe. Hence, the record is apparently erroneous. The

above data is repeated by Somfai (1959). At present there is no reliable data or existing voucher specimens supporting occurrence of this species in Hungary.

Camponotus sylvaticus (Olivier, 1792). Mocsáry (1897) mentioned this species from Budapest, Derekegyház, Eger, Simontornya, Sátoraljaújhely, Tokaj and Szendrő. According to Ionescu-Hirsch et al. (2009) there is a strong possibility that Mocsáry misidentified it. *C. sylvaticus* is distributed in southern Europe, and Bulgaria is the closest country to Hungary where it can be found, which throws into question its presence in Hungary.

Formica lugubris Zetterstedt, 1838 and *Formica aquilonia* Yarrow, 1955. A set of *Formica* s. str. specimens from Hungarian localities in the collection of the Natural History Museum in Budapest was studied by K. Gösswald, and specimens were identified either as *lugubris* or *aquilonia*. Based on this, other authors (e.g. Gallé 1979) included these species in the Hungarian fauna. Nevertheless neither the recent thorough analysis of the HNHM's material nor previous collections confirmed the existence of these typical high mountain elements (Czechowski et al. 2002) in Hungary. Thus, we remove these species from the Hungarian checklist because their occurrence in Hungary is improbable.

Discussion

The Hungarian fauna and flora can generally be characterized by the co-occurrence of eastern European, central European and Mediterranean elements (e.g. Borhidi 2003). Thus precise knowledge of Hungarian ant species is of major importance for any future phylogeographical and taxonomic-faunistic study regarding the origin of European myrmecofauna and speciation processes in Europe. The myrmecofauna of central-eastern Europe is clearly exemplified by the high diversity of cryptic species within the *Tetramorium caespitum* complex in the region, revealed only recently (Schlick-Steiner et al. 2006). New records presented in this checklist also support the general perception concerning Hungarian fauna that it is closely connected to the steppe region surrounding the Black Sea (Ponto-Caspian Region). A more accurate picture can be obtained when the Hungarian myrmecofauna is put in the context of the ant fauna of the neighbouring countries (Fig. 1). A

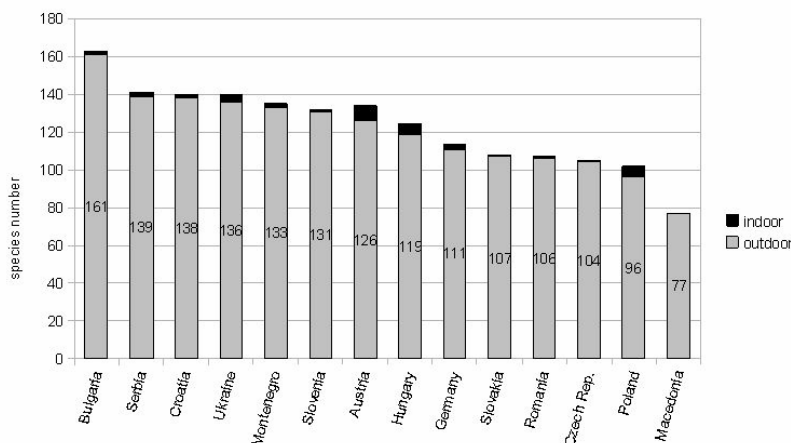


Figure 1. The number of outdoor ant species of different Central, Eastern and Southern European countries (the number of indoor species in parentheses) in decreasing order of species number: Bulgaria (2) (Lapeva-Gjonova et al. 2010), Serbia (2) (Petrov 2006), Croatia (2) (Bračko 2006), Ukraine (4) (Radchenko 1991, A. Radchenko, pers. comm.), Montenegro (2) (Karaman 2004, 2008), Slovenia (1) (Bračko 2007), Austria (8) (Steiner et al. 2002, Seifert 2007), Hungary (5), Germany (2) (Seifert 2007), Slovakia (1) (Werner & Wiezik 2007), Romania (1) (Markó et al. 2006, Markó 2008, Moscaliuc 2009, Ionescu-Hirsch et al. 2009), Czech Republic (1) (Werner & Wiezik 2007), Poland (6) (Czechowski et al. 2002, Czechowski 2008, Czechowski pers. comm.), Macedonia (Karaman 2009).

recent comprehensive study by Schlick-Steiner et al. (2008) treats relationships between the human population and biodiversity patterns for ants in Europe. Their analyses reveal that diversity of ant species increases with increases in size and geographical spread of the human population and the diversity of plant species. The diversity of ant species also seems to be related to temperature. A simple and brief comparison of the number of Hungarian outdoor ant species with their numbers in surrounding countries (Fig. 1) confirms Schlick-Steiner et al.'s (2008) findings that ant species diversity is indeed related to temperature, even if in this case only a smaller set of countries is under consideration: southern countries generally have a higher number of ant species, while Hungary fits well within the group of central European countries.

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