



## AN INTRODUCTION TO THE ANT FAUNA OF MACEDONIA (Balkan Peninsula), A CHECK LIST (HYMENOPTERA, FORMICIDAE)

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### SYNOPSIS

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The short history of investigation of myrmecofauna in the Republic of Macedonia is presented. The updated list of ant taxa recorded for R. of Macedonia is given. A total of 78 species, belonging to four subfamilies, Ponerinae, Myrmicinae, Dolichoderinae and Formicinae is known from the territory of the Republic of Macedonia.

### INTRODUCTION

**BIOGEOGRAPHICAL DATA:** The Republic of Macedonia is situated in the central part of the Balkan Peninsula in Southeastern Europe. It covers an area of 25713 km<sup>2</sup> (9779 sq mi). Geographically it is defined by the lowland habitats in the centre (occupy 19.1% of total surface area) and mountains arising on the west and the east sides of the lowlands (occupy 79% of total surface area). The west mountain range belong to the Dinaric Alps, and the eastern to the Rhodopi massive. The highest peaks of the western range (Šar, Baba, Nidže Mts.) are above 2500 m a.s.l. (the highest peak is Korab, 2764m a.s.l.), while the eastern mountain range (Osogovo, Belasica Mts.) is somewhat lower, with peaks reaching about 2200 m altitude. Because of its central position in the Balkan Peninsula, and its orography Macedonia contains four biogeographic zones, each characterized by different climate and, consequently, by different flora and fauna composition. These zones are: sub-mediterranean, sub-continental, sub-humid and sub-alpine. The flora of Macedonia is well studied (Micevski & Matevski, 1987; Micevski, 1985; Micevski, 1998 etc.). Many species reach their distribution limits here. Thus Macedonia is the southern border for boreal and alpine species, the northern border for Mediterranean species, and the western border for Ponto-Caspian and Asia Minor elements (MELOVSKI et al., 2009)

**HISTORY OF INVESTIGATION:** Detailed research of entomofauna of Balkan Peninsula dates back to the middle of the 19. century. Those studies mostly included its western part, Slovenia, Croatia, Bosnia and Hercegovina and Montenegro. The

eastern part of Peninsula was under Ottoman government until the 20. century, and scientists from Europe had not been considered welcome there. Hence, Macedonia started being investigated by biologists only after the retreat of Otoman government at the end of the First World War. The earliest information about myrmecofauna from territory of the Republic of Macedonia dates from the beginning of the 20. century (Doflein 1920). DOFLEIN cited 36 species, subspecies and varietes of ants from Macedonia, and gave their nesting habits. SANTSCI (1926) studied the ants from southern parts of Balkan Peninsula, Macedonia, Greece and Albania. He reported 18 taxa from Macedonia. Since then, in the following more than six decades there were no new contributions to the Macedonian myrmecofauna.

More recent work by AGOSTI and COLLINGWOOD (1987a) provided a list of 171 species of ants from SFR Yugoslavia, but did not include any details about their distribution. Hence, it is impossible to specify which species were found in Macedonia. Similarly PETROV and COLLINGWOOD (1992) in their survey of the mirmecofauna of Yugoslavia did not provide distribution data. More recently, PETROV (1994) cited 28 species collected from several localities in Macedonia and supplemented Doflein's list with 20 species, and KARAMAN (2000, 2002) surveyed the myrmecofauna of Macedonia, listing 50 species for the Demir Kapija crag and its surroundings.



Figure 1: A -Location of the Republic of Macedonia in Southeastern Europe  
 B - The map of the Republic of Macedonia.

Maps created using DIVA-GIS Version 5.4 (Hijmans et al., 2004).

## CHECKLIST OF ANT SPECIES IN THE REPUBLIC OF MACEDONIA

A total of 78 species are registered from the territory of FRY Macedonia. They are listed below. The species are arranged alphabetically within the corresponding subfamily. The naming and classification follows Bolton et al. (2006). For each species the currently accepted name is followed by the name(s) of taxa as given by the authors. Locality data are presented, and additionally, where available, the number of collected specimens of each caste is recorded.

Table 1: The list of ant taxa registered in Macedonia.

