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# Ants (Hymenoptera: Formicidae) of urban and rural indoor and outdoor spaces of human-made buildings in Sarakhs County: new records and range extensions

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**Abstract**
Ants (Hymenoptera: Formicidae) have a tremendous impact on food chains and natural ecosystems, and a significant number of species are in contact with humans due to their presence in anthropogenic structures. During a survey, ants from urban and rural indoor and outdoor spaces of human-made structures in Sarakhs County, Khorasan Razavi Province, located in the northeast of Iran, were collected and identified. In total, 3 subfamilies, 12 genera, and 20 species were collected and identified. Among the identified ants, six species, including *Tapinoma erraticum* (Latreille, 1798), *Lepisiota bipartita* (Smith, 1861), *Messor denticulatus* Santschi, 1927, *M. reticuliventris* Karavaiev, 1911, *Pheidole providens* (Sykes, 1835), and *Trichomyrmex destructor* (Jerdon, 1851), were directly collected from different parts of residential houses such as kitchens, bedrooms, dining rooms, and living rooms. The fourteen species, *T. erraticum*, *Camponotus cognatocompressus* Forel, 1904, *C. xerxes* Forel, 1904, *Cataglyphis setipes* (Forel, 1894), *Formica clara* Forel, 1886, *Aphaenogaster muschtaidica* Emery, 1908, *M. denticulatus*, *M. intermedius* Santschi, 1927, *M. reticuliventris*, *Myrmica specioides* Bondroit, 1918, *P. cicatricosa* Stitz, 1917, *P. providens*, *Tetramorium nursei* Bingham, 1903, and *T. destructor*, were collected from the outdoor spaces of residential houses and internal spaces of non-residential human-made buildings such as courtyards, parking lots, warehouses, stairs, gardens, walls, terraces, etc. *M. reticuliventris* is reported for the first time from Iran. In addition, the species *A. muschtaidica*, which is considered a Caucasian species, is reported far from this region in northeastern Iran.
**Keywords**: *Aphaenogaster muschtaidica*, *Messor reticuliventris*, New reports, Northeastern Iran.

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## Introduction

Insects are one of the most successful and diverse animal groups on Earth, with great diversity. Among insects, ants (Hymenoptera: Formicidae) occupy most of the terrestrial habitats (Schultz, 2000) and are one of the most successful insect groups on the planet (Hölldobler & Wilson, 1990). These insects live in most ecosystems and make up 15–25% of the biomass of soil-dwelling animals, 15–20% of the animals of different environments, and 25% of the animals of the tropics (Schultz, 2000). Ants in different regions of the world have very high population densities, which can be attributed to their wide distribution and high reproductive potential. These insects owe their biological success to their social life, high ability to adapt to the environment, use of different resources, defense of each other, and exploitation of complex intra- and inter-species chemical relationships (Hölldobler & Wilson, 1990). Ants play an important role in carbon and nitrogen cycles, decomposition of minerals, pollination of various plants, control of populations of some harmful invertebrates, and also serve as an excellent indicator group for monitoring surveillance programs (Fittkau & Klinge, 1973; Ward, 2007).

Ants may be involved with humans as pest species in houses and living facilities (such as closets, wardrobes, cabinets, and tables), as well as in outdoor facilities (such as tables, chairs, and benches). Furthermore, ants and humans can coexist in green spaces (including parks, gardens, and tourist attractions); thus, ants can seriously disrupt people's (especially children's) outdoor leisure and entertainment activities (Dong et al., 2023). The presence of ants in houses and anthropogenic buildings has always been an important problem in achieving peace of mind and living comfortably in such places (Jetter et al., 2002). It is obvious that knowing the number of species present in various human structures, such as houses, warehouses, workplaces, etc., can provide better insights for combating them. In some cases, especially from the point of view of resource exploitation, there is a possibility of ants competing with humans, and they may damage crops or attack buildings (Wilson, 1971; Hölldobler & Wilson, 1990). By feeding on plants, these insects act as vectors of plant pathogens, and by attacking and harming humans and livestock, they affect agricultural and animal husbandry activities and cause damage (Jetter et al., 2002). Regarding the damage caused by ants on crops, during an investigation by Zarei et al. (2020) in Ahvaz city, workers of *Messor ebeninus* Santschi, 1927 were observed on false flax (*Camelina sativa* (L.) Crantz), cutting off the siliquae and transferring them to the nest. Nesting along building foundations can cause damage to building structures and their exterior faces. The proximity of nests to buildings often allows ants to enter the building and find food, which they then communicate to their nestmates. Persistence of ants inside buildings through nesting is a major cause of their pest status for most species associated with humans (Robinson, 2005). The ability of seven synanthropic ant species in hospital environments of Bandar Abbas city to transmit 12 human bacterial pathogens was confirmed in the Palaearctic region by Shahi et al. (2017) for the first time. *Technomyrmex difficilis* Forel, 1892 and *Solenopsis geminata* (Fabricius, 1804) are insects often found in domestic kitchens in Mauritius, harboring disease-causing organisms and potentially transferring these pathogens to food (Simothy et al., 2018).

