

A preliminary checklist of the ants (Hymenoptera: Formicidae) of Iran

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Abstract

The first checklist of the ants of Iran is presented. The study is based on a comprehensive review of literature and the examination of material from our own collections and from several museums and institutions of different European countries. 110 species belonging to 26 genera of six subfamilies of the Formicidae (Formicinae, Myrmicinae, Ponerinae, Dolichoderinae, Dorylinae and Aenictinae) are recognized from Iran. Most of the reported species were sampled in the north of the country, mostly near human settlements. One subfamily (Dorylinae), two genera (*Ponera* LATREILLE, 1804 and *Dorylus* FABRICIUS, 1793), as well as seven species (*Aphaenogaster gibbosa* (LATREILLE, 1798), *A. kurdica* RUZSKY, 1905, *Crematogaster bogojawlenskii* RUZSKY, 1905, *Messor minor* (ANDRE, 1883), *Tapinoma karavaievi* EMERY, 1925, *Temnothorax parvulus* (SCHENCK, 1852) and *Tetramorium inerme* MAYR, 1877) were recorded for the Iranian fauna for the first time. The most speciose genera were *Camponotus* MAYR, 1861, *Cataglyphis* FOERSTER, 1850 and *Messor* FOREL, 1890 with 19, 14 and 13 species, respectively. Palaearctic zoogeographic elements prevail in Iran, but several Oriental and Afrotropical genera were also found. Many parts of the country are still studied insufficiently or even not studied at all and we suppose that the total species richness in Iran is essentially higher.

Key words: Ants, Iran, checklist, new records.

Myrmecol. News 11: 151-159 (online 29 June 2008)
ISSN 1994-4136 (print), ISSN 1997-3500 (online)

Received 29 October 2007; revision received 30 April 2008; accepted 5 May 2008

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Introduction

Much faunistic research on ants has recently been carried out in several parts of Asia (e.g., East and Southeast Asia: KUPYANSKAYA 1990, TERAYAMA 1994, WU & WANG 1995, CHUNG & MOHAMED 1996, IMAI & al. 2003, OGATA 2005, RADCHENKO 2005; India: BHARTI 2002a, b; Central Asia: TARBINSKY 1976, DLUSSKY & al. 1990, SCHULTZ & al. 2006, PFEIFFER & al. 2007); however, in the west and south-west of Asia only the ant fauna of Saudi Arabia has been studied satisfactorily (COLLINGWOOD 1985, COLLINGWOOD & AGOSTI 1996). The ant fauna of other countries from this region, including Iran, has been investigated only partly.

Iran situates mainly on the Iranian plateau and covers an area of 1,623,779 km². The country is located in the Palaearctic and naturally divided into six biomes and 14 ecoregions (OLSON & al 2001). At the same time, its borders are close to the boundaries of the Afrotropical and Oriental regions in the south and south-east of the country. Such position, as well as high environmental diversity, promotes the diversity of the Iranian flora and fauna.

The history of the myrmecological investigations in Iran can be divided into two main periods: the first third of the XX century includes works of FOREL (1904a, b), EMERY (1906), CRAWLEY (1920a, b, 1922) and MENOZZI (1927). After that, until the 1990ies new data on the Iranian myrmecofauna were very scarce (e.g., ARNOLDI 1977). The second period of ant research in Iran started in the 1990ies

and has continued until now. RADCHENKO (1994a, b, 1995, 1996b, 1997a, b), SEIFERT (2003) and TAYLOR (2006) described and recorded several species from Iran. ARDEH (1994) recorded 13 ant species from the Karaj Region, Alipanah and colleagues studied the ant fauna of Tehran (ALIPANAH & al. 1995, 2000), of the southwest of Iran (Khuzestan province) (ALIPANAH & DEZHAKAM 2000), and of several other parts of the country (ALIPANAH 2004). RADCHENKO & ALIPANAH (2004) documented the first Iranian species of the subfamily Aenictinae. TIRGARI & PAKNIA (2004, 2005) and PAKNIA & KAMI (2007) reported 21 species from various areas of the country.

As Iranian myrmecologists have published their reports mostly in local journals or presented them at certain national scientific congresses, it is difficult for foreign myrmecologists to access this literature. Other problems arise from old records that need revision. For all of these reasons a preliminary checklist of the Iranian ants is a helpful reference for myrmecologists that are interested in Asian ants.

Material and methods

This study is based on a comprehensive review of literature and the examination of material both collected by two of the authors of this paper (OP & HA), by Hamidreza Hajjiganbar and by many other entomologists as well as on investigated material preserved in the following museums

and institutions: Hay Mayans Insect Museum in the Iranian Research Institute of Plant Protection, Tehran, Iran (HMIM), Zoological Museum of Gorgan University, Gorgan, Iran (ZMGU), Institute of Zoology of Ukrainian National Academy of Sciences, Kiev, Ukraine (IZK), Zoological Museum of Moscow State University, Moscow, Russia (ZMMU), Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia (ZISP), Museum and Institute of Zoology of Polish Academy of Sciences, Warsaw, Poland (MIZ), The Natural History Museum, London, UK (BMNH), Museo Civico di Storia Naturale "Giacomo Doria", Genoa, Italy (MSNG), Istituto di Entomologia, University di Bologna, Bologna, Italy (IEUB), and Naturhistorisches Museum Basel, Basel, Switzerland (NHMB).