N <sup>o</sup> .	Taxon	Locality, data, number of specimens, author
Subfamily. <b>PONERINAE</b>		
1.	<b><i>Ponera coarctata</i></b> (Latreille, 1802) <i>Ponera coarctata</i> Karaman, 2002: 51;	Markova češma, Demir Kapija crag, 27.04.1997, 1 ♀ (KARAMAN, 2002).
2.	<b><i>Proceratium melinum</i></b> (Roger, 1860) <i>Proceratium melinum</i> Agosti & Collingwood, 1987b: 264; <i>Proceratum</i> (sic!) <i>melinum</i> Karaman, 2000: 72.	Koš Hill, Demir Kapija, 20.09.1999, 1 ♀ (KARAMAN, 2000).
Subfam. <b>MYRMICINAE</b>		
3.	<b><i>Aphaenogaster gibbosa</i></b> (Latreille, 1798) <i>Aphaenogaster gibbosa</i> Petrov, 1994: 12P.	Dojran, 19.05.1986 (PETROV, 1994).
4.	<b><i>Aphaenogaster sangiorgii</i></b> Emery, 1901 <i>Aphaenogaster sangiorgii</i> Karaman, 2002: 51; <i>Aphaenogaster</i> sp.1 Agosti & Collingwood, 1987: 270* ;	Demir Kapija crag, 27.04.1997, 4 ♀ (KARAMAN, 2002).
5.	<b><i>Aphaenogaster subterranea</i></b> (Latreille, 1798) <i>Aphaenogaster subterranea</i> Petrov, 1994: 12P; Karaman, 2002: 51;	Matka, 04.06.1980; Kozjak, 15.05.1987; Dojran, 07.10.1987 (PETROV, 1994). Demir Kapija crag, 27.04.1997, 7 ♀ (KARAMAN, 2002).
6.	<b><i>Cardiocondyla elegans</i></b> Emery, 1869 <i>Cardiocondyla elegans</i> Petrov, 1994: 12P; Karaman, 2002: 54;	Dojran, 05.10.1987 (PETROV, 1994). Bank of Bošavica river, 04.07.1981, 16 ♀; Demir Kapija village, 15.08.1992, 1 ♀; Demir Kapija crag, in the nest of <i>Cardiocondyla nigra</i> , 01.10.1995, 2 ♀; Demir Kapija crag, 03.10.1995, 1 ♀ (KARAMAN, 2002).
7.	<b><i>Cardiocondyla nigra</i></b> Forel, 1905 <i>Cardiocondyla nigra</i> Karaman, 2002: 54;	Demir Kapija crag, 01.10.1995, 16 ♀, (KARAMAN, 2002).

8.	<b><i>Crematogaster schmidtii</i></b> (Mayr, 1852) <i>Crematogaster scutellaris schmidtii</i> Doflein, 1920: 7; <i>Crematogaster schmidtii</i> Petrov, 1994: 12P; Karaman, 2002: 53;	Kalučkovo, Miletkovo, Marvinci, Strumica, 1917. and 1918 (DOFLEIN, 1920). Bank of Bošavica river, 04.08.1981, 28♀; Demir Kapija village, May 1995, 25♀; Demir Kapija village, 30.09.1995, 14♀ (KARAMAN, 2002). Dojran, 05.10.1987 (PETROV, 1994).
9.	<b><i>Crematogaster sordidula</i></b> (Nylander, 1849) <i>Crematogaster sordidula</i> var. <i>flachii</i> Doflein, 1920: 7; <i>Crematogaster sordidula mayri</i> Karaman, 2002: 53;	Dedeli village, 1918 (DOFLEIN, 1920). Demir Kapija village, May 1995, 20♀; Demir Kapija crag, 04.10.1995, 35♀, (KARAMAN, 2002).
10.	<b><i>Manica rubida</i></b> (Latreille, 1802) <i>Manica rubida</i> Karaman, 2002: 51;	Demir Kapija crag, 04.10.1995, 2♀ (KARAMAN, 2002).
11.	<b><i>Messor aralocaspius</i></b> (Arnoldy, 1902) <i>Messor aralocaspius</i> Karaman, 2002: 51;	Demir Kapija crag, 01.10.1995, 7♀ (KARAMAN, 2002).
12.	<b><i>Messor caducus</i></b> (Motschulski, 1839) <i>Messor caducus</i> Petrov, 1994: 12P; Karaman, 2002: 52;	Krivolak, 22.05.1987 (PETROV, 1994). Demir Kapija crag, 03.10.1995, 16♀ (KARAMAN, 2002).
13.	<b><i>Messor capitatus</i></b> (Latreille, 1798) <i>Messor barbarus</i> v. <i>capitatus</i> Santschi, 1926: 286; <i>Messor capitatus</i> Petrov, 1994: 12P; Karaman, 2002: 52;	S of Bitolj, between Bukovo and Oleveni, ♀ (SANTSCHI, 1926). Dojran, 05.10.1987 (PETROV, 1994). Demir Kapija village, 09.07.1984, ♀; Demir Kapija crag, 01.10.1995, 1♀ (KARAMAN, 2002).
14.	<b><i>Messor denticulatus</i></b> Kuznetzov-Ugamsky, 1927 <i>Messor denticulatus</i> Petrov, 1994: 12P; Karaman, 2002: 52;	Dojran, 05.10.1987 (PETROV, 1994). Demir Kapija village, May 1995, 25♀ (KARAMAN, 2002).
15.	<b><i>Messor meridionalis</i></b> (André, 1883) <i>Messor barbarus meridionalis</i> Doflein, 1920: 7; <i>Messor instabilis</i> Sm. st. <i>semirufus meridionalis</i> Santschi, 1926: 287;	Kalučkovo, 1917, Skopje 1918; Dedeli village, 1918 (DOFLEIN, 1920). Brod and Bač on Crna River, ♀; Valley of Vardar River, between villages Anatrovo and Petrovo, July 1917, ♀ (SANTSCHI, 1926).
16.	<b><i>Messor oertzeni</i></b> Forel, 1910 <i>Messor oertzeni</i> var. <i>amphigea</i> Doflein, 1920: 7;	Kalučkovo, 1917; Dedeli village, 1918 (DOFLEIN, 1920).
17.	<b><i>Messor structor</i></b> (Latreille, 1798) <i>Messor barbarus structor</i> var. <i>mutica</i> Doflein, 1920: 7; <i>Messor structor</i> Karaman, 2002: 52;	Skopje, 1918; Kalučkovo, 1917; Ohrid, Prilep; Skopje, 10.04.1918: ♀, ♂, ♀ (DOFLEIN, 1920). Demir Kapija village, 09.07.1984, 20♀; Demir Kapija crag,