The presence of the stinging ant, *Brachyponera sennaarensis* (Mayr, 1862), in urban and rural habitats of Iran (including human settlements) was reported for the first time from Fars Province (Lar city) and the southern cities of Sistan and Baluchistan Province (Tirgari & Paknia, 2005; Akbarzadeh et al., 2006b; Paknia, 2006), followed by Hormozgan Province (Qeshm Island) (Rafinejad et al., 2009). In three Iranian islands, Abu-Musa, Greater Tonb, and Lesser Tonb, in the Persian Gulf, this species causes pain, itching, and burning, and in military yards and settlements, it causes discomfort for soldiers and reduces their efficiency (Khoobdel et al., 2012). In Iran, despite a significant amount of research on the ant fauna of natural ecosystems, the study of ants in indoor and outdoor spaces of human-made structures has been generally neglected. According to our literature review, in addition to the presence of *B. sennaarensis* in some human-made building foundations in Iran, very few studies have been conducted in this field so far. In the first work by Farajollahzadeh et al. (2023), the ant fauna of six different urban environments in Shiraz city (including three city parks, a field, a destroyed garden, and a natural park) was investigated. In the second study by Torabi et al. (2017), ants in 18 study sites in Shiraz city were collected and identified. In both studies, specimens were not collected from indoor and outdoor spaces of human-made buildings. In the most relevant research, Shahi et al. (2017) reported seven species of ants belonging to four subfamilies, Dolichoderinae, Formicinae, Ponerinae, and Myrmicinae, from inside a hospital in Bandar Abbas city. In some studies, there are scattered reports concerning the presence of ants in rural areas and inside houses (e.g., Hossein Nezhad et al., 2012; Moradloo et al., 2015).

According to the latest reliable information, extant ants include 16 valid subfamilies, 38 valid tribes, 343 valid genera, and 14,312 valid species, while extinct ones include 6 valid subfamilies, 6 valid tribes, 176 valid genera, and 830 valid species (Bolton, 2025). According to AntWiki (2025), the Iranian ant fauna includes 6 subfamilies, 38 genera, and 262 species/subspecies, of which 24 species (equivalent to 9.2%) are native to the country, and *Trichomyrmex destructor* (Jerdon, 1851) is an introduced species. The existence of four different seasons with diverse weather conditions and vegetation in different parts of Iran has resulted in the presence of numerous and diverse species in each region. This shows the importance of investigating the ant fauna of each region. Although many studies have been conducted on Iranian ants, there are still many areas (especially human-made structures) that have not been studied or are not well studied. Therefore, the ant fauna of the country is still incomplete, and it is expected that many species are waiting to be identified or even discovered and described. Considering the presence of a significant number of ant species in anthropogenic structures and buildings and the problems that arise as a result of their presence, extensive faunal and taxonomic studies in these habitats are remarkable. Therefore, in this research, specimens from different types of human-made structures and buildings in urban and rural areas (such as residential houses, warehouses, factories, livestock facilities, etc.) were collected and identified.

## Materials and Methods

Sarakhs County in Khorasan Razavi Province, with an area of 5,396.88 km², is located in the northeast of Iran between 60°12' to 61°13' E and 35°52' to 36°38' N (Fig. 1, A-C). Ant specimens were collected from several urban and rural sites in the county at altitudes ranging from 263 to 1,050 m a.s.l. Under the influence of the Karakum Desert, Sarakhs County has cold winters and warm, dry summers, with temperatures ranging from a maximum of 50°C to a minimum of -25°C. The average annual precipitation is about 180 mm, and the average relative humidity (R.H.) is 48% (ranging from 26% to 70%), which places this county in a dry climate zone.

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Samples were collected from urban and rural indoor and outdoor spaces of different anthropogenic structures. The geographic coordinates of the sampling locations were recorded using a GPS device. Ant individuals were collected during both day and night using tweezers, hand collection, brushes, and the baiting method throughout all four seasons. The main sampling method was direct sampling (hand collecting), and specimens were collected while foraging on different surfaces. All specimens were preserved in 75% ethanol. Identification of ants was performed using an Olympus stereomicroscope (SZ, Tokyo, Japan). For identification at the subfamily and genus levels, the taxonomical hierarchy followed that of Bolton (1994). Identification keys such as Agosti and Collingwood (1987), Collingwood (1985), Collingwood and Agosti (1996) and Radchenko (1998) were used for identification at the species level. Finally, the samples were sent to Dr. Kadri Kiran and C. Karaman (Turkey) for species confirmation. All investigated specimens belonged to the worker caste ( ☿ ) and were collected by A. Shahnoori. All specimens are deposited in the Entomological Museum of Trakya University (EMTU), Edirne, Turkey. Photos of *Messor reticuliventris* Karavaiev, 1911 were taken using a Motic stereomicroscope equipped with a Motioncam 10MP photo camera.

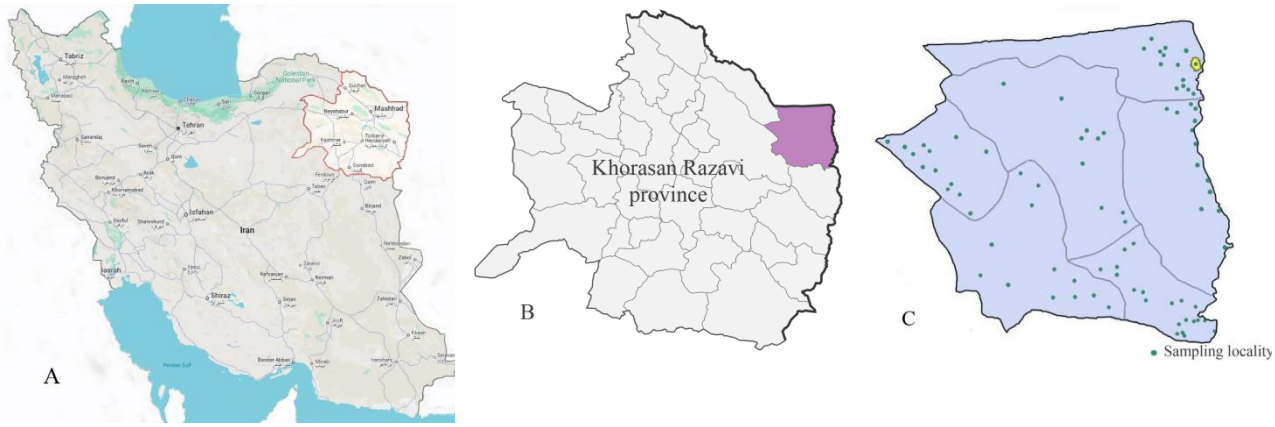


**Figure 1.** Sampling localities: (A) Khorasan Razavi Province located in northeastern Iran; (B) location of Sarakhs County in Khorasan Razavi Province; (C) sampling localities shown as green dots (A, adapted from Google Maps ©).

