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The ants (Hymenoptera, Formicidae) of Plana Mountain (Bulgaria)

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Abstract. The paper presents the first detailed research of the ants (Formicidae) of Plana Mountain (Western Bulgaria). A total number of 49 species were identified, 44 of which are new the studied area. *Tetramorium hungaricum* (Röszler, 1935) and *Formica exsecta* Nylander, 1846, reported from Plana by other authors, were not found during the current research. The paper also provides a brief zoogeographical analysis of the local ant fauna and a comparison with those of the adjacent Vitosha and Lozen Mountains. Some habitat information and additional remarks are given as well.
Key words: ants, Formicidae, distribution, Plana Mountain, zoogeography.

Introduction

Although the Formicidae in Bulgaria are considered a relatively well known group (approximately 160 species reported) some parts of the country remain more or less neglected in faunistical research works. Plana – a small mid-high mountain (max. 1338 m) situated between Vitosha, Rila and Sredna Gora Mts – is an example of that; despite its accessibility and proximity to the city of Sofia, the area has not previously been a subject of any special research. Hence, the ant fauna of the mountain was rather poorly studied with only 7 species reported. Furthermore, most of them are only cursorily mentioned in the respective publications, so the exact locality, altitude, and habitat are often omitted. Early data about the ants of Plana are found in Gueorgi Wesselinov's works on the domed nest building ants (WESSELINOFF, 1967, 1973), in which he reported 5 species of the genus *Formica* from the region. In more recent years STEINER et al. (2005, 2006) added *Tetramorium hungaricum* (Röszler, 1935) and *T. moravicum* Kratochvil, 1941 to the list of the established species in Plana.

Material and methods

Plana Mountain is situated in Western Bulgaria. It is bounded on the west-northwest by Vitosha Mt., on the south – by the Samokovian Plain, and on the east-southeast – by Iskar River and Iskar Dam. The climate is mid-mountainous with continental influence. The predominant soil types are brown forest soils and maroon-brown forest soils.

Plana's forest vegetation does not grow in well-defined zones which is partially due to the mountain's relatively low altitude together with human interference. Well-preserved deciduous forests are present on the northern slopes of the mountain, where the European beech (*Fagus sylvatica* L.) is the prevailing species; the european hornbeam (*Carpinus betulus* L.) and the durmast (*Quercus dalechampii* Wenz.) are also common, usually growing at lower altitudes. The mountain ash (*Fraxinus excelsior* L.) is often found mixed with beech, and the silver birch (*Betula pendula* Roth) is distributed in several scattered, pure formations. On the mountain's slant northeast slope grows an artificial planted, xerothermic oak forest (*Quercus cerris-Q. frainetto*) with a rich undergrowth. The common hazel (*Corylus avellana* L.) is very typical for almost the whole watershed hill. Near the streams grows grey alder (*Alnus incana* (L.)). The black poplar (*Populus nigra* L.) is a common species along the wider sections of Iskar and Palakariya river valleys. The central and eastern regions of Plana are predominated by artificial planted forests of scots pine (*Pinus sylvestris* L.) mixed with Norway spruce (*Picea abies*) and European black pine (*Pinus nigra* J.F.Arnold), replacing the oak and beech forests. Deforestation is very strong upon the southern and western slopes, where advanced erosion processes are evident; xerophytic meadows and agricultural fields are prevailing. Vast areas of the ridge mountain parts are also covered with secondary grass associations, mostly cereals – *Agrostis, Bromus, Dactylis*, etc.

The field work for the present research was carried out in a period of 11 months in two calendar years – from May to October 2008, and from April to August 2009. Two sampling methods have been used – direct sampling and pitfall trapping (BESTELMEYER et al., 2000). Direct sampling was more widely used in correspondence to the main goal of the research, which is finding a maximum number of species in comparatively short terms. A plastic sieve (1,5 mm openings) was used as an additional device for leaf litter inspection. Pitfall trapping had a limited role in the survey, and only supplemented the results from the first method. The traps (plastic cans with 2% formalin solution were used) were placed in 3 different habitats – a xerothermic oak forest *Quercus cerris-Q. frainetto* (N 42°31'09.6"E023°30'36.0", 920 m), a coniferous forest *Pinus sylvestris-Picea abies* (N 42°29'30.4"E023°26'53.8", 1170 m), and a mesophytic meadow (N 42°31'11.7"E023°29'20.1", 1155 m). Ten traps in a line were set 4 times (17.06.2008, 07.08.2008, 10.10.2008, and 01.05.2009) and the fallen material collected after a 7 day outage. The exact position of the traps was measured with a GPS Garmin 60CS.

All ants were preserved in 75% ethanol. Then part of them were mounted on pins for identification. All collected specimens are kept in the collection of Sofia University, Faculty of Biology. The classification is according to BOLTON (2003). The chorotypes used in the text are mainly after CZECHOWSKI et al. (2002) and TAGLIANTI et al. (1999) with some modifications based on the distribution data in Fauna Europaea (RADCHENKO, 2007).