		01.10.1995, 21♀; Demir Kapija crag, 02.10.1995, 25♀, 5♂; Demir Kapija crag, 02.10.1995, 22♀ (KARAMAN, 2002).
18.	<b>Messor structor aegaea</b> Menozzi, 1928 <i>Messor structor</i> v. <i>aegaeus</i> Santschi, 1926: 286;	Region of Iveni village, SE of Bitolj, ♀ (SANTSCHI, 1926).
19.	<b>Messor wasmanni</b> Krausse, 1909 <i>Messor wasmanni</i> Petrov, 1994: 12P; Karaman, 2002: 52;	Dojran, 07.10.1987 (PETROV, 1994). Demir Kapija village, May 1995, 16♀ (KARAMAN, 2002).
20.	<b>Myrmecina graminicola</b> (Latreille, 1802) <i>Myrmecina graminicola</i> Karaman, 2002: 53;	Demir Kapija crag, 27.04.1997, 1♀; Demir Kapija village, 03.05.1997, 8♀ (KARAMAN, 2002).
21.	<b>Myrmica rubra</b> (Linné, 1758) <i>Myrmica rubra</i> Petrov, 1994: 12P.	Šara Mt., 20.06.1983 (PETROV, 1994).
22.	<b>Myrmica ruginodis</b> Nylander, 1846 <i>Myrmica rubra ruginodis</i> Doflein, 1920: 7.	Lisiče village, 1800m a.s.l.; Golešnica Mt., June 1918 (DOFLEIN, 1920).
23.	<b>Myrmica schencki</b> Viereck, 1903 <i>Myrmica schencki</i> Petrov, 1994: 12P.	Nidže Mt (Kajmakčalan), 19.06.1989 (PETROV, 1994).
24.	<b>Oxyopomyrmex sp.</b> <i>Oxyopomyrmex</i> sp. Petrov, 1994: 12P.	Dojran, 07.10.1987 (PETROV, 1994).
25.	<b>Pheidole megacephala</b> (Fabricius, 1793) <i>Pheidole megacephala</i> Petrov, 1994: 12P.	Dojran, 07.10.1987 (PETROV, 1994).
26.	<b>Pheidole pallidula</b> (Nylander, 1848) <i>Pheidole pallidula</i> Doflein, 1920: 7; Karaman, 2002: 53; <i>Pheidole pallidula</i> st. <i>orientalis</i> Santschi, 1926: 287.	Dedeli, Marvinci, 1918; Drenovo, Vodno Mt, 1918 (DOFLEIN, 1920). Gevgelija, 1♀ (SANTSCHI, 1926). Demir Kapija village, 15.03.1992, 14♀; Demir Kapija crag, 01.10.1995, 1♀, 10♀; ibid. 01.10.1995, 6♀, 25♀; Demir Kapija crag, 02.10.1995, 28♀; Demir Kapija crag, 03.10.1995, 15♀; ibid. 03.10.1995, 15♀ (KARAMAN, 2002).
27.	<b>Solenopsis fugax</b> (Latreille, 1798) <i>Solenopsis fugax</i> Doflein, 1920: 7; <i>Diplorhoptrum fugax</i> Karaman 2002: 54; Petrov, 1994: 12P.	Vodno Mt, 1918 (DOFLEIN, 1920). Dojran, 05.10.1987 (PETROV, 1994). Demir Kapija crag, in the nest of <i>Plagiolepis schmitzii</i> , 03.10.1995, 2♀; Demir Kapija crag, 27.04.1997, 15♀; Demir Kapija village, 28.04.1997, ♀ (KARAMAN, 2002).
28.	<b>Temnothorax flavicornis</b> (Emery, 1870) <i>Leptothorax flavicornis</i> Agosti & Collingwood, 1987b: 273; Karaman, 2000: 72.	Koš Hill, Demir Kapija, 20.09.1999, 3♀ (KARAMAN, 2000).
29.	<b>Temnothorax nadigi</b> (Kutter, 1925)	Demir Kapija crag, 27.04.1997, 1♀, ♀,