## Results

We identified 20 species belonging to three subfamilies: Dolichoderinae (2 species), Formicinae (8 species), and Myrmicinae (10 species), collected from Sarakhs County. Data on the 20 species of ants are given alphabetically below based on their subfamilies and species.

### Subfamily: Dolichoderinae Forel, 1878

***Tapinoma erraticum* (Latreille, 1798)**

**Distribution in Iran.** Chaharmahal and Bakhtiari Province (Khalili-Moghadam et al., 2019), Kurdistan Province (Safariyan et al., 2022), northern and southern regions (Paknia et al., 2008), Sanandaj (Salawatabad village), Tehran, Gilan Province (Siahkal) (Pashaei Rad et al., 2018; Ghahari, 2021), Mazandaran Province (Ghahari, 2021), Khorasan Razavi Province (Mashhad) (Hosseini et al., 2015; Heidari Latibari et al., 2017).

**World distribution.** Åland Islands, Albania, Andorra, Armenia, Austria, Azerbaijan, Balearic Islands, Belarus, Belgium, Bulgaria, Canary Islands, Channel Islands, Croatia, Czech Republic, France, Georgia, Germany, Gibraltar, Great Britain, Greece, Hungary, Israel, Italy, Kazakhstan, Kyrgyzstan, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Morocco, Netherlands, Northern Ireland, North Macedonia, Poland, Portugal, Republic of Moldova, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkmenistan, Turkey, Ukraine, and Uzbekistan (Seifert, 1984; Khalili-Moghadam et al., 2019; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi Province, Sarakhs County: 2 ☿ , Shirtappeh village (36°06'49" N, 61°12'37" E, 366 m a.s.l.), on the ground, 22.vii.2020; 3 ☿ , Sarakhs suburbs (36°33'43" N, 61°09'44" E, 270 m a.s.l.), garden, on the ground, 24.vii.2020; 3 ☿ , Sarakhs city (36°32'32" N, 61°09'25" E, 277 m a.s.l.), residential house, on the cabinet, 31.viii.2020; 1 ☿ , Jahangir village (36°24'34" N, 60°16'07" E, 727 m a.s.l.), over the bridge, 13.ix.2020; 2 ☿ , Sarakhs city (36°32'42" N, 60°09'20" E, 276 m a.s.l.), residential house, kitchen, on the ground, 10.viii.2021; 3 ☿ , Sarakhs city (36°32'21" N, 61°09'33" E, 276 m a.s.l.), residential house, resting room, on the ground, 31.viii.2021; 3 ☿ , Sarakhs city (36°32'21" N, 61°09'33" E, 276 m a.s.l.), residential house, inside the yard, on the ground, 03.ix.2021.

***Tapinoma simrothi* Krausse, 1911**

**Distribution in Iran.** East Azerbaijan (Sakenin Chelav et al., 2009; Ghahari, 2021), Fars (Paknia & Kami, 2007), Isfahan (Shiran et al., 2013; Ghahari, 2021), Khuzestan (Dezhakam & Soleiman-Nejadian, 2002; Alizadeh et al., 2012; Mossadegh, 2012; Shiran et al., 2013; Ghahari, 2021), Mazandaran (Behshahr and Neka) (Ghahari et al., 2009), South Khorasan (Birjand and Ferdows) (Ghahari et al., 2015), Khorasan Razavi, Zanjan (Moradloo et al., 2015), Tehran (Alipanah & Dezhakam, 2000), Semnan and Golestan (Ghahari, 2021).

**World distribution.** Afghanistan, Algeria, Armenia, Balearic Islands, Canary Islands, China, Cyprus, Egypt, Gibraltar, Iran, Iraq, Italy, Malta, Montenegro, Lebanon, Libya, Oman, Portugal, Qatar, Serbia, Tunisia, Turkey, Turkmenistan (Antmaps, 2025), Greece (Agosti & Collingwood, 1987), Jordan (Borowiec & Salata, 2020), Saudi Arabia, Kuwait and Yemen (Collingwood & Agosti, 1996), Spain (Collingwood, 1978), United Arab Emirates (Collingwood et al., 1997).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 3 ☿ , Kandakli village (36° 34' 18" N, 61° 03' 23" E, 271 m a.s.l.), on the ground, 16.vii.2020; 2 ☿ , Qaleh Now village (36° 28' 01" N, 61° 08' 40" E, 290 m a.s.l.), on the ground, 02.ix.2020; 5 ☿ , Qasab Qassab village (36° 25' 20" N, 61° 08' 43" E, 299 m a.s.l.), on the ground, 06.ix.2020.

**Subfamily: Formicinae Latreille, 1809**

***Camponotus cognatocompressus* Forel, 1904**

**Distribution in Iran.** Khorasan Razavi province (Antmaps, 2025).

**World distribution.** Egypt, Iran (Borowiec, 2014).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 3 ☿ , Shorijeh Olya village (36° 19' 44" N, 60° 48' 44" E, 502 m a.s.l.), in mud house, on the ground, 03.iv.2021; 2 ☿ , Border area (36° 31' 04" N, 61° 09' 37" E, 277 m a.s.l.), in garden, on the ground, 07.v.2021; 1 ☿ , Ebrahim Abad village (36° 32' 20" N, 61° 07' 45" E, 277 m a.s.l.), in garden, on stairs, 26.v.2021; 1 ☿ , Ebrahim Abad village (36° 32' 16" N, 61° 08' 45" E, 277 m a.s.l.), in garden, 03.viii.2021.

