

РОССИЙСКАЯ АКАДЕМИЯ НАУК
Южный научный центр

RUSSIAN ACADEMY OF SCIENCES
Southern Scientific Centre



Кавказский Энтомологический Бюллетень

CAUCASIAN ENTOMOLOGICAL BULLETIN

Том 15. Вып. 1

Vol. 15. No. 1



Ростов-на-Дону
2019

New data on the ant fauna (Hymenoptera: Formicidae) of Azerbaijan

Новые данные по фауне муравьев (Hymenoptera: Formicidae) Азербайджана

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Key words: Hymenoptera, Formicidae, faunistics, new records, Azerbaijan, Caucasus.

Ключевые слова: Hymenoptera, Formicidae, фауна, новые находки, Азербайджан, Кавказ.

Abstract. Ants of Azerbaijan are relatively poorly known compared to other parts of the Caucasus area and Europe. To improve the knowledge of the ant fauna, we performed field sampling in 2017, including different habitats extending throughout the country. We collected data on ants from 46 localities, and identified 73 species all together, of which 30 present new records for Azerbaijan, i.e., *Camponotus lateralis* (Olivier, 1792), *Cardiocondyla brachycephala* Seifert, 2003, *C. stambuloffii* Forel, 1892, *Formica cunicularia* Latreille, 1798, *F. georgica* Seifert, 2002, *Lasius bombycina* Seifert et Galkowski, 2016, *L. illyricus* Zimmermann, 1935, *L. neglectus/turcicus* complex, *L. obscuratus* Stitz, 1930, *L. platythorax* Seifert, 1991, *L. cf. platythorax*, *Lepisiota syriaca* (André, 1881), *Myrmica salina* Ruzsky, 1905, *M. specioides* Bondroit, 1918, *Myrmoxenus cf. ravouxi*, *Plagiolepis arnoldii* Dlussky, Soyunov et Zabelin, 1990, *P. perperamus* Salata, Borowiec et Radchenko, 2018, *Ponera testacea* Emery, 1895, *Proformica epinotalis* Kuznetsov-Ugamsky, 1927, *Tapinoma magnum* Mayr, 1861, *Temnothorax interruptus* (Schenck, 1852), *T. parvulus* (Schenck, 1852), *T. cf. recedens*, *T. tauricus* (Ruzsky, 1902), *Tetramorium cf. caespitum*, *T. caucasicum* Wagner, Arthofer, Seifert, Muster, Steiner et Schlick-Steiner, 2017, *T. chefketi* Forel, 1911, *T. indocile* Santschi, 1927, *T. moravicum* Novák et Sadil, 1941, and *T. sulcinode* Santschi, 1927.

Резюме. Фауна муравьев Азербайджана относительно слабо изучена по сравнению с другими частями Кавказа и Европы. В ходе экспедиции по стране в 2017 году было собрано 73 вида муравьев из 46 местонахождений, 30 видов из них впервые указаны для Азербайджана: *Camponotus lateralis* (Olivier, 1792), *Cardiocondyla brachycephala* Seifert, 2003, *C. stambuloffii* Forel, 1892, *Formica cunicularia* Latreille, 1798, *F. georgica* Seifert, 2002, *Lasius bombycina* Seifert et Galkowski, 2016, *L. illyricus* Zimmermann, 1935, *L. neglectus/turcicus* complex, *L. obscuratus* Stitz, 1930, *L. platythorax* Seifert, 1991, *L. cf. platythorax*, *Lepisiota syriaca* (André, 1881), *Myrmica salina* Ruzsky, 1905, *M. specioides* Bondroit, 1918, *Myrmoxenus cf. ravouxi*, *Plagiolepis arnoldii* Dlussky, Soyunov et Zabelin, 1990, *P. perperamus* Salata, Borowiec et Radchenko, 2018, *Ponera testacea* Emery, 1895, *Proformica*

epinotalis Kuznetsov-Ugamsky, 1927, *Tapinoma magnum* Mayr, 1861, *Temnothorax interruptus* (Schenck, 1852), *T. parvulus* (Schenck, 1852), *T. cf. recedens*, *T. tauricus* (Ruzsky, 1902), *Tetramorium cf. caespitum*, *T. caucasicum* Wagner, Arthofer, Seifert, Muster, Steiner et Schlick-Steiner, 2017, *T. chefketi* Forel, 1911, *T. indocile* Santschi, 1927, *T. moravicum* Novák et Sadil, 1941, и *T. sulcinode* Santschi, 1927.

Introduction

Recently, ants of the Palaearctic region were subjected to several taxonomical revisions. Thus, some genera underwent important taxonomical changes, e.g. *Bothriomyrmex* Emery, 1869 [Seifert, 2012], *Cardiocondyla* Emery, 1869 [Seifert, 2003], *Formica* Linnaeus, 1758 [Seifert, Schultz, 2009a, b], *Messor* Forel, 1890 [Steiner et al., 2018], *Myrmica* Latreille, 1804 [Radchenko, Elmes, 2010], *Temnothorax* Mayr, 1861 [Csósz et al., 2015, 2018] and *Tetramorium* Mayr, 1855 [Csósz et al., 2007; Csósz, Schulz, 2010; Wagner et al., 2017]. These revisions incited European myrmecologists to update ant lists for their countries, which resulted in improved knowledge on distribution of ant taxa.