Species list

Subfamily Myrmicinae

Myrmica rubra (Linnaeus, 1758)

Localities. E Plana Village, 1160 m, shady riverside meadow, 18.05.2008; near Kokalyane Monastery, 850 m, mixed forest periphery, 10.06.2008; W Ivanova mogila Peak, 1020 m, riverside meadow, 13.06.2009.

Distribution in Bulgaria. Vitosha Mt., Stara planina Mts., Rodopes Mts., Sofia and the surroundings. More frequently found above 1500 m alt.

Chorotype. Holo-Palaearctic.

Myrmica ruginodis Nylander, 1846

Localities. Near Kokalyane Monastery, 850 m, mixed forest periphery, 10.06.2008; NE the astronomical observatory, 1170 m, coniferous forest, 17.06.2008 – 24.06.2008, 01.05.2009 – 08.05.2009 (pitfall traps); E Zheleznitsa Village, 1050 m, beech forest, 15.08.2008; E the astronomical observatory, 1140 m, pine clearing, 18.04.2009; W the astronomical observatory, 1130 m, coniferous forest, 18.04.2009; near Muhchel Peak, 1310 m, beech forest, 25.04.2009; Tsiganka Peak, 1150 m, meadow, 21.05.2009; E Peyova buka Hut, 1100 m, birch forest, 27.05.2009; W Tsiganka Peak, 1120 m, birch forest periphery, 09.06.2009.

Distribution in Bulgaria. Rila Mt., Vitosha Mt., Rhodopes Mts., Petrich district, Sofia and the surroundings. Usually found bellow 1700 m alt.

Chorotype. North-Palaearctic.

Myrmica sulcinodis Nylander, 1846

Localities. NE the astronomical observatory, 1170 m, coniferous forest, nest in leaf litter, 07.08.2008.

Distribution in Bulgaria. The mountains of Western and Southwestern Bulgaria; Sofia and the surroundings. Prefers 900 – 2200 m alt.

Chorotype. Boreo-Montane.

Myrmica scabrinodis Nylander, 1846

Localities. SE Pasarel Village, 830 m, xerothermic oak forest, 03.05.2009.

Distribution in Bulgaria. Common in different regions between 200 and 1400 m alt.

Chorotype. Holo-Palaearctic.

Myrmica sabuleti Meinert, 1861

Localities. Tsiganka Peak, 1150 m, meadow, 17.06.2008 – 24.06.2008, 01.05.2009 – 08.05.2009 (pitfall traps); N Bukov dol Locality, 920 m, xerothermic oak forest, 17.06.2000 – 24.06.2008 (pitfall traps); SE Pasarel Village, 925 m, xerothermic oak forest, 03.05.2009; near Peyova buka Hut, 1070 m, beech forest, 27.05.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009.

Distribution in Bulgaria. The mountains and foothills of Western and Southwestern Bulgaria; Sofia and the surroundings, Eastern Rhodopes Mts. Found at a maximum elevation of 1650 m alt.

Chorotype. Holo-Palaearctic.

Myrmica schencki Viereck, 1903

Localities. Tsiganka Peak, 1150 m, meadow, 07.08.2008 – 14.08.2008, 01.05.2009 – 08.05.2009 (pitfall traps); N Bukov dol Locality, 920 m, xerothermic oak forest, 17.06.2000 – 24.06.2008, 07.08.2008 – 14.08.2008, 10.10.2008 – 17.10.2008, 01.05.2009 – 08.05.2009 (pitfall traps); SE Pasarel Village, 820 m, xerothermic oak forest, 03.05.2009; SE Pasarel Village, 800 m, meadow, 11.05.2009; N Bukov dol Locality, 990 m, xerothermic oak forest, 27.05.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009; E Tourmachka Village, 1200 m, 14.06.2009.

Distribution in Bulgaria. the mountains of Western and Southwestern Bulgaria; Sofia and the surroundings. Most frequent at 1200 – 2000 m alt.

Chorotype. North-Palaearctic.

Myrmica lobicornis Nylander, 1846

Localities. E Plana Village, 1170 m, meadow, 18.05.2008; Tsiganka peak, 1150 m, meadow, 10.10.2008 – 17.10.2008 (pitfall traps).

Distribution in Bulgaria. The mountains of Western and Southwestern Bulgaria.

Chorotype. North-Palaearctic.

Stenamma debile (Förster, 1850)

Localities. NE Peyova buka Hut, 950 m, xerothermic oak forest, 27.05.2009.

Distribution in Bulgaria. Found in various regions throughout the country.

Chorotype. Euro-Caspian.

Messor structor (Latreille, 1798)

Localities. near Passarel Village, 740 m, rocky path, 29.05.2008; near Peyova buka Hut, 1140 m, meadow, 05.06.2008; SW Peyova buka Hut, 1160 m, half-open area, 10.10.2008; SW Peyova buka Hut, 1150 m, birch forest periphery, 10.10.2008; W Grobat Peak, 1210 m, dry meadow, 13.06.2009.