***Camponotus xerxes* Forel, 1904**

**Distribution in Iran.** Alborz, Fars (Lavar Khasht village), Tehran, Isfahan (Samirom) (Pashaei Rad et al., 2018), Ardabil (Kamardaragh and Dayo Kendi villages), Chaharmahal and Bakhtiari (Shorab) (Khalili-Moghadam et al., 2019; 2025; Khalili-Moghadam & Saeidi, 2023), Bushehr, Fars (Shiraz) (Vonshak & Ionescu-Hirsch, 2009; Pashaei Rad et al., 2018), Kurdistan (Bijar) (Safariyan et al., 2022), Mazandaran province (Amol and Qaim Shahr), Kerman (Bam), Zahedan (Ghahari et al., 2009), Northern regions (Paknia et al., 2008), Sabzevar (Radchenko, 1997), Torbat Heydarieh (Hosseini et al., 2015).

**World distribution.** Central Asia (Moradloo et al., 2015), Egypt, Iraq (Borowiec, 2014), Israel (Vonshak & Ionescu-Hirsch, 2009), Kuwait (Collingwood et al., 2011), Middle East (Collingwood et al., 2011; Moradloo et al., 2015), Saudi Arabia, United Arab Emirates, Oman (Collingwood, 1985; Collingwood & Agosti, 1996), Turkey (Karaman & Aktac, 2013; Borowiec, 2014).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Qara Sangi village (36° 58' 41" N, 61° 06' 39" E, 407 m a.s.l.), on the ground, 29.vii.2020; 1 ☿ , Yaztappeh village (36° 36' 25" N, 61° 01' 43" E, 263 m a.s.l.), on the ground, 0.viii.2020; 1 ☿ , Shurluq village (36° 19' 03" N, 60° 37' 29" E, 562 m a.s.l.), on the ground, 15.viii.2020; 1 ☿ , Sarakhs suburbs (36° 26' 15" N, 61° 02' 07" E, 319 m a.s.l.), on the ground, 22.viii.2020; 2 ☿ , Sarakhs city (36° 31' 39" N, 61° 09' 13" E, 276 m a.s.l.), on flower stem, 31.viii.2020; 1 ☿ , Sangar village (36° 11' 47" N, 61° 11' 35" E, 342 m a.s.l.), on the ground, 04.ix.2020; 1 ☿ , Ebrahim Abad village (36° 32' 28" N, 61° 06' 28" E, 277 m a.s.l.), livestock facilities, 18.x.2020; 1 ☿ , Qaleh Now village (36° 28' 20" N, 61° 08' 50" E, 288 m a.s.l.), on the ground, 25.x.2020; 1 ☿ , Kachuli village (36° 25' 52" N, 61° 06' 20" E, 299 m a.s.l.), residential house, inside garden, 29.iii.2021; 3 ☿ , Amir Abad village (36° 32' 20" N, 61° 08' 32" E, 279 m a.s.l.), on tree trunk, 22.v.2021.

***Cataglyphis foreli* (Ruzsky, 1903)**

**Distribution in Iran.** Chaharmahal and Bakhtiari province (Farokhshahr) (Khalili-Moghadam et al., 2019); Isfahan province (Samirom) (Pashaei Rad et al., 2018), northeastern regions (Paknia et al., 2008).

**World distribution.** Iran (Borowiec, 2014; Khalili-Moghadam et al., 2023b; Antmaps, 2025), Kazakhstan (Antmaps, 2025), Turkmenistan (Radchenko, 1998; Khalili-Moghadam et al., 2019).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Sarakhs city (36° 33' 56" N, 61° 09' 47" E, 272 m a.s.l.), in garden, 20.viii.2020.

***Cataglyphis setipes* (Forel, 1894)**

**Distribution in Iran.** Ardabil province (Pashaei Rad et al., 2018), Fars province (Ghahari & Collingwood, 2011), Chaharmahal and Bakhtiari province (Shahrkord, Shurab) (Khalili-Moghadam et al., 2019; 2025), Khuzestan province (Dezhakam & Suleiman-Nejadian, 2002; Shiran et al., 2013), Lorestan province (Boroujard) (Pashaei Rad et al., 2018), salt marshes of central Iran (Mohseni et al., 2019a), salt marshes of Qomroud (Mohseni et al., 2019b), South Khorasan province (Ferdows) (Ghahari et al., 2015), southern regions (Paknia et al., 2008), Tehran province (Alipanah et al., 2000).

**World distribution.** Afghanistan, Kazakhstan, Kyrgyzstan, Turkey, Turkmenistan, Russian Republic of Dagestan, Uzbekistan (Khalili-Moghadam et al., 2019), Georgia, Pakistan (Antmaps, 2025), India (Forel, 1894; Antmaps, 2025), Iran (Borowiec, 2014), Syria (Forel, 1886).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Gunbadli village (36° 32' 51" N, 61° 55' 38" E, 377 m a.s.l.), on the ground, 17.vii.2020; 1 ☿ , Sarakhs city (36° 32' 49" N, 61° 09' 12" E, 276 m a.s.l.), residential yard, 08.viii.2020; 1 ☿ , Qasab Qassab village (36° 24' 29" N, 61° 08' 31" E, 301 m a.s.l.), on the wall, 06.ix.2020; 1 ☿ , Border area (36° 38' 07" N, 61° 06' 17" E, 265 m a.s.l.), livestock, on the ground, 09.ix.2020; 2 ☿ , Qaleh Now village (36° 28' 20" N, 61° 08' 50" E, 288 m a.s.l.), on the ground, 25.x.2020; 1 ☿ , Kachuli village (36° 25' 45" N, 61° 06' 12" E, 299 m a.s.l.), livestock facilities, on the ground, 28.x.2020; 3 ☿ , Now Bonyad village (36° 01' 38" N, 60° 52' 28" E, 394 m a.s.l.), livestock facilities, on the ground, 30.iii.2021.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

***Formica clara* Forel, 1886**

**Distribution in Iran.** Chaharmahal and Bakhtiari province (Khalili-Moghadam et al., 2019; 2025), Golestan province (Gorgan, Khatirabad) (Mirzamohammadi et al., 2015), Gilan (Lahijan and Kiashahr) and Isfahan (Pashaei Rad et al., 2018; Khalili-Moghadam

et al., 2025), Mazandaran province (Gholami et al., 2012), Khorasan Razavi and Zanjan provinces (Moradloo et al., 2015), Tehran (Pardisan, Fedaiyan Islam and Taleghani forest parks) (Pashaei Rad et al., 2018).