	<i>Leptothorax nadigi</i> Karaman, 2002: 54;	eggs and larvae (KARAMAN, 2002).
30.	<b><i>Temnothorax tuberum</i></b> (Fabricius, 1775) <i>Leptothorax tuberum</i> Karaman, 2002: 54;	Demir Kapija village, 03.05.1997, 1 ♀ (KARAMAN, 2002).
31.	<b><i>Temnothorax nylanderi</i></b> (Foerster, 1850) <i>Leptothorax nylanderi</i> Karaman, 2000: 72;	Koš Hill, Demir Kapija, 20.09.1999, 1 ♀ (KARAMAN, 2000).
32.	<b><i>Tetramorium caespitum</i></b> Linné, 1758 <i>Tetramorium caespitum</i> Doflein 1920: 6; Petrov, 1994: 12P; Karaman, 2002: 55;	Kobelica, 1600m a.s.l., 12.08.1917; N of Kalučkovo hill, July, 1917, ♀, ♂, ♀; Kalučkovo, 1917; Dedeli, 1918; Kobelica (Čardaklija), 1600m a.s.l., 1917 (DOFLEIN, 1920). Dojran, 05.10.1987 (PETROV, 1994). Demir Kapija village, 02.08.1981, 21 ♀; Demir Kapija crag, 01.10.1995, 1 ♀; Demir Kapija crag, 03.10.1995, ♀ (KARAMAN, 2002).
33.	<b><i>Tetramorium forte</i></b> Forel, 1904 <i>Tetramorium caespitum</i> var. <i>fortis</i> Doflein, 1920: 7; <i>Tetramorium forte</i> Karaman, 2002: 55;	Kalučkovo, Štip, Plaguša Mt. 1917; Skopje, Vodno Mt, 1918 (DOFLEIN, 1920). Demir Kapija crag, 03.10.1995, ♀ (KARAMAN, 2002).
34.	<b><i>Tetramorium lucidulum</i></b> Emery, 1909 <i>Tetramorium lucidulum</i> Petrov, 1994: 12P; Karaman, 2002: 55;	Dojran, 07.10.1987 (PETROV, 1994). Demir Kapija village, June 1981, 3 ♀; ibid. May 1995, 14 ♀; Demir Kapija crag, 02.10.1995, 20 ♀ (KARAMAN, 2002).
35.	<b><i>Tetramorium schmidti</i></b> Forel, 1904 <i>Tetramorium caespitum</i> var. <i>schmidti</i> Doflein, 1920: 7;	Kalučkovo, 1917 (DOFLEIN, 1920).
36.	<b><i>Tetramorium semilaeve</i></b> Andre, 1881 <i>Tetramorium caespitum semilaeve</i> Doflein, 1920: 7; <i>Tetramorium semilaeve</i> Karaman, 2002: 55;	Kalučkovo, 1917 (DOFLEIN, 1920). Demir Kapija village, 15.08.1992, 1 ♀; Demir Kapija crag, 02.10.1995, 9 ♀; ibid. 03.10.1995, 2 ♀ (KARAMAN, 2002).
37.	<b><i>Tetramorium cf. perspicax</i></b> <i>Tetramorium cf. perspicax</i> Karaman, 2002: 56;	Demir Kapija village, 04.10.1995, 15 ♀ (KARAMAN, 2002).
<b>Subfam. DOLICHODERINAE</b>		
38.	<b><i>Dolichoderus quadripunctatus</i></b> (Linné, 1771) <i>Dolichoderus quadripunctatus</i> Karaman, 2000: 73.	Bank of Bošavica River, 21.09.2000, 1 ♀ (KARAMAN, 2000).