Distribution in Bulgaria. Throughout the whole country up to 1500 m alt.

Chorotype. Euro-Mediterranean.

Leptothorax acervorum (Fabricius, 1793)

Localities. W Tsiganka peak, 1120 m, birch forest, 09.06.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009.

Distribution in Bulgaria. Rila Mt., Stara Planina Mts., Vitosha Mt., Rhodopes Mts. Found up to 2250 m alt.; Optimum of distribution: 1800 – 1900 m.

Chorotype. Boreo-Montane.

Temnothorax affinis (Mayr, 1855)

Localities. N Bukov dol Locality, 990 m, xerothermic oak forest, 11.05.2009; NE Peyova buka Hut, 1110 m, birch forest, 11.05.2009; NE Peyova buka Hut, 920 m, xerothermic oak forest, 21.05.2009; E Tsiganka Peak, 1130 m, birch forest, 21.05.2009; N Bukov dol Locality, 990 m, xerothermic oak forest, 27.05.2009; N Peyova buka Hut, 1010 m, beech forest, 09.06.2009; W Tsiganka Peak, 1120 m, birch forest periphery, 09.06.2009; Pasarel Village, 700 m, riverside meadow, 09.06.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009.

Distribution in Bulgaria. Found in many mountainous areas throughout the country, where it reaches up to 1900 m alt. It is also reported from Sofia.

Chorotype. Euro-Caspian.

Temnothorax clypeatus (Mayr, 1853)

Localities. SE Pasarel Village, 850 m, half-open area, 20.06.2009.

Distribution in Bulgaria. Osogovo Mt., Lyulin Mt., the districts of Petrich, Zemen and Obzor. Rare species.

Chorotype. Central-European.

Temnothorax interruptus (Schenck, 1852)

Localities. Near Kokalyane Monastery, 850 m, mixed forest periphery, 05.06.2008.

Distribution in Bulgaria. Reported from Belogradchik, Berkovitsa, Petrich, Kotel, Obzor, Balchik. Rare species.

Chorotype. European.

Remark. The finding of this species near a woodland is somewhat unexpected, its typical habitat being warm, dry terrains with scarce vegetation (ATANASSOV & DLUSSKIJ, 1992).

Temnothorax crassispinus (Karavaiev, 1926)

Localities. Near Pasarel Village, 850 m, beech forest, 10.10.2008; N Bukov dol Locality, 920 m, xerothermic oak forest, 07.08.2008 – 14.08.2008 (pitfall traps); near Muhchel Peak, 1313 m, beech forest, 25.04.2009; SE Pasarel Village, 820 m, xerothermic oak forest, 03.05.2009; SE Pasarel Village, 820 m, xerothermic oak forest, 03.05.2009; N Bukov dol Locality, 930 m, xerothermic oak forest, 11.05.2009; N Bukov dol Locality, 960 m, xerothermic oak forest, 27.05.2009; SE Pasarel Village, 830 m, xerothermic oak forest, 27.05.2009; near Peyova buka Hut, 1070 m, beech forest, 27.05.2009; N Peyova buka Hut, 1120 m, beech forest, 09,06.2009; N Peyova buka Hut, 1010 m, beech forest, 09.06.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009.

Distribution in Bulgaria. Found in the districts of Belogradchik, Vratsa, Sofia, Peshtera, Petrich, Byala (Vn.), Balchik.

Chorotype. East-European.

Remark. Part of the material may refer to *Temnothorax nylanderi* Förster, since, the taxonomical and biogeographical distinction of the two species is still uncertain (SEIFERT, 1995; RADCHENKO, 2000).

Temnothorax parvulus (Schenck, 1852)

Localities. N Bukov dol Locality, 910 m, xerothermic oak forest periphery, 27.05.2009.

Distribution in Bulgaria. Found in Sliven, Knyazhevo, Chepan Mt. Rare species.

Chorotype. Euro-Mediterranean.

Temnothorax unifasciatus (Latreille, 1798)

Localities. NE Alino Village, 920 m, pine forest periphery, 13.06.2009.

Distribution in Bulgaria. Known from the lowland areas and the mountain slopes in different parts of the country. Found at a maximum of 1700 m alt.

Chorotype. South-Palaearctic.

Tetramorium caespitum/impurum complex

Localities. SE Plana Village, 1180 m, meadow, 13.05.2008; E Plana Village, 1170 m, meadow, 18.05.2008; S Pasarel Village, 1100 m, meadow, 29.05.2008; E Richov kladenets Well, 1170 m, dry sandy terrain, 07.08.2008; Tsiganka Peak, 1150 m, meadow, 07.08.2008 – 14.08.2008, 01.05.2009 – 08.05.2009 (pitfall traps); Pasarel Village, 700 m, pavement, 24.08.2008; SE Pasarel Village, 780 m, birch forest periphery, 11.05.2009; S Yovichina mogila Peak, 1120 m, dry meadow, 14.06.2009.