**World distribution.** Austria, Azerbaijan, Belgium, Bosnia and Herzegovina, Britain, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France: mainland, Georgia, Germany, Greece: mainland, Hungary, Iran, Israel, Italy: Sardinia, Montenegro, Netherlands, Poland, Romania, Slovakia, Slovenia, Switzerland, Syria, Turkey (Borowiec, 2014), China, Kazakhstan, Kyrgyzstan, Northern India, Pakistan, Turkmenistan (Seifert & Schultz, 2009; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 4 ☿ , Qosh Kohneh village (36° 28' 56" N, 61° 09' 53" E, 286 m a.s.l.), residential house, warehouse, on the ground, 16.viii.2021.

***Lepisiota bipartita* (Smith, 1861)**

**Distribution in Iran.** Bushehr province (Ghahari & Collingwood, 2011), Khorasan Razavi and Zanjan provinces (Moradloo et al., 2015), Khuzestan province (Ahvaz and Khorramshahr cities) (Shiran et al., 2013), Northern and Eastern regions (Paknia et al., 2008), Tehran (Nahj-al Balagha Park) (Pashaei Rad et al., 2018).

**World distribution.** India, Iran, Israel, Greece, Lebanon, Saudi Arabia (Collingwood & Agosti, 1996; Moradloo et al., 2015; Sharaf et al., 2016; Borowiec, 2014), Algeria, Jordan, Syria, Tunisia, Turkmenistan (Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 3 ☿ , Sarakhs city (36° 32' 21" N, 61° 09' 33" E, 275 m a.s.l.), residential house, kitchen, on the ground, 16.x.2020; 3 ☿ , Asef Abad village (36° 26' 28" N, 61° 08' 57" E, 291 m a.s.l.), residential house, kitchen, 22.x.2020; 3 ☿ , Sarakhs city (36° 32' 20" N, 60° 09' 29" E, 276 m a.s.l.), residential house, kitchen, on the cabinet, 11.viii.2021.

***Lepisiota karawaiewi* (Kuznetsov-Ugamsky, 1929)**

**Distribution in Iran.** Chaharmahal and Bakhtiari province (Shahrkord) (Khalili-Moghadam et al., 2019), Isfahan province (Samirom) (Pashaei Rad et al., 2018), Mazandaran province (Amol) (Ghahari et al., 2009).

**World distribution.** Afghanistan, Iran (Antmaps, 2025), Balkan Peninsula, Central Asia, Kazakhstan, Kuwait (Sharaf et al., 2016; Khalili-Moghadam et al., 2019; Borowiec, 2014), United Arab Emirates, Uzbekistan (Khalili-Moghadam et al., 2019; Borowiec, 2014).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Sarakhs suburbs (36° 31' 31" N, 61° 08' 45" E, 281 m a.s.l.), asphalt road, on the ground, 20.viii.2020.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

***Lepisiota melas* (Emery, 1915)**

**Distribution in Iran.** Fars province (Shiraz, Jahorm, Fasa and Janatshahr cities) (Mohammadi et al., 2012), Khorasan Razavi province (Mashhad and Sabzevar) (Ghahari et al., 2015).

**World distribution.** Greece, Iran, Italy, Serbia, Turkey (Agosti & Collingwood, 1987; Borowiec, 2014; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Sarakhs city (36° 32' 36" N, 61° 10' 02" E, 276 m a.s.l.), on the ground, 05.xi.2020.

**Subfamily: Myrmicinae Lepeletier de Saint-Fargeau, 1835**

***Aphaenogaster muschtaidica* Emery, 1908**

**Distribution in Iran.** Ardabil province (Germi) (Samin et al., 2020).

**World distribution.** Azerbaijan (Arnoldi, 1948), Iran (Antmaps, 2025), Tbilisi, Georgia (Salata & Borowiec, 2018).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Qosh Kohneh village (36° 28' 56" N, 61° 09' 53" E, 286 m a.s.l.), inside the warehouse, 16.viii.2021.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province. As a Caucasian species, this ant is reported far away from the Caucasus from northeastern Iran for the first time.

***Crematogaster schmidti* (Mayr, 1853)**

**Distribution in Iran.** Ardabil province (Kazaj village) (Pashaei Rad et al., 2018), Gilan province, Qom province (Pashaei Rad et al., 2018), northern regions (Paknia et al., 2008), Khorasan Razavi province (Mashhad; in relation to aphids) (Mortazavi et al., 2015).

**World distribution.** Afghanistan, Albania, Armenia, Austria, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Greece, Hungary, Iran, Italy, Montenegro, Republic of Macedonia, Romania, Russian Federation, Serbia, Slovenia, Turkey, Turkmenistan, Ukraine (Borowiec, 2014; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 3 ☿ , Qosh Kohneh village (36° 28' 56" N, 61° 09' 53" E, 286 m a.s.l.), on the ground, 16.viii.2021.

***Messor denticulatus* Santschi, 1927**

**Distribution in Iran.** Isfahan province (Samirom) (Pashaei Rad et al., 2018), Kurdistan province (Ghahari & Collingwood, 2013), Mazandaran province (Sawadkooh) (Ghahari et al., 2009), northeast regions (Arnoldi, 1977; Paknia et al., 2008), Khorasan Razavi province from Mashhad (Ghahari et al., 2015) and Shandiz (Hosseini et al., 2015).