The Caucasus, situated at the junction of Europe and Asia, is an important natural region with high species richness, levels of endemism, taxonomic uniqueness and presence of many habitat types of global rarity [Biodiversity..., 2000]. As far as ants are concerned, this territory used to be part of myrmecological investigations for a long time, but recently, intensity of faunistic studies lagged behind the ones in other European regions. The last ant list was published for Georgia [Gratiashvili, Barjadze, 2008], but the list lacks critical evaluation of older literature records. For Armenia, the last extensive study of ants dates 25 years back [Arakelian, 1994]. Ants of Russian part of the Caucasus were studied in several shorter contributions [Dubovikoff, 2002, 2005; Radchenko et al., 2015; Radchenko, Yusupov, 2017; Yusupov, 2014, 2017a, b]. Compared to other parts of the Caucasus, Azerbaijan is the most deficient and outdated in knowledge on ant fauna, without any faunistic



Fig. 1. Sampling localities of ants in Azerbaijan in 2017.

Рис. 1. Точки сбора муравьев в Азербайджане в 2017 году.

work published recently. Moreover, while Armenian and Georgian ant material was used in several latest taxonomical revisions [Csősz et al., 2007, 2015, 2018; Seifert, 2011; Seifert, Csősz, 2015; Wagner et al., 2017; Steiner et al., 2018], Azerbaijan was mostly neglected in those investigations.

In the past studies, ants from the territory of present Azerbaijan were included in the survey of the ant fauna of former Imperial Russia [Ruzsky, 1905], or the whole Caucasus [Karavaiev, 1926a, b, c]. Records on Azerbaijanian ants can be found in reviews of certain genera from the former Soviet Union, e.g. *Messor* [Arnol'di, 1977], *Proformica* Ruzsky, 1902 [Dlussky, 1969], *Solenopsis* Westwood, 1840 [Dlussky, Radchenko, 1994], *Temnothorax* [Radchenko, 1994a, 1995] and *Tetramorium* [Radchenko, 1992]. An important study, which dealt particularly with Azerbaijanian ants, was published by Arnol'di [1948], who presented an extensive faunistic and ecological investigation of the ants of the Talysh Mts. and Diabar Depression (south-eastern Azerbaijan). Recently, Dubovikoff and Radchenko [2010] described *Chalepoxenus hircanus* from Talysh Mts. In the list of ants from Europe and Mediterranean [Borowiec, 2014], 70 species are reported for Azerbaijan.

So far, there has not been any investigation that would include sampling of ants throughout Azerbaijan. Here we present the results of such investigation carried out in Azerbaijan in 2017.

Material and methods

Ants were sampled in August and September 2017, in different parts of Azerbaijan (Fig. 1). The only areas not covered in the investigation were Nagorno-Karabakh region and exclave of Nakhchivan. Altogether, 46 localities were investigated (Table 1). Ants were sampled applying direct sampling method [Bestelmeyer et al., 2000]. The material was preserved in 70% ethanol and is deposited in the ant collection of the author (Ljubljana, Slovenia).

The following taxonomic literature was considered for the identification of species: Arnol'di [1977], Borowiec and Salata [2013], Csősz et al. [2007, 2015, 2018], Dlussky [1969], Dlussky and Radchenko [1994], Dlussky and Zabelin [1985], Radchenko [1994b, 1996a, b, 1997, 1998], Radchenko and Elmes [2010], Salata and Borowiec [2015, 2018], Salata et al. [2018], Seifert [1992, 2000a, 2002, 2003, 2011, 2016, 2018], Seifert and Galkowski [2016], Seifert and Schultz [2009a, b], Seifert et al. [2017], Steiner et al. [2018],

Wagner et al. [2017]. Where available, we compared our samples with high quality images of the type specimens on the AntWeb website [http://www.antweb.org].

Images of ant specimens shown here were taken with a Canon 80D photo camera with Canon MP-E 65 mm macro lens and processed with CombineZM software.

We list all 73 species collected by the author in Azerbaijan in 2017, and give numbers of localities as defined in Table 1, and number of collected specimens for each species (w. – workers, q. – queens, m. – males). We give comments to some records, and mark new species for Azerbaijan with an asterisk *.

Table 1. List of localities (arranged chronologically) in Azerbaijan where ants were sampled in 2017.
Таблица 1. Список местонахождений муравьев в Азербайджане в 2017 году (в хронологическом порядке).