Distribution in Bulgaria. Widespread throughout the country; up to 2000 m alt. (*T. caespitum* L.).

Chorotype. Holarctic (*T. caespitum* L.).

Remark. The term *Tetramorium caespitum/impurum* complex is brought in by SCHLICK-STEINER et al. (2006) and comprises seven Palaearctic *Tetramorium* species, along with *T. caespitum* Linnaeus and *T. impurum* Förster. Since, most of the samples gathered lack alates needed for reliable morphometric identification, we considered it appropriate to include the uncertain species into this particular group.

Tetramorium moravicum Kratochvil, 1941

Localities. Near Peyova buka Hut, 1140 m, meadow, 24.08.2009.

Distribution in Bulgaria. Common in many mountainous and lowland areas; up to 1600 m alt.

Chorotype. Insufficient data.

Remark. Many authors had synonymized *Tetramorium moravicum* with *T. forte* based on the strong morphometrical resemblance between the worker castes of both taxa, before SANETRA et al. (1994) presented strong arguments supporting its species status. It is assumed that the distribution of *T. forte* Forel, 1904 is restricted to Western Europe only, hence, the reports for this species from Bulgaria are most likely to concern *T. moravicum* (STEINER et al., 2005).

Myrmecina graminicola (Latreille, 1802)

Localities. SE Pasarel Village, 820 m, xerothermic oak forest, 03.05.2009.

Distribution in Bulgaria. Known mainly from the lowlands and foothills of Southern Bulgaria.

Chorotype. South-Palaearctic.

Subfamily Dolichoderinae

Dolichoderus quadripunctatus (Linnaeus, 1771)

Localities. Near Pasarel Village, 710 m, riverside meadow, 21.05.2009.

Distribution in Bulgaria. Typical of the foothills of Southwestern and Southeastern Bulgaria. Reported also from Sofia and the surroundings.

Chorotype. Euro-South-Siberian.

Tapinoma erraticum (Latreille, 1798)

Localities. E Plana Village, 1170 m, meadow, 18.05.2008; Tsiganka Peak, 1150 m, meadow, 17.062008 – 24.06.2008, 07.08.2008 – 14.08.2008, 10.10.2008 – 17.10.2008, 01.05.2009 – 08.05.2009 (pitfall traps); Vrabnitsa Locality, 1200 m, dry meadow, 18.04.2009; E Tourmachka Village, 1150 m, meadow, 18.04.2009; E Krasta Peak, 1100 m, half-open Locality, 18.04.2009; SE Pasarel Village, 800 m, meadow, 21.05.2009; near Alino Village, 920 m, meadow, 13.06.2009.

Distribution in Bulgaria. Widespread throughout the country; up to 1500 m alt.

Chorotype. Euro-Mediterranean.

Tapinoma madeirense Forel, 1895

Localities. E Plana Village, 1170 m, meadow, 18.05.2008.

Distribution in Bulgaria. Reported only by SEIFERT (1984) from Rhodopes Mts., Pirin Mt. and the Black Sea Coast. Rare species.

Chorotype. Euro-South-Siberian.

Subfamily Formicinae

Plagiolepis taurica Santschi, 1920

Localities. N Bukov dol Locality, 960 m, dry meadow, 20.06.2009.

Distribution in Bulgaria. Rhodopes Mts., Chepan Mt., Vrachanski Balkan Mt., Petrich, the surroundings of Sofia.

Chorotype. Euro-South-Siberian.

Camponotus herculeanus (Linnaeus, 1758)

Localities. near Peyova buka Hut, 1140 m, half-open area, 05.06.2008; S Dyavolskiya most Bridge, 800 m, beech-hornbeam forest, 10.06.2008; N Bukov dol Locality, 1010 m, beech forest, 09.06.2009; E Peyova buka Hut, 1120 m, beech forest, 09.06.2009.

Distribution in Bulgaria. Mainly the high parts of the mountains.

Chorotype. Boreo-Montane.

Camponotus ligniperdus (Latreille, 1802)

Localities. NE the astronomical observatory, 1170 m, coniferous forest periphery, 07.08.2008; Tsiganka Peak, 1150 m, meadow, 07.08.2008 – 14.08.2008 (pitfall traps); SE Pasarel Village, 830 m, xerothermic oak forest periphery, 03.05.2009; N Bukov dol Locality, 990 m, beech-hornbeam forest periphery, 20.06.2009; NE Peyova buka Hut, 970 m, xerothermic oak forest, 27.05.2009; near Peyova buka Hut, 1070 m, beech forest, 27.05.2009.

Distribution in Bulgaria. Common in many regions of the country between 900 and 1500 m alt.

Chorotype. Holo-Palaearctic.

Camponotus vagus (Scopoli, 1763)

Localities. N Bukov dol Locality, 920 m, xerothermic oak forest, 17.06.2008 – 24.06.2008 (pitfall traps); SE Pasarel Village, 790 m, half-open locality, dirt road, 11.05.2009; SE Pasarel Village, 920 m, xerothermic oak forest periphery, 11.05.2009; N Bukov dol Locality, 910 m, xerothermic oak forest, 20.06.2009.