Altogether, we examined about 3350 specimens. We verified existence of the voucher specimens for all species listed in Table 1, except for several species recorded by CRAWLEY (1920a, b), MENOZZI (1927) and ANARAKI (1981) as we could not locate their vouchers, and the *Cardiocondyla* species recently recorded for Iran by SEIFERT (2003). For all species taxonomically described from Iran we assumed that there are vouchers for them. We avoided to list unavailable names.

While there are no keys specifically for the identification of the ants of Iran, we used existing keys for adjacent regions and taxonomic revisions of different ant genera (ARNOLDI 1976, 1977, COLLINWOOD 1985, DLUSSKY & al 1990, ARAKELIAN 1994, DLUSSKY & RADCHENKO 1994, RADCHENKO 1992a, b, 1994c, d, 1996a, b, 1998, COLLINGWOOD & AGOSTI 1996), as well as unpublished data and keys for several genera of A. Radchenko. In all cases the correct names of the taxa were verified according to the catalogue of BOLTON & al. (2007) except for *Tetramorium forte* FOREL, 1904 and *T. chefketi* FOREL, 1911. The software ArcView program was used to prepare a map of all records of ants in Iran.

Results

The proposed preliminary list of Iran comprises 110 ant species and subspecies from 26 genera of six subfamilies (Formicinae, Myrmicinae, Ponerinae, Dolichoderinae, Dorylinae and Aenictinae) (Tab. 1). The most speciose subfamily is that of the Myrmicinae (52 species), while Aenictinae and Dorylinae include only one species each. The most speciose genera in Iran are *Camponotus*, *Cataglyphis* and *Messor* with 19, 14 and 13 species, respectively. By contrast, only one species per genus was also recorded for *Liometopum*, *Anochetus*, *Pachycondyla*, and *Ponera*. Nine species have been taxonomically described from Iran in earlier studies (indicated by # in Tab. 1).

One subfamily (Dorylinae), two genera and seven species were recorded for Iran for the first time:

***Aphaenogaster gibbosa* (LATREILLE, 1798):** Mazandaran province, Miankaleh peninsula, Plangan, in shrubland and grassland habitats, 14.IV.2005, leg. O. Paknia, 3 workers (ZMGU), det. A. Radchenko.

***Aphaenogaster kurdica* RUZSKY, 1905:** Golestan province, Aliabad, near Kabudval waterfall, in forest habitat, 17.VI.2005, leg. O. Paknia, 8 workers (ZMGU), det. A. Radchenko.

***Crematogaster bogojawlenskii* RUZSKY, 1905:** Khorasan Razawi province, Sarakhs, 27.IV.2007, leg. H. Hajiqaanbar, (IZK), det. A. Radchenko.

***Dorylus* sp.:** Khuzestan province, Ahvaz, 4.X.1954, leg. Sal, 1 worker (HMIM), det. H. Alipanah.

***Messor minor* (ANDRE, 1883):** Hamedan province, Hamedan, 25.V.1997, leg. P. Moghadasi, 5 workers (HMIM), det. A. Radchenko.

***Ponera* sp.:** Golestan province, 20 km East Gorgan, Tuskestan forest, 28.V.2005, leg. Omid Paknia, 9 workers (ZMGU), det. A. Radchenko.

***Tapinoma karavaievi* EMERY, 1925:** Tehran province, Tehran: 19.X.1992, leg. Shemiranat; Lavasanat, 1600 m, 12.VII.1994, leg. H. Alipanah, 2 workers (HMIM); Khuzestan province, Ahvaz, 23.XI.1997, leg. M. Dezhakam, 3 workers (HMIM); Khorasan Razavi province, Mashhad, 23.I.1999, leg. M. Ghasemi, 5 workers (HMIM); Mazandaran, Miankaleh, 14.IV.2005, leg. O. Paknia, 6 workers (ZMGU), det. A. Radchenko.

***Temnothorax parvulus* (SCHENCK, 1852):** Golestan province, Gorgan, Tuskestan forest, 28.V.2005, leg. S. Shalchian, (ZMGU), det. A. Radchenko.

***Tetramorium inerme* MAYR, 1877:** Khorasan Razawi province, Sarakhs, 27.IV.2007, leg. H. Hajiqaanbar, (IZK), det. A. Radchenko.