**World distribution.** Central Asia (Borowiec & Salata, 2012a; 2012b), Iran, Israel, Kazakhstan (Santschi, 1927), Greece, Macedonia, Montenegro, Russia, Turkey (Borowiec & Salata, 2012a; 2012b; Borowiec, 2014), Turkmenistan (Dlussky et al., 1990; Pashaei Rad et al., 2018).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Sarakhs railway station (36° 28' 15" N, 61° 06' 14" E,

286 m a.s.l.), on the ground, 24.vi.2020; 5 ♀ , Sarakhs special economic zone (36° 26' 22" N, 61° 03' 45" E, 314 m a.s.l.), on the wall, on the ground, 25.vi.2020; 1 ♀ , Sarakhs customs (36° 31' 13" N, 61° 09' 47" E, 277 m a.s.l.), on the ground, 30.vi.2020; 1 ♀ , Sarakhs airport (36° 33' 31" N, 61° 09' 03" E, 306 m a.s.l.), on the ground, 03.vii.2020; 1 ♀ , Sarakhs suburbs (36° 32' 36" N, 61° 08' 43" E, 277 m a.s.l.), livestock facilities, 11.vii.2020; 3 ♀ , Sarakhs suburbs (36° 31' 31" N, 61° 08' 45" E, 281 m a.s.l.), slaughterhouse, on the ground, 14.vii.2020; 3 ♀ , Kandakli village (36° 34' 24" N, 61° 03' 20" E, 271 m a.s.l.), on the ground, 16.vii.2020; 1 ♀ , Abbas Abad village (36° 33' 26" N, 61° 08' 59" E, 276 m a.s.l.), on the ground, 18.vii.2020; 1 ♀ , Khangiran area (36° 27' 20" N, 60° 49' 57" E, 463 m a.s.l.), on the ground, 23.vii.2020; 1 ♀ , Kachuli village (36° 26' 06" N, 61° 06' 16" E, 298 m a.s.l.), on the ground, 31.vii.2020; 3 ♀ , Sarakhs city (36° 31' 58" N, 61° 09' 23" E, 277 m a.s.l.), on the ground, 03.viii.2020; 1 ♀ , Sarakhs city (36° 33' 03" N, 61° 09' 32" E, 273 m a.s.l.), Loghman hospital, on stairs, 09.viii.2020; 3 ♀ s, Qosh Khazaei village (36° 29' 46" N, 61° 07' 05" E, 284 m a.s.l.), on the ground, 10.viii.2020; 1 ♀ , Abderaz village (36° 16' 28" N, 60° 27' 04" E, 972 m a.s.l.), on the roof of residential house, 14.viii.2020; 3 ♀ , Shurluq village (36° 18' 51" N, 60° 37' 30" E, 582 m a.s.l.), in mud house, 15.viii.2020; 1 ♀ , Abbas Abad village (36° 34' 01" N, 61° 09' 09" E, 272 m a.s.l.), on the ground, 19.viii.2020; 1 ♀ , Bazangan village (36° 18' 01" N, 60° 26' 27" E, 985 m a.s.l.), on stairs, 21.viii.2020; 1 ♀ , Sarakhs city (36° 32' 00" N, 61° 10' 08" E, 276 m a.s.l.), on tree trunk, 25.viii.2020; 3 ♀ , Sarakhs suburbs (36° 34' 50" N, 61° 09' 41" E, 269 m a.s.l.), livestock, on the ground, 29.viii.2020; 6 ♀ , Sarakhs city (36° 31' 34" N, 61° 09' 10" E, 276 m a.s.l.), on the ground, 30.viii.2020; 3 ♀ , Sarakhs city (36° 31' 21" N, 61° 09' 37" E, 276 m a.s.l.), Municipal parking, on the ground, 30.viii.2020; 1 ♀ , Qaleh Now village (36° 28' 25" N, 61° 08' 54" E, 288 m a.s.l.), in mud house, 02.ix.2020; 3 ♀ , Dowlat Abad village (36° 21' 33" N, 61° 08' 36" E, 308 m a.s.l.), in mud house, 03.ix.2020; 5 ♀ , Qasab Qassab village (36° 25' 20" N, 61° 08' 43" E, 299 m a.s.l.), on the ground, 06.ix.2020; 2 ♀ , Tom Rasool village (36° 35' 02" N, 61° 01' 01" E, 264 m a.s.l.), on the ground, 07.ix.2020; 1 ♀ , Now Bonyad village (36° 23' 20" N, 60° 52' 46" E, 391 m a.s.l.), on the ground, 11.ix.2020; 1 ♀ , Kalateh Haj Madad (36° 07' 57" N, 60° 56' 46" E, 551 m a.s.l.), on the ground, 17.ix.2020; 3 ♀ , Daq Behlool village (36° 13' 21" N, 60° 51' 33" E, 489 m a.s.l.), on the ground, 18.ix.2020; 1 ♀ , Sarakhs city (36° 32' 30" N, 61° 09' 20" E, 277 m a.s.l.), in garden, 20.ix.2020; 3 ♀ , Bazangan village (36° 17' 51" N, 60° 26' 09" E, 1050 m a.s.l.), warehouse, on the ground, 02.x.2020; 1 ♀ , Tappeh Mirahmad village (36° 34' 14" N, 61° 07' 57" E, 274 m a.s.l.), livestock facilities, on the ground, 08.x.2020; 2 ♀ , Sarakhs suburbs (36° 32' 31" N, 61° 08' 28" E, 279 m a.s.l.), in garden, 18.x.2020; 3 ♀ , Tappeh Mirahmad village (36° 24' 30" N, 60° 49' 38" E, 274 m a.s.l.), livestock facilities, on the ground, 25.iii.2021; 3 ♀ , Kachuli village (36° 34' 03" N, 61° 04' 03" E, 299 m a.s.l.), livestock facilities, on the ground, 21.v.2021; 1 ♀ , Sarakhs city (36° 32' 34" N, 61° 09' 24" E, 276 m a.s.l.), house parking, on the ground, 28.vii.2021; 3 ♀ , Abderaz village (36° 16' 24" N, 60° 26' 49" E, 973 m a.s.l.), livestock facilities, on the ground, 06.viii.2021; 3 ♀ , Sarakhs suburbs (36° 33' 44" N, 61° 09' 45" E, 270 m a.s.l.), in garden, on the ground, 07.viii.2021.