Distribution in Bulgaria. Widespread below 1000 m alt.; found at a maximum of 1400 m.

Chorotype. Holo-Palaearctic.

Camponotus aethiops (Latreille, 1798)

Localities. NE Alino Village, 930 m, pine forest, 13.06.2009; E Tourmachka Village, 1200 m, 14.06.2009; E Peyova buka Hut, 1070 m, beech-hornbeam forest, 20.06.2009.

Distribution in Bulgaria. Common in many regions of the country; found up to 1200 m alt.

Chorotype. Euro-Mediterranean.

Camponotus fallax (Nylander, 1856)

Localities. N Bukov dol Locality, 920 m, xerothermic oak forest periphery, 27.05.2009.

Distribution in Bulgaria. Sofia and the surroundings, Petrich, Lozen Mt. Rare species.

Chorotype. South-Palaearctic.

Camponotus piceus (Leach, 1825)

Localities. NE Alino Village, 950 m, gravel road, 13.06.2009; NE Alino Village, 930 m, dry meadow, 13.06.2009; N Bukov dol Locality, 960 m, dry meadow, 20.06.2009.

Distribution in Bulgaria. Widespread throughout Southern Bulgaria between 800 and 1200 m alt. North the species is common for the region of Belogradchik.

Chorotype. Euro-Mediterranean.

Lasius niger (Linnaeus, 1758)

Localities. Near Plana Village, 1190 m, meadow, 18.04.2009; SE Pasarel Village, 830 m, xerothermic oak forest, 03.05.2009; near Pasarel Village, 710 m, riverside meadow, 27.05.2009.

Distribution in Bulgaria. Countrywide; up to 1600 m alt.

Chorotype. Holarctic.

Lasius platythorax Seifert, 1991

Localities. SE Pasarel Village, 925 m, xerothermic oak forest, 03.05.2009; Pasarel Village, 700 m, riverside meadow, 09.06.2009; N Bukov dol Locality, 911 m, xerothermic oak forest, 20.06.2009.

Distribution in Bulgaria. Sofia and the surroundings, Peshtera, Batak.

Chorotype. North-Palaearctic.

Remark. *L. platythorax* is a sibling species of *L. niger*. Considering its comparatively recent description, part of the older records for *L. niger* for Bulgaria should probably refer to *L. platythorax.*

Lasius brunneus (Latreille, 1798)

Localities. Near Kokalyane Monastery, 850 m, mixed forest periphery, 05.06.2008; SW Richov kladenets Well, 1240 m, beech forest periphery, 07.08.2008; E Tourmachka Village, 1200 m, moist meadow, 18.04.2009; N Bukov dol Locality, 950 m, xerothermic oak forest, 20.06.2009.

Distribution in Bulgaria. widespread throughout the country, usually below 1100 m alt.

Chorotype. South-Palaearctic.

Lasius alienus (Förster, 1850)

Localities. Tsiganka Peak, 1150 m, meadow, 07.08.2008 – 14.08.2008, 01.05.2009 – 08.05.2009 (pitfall traps); N Bukov dol Locality, 920 m, xerothermic oak forest, 17.06.2008 – 24.06.2008, 07.08.2009 – 14.08.2008, 01.05.2009 – 08.05.2009 (pitfall traps); SE Plana Village, 1180 m, meadow, 13.05.2008, 01.05.2009 – 08.05.2009; SE Plana Village, 1180 m, meadow, 13.05.2008; SE Pasarel Village, 820 m, xerothermic oak forest, 03.05.2009; SE Pasarel Village, 820 m, xerothermic oak forest, 03.05.2009; E Peyova buka Hut, 1050 m, birch forest periphery, 11.05.2009; E Peyova buka Hut, 990 m, xerothermic oak forest, 11.05.2009; NE Peyova buka Hut, xerothermic oak forest, 920 m, 21.05.2009; E Peyova buka Hut, 1120 m, beech forest, 09.06.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009.

Distribution in Bulgaria. Countrywide, up to 1500 m alt.

Chorotype. Holarctic.

Remark. Although this species is known to inhabit sunny broad-leaved forests and forest peripheries, it is more typical for open, rocky areas and dry meadows (SEIFERT, 1992). The present specimens were gathered exclusively from woody areas, which can be considered unusual.

Lasius paralienus Seifert, 1992

Localities. E Plana Village, 1170 m, meadow with single pine trees, 18.05.2008; SW the

astronomical observatory, 1100 m, meadow, 18.04.2009; E Tourmachka Village, 1150 m, meadow, 18.04.2009; NW Kiselichki kamak Peak, 1200 m, dry meadow, 13.06.2009.

Distribution in Bulgaria. reported from Kavarna, Sofia and the surroundings.

Chorotype. Central-European.

Remark. In Central Europe the species is typical for dry, limestone areas (SEIFERT, 1996). The colonies from Plana show wider tolerance towards habitat conditions. *L. paralienus* is probably not rare in Bulgaria, but its recent division from *L. alienus* is the reason for the insufficient data.