Locality number № местонахождения	Locality Местонахождение	Coordinates Координаты	Altitude, m Высота н.у.м, м	Habitat Местообитание	Date / Дата сборов
1	Baku (Philharmony Park) Баку (Парк Филармонии)	40°21.8'N 49°50.0'E	-15	urban park городской парк	17.08.2017
2	Baku (Ataturk Park) Баку (парк Атаатюрка)	40°24.2'N 49°51.0'E	40	urban park городской парк	17.08.2017
3	3 km W of Khalanj, Khizi District Зкм З с. Халандж, Хызынский р-н	40°54.9'N 49°08.8'E	620	deciduous (mostly oak) forest лиственный (преимущественно дубовый) лес	18.08.2017
4	1.5 km SW of Afurgha, Quba District 1.5 км ЮЗ с. Афурка, Кубинский р-н	41°9.1'N 48°36.0'E	850	dry stony grassland with some shrubs сухой каменистый луг с кустами	19.08.2017
5	3.5 km E of Rustov, Quba District 3.5 км В с. Рустов, Кубинский р-н	41°14.9'N 48°37.5'E	610	open deciduous forest / roadside открытый лиственный лес / обочина дороги	19.08.2017
6	Quba, Quba District Куба, Кубинский р-н	41°21.8'N 48°30.8'E	600	urban park городской парк	19.08.2017
7	4.5 km NE of Khudat, Khachmaz District 4.5 км СВ Худата, Хачмазский р-н	41°40.2'N 48°42.6'E	10	forest edge on a partly wet ground опушка леса, на частично влажном грунте	20.08.2017
8	Nabran, Khachmaz District Набрань, Хачмазский р-н	41°45.3'N 48°41.9'E	-15	partly wet deciduous forest частично влажный лиственный лес	20.08.2017
9	3 km NW of Langi, Qusar District 3 км СЗ с. Лыги, Кусарский р-н	41°34.7'N 48°30.9'E	260	dry deserted field сухое опустыненное поле	20.08.2017
10	4 km SW of Qirizdahna, Quba District 4 км ЮЗ с. Кириздана, Кубинский р-н	41°12.8'N 48°16.0'E	1510	stony ground along the roadside каменистая почва вдоль дороги	21.08.2017
11	1 km NE of Khuray, Quba District 1 км СВ с. Хурай, Кубинский р-н	41°22.4'N 48°18.4'E	970	dry open deciduous forest сухой открытый лиственный лес	21.08.2017
12	1 km NE of Laza, Qusar District 1 км СВ с. Лаза, Кусарский р-н	41°18.1'N 48°7.3'E	1800	mountain stony grassland горный каменистый луг	21.08.2017
13	8 km SW of Gilazi, Khizi District 8 км ЮЗ с. Гилязи, Хызынский р-н	40°51.0'N 49°15.1'E	120	semi-desert полупустыня	22.08.2017
14	5 km NE of Agsu, Agsu District 5 км СВ Ахсу, Ахсуйский р-н	40°36.3'N 48°26.3'E	800	dry deciduous forest сухой лиственный лес	22.08.2017
15	1 km SW of Lahich, Ismailli District 1 км ЮЗ пос. Лагич, Исмаиллинский р-н	40°50.3'N 48°22.5'E	1300	dry stony grassland / deciduous forest / river bank сухой каменистый луг / лиственный лес / берег реки	23.08.2017
16	2 km W of Lahich, Ismailli District 2 км З пос. Лагич, Исмаиллинский р-н	40°50.5'N 48°21.6'E	1150	dry grassland with some shrubs / forest edge сухой луг с небольшим количеством кустарников / опушка леса	24.08.2017
17	Lahich, Ismailli District Пос. Лагич, Исмаиллинский р-н	40°50.8'N 48°23.0'E	1220	garden сад	24.08.2017
18	1 km SE of Birinci Yeniyo, Ismailli District 1 км ЮВ с. Биринчи Ениёл, Исмаиллинский р-н	40°44.9'N 48°17.7'E	740	forest edge / pasture опушка леса / пастбище	25.08.2017

Table 1 (continuation).
Таблица 1 (продолжение).