39.	<b><i>Liometopum microcephalum</i></b> (Panzer, 1798) <i>Liometopum microcephalum</i> Doflein, 1920: 7;	Kalučkovo, Štip 1917; Bajlik village (Belasica Mnt.) 1918 (Doflein, 1920).
40.	<b><i>Tapinoma erraticum</i></b> (Latreille, 1798) <i>Tapinoma erraticum</i> Doflein, 1920: 7; Petrov, 1994: 12P; Karaman, 2002: 56;	Dedeli, 1918 (Doflein, 1920). Dojran, 07.10.1987 (Petrov, 1994). Demir Kapija crag, 04.10.1995, 30♀ (Karaman, 2002).
41.	<b><i>Tapinoma nigerrimum</i></b> (Nylander, 1886) <i>Tapinoma nigerrimum</i> Petrov, 1994: 12P; Karaman, 2002: 56;	Dojran, 05.10.1987 (Petrov, 1994). Demir Kapija crag, 27.04.1997, 15♀ (Karaman, 2002).
Subfam. <b>FORMICINAE</b>		
42.	<b><i>Camponotus aethiops</i></b> (Latreille, 1798) <i>Camponotus (Myrmoturba) maculatus aethiops</i> var. <i>marginata</i> Doflein, 1920: 4; <i>Camponotus maculatus aethiops</i> Doflein, 1920: 8; <i>Camponotus aethiops</i> Karaman, 2000:73; <i>Camponotus (Myrmoturba) aethiops</i> Santschi, 1926: 288; <i>Camponotus (Myrmoturba) aethiops</i> v. <i>marginatus</i> Latr. Santschi, 1926: 288.	Kalučkovo, July 1917, gyne; Skopska Crna Gora Mt, 1918; Dedeli, 1918; Crag between Resen and Ohrid, 1917; Strumica, pine wood, 1918 (Doflein, 1920). Gevgelija, ♀; S of Bitolj, between Bukovo and Oleveni, ♀ (Santschi, 1926). Dojran, 07.10.1987 (Petrov, 1994). Koš Hill, 21.09.1999, 9♀ (Karaman, 2000).
43.	<b><i>Camponotus dalmaticus</i></b> (Nylander, 1849) <i>Camponotus (Orthonotomyrmex) lateralis</i> var. <i>dalmatica</i> Doflein, 1920: 8;	Furka near Dedeli, 1918 (Doflein, 1920).
44.	<b><i>Camponotus (Tanaemyrmex) pilicornis siculus</i></b> Grandi, 1935 <i>Camponotus (Myrmoturba) maculatus pilicornis</i> var. <i>sicula</i> Doflein, 1920: 8;	Strumica, pine wood, 1918 (Doflein, 1920).
45.	<b><i>Camponotus fallax</i></b> (Nylander, 1856) <i>Camponotus fallax</i> Karaman, 2002: 56;	Demir Kapija village, 07.07.1979, 1♀; ibid. July 1981, 3♀; ibid. 28.06.1984, 1♀; ibid. 30.09.1995, 1♀; ibid. 16.08.1992, 6♀ (Karaman, 2002).
46.	<b><i>Camponotus lateralis</i></b> (Olivier, 1792) <i>Camponotus (Orthonotomyrmex) lateralis</i> Doflein, 1920: 4;	Kalučkovo, February 1918, ♀ (Doflein, 1920).
47.	<b><i>Camponotus ligniperdus</i></b> (Latreille, 1802) <i>Camponotus</i> (s.str.) <i>herculeanus ligniperda</i> Doflein, 1920: 4;	Gostivar, June 1918, gyne; Vodno Mt, 1918 (Doflein, 1920).
48.	<b><i>Camponotus piceus</i></b> (Leach, 1825)	Dedeli, 500m a.s.l., 29. Aprile 1918, ♀;