Lasius psammophilus Seifert, 1992

Localities. E Plana Village, meadow, 1180 m, 18.05.2008; near Plana Village, 1190 m, sandy path, 18.05.2008; SE Pasarel Village, 820 m, xerothermic oak forest periphery, 03.05.2009.

Distribution in Bulgaria. One record from Sofia; Plana Mt. becomes the second known locality in the country.

Chorotype. North-Palaearctic.

Remark. The very few records of this species are certainly no representative of its distribution in Bulgaria for the same reason as in *L. paralienus.*

Lasius fuliginosus (Latreille, 1798)

Localities. SE Plana Village, 1150 m, pine forest, 13.05.2008; near Peyova buka Hut, 1160 m, beech forest periphery, 05.06.2008; SE Plana Village, 1100 m, beech forest, 17.06.2008; E Tsiganka peak, 1140 m, birch forest, 21.05.2009; W the astronomical observatory, 1130 m, pine forest, 18.04.2009; NE the astronomical observatory, 1170 m, pine-spruce forest, 17.06.2008 – 24.06.2008, 07.08.2008 – 14.08.2008, 10.10.2008 – 17.10.2008, 01.05.2009 – 08.05.2009.

Distribution in Bulgaria. Countrywide, mainly below 1000 m alt.

Chorotype. Holo-Palaearctic.

Lasius balcanicus Seifert, 1988

Localities. N Bukov dol Locality, 920 m, xerothermic oak forest, 20.06.2009; E Peyova buka Hut, 950 m, xerothermic oak forest periphery, 20.06.2009.

Distribution in Bulgaria. Known from Obzor, Rozhen, Dospat and Sofia. Rare species.

Chorotype. Probably Central-European.

Remark. Females were not found in the two observed nests. Considering the close morphometrical similarities between the workers of *L. balcanicus* and *L. distinguendus* (SEIFERT, 1988), the present records for Plana should be concidered doubtful.

Lasius nitidigaster Seifert, 1997

Localities. SE Plana Village, 1190 m, meadow, 13.05.2008.

Distribution in Bulgaria. Known from Melnik and Obzor (SEIFERT, 1997). This is the third find of the species in the country. Rare species.

Chorotype. Central-European.

Formica fusca Linnaeus, 1758

Localities. Plana Village, 1190 m, meadow, 18.05.2008; near Kokalyane Monastery, 850 m, half-open area, 10.06.2008; N Bukov dol Locality, 900 m, xerothermic oak forest periphery, slaves in a nest of *Formica sanguinea*, 20.06.2009.

Distribution in Bulgaria. common species; up to 1800 m alt.
Chorotype. Cosmopolitan.

Formica cinerea Mayr, 1853

Localities. SE Plana Village, 1180 m, meadow, 13.05.2008; Plana Village, 1190 m, meadow, 18.05.2008; E Plana Village, 1180 m, meadow, 18.05.2008; Pasarel Village, 740 m, rocky path, 29.05.2008; near Tourmachka Village, 1180 m, corn-field, 07.08.2008; Dolni Okol Village, 1040 m, grassy path, 18.04.2009; near the astronomical observatory, 1100 m, grassy concrete ground, 18.04.2009; S Rechyov kamak Peak, 1200 m, dry meadow, 13.06.2009.

Distribution in Bulgaria. Very common species in whole country; found up to 1300 m alt., most abundant at 200 – 600 m alt.

Chorotype. Holo-Palaearctic.

Formica rufibarbis Fabricius, 1793

Localities. SE Plana Village, 1180 m, meadow, 13.05.2008; W Tsiganka Peak, 1100 m, meadow, 'slaves' in a nest of *Formica sanguinea*, 27.05.2009; NE Alino Village, 960 m, dry meadow, 13.06.2009.

Distribution in Bulgaria. Countrywide below 1500 m alt.

Chorotype. Holo-Palaerctic.

Formica cunicularia Latreille, 1798

Localities. SE Plana Village, 1180 m, meadow, 13.05.2008; SE Plana Village, 1170 m, half-open area, 13.05.2008; E Plana Village, 1170 m, dry meadow, 18.05.2008; NW the astronomical observatory, meadow with single pine trees, 18.05.2008; near Peyova buka Hut, 1140 m, meadow, 17.06.2008; near the astronomical observatory, 1100 m, pine forest periphery, 18.04.2009; NE Alino Village, 980 m, dry meadow with single juniper bushes, 14.06.2009.

Distribution in Bulgaria. Widespread mainly in planes and low mountains. Found up to 1800 m alt., most abundant at 200 – 400 m.

Chorotype. Holo-Palaearctic.

Remark. The sample near the astronomical observatory was taken from a compound nest with *Lasius paralienus*.

Formica gagates Latreille, 1798

Localities. SE Pasarel Village, 790 m, sandy path, 03.05.2009; SE Pasarel Village, 810 m, half-open area, 11.05.2009; NE Peyova buka Hut, 950 m, xerothermic oak forest, 27.05.2009.