Locality number № местонахождения	Locality Местонахождение	Coordinates Координаты	Altitude, m Высота н.у.м., м	Habitat Местообитание	Date / Дата сборов
19	2.5 km N of Topchu, Ismailli District 2.5 км С с. Топчу, Исмаиллинский р-н	40°54.0'N 48°3.9'E	710	deciduous forest / dry pasture лиственный лес / сухое пастбище	25.08.2017
20	SW shore of Nohur Lake, Qabala District ЮЗ берег оз. Нохур, Габалинский р-н	40°57.4'N 47°52.6'E	640	park with poplar trees парк с тополями	26.08.2017
21	12 km S of Oghuz, Oghuz District 12 км Ю Огуза, Огузский р-н	40°57.6'N 47°28.8'E	390	roadside with some trees обочина дороги с деревьями	26.08.2017
22	3 km SE of Bideyiz, Oghuz District 3 км ЮВ с. Бидеиз, Огузский р-н	41°6.1'N 47°20.0'E	630	dry stony shrubland кустарниковые заросли на камнях	27.08.2017
23	1.5 km NE of Kish, Shaki District 1.5 км СВ с. Киш, Шекинский р-н	41°15.5'N 47°12.9'E	1070	pine forest / grassland with some trees сосновый лес / луг с деревьями	27.08.2017
24	Balakan, Balakan District Белоканы, Белоканский р-н	41°43.1'N 46°25.1'E	380	urban park городской парк	28.08.2017
25	NE outskirts of Balakan, Balakan District СВ окраина Белокан, Белоканский р-н	41°44.1'N 46°26.5'E	510	dry open forest on a stony slope / path along forest edge сухой открытый лес на каменистом склоне / тропа вдоль края леса	28.08.2017
26	1.5 km W of Dardoqqaz, Zaqatala District 1.5 км З с. Дардогаз, Закаतालский р-н	41°36.6'N 46°32.3'E	300	wet forest влажный лес	28.08.2017
27	1 km E of Plisu, Qakh District 1 км В с. Илису, Гахский р-н	41°28.0'N 47°4.8'E	1350	mountain stony grassland with some shrubs горный каменистый луг с кустами	29.08.2017
28	1 km E of Calayir, Qakh District 1 км В с. Джалаир, Гахский р-н	41°19.2'N 46°49.1'E	220	partly wet deciduous forest / roadside along grassland частично влажный лиственный лес / обочина вдоль лугов	29.08.2017
29	1 km S of Xanabad, Yevlakh District 1 км Ю с. Ханабат, Евлахский р-н	40°46.8'N 47°10.6'E	80	dry grassland with some shrubs and trees сухой луг с кустарниками и деревьями	30.08.2017
30	3 km SE of Yevlakh, Yevlakh District 3 км ЮВ Евлаха, Евлахский р-н	40°35.3'N 47°11.3'E	10	partly wet shrubland with some poplar trees on sandy soil / partly wet grassland with some shrubs / open pine forest частично влажные кустарниковые заросли с несколькими тополями на песчаной почве / частично влажный луг с кустарником / открытый сосновый лес	30.08.2017
31	1.5 km N of Poylu qesebesi, Agstafa District 1.5 км С с. Пойлу, Акстафинский р-н	41°14.8'N 45°26.1'E	210	shrubland with some trees кустарниковые заросли с несколькими деревьями	31.08.2017
32	N of Lake Göygöl, Goygol District С оз. Гёйгёль, Гёйгёльский р-н	40°25.0'N 46°19.7'E	1590	path along shrubland тропа вдоль кустаников	1.09.2017
33	3 km NE of Toghnanali, Goygol District 3 км СВ с. Тоганалы, Гёйгёльский р-н	40°27.1'N 46°20.3'E	1200	dry open deciduous forest сухой открытый лиственный лес	1.09.2017
34	2.5 km NE of Dashkasan, Dashkasan District 2.5 км СВ Дашкесана, Дашкесанский р-н	40°32.0'N 46°6.4'E	1100	dry rocky slope with some shrubs and trees сухой каменистый склон с кустарниками и деревьями	1.09.2017
35	2.5 km SW of Yenikand, Samukh District 2.5 км ЮЗ с. Еникенд, Самухский р-н	40°54.1'N 46°17.8'E	100	dry shrubland with some trees / partly wet grassland сухой кустарник с несколькими деревьями / частично влажный луг	2.09.2017

Table 1 (completion).
Таблица 1 (окончание).

Locality number № местонахождения	Locality Местонахождение	Coordinates Координаты	Altitude, m Высота н.у.м, м	Habitat Местообитание	Date / Дата сборов
36	6 km S of Aghjabadi, Aghjabadi District 6 км Ю Агдажебеди, Агдажебединский р-н	39°59.4'N 47°29.4'E	20	roadside with some shrubs / open oak forest обочина с кустарниками / открытый дубовый лес	3.09.2017
37	Lankaran Ленкорань	38°45.5'N 48°51.3'E	-20	urban park городской парк	4.09.2017
38	3.5 km SW of Girdani, Lankaran District 3.5 км ЮЗ с. Гирдани, Ленкоранский р-н	38°46.9'N 48°44.9'E	50	dry pasture with some shrubs / deciduous forest сухое пастбище с кустарниками / лиственный лес	4.09.2017
39	2 km W of Hirkan, Lankaran District 2 км З с. Гиркан, Ленкоранский р-н	38°39.9'N 48°46.5'E	100	deciduous forest лиственный лес	5.09.2017
40	Sipiapart, Astara District Сипиапарт, Астаринский р-н	38°32.0'N 48°42.9'E	150	roadside with some shrubs обочина с кустарниками	5.09.2017
41	3.5 km S of Blaband, Lerik District 3.5 км Ю с. Блабанд, Лерикский р-н	38°42.5'N 48°25.5'E	1230	bare rocky slope голый скалистый склон	6.09.2017
42	2 km NE of Gosmalijion, Lerik District 2 км СВ Госмальяна, Лерик District	38°41.2'N 48°23.2'E	1350	grassland with some poplar trees луг с несколькими тополями	6.09.2017
43	Aghalikand, Bilasuvar District с. Агалыкенд, Билясуварский р-н	39°23.0'N 48°35.0'E	-10	roadside with some trees обочина с деревьями	7.09.2017
44	S of Hesenli, Salyan District Ю с. Гасанлы, Сальянский р-н	39°41.3'N 49°5.7'E	-25	dry deserted field on sandy soil сухое опустыненное поле на песчаном грунте	7.09.2017
45	5 km W of Qobustan, Baku 5 км З Гобустана, Баку	40°4.9'N 49°21.2'E	20	semi-desert полупустыня	8.09.2017
46	2 km E of Qaraguney, Sabirabad District 2 км В с. Гарагуней, Сабирабадский р-н	39°57.6'N 48°52.5'E	-20	pasture / shrubland with some trees on sandy soil пастбище / кустарник с деревьями на песчаном грунте	9.09.2017

List of species

Aphaenogaster muschtaidica Emery, 1908

Material. Localities: 7, 8, 14, 26, 30. Number of specimens collected: 25 w.