	<i>Camponotus lateralis merula</i> Doflein, 1920: 4; <i>Camponotus piceus</i> Santschi, 1926: 288; Petrov, 1994: 12P; Karaman, 2000: 73.	Vodno Mt, 13. Aprile 1918, gyne; Kalučkovo, 1917 (DOFLEIN, 1920). Nevolani, N of Rudnik Lake (SANTSCHI, 1926). Dojran, 07.10.1987 (PETROV, 1994). Čiflik village, 13.09.1999, 1 ♀ (KARAMAN, 2000).
49.	<b><i>Camponotus truncatus</i></b> (Spinola, 1808) <i>Camponotus truncatus</i> Karaman, 2000: 74.	Bank of Bošavica River, 21.09.2000, 1 ♀ (KARAMAN, 2000).
50.	<b><i>Camponotus vagus</i></b> (Scopoli, 1763) <i>Camponotus</i> (s.str.) <i>vagus</i> Doflein, 1920: 8; <i>Camponotus vagus</i> Petrov, 1994: 12P; Karaman, 2002: 56;	Kalučkovo-Valandovo, Bajlik village (Belasica Mnt.), 1918 (DOFLEIN, 1920). Dojran, 07.10.1987 (PETROV, 1994). Demir Kapija village, 28.06.1984, 1 ♀; ibid. 06.07.1984, 12 ♀; bank of Bošavica River, 15.08.1992, 14 ♀ (KARAMAN, 2002).
51.	<b><i>Cataglyphis aenescens</i></b> (Nylander, 1849) <i>Cataglyphis cursor aenescens</i> Doflein, 1920: 4; <i>Cataglyphis cursor</i> st. <i>aenescens</i> Santschi, 1926: 290; <i>Cataglyphis aenescens</i> Karaman, 2002: 56;	Kalučkovo, 23. May 1918, ♀ (DOFLEIN, 1920). Brod and Bač on Crna River, SE of Bitolj, ♀ (SANTSCHI, 1926). Demir Kapija village, 15.08.1992, 10 ♀; ibid. 16.08.1992, 3 ♀ (KARAMAN, 2002).
52.	<b><i>Cataglyphis nodus</i></b> (Brulle, 1832) <i>Cataglyphis bicolor</i> var. <i>orientalis</i> Doflein, 1920: 8; <i>Cataglyphis bicolor</i> v. <i>nodus</i> Santschi, 1926: 290; <i>Cataglyphis nodus</i> Karaman, 2002: 56;	Kalučkovo, Plaguša Mnt., 1917; Vodno Mt, 1918 (DOFLEIN, 1920). Region of Oleveni village, S of Bitolj (SANTSCHI, 1926). Nidže Mt, 19.06.1989; Dojran, 05.10.1987; Bogdanci, 06.10.1987 (PETROV, 1994). Demir Kapija crag, Markova češma, 02.10.1995, 16 ♀ (KARAMAN, 2002).
53.	<b><i>Formica balcanina</i></b> Petrov & Collingwood, 1993 <i>Formica balcanina</i> Petrov, 1994: 12P.	Dojran, 19.05.1986; Nidže Mt, 19.06.1989 (PETROV, 1994).
54.	<b><i>Formica cunicularia</i></b> Latreille, 1798 <i>Formica</i> (Serviformica) <i>fusca</i> st. <i>glebaria</i> Santschi, 1926: 289; <i>Formica cunicularia</i> Petrov, 1994: 12P; Karaman, 2002: 56;	Oleveni village, SE of Bitolj, ♀; Brod and Bač on Crna River, SE of Bitolj, ♀ (SANTSCHI, 1926). Dojran, 05.10.1987 (PETROV, 1994). Demir Kapija village, 07.07.1979, 13 ♀; ibid. 18.06.1981, 1 ♀; ibid. 05.08.1981, 12 ♀; bank of Bošavica River, 16.08.1992, 11 ♀; Demir Kapija crag, 02.10.1995, 17 ♀ (KARAMAN, 2002).
55.	<b><i>Formica exsecta</i></b> Nylander, 1846 <i>Formica</i> (s.str.) <i>exsecta</i> Doflein, 1920: 8;	Pepelak (Golešnica Mnt.) 2200m a.s.l., 1918 (DOFLEIN, 1920).