Reidentified species

Based on the re-examination of voucher specimens (ZMGU, HMIM) by A. Radchenko, several previously recorded species are excluded from the Iranian fauna: *Camponotus cruentatus* (LATREILLE, 1802) and *C. micans* (NYLANDER, 1856) (TAYLOR 2006) are *C. turkestanicus* EMERY, 1887 and *C. xerxes* FOREL, 1904, respectively; *Messor galla* (MAYR, 1904) and *Camponotus maculatus* (FABRICIUS, 1782) (TIRGARI & PAKNIA 2004) are *M. intermedius* SANTSCHI, 1927 and *C. armeniacus* ARNOLDI, 1967, respectively; *Tapinoma simrothi* KRAUSSE, 1911 (PAKNIA & KAMI 2007) is *T. karavaievi* EMERY, 1925; *Tetramorium forte* FOREL, 1904 (ARDEH 1994) is a junior synonym of *T. chefketi* FOREL, 1911 (see also CSÖSZ & al. 2007); *Tetramorium moravicum* KRATOCHVÍL, 1941 (ALIPANAH & al. 1995) was determined only as *Tetramorium* sp. now, but it is clearly not *T. moravicum*.

Excluded species

As our colleague Dr. Dobovikov, who checked material recorded by FOREL (1904a) in ZISP, did not find the voucher specimens of *Messor barbarus* (LINNAEUS, 1767) and *M. capitatus* (LATREILLE, 1798), we propose to exclude both species from the Iranian list, especially as these species are restricted to the Mediterranean Region.

Included species without vouchers

The vouchers of *Camponotus maculatus* (FABRICIUS, 1782), *Camponotus thoracicus* (FABRICIUS, 1804) and *Paratrechina vividula* (NYLANDER, 1846) recorded by FOREL (1904a) were not found in ZISP. However, as these species have been recorded from adjacent countries (COLLINGWOOD & AGOSTI 1996, DONISTHORPE 1950) and also because the latter one is a tramp species living in the temperate zones in houses and greenhouses, the presence of these species in Iran appears likely. We included these species in our list.

The records of *Tetramorium caespitum* are based on the old keys and have to be reviewed by use of modern taxonomic approaches (see SCHLICK-STEINER & al. 2006,

Tab. 1: Preliminary check-list of Iranian ant species. Genera and species within them are listed alphabetically. Listed are the valid names, region names (N = North, NW = Northwest, NE = Northeast, E = East, S = South, SW = Southwest, SE = Southeast, W = West; also see Fig. 1), any former names and junior synonyms and the collections where vouchers are kept. References are marked as follows: a = RADCHENKO & ALIPANAH (2004), b = CRAWLEY (1922), c = ALIPANAH & DEZHAKAM (2000), d = RADCHENKO (1996b, 1997a), e = MENOZZI (1927), f = ALIPANAH & al. (1995), g = TIRGARI & PAKNIA (2004), h = ALIPANAH & al. (2000), I = ALIPANAH (2004), j = FOREL (1904a), k = ARDEH (1994), l = SEIFERT (2003), m = RADCHENKO (1997b), n = KARAVAEV (1924), o = EMERY (1906), p = PAKNIA & KAMI (2007), q = CRAWLEY (1920b), r = TAHMASEBI & ALIPANAH (2000), s = TAYLOR (2006), t = CRAWLEY (1920a), u = RADCHENKO (1994a), v = ANARAKI (1981), w = AKBARZADEH & al. (2004), x = FOREL (1904b), y = TIRGARI & PAKNIA (2005), z = ARNOLDI (1977). Asterisks at species names refer to those species which have been mentioned in the text, except new records; hatches refer to taxa described from Iran.