Distribution in Bulgaria. Countrywide up to 1000 m alt.

Chorotype. Euro-South-Siberian.

Formica clara Forel, 1886

Localities. SE Plana Village, 1180 m, half-open area, 13.05.2008; near Peyova buka Hut, 1140 m, beech forest periphery, 05.06.2008.

Distribution in Bulgaria. Known from Nesebar (BARRETT, 1970) and Obzor (SEIFERT & SCHULTZ, 2009).

Chorotype. Palaearctic.

Formica pratensis Retzius, 1783

Localities. Tsiganka Peak, 1150 m, meadow, 07.08.2008 – 14.08.2008 (pitfall traps); N

Bukov dol Locality, 920 m, xerothermic oak forest, 07.08.2008 – 14.08.2008, 10.10.2008 – 17.10.2008, 01.05.2009 – 08.05.2009 (pitfall traps); SE Plana Village, 1180 m, meadow, 13.05.2008; SE Plana Village, 1180 m, meadow, 13.05.2008; E Plana Village, 1180 m, meadow, 18.05.2008; Manastirishte Peak, 1330 m, meadow, 10.06.2008; NE the astronomical observatory, 1170 m, pine-spurce forest, 17.06.2008 – 24.06.2008 (pitfall traps); near the astronomical observatory, half-open area, 1110 m, 18.04.2009; SE Pasarel Village, 900 m, oak forest periphery, 11.05.2009; SW Mechitski kamak Peak, 1200 m, meadow, 13.06.2009.

Distribution in Bulgaria. Widespread mainly in planes and hilly districts; reaches up to 1800 m alt.

Chorotype. Temperate-Palaearctic.

Formica lugubris Zetterstedt, 1840

Localities. SW astronomical observatory, 1140 m, half-open area, 18.04.2009; SW the astronomical observatory, 1130 m, pine forest periphery, 18.04.2009.

Distribution in Bulgaria. known mainly from the high mountain regions; 900 – 2300 m alt, most abundant at 1500 – 1900 m alt.

Chorotype. Boreo-Montane.

Formica rufa Linnaeus, 1758

Localities. SE Plana Village, 1180 m, mixed forest, 13.05.2008; near Kokalyane Monastery, 850 m, mixed forest periphery, 10.06.2008; NE Peyova buka Hut, 1100 m, half-open area, 10.10.2008; NE Malinov chukar peak, 1130 m, birch forest periphery, 09.06.2009; N Bukov dol Locality, 1120 m, beech forest, 09.06.2009; W Ivanova mogila Peak, 1100 m, mixed forest periphery, 13.06.2009; NE Alino Village, 920 m, pine forest periphery, 13.06.2009; NE Alino Village, 940 m, pine forest, 14.06.2009.

Distribution in Bulgaria. Mainly the mountain areas between 600 and 1600 m alt. Single colonies are found up to 2000 m.

Chorotype. Holo-Palaearctic.

Formica sanguinea Latreille, 1798

Localities. E Plana Village, meadow, 18.05.2008; E Plana Village, 1180 m, meadow, 18.05.2008; N Bukov dol Locality, 1060 m, half-open area, 29.05.2008; Tsiganka Peak, 1150 m, meadow, 17.06.2008 – 24.06.2008 (pitfall traps); E the astronomical observatory, 1140 m, pine clearing, 25.04.2009; SE Pasarel Village, 880 m, xerothermic oak forest periphery, 21.05.2009; W Tsiganka Peak, 1100 m, meadow, 27.05.2009; N Bukov dol Locality, 900 m, xerothermic oak forest periphery, 20.06.2009.

Distribution in Bulgaria. Many scattered locations throughout the country.

Chorotype. Holo-Palaearctic.

Remark. According to ATANASSOV & DLUSSKIJ (1992), *F. sanguinea* is known as a widely distributed but comparatively rare species in Bulgaria. In Plana Mt., at least in its northern part, the species seems to be quite common. An interesting fact is that two of the five nests observed were relatively large domed nests, which is untypical of these ants.

Polyergus rufescens (Latreille, 1798)

Localities. N Bukov dol Locality, 880 m, gravel road, 20.08.2009.

Distribution in Bulgaria. many scattered locations throughout the country.

Chorotype. Holo-Palaearctic.