***Messor intermedius* Santschi, 1927**

**Distribution in Iran.** Chaharmahal and Bakhtiari province (Borujen and Sefiddasht) (Khalili-Moghadam et al., 2019), Southern regions (Paknia et al., 2008), Isfahan (Shahinshahr Va Meymeh) (Khalili-Moghadam et al., 2025).

**World distribution.** Greece, Oman (Collingwood & Agosti, 1996), Israel, Syria (Khalili-Moghadam et al., 2019), Turkey, Turkmenistan (Collingwood & Agosti, 1996; Khalili-Moghadam et al., 2019), Cyprus, Iran, Lebanon, Saudi Arabia, Uzbekistan (Borowiec, 2014; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 2 ♀ , Sarakhs customs (36° 31' 13" N, 61° 09' 47" E, 277 m a.s.l.), on the ground, 30.vi.2020; 2 ♀ , Sarakhs airport (36° 33' 31" N, 61° 09' 03" E, 306 m a.s.l.), on the ground, 30.vii.2020; 3 ♀ , Shirtappeh village (36° 06' 51" N, 61° 12' 43" E, 365 m a.s.l.), on the wall, 22.vii.2020; 2 ♀ , Khangiran area (36° 27' 20" N, 60° 49' 57" E, 463 m a.s.l.), on the ground, 23.vii.2020; 1 ♀ , Sarakhs suburbs (36° 35' 21" N, 61° 09' 19" E, 269 m a.s.l.), on the wall, 24.vii.2020; 2 ♀ , Sarakhs suburbs (36° 31' 14" N, 61° 09' 43" E, 277 m a.s.l.), on the ground, 27.vii.2020; 3 ♀ , Qasem Khan village (36° 16' 10" N, 61° 10' 24" E, 320 m a.s.l.), on the ground, 28.vii.2020; 1 ♀ , Boreder area (36° 31' 28" N, 61° 10' 22" E, 275 m a.s.l.), on the ground, 02.viii.2020; 3 ♀ , Sarakhs city (36° 32' 34" N, 61° 09' 25" E, 276 m a.s.l.), residential house yard, on the ground, 06.viii.2020; 1 ♀ , Sarakhs city (36° 33' 07" N, 61° 09' 09" E, 273 m a.s.l.), on the ground, 12.viii.2020; 3 ♀ , Sarakhs city (36° 32' 12" N, 61° 09' 17" E, 276 m a.s.l.), on the ground, 12.viii.2020; 3 ♀ , Sarakhs city (36° 32' 06" N, 61° 09' 14" E, 277 m a.s.l.), residential house, on the ground, 12.viii.2020; 3 ♀ , Chekodar village (36° 14' 31" N, 60° 39' 35" E, 645 m a.s.l.), on the ground, 13.viii.2020; 3 ♀ , Tappeh Mirahmad village (36° 34' 15" N, 61° 07' 55" E, 273 m a.s.l.), in mud house on the ground, 18.viii.2020; 3 ♀ , Abbas Abad village (36° 34' 01" N, 61° 09' 04" E, 273 m a.s.l.), on tree trunk, 19.viii.2020; 1 ♀ , Bazangan village (36° 18' 01" N, 60° 26' 27" E, 985 m a.s.l.), on stairs, 21.viii.2020; 1 ♀ , Shurijeh Sofla village (36° 01' 31" N, 60° 56' 09" E, 499 m a.s.l.), on the ground, 23.viii.2020; 1 ♀ , Lake of Bazangan (36° 18' 38" N, 60° 28' 54" E, 847 m a.s.l.), on tree trunk, 28.viii.2020; 2 ♀ , Sarakhs suburbs (36° 35' 22" N, 61° 09' 19" E, 269 m a.s.l.), on the ground, 29.viii.2020; 2 ♀ , Tom Rasool village (36° 35' 02" N, 61° 01' 01" E, 264 m a.s.l.), on the ground, 07.ix.2020; 1 ♀ , Now Bonyad village (36° 23' 20" N, 60° 52' 46" E, 391 m a.s.l.), on the ground, 11.ix.2020; 1 ♀ , Sarakhs city (36° 32' 01" N, 61° 10' 10" E, 276 m a.s.l.), on the ground, 16.ix.2020; 2 ♀ , Kalateh Haj Madad (36° 07' 57" N, 60° 56' 46" E, 551 m a.s.l.), on the ground, 17.ix.2020; 2 ♀ , Sarakhs city (36° 32' 30" N, 61° 09' 20" E, 277 m a.s.l.), inside garden, 20.ix.2020; 3 ♀ , Ebrahim Abad village (36° 32' 23" N, 61° 06' 34" E, 277 m a.s.l.), livestock, on the ground, 20.ix.2020; 3 ♀ , Qosh Kohne village (36° 29' 05" N, 61° 07' 53" E, 286 m a.s.l.), on the ground, 21.ix.2020; 3 ♀ , Abbas Abad village (36° 34' 01" N, 61° 09' 04" E, 275 m a.s.l.), in mud

house, on the ground, 08.x.2020; 1 ☿ , Sarakhs suburbs (36° 32' 31" N, 61° 08' 28" E, 276 m a.s.l.), in garden, 18.x.2020.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