Scientific valid name	Regions of Iran	Former name or synonymies, used in old literature	Determinator	References and material deposition
<i>Aenictus dluskyi</i> ARNOLDI, 1968 *	N		Radchenko	a, IZK
<i>Anochetus evansi</i> CRAWLEY, 1922 * #	NW		Crawley	b
<i>Aphaenogaster gibbosa</i> (LATREILLE, 1798)	N		Radchenko	ZMGU
<i>Aphaenogaster kurdica</i> RUZSKY, 1905	N		Radchenko	ZMGU
<i>Aphaenogaster syriaca</i> Emery, 1908	SW		Collingwood	c, HMIM
<i>Camponotus aethiops</i> (LATREILLE, 1798)	N		Radchenko	d, HMIM
<i>Camponotus armeniacus</i> ARNOLDI, 1967 *	S		Radchenko	d, ZMGU
<i>Camponotus atlantis</i> FOREL, 1890	N		Ward, Collingwood or Munsee	k, HMIM
<i>Camponotus buddhae</i> FOREL, 1892	N		Radchenko	d, ZMMU, IZK
<i>Camponotus cecconii</i> EMERY, 1908	N		Collingwood	h, HMIM
<i>Camponotus fedtschenkoi</i> MAYR, 1877	N		Radchenko	d, ZMMU, IZK
<i>Camponotus fellah</i> DALLA TORRE, 1893 *	S		Cook	g, ZMGU
<i>Camponotus gestroi</i> EMERY, 1878	N		Collingwood	h, HMIM
<i>Camponotus kopetdaghensis</i> DLUSSKY & ZABELIN, 1985	N		Radchenko	i, HMIM
<i>Camponotus libanicus</i> ANDRÉ, 1881	N		Radchenko	h, HMIM
<i>Camponotus maculatus</i> (FABRICIUS, 1782) *	E	<i>C. maculatus</i> r. <i>cognatus</i> (SMITH, F. 1858)	Forel	j
<i>Camponotus oasisium</i> FOREL, 1890	SE	<i>C. maculatus</i> r. <i>oasisium</i>	Collingwood, Radchenko	j, c, HMIM
<i>Camponotus oertzeni</i> FOREL, 1889	NW		Radchenko	d, IZK, ZMMU, MIZ
<i>Camponotus sanctus</i> FOREL, 1904	S		Radchenko	d, HMIM, ZMMU
<i>Camponotus thoracicus</i> (FABRICIUS, 1804) *	E	<i>C. maculatus</i> r. <i>dichrous</i>	Forel	j
<i>Camponotus turkestanicus</i> EMERY, 1887 *	NE		Radchenko	d, HMIM, ZMGU
<i>Camponotus turkestanus</i> ANDRÉ, 1882	N		Radchenko	d, IZK, ZMMU
<i>Camponotus vogti</i> FOREL, 1906	N		Collingwood	h, k, HMIM
<i>Camponotus xerxes</i> FOREL, 1904 * #	N	<i>C. maculatus</i> r. <i>xerxes</i>	Radchenko	d, x, k, ZMGU, ZMMU
<i>Cardiocondyla brachyceph</i> SEIFERT, 2003 #	S		Seifert	l
<i>Cardiocondyla elegans</i> EMERY, 1869	N		Seifert, Radchenko	l, s, HMIM
<i>Cardiocondyla fajumensis</i> FOREL, 1913	S		Seifert	l
<i>Cardiocondyla mauritanica</i> FOREL, 1890	S		Seifert	l
<i>Cardiocondyla persiana</i> SEIFERT, 2003 #	S		Seifert	l
<i>Cardiocondyla sahlbergi</i> FOREL, 1913	NW		Seifert	l
<i>Cardiocondyla stambuloffii</i> FOREL, 1892	NW		Seifert	l
<i>Cardiocondyla unicalis</i> SEIFERT, 2003 #	W		Seifert	l
<i>Cataglyphis aenescens</i> (NYLANDER, 1849)	N, NE	<i>Myrmecocystus cursor</i> r. <i>tancrei</i>	Radchenko, Taylor	j, p, s, HMIM
<i>Cataglyphis altisquamis</i> (ANDRE, 1881)	N		Radchenko	m, ZMMU

<i>Cataglyphis bellicosus</i> (KARAVAIEV, 1924) #	N	<i>Myrmecocystus bicolor</i> ssp. <i>bellicosus</i>	Radchenko	n, IZK, ZMMU
<i>Cataglyphis bucharicus</i> EMERY, 1925	N		Radchenko	m, ZMMU
<i>Cataglyphis cuneinodis</i> ARNOLDI, 1964	NW		Radchenko	m, ZMMU