56.	<b><i>Formica fusca</i></b> Linné, 1758 <i>Formica</i> ( <i>Serviformica</i> ) <i>fusca</i> Doflein, 1920: 4;	Pepelak, 2000-2400m a.s.l., June 1918, ♀ (DOFLEIN, 1920). Dojran, 05.10.1987 (PETROV, 1994).
57.	<b><i>Formica gagates</i></b> Latreille, 1798 <i>Formica</i> ( <i>Serviformica</i> ) <i>gagates</i> Santschi, 1926: 289;	Oleveni village, S of Bitolj, ♀ (SANTSCHI, 1926).
58.	<b><i>Formica pratensis</i></b> Retzius, 1783 <i>Formica</i> ( <i>Formica</i> ) <i>rufa</i> st. <i>pratensis</i> Santschi, 1926: 289;	Iveni region, SE of Bitolj, 5♀ (SANTSCHI, 1926).
59.	<b><i>Formica rufa</i></b> Linné, 1761 <i>Formica</i> (S.str.) <i>rufa</i> Doflein, 1920: 4; <i>Formica rufa</i> var. <i>rufo-pratensis</i> Doflein, 1920: 7;	Lisiče (Golešnica Mt.), 1700m a.s.l., 24. June 1918, ♀; Lisiče, 1700m a.s.l., 25. June 1918, gyne; Bejlik (Belasica Mt.) 1200m a.s.l. 1918 (DOFLEIN, 1920);
60.	<b><i>Formica rufibarbis</i></b> Fabricius, 1793 <i>Formica</i> ( <i>Serviformica</i> ) <i>rufibarbis</i> Santschi, 1926: 289;	Valley of Vardar river, between villages Anatovo and Petrovo, ♀ (SANTSCHI, 1926).
61.	<b><i>Formica sanguinea</i></b> Latreille, 1798 <i>Formica</i> ( <i>Raphiformica</i> ) <i>sanguinea</i> Doflein, 1920: 8; <i>Formica sanguinea</i> Karaman, 2000: 74.	Kobelica (Čardaklija) 1700m a.s.l., 1917 (DOFLEIN, 1920). Čiflik village, 13.09.1999, 2♀ (KARAMAN, 2000).
62.	<b><i>Proformica nasuta</i></b> (Nylander, 1856) <i>Formica</i> ( <i>Proformica</i> ) <i>nasuta</i> Santschi, 1926: 289;	Brod and Bač on Crna River, SE of Bitolj, ♀ (SANTSCHI, 1926)
63.	<b><i>Lasius alienus</i></b> Förster, 1850 <i>Lasius niger</i> st. <i>alienus</i> Santschi, 1926: 289; <i>Formicina</i> ( <i>Donisthorpea</i> ) <i>nigra aliena</i> Doflein, 1920: 7; <i>Lasius alienus</i> Petrov, 1994: 12P.	Crag between Resen and Ohrid, 1917 (DOFLEIN, 1920). S of Bitolj, between Bukovo and Oleveni, 1♀, ♂; valley of Vardar river, between villages Anatovo and Petrovo, ♀ (SANTSCHI, 1926). Nidže Mt, 19.06.1989 (PETROV, 1994).
64.	<b><i>Lasius brunneus</i></b> (Latreille, 1798) <i>Lasius brunneus</i> Santschi, 1926: 288;	S of Bitolj, between villages Bukovo and Oleveni, 1♀ (SANTSCHI, 1926). Bank of the Bošavica River, 21.09.2000, 4♀ (KARAMAN, 2000).
65.	<b><i>Lasius emarginatus</i></b> (Olivier, 1791) <i>Lasius emarginatus</i> Santschi, 1926: 289; Karaman, 2002: 56;	S of Bitolj, between Bukovo and Oleveni, ♀ (SANTSCHI, 1926). Demir Kapija village, 18.06.1981, 19♀; ibid. 27.06.1981, 38♀; bank of Bošavica River, 21.06.1984, 20♀, 5♀, 5♂; Demir Kapija crag, 04.10.1995, 14♀