Discussion

The present research resulted in establishing 49 species[1] of ants representing 13 genera and three subfamilies – Myrmicinae, Dolichoderinae and Formicinae. Not surprisingly, genus *Formica* comprises the most species (10), followed by *Lasius* (9), and *Myrmica* (7). Forty-four species are new to the region of Plana Mountain, of which 12 are presented with very few records in the references for Bulgaria, due to limited distribution, change in systematics, or misidentification. Two species reported from Plana in previous publications were not found during the current surveys – *Tetramorium hungaricum* Röszler (in STEINER et al., 2005) and *Formica exsecta* Nylander (in WESSELINOFF, 1967). The distribution of the first is probably restricted to only certain localities in the mountain, so some more extensive sampling should confirm its presence. The absence of the latter from our samples could be for different reasons. An important factor is the altitude – *F. exsecta* usually inhabits the high mountain belts; the ridges of Plana (ca. 1200 – 1250 m alt.) are close to its lower vertical limit and a supposed population is likely to consist of a few spatially confined colonies. Another possible explanation considering the over 40 year period, since the only report from the mountain, is a profound change in habitat, which has led to the species extinction from the region. The samples with *Tetramorium caespitum/impurum* complex include at least one species different from *T. caespitum* L. It could be an undescribed cryptic species, but this speculation will need more material and further investigation.

Of the total number of 51 species (two from references) 43 (84.3%) belong to the Euro-Siberian zoogeographical complex, 5 (9.8%) are Mediterranean elements, 1 species, namely *Formica fusca*, is Cosmopolitan, and 2 (3.9%) are with indistinct distribution. Of the Euro-Siberian complex the most taxa come under the Holo-Palaearctic group – 12 (23.5%), followed by the North-Palaearctic – 6 (11.7%), the Central-European – 5 (9.8%), etc. All 5 Mediterranean species have Euro-Mediterranean distribution; the lack of typical Holomediterranean elements can be explained with the temperate continental climate of Plana, in a combination with its relatively high altitude.

Plana's location next to Vitosha Mt. (northwest) and Lozen Mt. (northeast) is a good ground for comparison of the present species list with the relatively better studied ant faunas of these two neighbouring mountains. Fifty-five species of ants are known from Vitosha (ATANASSOV, 1952; ATANASSOV & DLUSSKIJ, 1992; LAPEVA-GJONOVA, 2004; ANTONOVA, 2006; HLAVAČ et al., 2007 and others) and 41 from Lozen (VASSILEV & EFTIMOV, 1973; ANTONOVA, 2006). It turns out that Plana and Lozen, despite their similar maximal altitudes (1338 m and 1190 m respectively), have only 29 common species, while for Plana and the much higher Vitosha (max. 2290) this number is 36. This pattern is clearly seen when comparing the number of North-Palaearctic and Boreo-Montane elements in the three mountains, which are, accordingly: 6 and 4 in Plana, 7 and 6 in Vitosha, and only two North-Palaearctic species reported from Lozen, with no Boreo-Montane species known from there. A possible explanation for this considerable amount of cold-hardy ants in Plana, is the proximity of the much bigger and higher Rila Mt. from south. As a result, Plana is exposed exclusively to northwest and northeast winds, which increase the continental influence over the mountain's climate. The same has a negative

[1] This is the number of the certainly identified species. The specimens of *Tetramorium caespitum/impurum* complex include one or two species different from *T. caespitum* Linnaeus, that are unrecognizable at this stage.

effect on the number of Mediterranean species – 5 against 6 in Lozen and 8 in Vitosha. Lozen, from other hand, has also some features that differ from the other two mountains – relatively low annual rainfall (560 – 628 mm) and predominance of maroon forest soils, while Plana and Vitosha are more humid (800 – 1025 mm), and covered mainly with brown forest soils (ANDREEV, 1982; NIKOLOV & YORDANOVA, 1997). The more arid climate, combined with the lowest minimal altitude (ca. 600 m) of the three mountains, are probably the reason for the presence of two typically xerophilous, macrothermic species in Lozen, that are absent in Vitosha and Plana – *Cataglyphis nodus* Brulle and *Camponotus sylvaticus* Olivier.

With 51 presently known species, which is approximately 33% of all Bulgarian ants, the ant fauna of Plana Mountain is comparatively rich. It can also be regarded as relatively well-studied, considering the number of species in Vitosha Mt. (55), which is a result of a much longer research practice. However, new taxa will certainly appear, if following studies are to be carried out. The many unique samples per species, as well as the absence of several generally common ants (*Lasius flavus* (Fabricius, 1782), *Aphaenogaster subterranea* (Latreille, 1798), *Camponotus lateralis* (Olivier, 1792), etc.), confirm this expectation. Some parts of Plana Mt., especially the southeastern, remain more or less unexplored.

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Мравките (Hymenoptera, Formicidae) на Плана планина

(Р е з ю м е)

Боян ВАГАЛИНСКИ, Албена ЛАПЕВА-ГЪОНОВА

Настоящата статия представя резултатите от първото досега целенасочено изследване на мирмекофауната (семейство Formicidae) на Плана планина (Западна България). Установени са общо 49 вида мравки, от които 44 се съобщават за първи път от проучвания район. *Tetramorium hungaricum* (Röszler, 1935) и *Formica exsecta* Nylander, 1846, съобщени за планината от други автори, не са намерени при това изследване. Представен е и зоогеографски анализ на локалната фауна на мравките, както и в сравнение с тази на съседните Витоша и Лозен планини. Включена е информация за хабитатите на проучваните видове и допълнителни бележки за някои от тях.