<i>Cataglyphis emeryi</i> (KARAVAIEV, 1911)	N		Radchenko	m, ZMMU
<i>Cataglyphis foreli</i> (RUZSKY, 1903)	NE	<i>Myrmecocystus altiquamis</i> r. <i>foreli</i>	Radchenko	j, ZMGU
<i>Cataglyphis frigidus persicus</i> (EMERY, 1906) #	S	<i>Myrmecosystus frigidus</i> var. <i>persica</i>	Emery	o
<i>Cataglyphis lividus</i> (ANDRÉ, 1881)	NE, N, S	<i>Myrmecocystus albicans</i> r. <i>lividus</i>	Collingwood, Radchenko	j, h, k, p, HMIM, ZMGU
<i>Cataglyphis niger</i> (ANDRÉ, 1881)	N, S	<i>Myrmecocystus viaticus</i> r. <i>niger</i>	Collingwood, Radchenko	j, h, k, p, HMIM, ZMGU
<i>Cataglyphis nigripes</i> ARNOLDI, 1964	W, NW		Radchenko	m, ZMMU, HMIM
<i>Cataglyphis nodus</i> (BRULLÉ, 1833)	N, S	<i>Cataglyphis bicolor</i> var. <i>nodus</i> MENOZZI (1927)	Collingwood, Radchenko	e, h, k, p, ZMGU
<i>Cataglyphis ruber</i> (FOREL, 1903)	NW		Radchenko	m, ZMMU
<i>Cataglyphis setipes</i> (FOREL, 1894)	S		Radchenko	m, HMIM
<i>Crematogaster antaris</i> FOREL, 1894	SW		Collingwood	c, HMIM
<i>Crematogaster bogojawlenskii</i> RUZSKY, 1905	NE		Radchenko	IZK
<i>Crematogaster inermis</i> MAYR, 1862 *	N		Collingwood	f, HMIM
<i>Crematogaster schmidtii</i> (MAYR, 1853)	N	<i>C. scutellaris</i> ssp. <i>schmidtii</i>	Crawley	t
<i>Crematogaster sorokini</i> RUZSKY, 1905	W		Radchenko	i, HMIM
<i>Crematogaster subdentata</i> MAYR, 1877	N		Ward, Collingwood or Munsee	k, HMIM
<i>Dorylus</i> sp. *	SW		Alipanah	HMIM
<i>Formica cunicularia</i> LATREILLE, 1798	N	<i>Formica glauca</i> RUZSKY, 1896	Collingwood	h, HMIM
<i>Formica lusatica</i> SEIFERT, 1997	N		Schultz, Seifert	p, ZMGU
<i>Formica rufibarbis</i> FABRICIUS, 1793	NW		Crawley, Anaraki	q, v
<i>Formica sanguinea</i> LATREILLE, 1798	N		Collingwood	h, HMIM
<i>Lasius alienus</i> (FÖRSTER, 1850)	NW		Ward, Collingwood or Munsee	q, k, HMIM
<i>Lasius brunneus</i> (LATREILLE, 1798)	NW		Crawley	q
<i>Lasius emarginatus</i> (OLIVER, 1792)	NW, N	<i>L. emarginatus</i> var. <i>nigro-emarginatus</i>	Seifert	q, ZMGU
<i>Lasius lasioides</i> (EMERY, 1869)	N		Radchenko	p, ZMGU
<i>Lasius neglectus</i> VAN LOON, BOOMSMA & ANDRASFALVY, 1990 *	N		Schultz, Seifert	p, ZMGU
<i>Lasius platythorax</i> SEIFERT, 1991	SW		Radchenko	i, HMIM
<i>Lasius turcicus</i> SANTSCHI, 1921	N		Collingwood, Radchenko	h, HMIM
<i>Lepisiota bipartita</i> (SMITH, F., 1861)	E, N	<i>Acantholepis frauenfeldi</i> r. <i>bipartita</i>	Collingwood	j, HMIM
<i>Lepisiota dolabellae</i> (FOREL, 1911)	N		Ward, Collingwood or Munsee	k, HMIM
<i>Lepisiota semenovi</i> (RUZSKY, 1905)	N		Radchenko	r, HMIM
<i>Leptothorax acervorum</i> (FABRICIUS, 1793)	N		Taylor	s, ZMGU
<i>Liometopum microcephalum</i> (PANZER, 1798)	W		Radchenko	p, ZMGU
<i>Messor caducus</i> (VICTOR, 1839)	N, NW, S		Cook	f, p, z, ZMMU
<i>Messor concolor</i> SANTSCHI, 1927	N		Taylor	s, ZMGU
<i>Messor dentatus</i> SANTSCHI, 1927	N		Collingwood	f, HMIM