Notes. Salata and Borowiec [2018] redescribed *A. muschtaidica* based on the material from Georgia. This species was formerly mostly treated as subspecies or synonym of *A. gibbosa* (Latreille, 1798). *Aphaenogaster muschtaidica* is probably restricted to the Caucasus area while true *A. gibbosa* has western-Mediterranean distribution.

Aphaenogaster subterranea (Latreille, 1798) (Fig. 2)

Material. Localities: 3, 5, 7, 8, 11, 14, 15, 19, 23, 25, 26, 27. Number of specimens collected: 142 w., 6 q., 3 m.

Notes. Individuals we collected show some morphological differences from the typical *A. subterranea* from Europe. They include mostly darker colour, smaller body size and more dilute head sculpture. The true identity

of Azerbaijanian samples shall be established only after the complete revision of *A. subterranea* group.

Camponotus aethiops (Latreille, 1798)

Material. Localities: 4, 5, 16, 18, 29, 42, 43, 44. Number of specimens collected: 61 w.

Camponotus atricolor (Nylander, 1849)

Material. Localities: 4, 7, 9, 13, 29, 30, 31, 35, 36, 39, 42, 43. Number of specimens collected: 70 w., 1 q., 11 m.

Camponotus fallax (Nylander, 1856)

Material. Localities: 6, 18, 26, 28. Number of specimens collected: 4 w.

**Camponotus lateralis* (Olivier, 1792)

Material. Localities: 3, 7, 14, 18, 25, 39. Number of specimens collected: 29 w.

Camponotus turkestanicus Emery, 1887

Material. Localities: 30, 35, 44, 45, 46. Number of specimens collected: 15 w.

**Cardiocondyla brachyceps* Seifert, 2003

Material. Locality: 25. Number of specimens collected: 18 w.

Cardiocondyla sahlbergi Forel, 1913

Material. Localities: 20, 22, 24, 25, 28, 29, 30, 36, 37, 40, 42, 45. Number of specimens collected: 70 w.

**Cardiocondyla stambuloffii* Forel, 1892

Material. Localities: 31, 46. Number of specimens collected: 19 w.

Cataglyphis aenescens (Nylander, 1849)

Material. Localities: 9, 35, 41, 42, 43, 44, 45. Number of specimens collected: 89 w.

Cataglyphis nodus (Brullé, 1833)

Material. Localities: 13, 29, 30, 31, 35, 36, 43, 44, 45, 46. Number of specimens collected: 61 w.

Colobopsis truncata (Spinola, 1808)

Material. Localities: 8, 21, 25, 26. Number of specimens collected: 9 w.

Crematogaster schmidti (Mayr, 1853)

Material. Localities: 3, 7, 8, 14, 18, 22, 25, 26, 31, 35, 39, 40. Number of specimens collected: 212 w.

Crematogaster subdentata Mayr, 1877

Material. Localities: 2, 29, 30, 36, 43. Number of specimens collected: 79 w.

Dolichoderus quadripunctatus (Linnaeus, 1771)

Material. Localities: 7, 8, 14, 18, 26, 28, 39. Number of specimens collected: 35 w.

Formica clara Forel, 1886

Material. Localities: 1, 4, 8, 10, 16, 19, 20, 26, 28, 30, 35, 38, 42. Number of specimens collected: 85 w.

**Formica cunicularia* Latreille, 1798

Material. Locality: 19. Number of specimens collected: 7 w.

Formica cf. *forsslundi*
(Fig. 3)

Material. Locality: 12. Number of specimens collected: 20 w.

Notes. Seifert [2000a] pointed out that population of *F. forsslundi* Lohmander, 1949 from the Caucasus differs from European population in few characters, and later Schultz and Seifert [2007] considered it as a separate undescribed species.

**Formica georgica* Seifert, 2002

Material. Localities: 4, 10, 15, 23, 25, 27, 32, 34. Number of specimens collected: 96 w.

Formica picea Nylander, 1846

Material. Locality: 12. Number of specimens collected: 31 w., 1 q., 1 m.

Formica sanguinea Latreille, 1798

Material. Localities: 7, 15, 19, 30, 42. Number of specimens collected: 50 w.

Formica subpilosa Ruzsky, 1902

Material. Locality: 46. Number of specimens collected: 29 w.

**Lasius bombycina* Seifert et Galkowski, 2016

Material. Localities: 4, 10, 11. Number of specimens collected: 23 w.

Lasius brunneus (Latreille, 1798)

Material. Locality: 8. Number of specimens collected: 9 w.

Lasius flavus (Fabricius, 1782)

Material. Localities: 10, 12, 15, 27, 32. Number of specimens collected: 77 w., 1 q., 9 m.

**Lasius illyricus* Zimmermann, 1935

Material. Localities: 15, 19, 26, 28, 32. Number of specimens collected: 39 w., 1 q.

Lasius myops Forel, 1894

Material. Locality: 42. Number of specimens collected: 15 w., 2 q., 3 m.

**Lasius neglectus/turcicus* complex

Material. Localities: 1, 7, 8, 9, 14, 18, 19, 25, 26, 28, 31, 35, 36, 38, 39, 40, 44. Number of specimens collected: 280 w.