		(KARAMAN, 2002).
66.	<b><i>Lasius flavus</i></b> (Fabricius, 1782) <i>Formicina</i> (s.str.) <i>flava</i> Doflein, 1920: 4	Kalučkovo, July 1917, gyne; Kobelica (Čardaklija), 2000-2400m a.s.l., 1917 (DOFLEIN, 1920). Koš Hill, 20.09.1999, 1 ♀ (KARAMAN, 2000).
67.	<b><i>Lasius fuliginosus</i></b> (Latreille, 1798) <i>Formicina</i> ( <i>Dendrolasius</i> ) <i>fuliginosa</i> Doflein 1920: 4	Kalučkovo, July 1917, gyne (DOFLEIN, 1920).
68.	<b><i>Lasius lasioides</i></b> (Emery, 1869) <i>Lasius lasioides</i> Karaman, 2002: 56;	Demir Kapija village, 11.06.1981, ♀; ibid. 18.06.1981, ♀ (KARAMAN, 2002).
69.	<b><i>Lasius mixtus</i></b> (Nylander, 1846) <i>Formicina mixta</i> Doflein, 1920: 4;	Kalučkovo, July 1917, gyne; Vodno Mt 1918; Golešnica Mt, 2100m a.s.l., 1918 (DOFLEIN, 1920);
70.	<b><i>Lasius mixtoumbratus</i></b> Forel, 1874 <i>Formicina</i> (s.str.) <i>mixta</i> var. <i>mixta umbrata</i> Doflein, 1920: 4; <i>Formicina mixta</i> var. <i>mixto-umbrata</i> Doflein, 1920: 7;	Skopje, 25. June 1918; Kobelica (Čardaklija) 2000-2400m a.s.l., 1917 (DOFLEIN, 1920);
71.	<b><i>Lasius niger</i></b> (Linneaus, 1758) <i>Formicina</i> ( <i>Donisthorpea</i> ) <i>nigra</i> Doflein, 1920: 7; <i>Lasius niger</i> Santschi, 1926: 288; Karaman, 2002: 56;	Skopje, Katlanovo, Vodno Mt, 1918 (DOFLEIN, 1920); S of Bitolj, between Bukovo and Oleveni, ♀ (SANTSCHI, 1926). Demir Kapija village, 09.06.1981, 24 ♀; ibid. 07.07.1979, 10 ♀; ibid. 28.06.1984, 35 ♀; ibid., 01.07.1984, ♀ (KARAMAN, 2002).
72.	<b><i>Lasius paralienus</i></b> Seifert 1992 <i>Lasius paralienus</i> Karaman, 2000: 74.	Demir Kapija village, 11.09.1999, 8 ♀, 3 ♀, 9 ♂ (KARAMAN, 2000).
73.	<b><i>Lasius umbratus</i></b> (Nylander, 1846) <i>Lasius umbratus</i> Karaman, 2002: 56;	Demir Kapija village, 07.07.1981, 35 ♀, 14 ♀ (KARAMAN, 2002).
74.	<b><i>Lepisiota frauenfeldi</i></b> (Mayr, 1855) <i>Acantholepis frauenfeldi</i> Petrov, 1994: 12P <i>Acantholepis caucasica</i> Petrov, 1994: 12P	Bogdanci, 06.10.1987 (PETROV, 1994).
75.	<b><i>Plagiolepis pygmaea</i></b> (Latreille, 1798) <i>Plagiolepis pygmaea</i> Doflein, 1920: 7; Karaman, 2002: 56;	Vodno Mt, 1918 (DOFLEIN, 1920). Demir Kapija crag, 27.04.1997, 1 ♀, 30 ♀ (KARAMAN, 2002).
76.	<b><i>Plagiolepis schmitzii</i></b> Forel, 1895 <i>Plagiolepis schmitzii</i> Karaman, 2002: 56;	Demir Kapija crag, 03.10.1995, 27 ♀ (KARAMAN, 2002).
77.	<b><i>Polyergus rufescens</i></b> (Latreille, 1798) <i>Polyergus rufescens</i> Petrov, 1994: 12P; Karaman, 2002: 56;	Dojran, 05.10.1987 (PETROV, 1994). Demir Kapija village, July 1981, 1 ♀; ibid. 28.06.1984, 30 ♀; ibid. 22.08.1988, 18 ♀

		(KARAMAN, 2002).
78.	<b><i>Prenolepis nitens</i></b> (Mayr, 1852) <i>Prenolepis nitens</i> Karaman, 2002: 56;	Demir Kapija crag, 04.10.1995, 9♀ (KARAMAN, 2002).

\* (Collingwood, pers. comm.)

## CONCLUSIONS

The myrmecofauna of the Republic of Macedonia had been investigated by few authors. Based on those data, a total of 78 species, belonging to four subfamilies (Ponerinae, Myrmicinae, Dolichoderinae and Formicinae) is documented from this region of Balkan Peninsula. The number of ant species recorded for the territory of the Republic of Macedonia is similar to the number of species in Bosnia and Herzegovina (74 species; VESNIĆ & LELO, 2008), and much higher than in Albania (29 species; AGOSTI & COLLINGWOOD, 1987a). However, when compared to the myrmecofauna of other Balkan countries [Greece - 268 species (PETROV & LEGAKIS, 1996), Serbia 141 species (PETROV, 2004), Croatia 140 species (BRAČKO, 2006), Slovenia 132 species (BRAČKO, 2007), Montenegro 141 (KARAMAN, in press), and Bulgaria 108 species (ATANASSOV & DLUSSKIJ, 1992)] we can conclude that the myrmecofauna of Macedonia, as well as of Bosnia and Hercegovina and Albania is poorly known. Vast regions of Macedonia remain unexplored, and future investigation are needed.

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