<i>Messor denticulatus</i> SANTSCHI, 1927	NE		Radchenko	z, HMIM
<i>Messor ebeninus</i> SANTSCHI, 1927	SW, N		Collingwood	f, HMIM
<i>Messor incorruptus</i> KUZNETSOV-UGAMSKY, 1929	W		Radchenko	i, HMIM
<i>Messor intermedius</i> SANTSCHI, 1927 *	S	<i>Messor semirufus</i> var. <i>intermedius</i>	Radchenko	e, ZMGU
<i>Messor meridionalis</i> (ANDRÉ, 1883)	SW, N		Ward, Collingwood or Munsee	k, HMIM
<i>Messor minor</i> (ANDRÉ, 1883)	W		Radchenko	HMIM
<i>Messor rufotestaceus</i> (FÖRSTER, 1850)	S, SW		Radchenko, Collingwood	c, ZMGU, HMIM
<i>Messor semirufus</i> (ANDRÉ, 1883)	SW	<i>M. barbarus</i> r. <i>semirufus</i>	Crawley	t
<i>Messor structor</i> (LATREILLE, 1798)	NW, N	<i>M. platyceras</i> var. <i>rubella</i>	Radchenko	t, HMIM
<i>Messor structor platyceras</i> CRAWLEY, 1920 #	NW	<i>M. platyceras</i>	Crawley	t
<i>Monomorium abeillei</i> ANDRÉ, 1881	SW		Radchenko	c, HMIM
<i>Monomorium destructor</i> (JERDON, 1851) *	SW		Radchenko	c, HMIM
<i>Monomorium kusnezovi</i> SANTSCHI, 1928	NE		Radchenko	i, HMIM
<i>Monomorium nitidiventre</i> EMERY, 1893	S		Taylor	s, ZMGU
<i>Monomorium pharaonis</i> (LINNAEUS, 1758) *	S		Radchenko	e, ZMGU
<i>Monomorium salomonis</i> (LINNAEUS, 1758)	S	<i>M. salmonis</i> var. ?	Menozi	e
<i>Myrmica bergi</i> RUZSKY, 1902	N, NW	<i>M. bergi</i> var. <i>fortior</i>	Radchenko	t, IZK
<i>Myrmica sabuleti</i> MEINERT, 1861	N		Collingwood	k, HMIM
<i>Pachycondyla sennaarensis</i> (MAYR, 1862) *	S, SE		Cook, Paknia	y, p, w, ZMGU
<i>Paratrechina flavipes</i> (F. SMITH, 1874) *	SW		Collingwood	c, HMIM
<i>Paratrechina longicornis</i> (LATREILLE, 1802) *	N		Collingwood, Schultz	f, p, HMIM, ZMGU
<i>Paratrechina vividula</i> (NYLANDER, 1846) *	SE	<i>Prenolepis vividula</i>	Forel	j
<i>Pheidole pallidula</i> (NYLANDER, 1849)	NW	<i>Ph. pallidula</i> subsp. <i>arenarum</i> var. <i>orientalis</i>	Collingwood	t, f, HMIM
<i>Pheidole sinaitica</i> MAYR, 1862	S		Cook	g, ZMGU
<i>Pheidole teneriffana</i> FOREL, 1893 *	N, S		Collingwood, Cook	f, k, p, ZMGU, HMIM
<i>Plagiolepis pallescens</i> FOREL, 1889	N		Collingwood	h, HMIM
<i>Plagiolepis taurica</i> SANTSCHI, 1920	N	<i>Plagiolepis vindobonensis</i> LOMNICKI, 1925	Ward, Collingwood or Munsee	k, HMIM
<i>Polyrhachis lacteipennis</i> F. SMITH, 1858 *	S, SE		Cook, Radchenko	g, HMIM, ZMMU, ZMGU
<i>Ponera</i> sp.	N		Radchenko	ZMGU
<i>Solenopsis cf. fugax</i> (LATREILLE, 1798)	N		Collingwood	f, HMIM
<i>Solenopsis cf. latro</i> FOREL, 1894	N		Collingwood	f, HMIM
<i>Tapinoma erraticum</i> (LATREILLE, 1798)	N, S	<i>T. erraticum</i> subsp. <i>nigerrimum</i>	Radchenko, Taylor	t, s, ZISP, ZMGU
<i>Tapinoma karavaievi</i> EMERY, 1925 *	N, S		Radchenko	HMIM, ZMGU
<i>Temnothorax iranicus</i> (RADCHENKO, 1994) #	N	<i>Leptothorax iranicus</i>	Radchenko	u, ZMMU, IZK
<i>Temnothorax parvulus</i> (SCHENCK, 1852)	N		Radchenko	ZMGU
<i>Tetramorium cf. caespitum</i> (LINNAEUS, 1758) *	N, S		Cook	t, p, ZMGU
<i>Tetramorium chefketi</i> FOREL, 1911 *	N		Collingwood	f, HMIM
<i>Tetramorium davidi</i> FOREL, 1911	N		Collingwood	f, HMIM
<i>Tetramorium ferox</i> RUZSKY, 1903	S		Cook	g, ZMGU
<i>Tetramorium inerme</i> MAYR, 1877	NE		Radchenko	IZK
<i>Tetramorium</i> sp. *	N	<i>T. moravicum</i>	Radchenko	HMIM