Notes. The status of both taxa, *L. neglectus* Van Loon, Boomsma et Andrasfalvy, 1990 and *L. turcicus* Santschi, 1921, is still under discussion. Populations of both taxa show differences in biology and ecology and quite expressed morphometric differences in males (these are less expressed in female castes), which could indicate that these are two distinct species [Seifert, 2000b]. However, preliminary molecular studies suggest conspecificity of both taxa, which confirms hypothesis of two ecomorphotypes of one species.

**Lasius obscuratus* Stitz, 1930

Material. Localities: 3, 11, 12, 15, 16, 42. Number of specimens collected: 52 w., 5 q.

**Lasius platythorax* Seifert, 1991

Material. Locality: 28. Number of specimens collected: 15 w.

**Lasius* cf. *platythorax*

Material. Locality: 10. Number of specimens collected: 7 w.

Notes. Workers of this sample are similar to *L. platythorax*, but show reduced standing pilosity on underside of head, scapus and hind tibia.

Lepisiota caucasica (Santschi, 1917)
(Fig. 4)

Material. Localities: 13, 22, 29, 35, 45. Number of specimens collected: 45 w.



Figs 2–7. Lateral view of the body of ant workers.

2 – *Aphaenogaster subterranea* from locality 11; 3 – *Formica* cf. *forsslundi* from locality 12; 4 – *Lepisiota caucasica* from locality 29; 5 – *Messor caducus* from locality 44; 6 – *Temnothorax* cf. *recedens* from locality 25; 7 – *Tetramorium* cf. *caespitum* from locality 27. Scale bars 1 mm.

Рис. 2–7. Муравьи-рабочие, вид сбоку.

2 – *Aphaenogaster subterranea*, местонахождение 11; 3 – *Formica* cf. *forsslundi*, местонахождение 12; 4 – *Lepisiota caucasica*, местонахождение 29; 5 – *Messor caducus*, местонахождение 44; 6 – *Temnothorax* cf. *recedens*, местонахождение 25; 7 – *Tetramorium* cf. *caespitum*, местонахождение 27. Масштабные линейки 1 мм.

Notes. The genus *Lepisiota* Santschi, 1926 needs to be revised. The above listed samples were identified as *L. caucasica*, which is by some authors treated as a valid species [Borowiec, 2014], but by others as a synonym of *L. frauenfeldi* (Mayr, 1855) [Arakelian, 1994].

**Lepisiota syriaca* (André, 1881)

Material. Locality: 13. Number of specimens collected: 10 w.

Messor caducus (Victor, 1839)
(Fig. 5)

Material. Localities: 9, 29, 30, 35, 36, 43, 44, 46. Number of specimens collected: 134 w., 4 q.

Notes. All our samples belong to subspecies *M. caducus caucasicola* Arnol'di, 1977.

Messor melancholicus Arnol'di, 1977

Material. Localities: 41, 42. Number of specimens collected: 45 w.

Messor muticus (Nylander, 1849)

Material. Localities: 4, 5, 15, 19, 24, 28, 31, 34, 35, 36, 38, 40, 43, 46. Number of specimens collected: 202 w., 1 q.

Notes. Integrative taxonomy study applied by Steiner et al. [2018] showed that traditionally known taxon *Messor "structor"* (Latreille, 1798) comprises of five distinct species. Based on their studied material only *M. muticus* occurs in the Caucasus area.

Monomorium ruzskyi Dlussky et Zabelin, 1985

Material. Localities: 13, 29, 30, 35, 36, 44, 45. Number of specimens collected: 111 w.

Myrmica caucasicola Arnol'di, 1934

Material. Locality: 10. Number of specimens collected: 1 w.

Myrmica hellenica Finzi, 1926

Material. Localities: 15, 26, 28, 33, 42. Number of specimens collected: 83 w., 1 q., 2 m.

Myrmica lobicornis Nylander, 1846

Material. Locality: 12. Number of specimens collected: 20 w.

Myrmica ruginodis Nylander, 1846

Material. Localities: 10, 12, 32. Number of specimens collected: 27 w.

**Myrmica salina* Ruzsky, 1905

Material. Localities: 20, 30, 31. Number of specimens collected: 24 w., 3 m.

**Myrmica specioides* Bondroit, 1918

Material. Localities: 7, 8, 10, 17, 19, 40, 42. Number of specimens collected: 77 w., 5 m.

**Myrmoxenus cf. ravouxi*

Material. Locality: 15. Number of specimens collected: 6 w., 4 q., 6 m.

Notes. Two closely related socially parasitic species *M. ravouxi* (André, 1896), known from southern and central Europe, and *M. tamarae* (Arnol'di, 1968), apparently restricted to the Caucasus, can be safely separated only by multidisciplinary comparison [Gratiashvili et al., 2014]. Based on morphometry our sample was closer to *M. ravouxi*, but for more certain identification molecular analysis is needed (N. Gratiashvili, pers. comm. 2019). The host species was *Temnothorax tauricus*.

Pheidole koshewnikovi Ruzsky, 1905

Material. Localities: 7, 9, 18, 22, 25, 29, 35, 38, 40, 42, 43, 46. Number of specimens collected: 119 w.

**Plagiolepis arnoldii* Dlussky, Soyunov et Zabelin, 1990

Material. Localities: 3, 7, 18, 21, 46. Number of specimens collected: 26 w.

Plagiolepis pallescens Forel, 1889

Material. Localities: 4, 5, 9, 16, 18, 20, 31, 36, 41. Number of specimens collected: 72 w.

Notes. According to Salata et al. [2018], a taxon considered as *P. pallescens* sensu Radchenko, characterised by dense pubescence on gaster tergites, is described as a new species *P. perperamus*, while species with sparse pubescence, before also known under the name *P. taurica* Santschi, 1920, is redescribed as *P. pallescens* Forel, 1889. Since their study is based on the material from eastern Mediterranean, the taxonomic status of *Plagiolepis* species from the Caucasus area needs to be confirmed in further revisions.

**Plagiolepis perperamus* Salata, Borowiec et Radchenko, 2018

Material. Localities: 1, 13, 31, 37, 39, 40. Number of specimens collected: 33 w.

Notes. See notes under *P. pallescens*.

Ponera coarctata (Latreille, 1802)

Material. Localities: 23, 34. Number of specimens collected: 15 w., 4 m.

**Ponera testacea* Emery, 1895

Material. Locality: 5. Number of specimens collected: 1 w.

**Proformica epinotalis* Kuznetsov-Ugamsky, 1927

Material. Localities: 9, 41. Number of specimens collected: 17 w.

Solenopsis fugax (Latreille, 1798)

Material. Localities: 4, 11, 22, 26, 39. Number of specimens collected: 160 w., 3 q., 3 m.

Notes. The genus *Solenopsis* Westwood, 1840 from Western Palaearctic needs to be revised. Following the key in Dlussky and Radchenko [1994], workers with sides of head convex were identified as *S. fugax*. In several other species known from the region (*S. deserticola* Ruzsky, 1905, *S. juliae* (Arakelian, 1991), *S. ilinei* Santschi, 1936, and *S. nitida* (Dlussky et Radchenko, 1994)), where workers

show more parallel head sides (as in our sample from the locality 15), safe distinguishing between species is only possible in sexuals.

Solenopsis sp.

Material. Locality: 15. Number of specimens collected: 25 w.

Notes. See notes under *S. fugax*.

Strongylognathus rehbinderi Forel, 1904

Material. Locality: 40. Number of specimens collected: 30 w.

Tapinoma erraticum (Latreille, 1798)

Material. Localities: 4, 35, 40. Number of specimens collected: 45 w.

Tapinoma karavaievi Emery, 1925

Material. Localities: 5, 15, 27, 46. Number of specimens collected: 88 w., 1 q.

**Tapinoma magnum* Mayr, 1861

Material. Locality: 1. Number of specimens collected: 20 w.

Notes. This is one of the species of the *T. nigerrimum* complex which has a strong invasive potential [Seifert et al., 2017]. In the Mediterranean area it is abundant in degraded areas with significant anthropogenic influence and was already reported from several cities in central and western Europe. These ants were abundant in urban park in central Baku (Philharmony Park), and they acted aggressively.

Temnothorax crasecundus Seifert et Csósz, 2015

Material. Localities: 11, 14, 16, 26, 28. Number of specimens collected: 15 w.

Notes. The revision of *T. nylanderi* group [Seifert, Csósz, 2015; Csósz et al., 2015] showed that of the three parapatric closely related species, *T. nylanderi* (Foerster, 1850), *T. crassispinus* (Karavaiev, 1926) and *T. crasecundus*, only the latter occupies eastern part of the range. So, older records for *T. nylanderi* or *T. crassispinus* from the Caucasus should be attributed to this species.

**Temnothorax interruptus* (Schenck, 1852)

Material. Localities: 4, 5, 7, 27. Number of specimens collected: 70 w., 1 q.

Temnothorax cf. *nadigi*

Material. Locality: 28. Number of specimens collected: 2 w.

Notes. Our sample differs from typical *T. nadigi* (Kutter, 1925) from central Europe by unicolorous yellowish-brown head and mesosoma, less pronounced sculpture and higher petiole with longer peduncle. Two other taxa, *T. caucasicus* (Arnol'di, 1977) and *T. hasardaghi* (Dlussky et Zabelin, 1985), currently treated as synonym of *T. nadigi*, are known from the Caucasus and western Kopet Dag, respectively, so we cannot give certain species determination at this stage.

**Temnothorax parvulus* (Schenck, 1852)

Material. Localities: 3, 8, 33, 39. Number of specimens collected: 88 w., 2 q.

**Temnothorax* cf. *recedens*
(Fig. 6)

Material. Locality: 25. Number of specimens collected: 7 w.

Notes. This sample belongs to *T. recedens* group, but it is not conspecific with any of the species of this group known from eastern Mediterranean, i.e. *T. antigoni* (Forel, 1911), *T. finzii* (Menozzi, 1925), *T. recedens* (Nylander, 1856), *T. rogeri* Emery, 1869 and *T. solerii* (Menozzi, 1936) [Salata, Borowiec, 2015] (L. Borowiec, pers. comm. 2019).