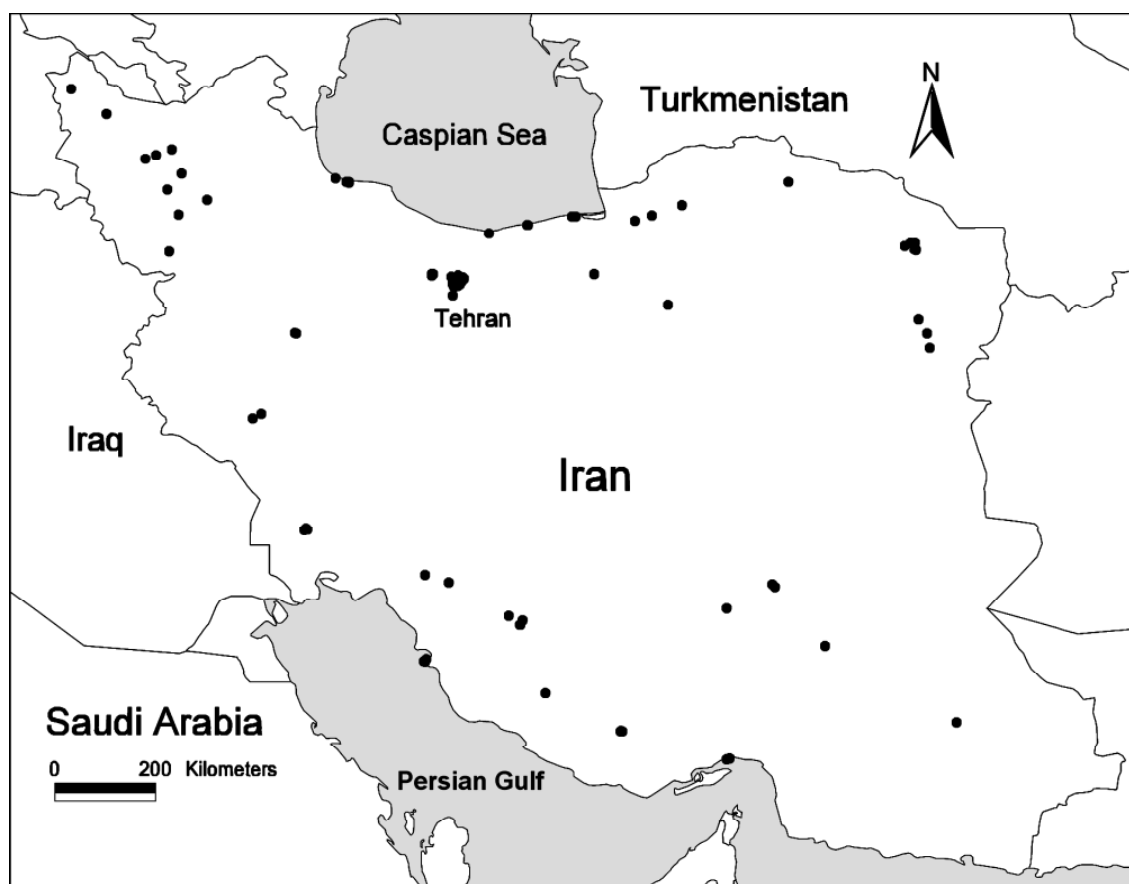


Fig. 1: Map of Iran with the localities where ants were collected (black dots).

STEINER & al. 2006, CSÖSZ & al. 2007). However, based on distribution maps of *Tetramorium* ants in the western Palearctic (see SCHLICK-STEINER & al. 2006) we left this species in the list as *Tetramorium* cf. *caespitum*. The situation is similar with the old records of *Lasius* species (see SEIFERT 1992), that need to be reviewed by modern keys. Nevertheless this work is beyond the scope of the present paper, so we included these species in our preliminary list without revision.

The record of Dorylinae is the first record of this subfamily after the new clarification of this subfamily by BOLTON (2003).

Distribution of records

Regarding the geographical distribution of the species records that had been examined in this study, we found a mismatching between the area of the locations that had been studied and the respective number of species that had been found there: e.g., 34 species of a total of 109 species were collected in natural or disturbed habitats of Tehran province, though the territory of this province is less than 2 % of the territory of the country. Fifteen species were recorded from the Caspian forest region in the north of Iran that covers only 4 % of the country. Eight species were found in Zagros Mountains forest-steppe ecoregion (about 20 % of entire area of the country). From the south of Iran altogether 34 species were reported. In contrast, there are only a few records from the wide Elburz Range forest-steppe and the Eastern Anatolian Mountains in the north and northwest of Iran, or from eastern parts and the

centre of the country that lie in the vast Central Persian desert basin. There are no species records at all from the Eastern Iran mountain woodlands, the Kopet Dag woodlands, Kopet Dag semi desert, Azerbaijan shrub desert and steppe, and the desert and semi-desert areas in the centre and the east of Iran that comprise more than 50 % of the area of the country.

Discussion

Although the first reports on Iranian ants were published more than 100 years ago, the ant fauna of this country remains poorly known. Most of the records are from the north of Iran, but many of these samples were collected in disturbed environments near human settlements that comprise only a few percent of the country's surface area. There are only a few species reports from the extensive natural habitats of the north, for example from the Caspian deciduous forests. The latter should have a rich ant fauna due to old geological age of that forest region: it has been covered with forests since the late Tertiary period (ZOHARY 1973). As a result, Tertiarian elements could have survived, as it is known for the adjacent Talysh and Zuvand districts in south-eastern Azerbaijan (ARNOLDI 1930, 1948).

Among the other regions that have been investigated only cursorily is the Nubo-Sindian desert and semi desert ecoregion in the south and the southeast of the country. These areas are particularly interesting faunistically, as they are close to the boundaries of the Oriental and Afrotropical zoogeographic regions. Four important ecoregions that comprise a large part of the Irano-Anatolian biodiversity

hotspot have not been studied at all. These are the Eastern Anatolian Mountains, Elburz forest-steppe, Kopet Dag woodlands and forest-steppe, and Zagros Mountains forest-steppe. For comparison, the well studied myrmecofauna of the Turkmenistan's part of the Kopet Dag is one of the richest local ant fauna in Central Asia (DLUSSKY & ZABELIN 1985, DLUSSKY & al. 1990).

This scarcity of data, especially from the border regions, does not permit to make a proper zoogeographical analysis of the Iranian ant fauna at present. However, in the future, when sufficient material will have been sampled, the Iranian myrmecofauna needs to be compared with those of the adjacent regions, e.g., Turkey, Armenia, Azerbaijan, Turkmenistan, Afghanistan, and Arabian Peninsula. Similarly, the presence of North African elements in Iran (e.g., *Camponotus fellah* DALLA TORRE, 1893 or *Crematogaster inermis* MAYR, 1862) demonstrates a relation of the Iranian and North African desert faunas that has to be confirmed by more intensive sampling.

The Iranian ant fauna includes eight "tramp" species, which have been introduced by humans to many countries and in some cases have gained a worldwide distribution (see also MCGLYNN 1999, PAKNIA 2006, PAKNIA & KAMI 2007): *Lasius neglectus* VAN LOON, BOOMSMA & ANDRASZALVY, 1990, *Monomorium pharaonis* (LINNAEUS, 1758), *M. destructor* (JERDON, 1851), *Pheidole teneriffana* FOREL, 1893, *Paratrechina longicornis* (LATREILLE, 1802), *P. flavipes* (SMITH, F., 1874), *P. vividula* (NYLANDER, 1846) and *Pachycondyla sennaarensis* (MAYR, 1862).

Almost half of the recorded species in the Iranian checklist belong to the genera *Camponotus*, *Messor* and *Cataglyphis*. Similar faunistic patterns are found in other arid Asian regions, e.g., Turkmenistan (DLUSSKY & al. 1990) and Saudi Arabia (COLLINGWOOD 1985, COLLINGWOOD & AGOSTI 1996). The main reason for the high diversity of these genera are the environmental conditions in Iran that comprise mainly arid and semi arid areas, the preferred habitats of *Messor*, *Cataglyphis* and many *Camponotus* species (DLUSSKY 1981, DLUSSKY & al. 1990, HÖLDOBLER & WILSON 1990, ANDERSEN & CLAY 1996, ANDERSEN & SPAIN 1996).

The second reason for the dominance of those three genera in ant collections may be artificial: their members are large and can be easily collected by anyone. In the majority of the former studies, "direct hand collecting" was the main method. For this reason small-sized and cryptic ants (e.g., Leptanillinae, Amblyoponinae, Dacetini, etc.) are under-represented in the investigated material. Furthermore, social parasites are also missing in the presented species list of Iran. To overcome this sampling bias and to establish a reliable species list, thorough investigations of ant diversity in all parts of Iran are urgently needed. They should be conducted by standard sampling methods, like direct collecting from ant nests, pitfall traps, bait trapping and litter extraction with Winkler collectors (see AGOSTI & ALONSO 2000).

At last, we have to emphasize that the Iranian ant fauna seems to be one of typically Palaearctic character. If we exclude the introduced species mentioned above, native members of only four tropical (Oriental or Afrotropical) genera are found in Iran: *Aenictus dluskyi* ARNOLDI, 1968, *Anochetus evansi* CRAWLEY, 1922, *Dorylus* sp., and *Polyrhachis lacteipennis* SMITH, F., 1858. This dominance of

Palaearctic ant genera will probably persist in a more comprehensive species list to be presented in the future.

Acknowledgements

We thank Hamidreza Hajiianbar for collecting and sending the material of two ant species, *Crematogaster bogojawlenskii* and *Tetramorium inerme* that were new to Iran. We thank Dr. Bernhard Seifert for his taxonomic comments, Dr. Cedric A. Collingwood for the identification of many specimens and Dr. Dubovikov for checking Forel's vouchers in ZISP. We are indebted to John Fellowes, an anonymous referee and the editors for their useful suggestions towards the improvement of our paper. We thank Doug Johns and Bryson Voirin for language correction of the first and the second versions of the text, respectively.

Zusammenfassung

Nach einer umfassenden Durchsicht der Literatur und der Untersuchung von Material aus eigenen Aufsammlungen sowie aus Museen und Forschungsinstituten verschiedener europäischer Länder, präsentieren wir die erste Artenliste der Ameisen des Iran: 110 Arten aus 26 Gattungen und sechs Unterfamilien der Formicidae (Formicinae, Myrmicinae, Ponerinae, Dolichoderinae, Dorylinae und Aenictinae) wurden bislang gefunden. Die meisten der hier gelisteten Arten wurden im Norden des Landes gesammelt, zumeist in anthropogen beeinflussten Gebieten in der Nähe von Siedlungen. Eine Unterfamilie (Dorylinae), zwei Gattungen (*Ponera* LATREILLE, 1804 und *Dorylus* FABRICIUS, 1793), sowie sieben Arten der Formicidae (*Aphaenogaster gibbosa* (LATREILLE, 1798), *A. kurdica* RUZSKY, 1905, *Messor minor* (ANDRE, 1883), *Tapinoma karavaievi* EMERY, 1925, *Temnothorax parvulus* (SCHENCK, 1852), *Tetramorium inerme* MAYR, 1877, und *Crematogaster bogojawlenskii* RUZSKY, 1905) wurden erstmalig für den Iran registriert. Die artenreichsten Gattungen des Iran sind *Camponotus* MAYR, 1861 mit 19 Arten sowie *Cataglyphis* FOERSTER, 1850 mit 14 und *Messor* FOREL, 1890 mit 13 Arten. Zoogeographisch gesehen dominieren paläarktische Elemente im Iran, allerdings wurden auch verschiedene Arten der Orientalis und Afrotropis gefunden. Viele Landesteile wurden bislang kaum oder gar nicht untersucht und der Artenreichtum der Formicidae des gesamten Iran dürfte wesentlich größer sein.

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Jahr/Year: 2008

Band/Volume: [011](#)

Autor(en)/Author(s): Paknia Omid, Radchenko Alexander, Alipanah Helen, Pfeiffer Martin

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