Temnothorax shelkovnikovi (Karavaiev, 1926)

Material. Locality: 30. Number of specimens collected: 17 w., 1 q.

**Temnothorax tauricus* (Ruzsky, 1902)

Material. Locality: 4, 10, 15, 16, 25, 27, 34. Number of specimens collected: 150 w., 3 q.

**Tetramorium* cf. *caespitum*
(Fig. 7)

Material. Locality: 27. Number of specimens collected: 37 w.

Notes. See notes under *T. immigrans*.

**Tetramorium caucasicum* Wagner, Arthofer, Seifert, Muster, Steiner et Schlick-Steiner, 2017

Material. Locality: 42. Number of specimens collected: 2 w.

Notes. See notes under *T. immigrans*.

**Tetramorium chefketi* Forel, 1911

Material. Locality: 9. Number of specimens collected: 9 w.

Tetramorium immigrans Santschi, 1927

Material. Localities: 2, 4, 5, 7, 10, 14, 18, 19, 20, 23, 25, 26, 27, 28, 29, 30, 31, 34, 35, 37, 38, 39, 40, 41, 42, 44, 46. Number of specimens collected: 443 w.

Notes. According to the latest taxonomical revision of the *Tetramorium caespitum* complex [Wagner et al., 2017], ten species are present in Europe. We collected four species of the complex, *T. caucasicum*, *T. immigrans*, *T. indocile*, and one probably still undescribed species (*T.* cf. *caespitum*) not included in the mentioned revision. Out of them, *T. immigrans* was by far the most common, but also of all ants sampled in this study – it was found on 27 localities all together.

**Tetramorium indocile* Santschi, 1927

Material. Localities: 10, 41. Number of specimens collected: 23 w.

Notes. See notes under *T. immigrans*.

**Tetramorium moravicum* Novák et Sadil, 1941

Material. Localities: 11, 15. Number of specimens collected: 30 w.

**Tetramorium sulcinode* Santschi, 1927

Material. Locality: 9, 30. Number of specimens collected: 13 w.

Trichomyrmex perplexus (Radchenko, 1997)

Material. Localities: 29, 30. Number of specimens collected: 20 w.

Discussion

The here presented list of ant species is based on the updated taxonomic species identification literature, so it is hard to compare it with old literature records. There may be several cases, where species listed here were cited under different name. For instance, literature records for *Lasius emarginatus* (Olivier, 1792) could refer to *L. illyricus*, records for *Messor structor* most probably refer to *M. muticus*, and data for *Tetramorium caespitum* quite possibly represent some other species of the *T. caespitum* complex. Altogether, 30 species from our list can be characterised as new for the ant fauna of Azerbaijan. If we combine the list from Borowiec [2014] and our data, then 114 ant species are known for this country. This is similar number of species as in Armenia (119 species) [Arakelian, 1994; Borowiec, 2014], but noticeably lower compared to Georgia (142 species) [Gratiashvili, Barjadze, 2008]. However, due to geographical diversity of Azerbaijan, where Caucasus Mountains, lowland area of the Caspian Basin (Kura-Aras Lowland) and Talysh Mountains converge, many additional ant species can be expected to be found in this country. So far, Azerbaijanian ant fauna is represented by widely distributed Western Palaearctic or Transpalaearctic species (e.g. *Camponotus fallax*, *Dolichoderus quadripunctatus*, *Formica cunicularia*, *F. sanguinea*, *Lasius brunneus*, *L. flavus*, *Myrmica ruginodis*, *Ponera coarctata*, *Tapinoma erraticum*), by species distributed from the Mediterranean region to Central Asia (e.g. *Camponotus aethiops*, *C. lateralis*, *Cataglyphis nodus*, *Crematogaster schmidti*, *Pheidole koshewnikovi*), or from the Caucasus to Central Asia (e.g. *Camponotus turkestanicus*, *Cardiocondyla brachyceps*, *Crematogaster subdentata*, *Lasius obscuratus*, *Monomorium ruzskyi*, *Tapinoma karavaievi*), and by species more or less restricted to the Caucasus area (e.g. *Aphaenogaster muschtaidica*, *Formica georgica*, *Lepisiota caucasica*, *Myrmica caucasicola*, *Strongylognathus rehbinderi*, *Temnothorax shelkovnikovi*, *Tetramorium caucasicum*).

Seventy-three species found during our field work perhaps does not correspond with expectations on finding higher richness of the Azerbaijanian ant fauna. A possible reason could be the selected period of field work, as in August and September we were facing high daily temperatures and very dry conditions in the majority of visited habitats, which certainly reduces sampling efficiency. We predict that sampling in late spring or early summer would importantly supplement the species list for the country.

Acknowledgements

I kindly thank the following myrmecologists for help in the identification and information on certain species: L. Borowiec (University of Wrocław, Wrocław, Poland), S. Csősz (MTA-ELTE-MTM, Budapest, Hungary), N. Gratiashvili (Ilia State University, Tbilisi, Georgia) and H. C. Wagner (ÖKOTEAM, Graz, Austria). I am grateful to M. Zagamjster (University of Ljubljana, Ljubljana, Slovenia) for preparing a map and useful comments and to T. Delić (University of Ljubljana, Ljubljana, Slovenia) for taking photos of ants.

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