***Messor reticuliventris* Karavaiev, 1911**

**Distribution in Iran.** Sarakhs County, Khorasan Razavi province, northeastern Iran (present study).

**World distribution.** Afghanistan, Pakistan, Turkmenistan (Arnoldi, 1977; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Sarakhs railway station (36° 28' 15" N, 61° 06' 14" E, 286 m a.s.l.), on the ground, 24.vi.2020; 1 ☿ , Abbas Abad village (36° 33' 26" N, 61° 08' 59" E, 276 m a.s.l.), on the ground, 18.vii.2020; 2 ☿ , Kachuli village (36° 26' 06" N, 61° 06' 16" E, 298 m a.s.l.), on the ground, 31.vii.2020; 2 ☿ , Sarakhs city (36° 33' 03" N, 61° 09' 32" E, 273 m a.s.l.), Loghman hospital, on stairs, 12.viii.2020; 1 ☿ , Sarakhs city (36° 33' 07" N, 61° 09' 09" E, 273 m a.s.l.), on the ground, 12.viii.2020; 1 ☿ , Abderaz village (36° 16' 28" N, 60° 27' 04" E, 972 m a.s.l.), on the roof of residential house, 14.viii.2020; 1 ☿ , Bazangan village (36° 18' 01" N, 60° 26' 27" E, 985 m a.s.l.), on stairs, 21.viii.2020; 3 ☿ , Bazangan village (36° 17' 52" N, 60° 26' 10" E, 1030 m a.s.l.), on stairs, 21.viii.2020; 3 ☿ , Sarakhs suburbs (36° 30' 35" N, 61° 07' 52" E, 279 m a.s.l.), on the ground, 22.viii.2020; 1 ☿ , Kachuli village (36° 26' 25" N, 61° 05' 40" E, 294 m a.s.l.), on tree trunk, 23.viii.2020; 2 ☿ , Shurijeh Sofla village (36° 01' 31" N, 60° 56' 09" E, 499 m a.s.l.), on the ground, 23.viii.2020; 2 ☿ , Sarakhs city (36° 32' 00" N, 61° 10' 08" E, 276 m a.s.l.), on tree trunk, 25.viii.2020; 1 ☿ , Lake of Bazangan (36° 18' 38" N, 60° 28' 54" E, 847 m a.s.l.), on tree trunk, 28.viii.2020; 2 ☿ , Qaleh Now village (36° 28' 25" N, 61° 08' 54" E, 288 m a.s.l.), in mud house, 02.ix.2020; 2 ☿ , Kalateh Morei village (36° 14' 17" N, 61° 10' 48" E, 335 m a.s.l.), on the ground, 05.ix.2020; 1 ☿ , Sarakhs city (36° 32' 43" N, 61° 09' 56" E, 276 m a.s.l.), on the ground, 19.ix.2020.

**Remarks.** The species is a new record for ant fauna of Iran.

**Description:** Body pitch black, mandibles and especially the legs rusty brown. Quite densely and evenly covered with protruding, whitish hairs, which turn into a rusty brown color on the mandibles, tibiae, under the gastral end and especially on the legs. Quite dull (Fig. 2, A, B). Head approximately square, barely wider at the back, with rounded rear corners and slightly bulging rear edge. The head has fine longitudinal stripes, with this longitudinal striping being interrupted in places by elongated points in the occipital region. A divergence of the striations towards the hind end is hardly noticeable. Eyes small (Fig. 2, C). The antennal scape extends to the posterior edge of the head, strong but even in its proximal half, curved, weakly enlarged at the base (Fig. 3, A); flagellum without a separate club (Fig. 3, B). Mandibles striated, with straight fine, but irregular, serrated edges (Fig. 3, C). Thorax with the corners of the propodeum which can hardly be described as teeth, with a slight depression between them (Fig. 3, D). The upper bulges of the petiolar nodes, especially in the front limb, are somewhat thicker and more separated. The surface of the petiolar segment is punctate and wrinkled. The gaster is roundish-oval (Fig. 2, A). A fine network can be seen on its surface under the stereomicroscope (Fig 3. E). Body length 2.5-6 mm (Karawajew, 1910).

**Figure 2.** *Messor reticuliventris*, new record for the myrmecofauna of Iran. A, Body in profile; B, Body in dorsal view; C, Head in full-face view (Photograph by M. Yazdanian).

**Figure 3.** *Messor reticuliventris*, new record for the myrmecofauna of Iran. A, Antennal scape; B, Flagellum; C, Mandibles; D, Propodeum; E, Reticulation on ventral surface of gaster (Photograph by M. Yazdanian).

***Myrmica specioides* Bondroit, 1918**

**Distribution in Iran.** Gilan province (Pashaei Rad et al., 2018), Mazandaran province (Babolsar and Amol) (Paknia et al., 2010; Pashaei Rad et al., 2018).

**World distribution.** Andorra, Austria, Belgium, Bosnia and Herzegovina, Britain, Bulgaria, Croatia, Czech Republic, France: mainland, Georgia, Germany, Greece: mainland, Hungary, Iran, Italy: mainland, Luxembourg, Moldova, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain: mainland, Sweden, Switzerland, Turkey, Ukraine (Borowiec, 2014), Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Turkmenistan (Radchenko & Elmes, 2004; Radchenko, 1994; Antmaps, 2025), North America (Jansen & Radchenko, 2009).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Qosh Kohneh village (36° 28' 56" N, 61° 09' 53" E, 286 m a.s.l.), residential house, warehouse, on the ground, 16.viii.2021.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

***Pheidole cicatricosa* Stitz, 1917**

**Distribution in Iran.** Golestan province (Gonbad; under scientific name *P. jordanica*), Isfahan province (Samirom), Qom Province (Salafchegan) (Pashaei Rad et al., 2018).

**World distribution.** Algeria (Pashaei Rad et al., 2018; Antmaps, 2025), Egypt, Iran, Israel, Mali, Morocco, Niger, Tunisia (Antmaps, 2025), Libya (Seifert, 2016; Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 3 ☿ , Sarakhs suburbs (36° 32' 35" N, 61° 08' 44" E, 277 m a.s.l.), livestock facilities, on the ground, 11.vii.2020.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

***Pheidole providens* (Sykes, 1835)**

**Distribution in Iran.** Gilan province (Bandar Anzali), Isfahan province (Samirom), Lorestan province (Boroujerd), probably the northern and southern regions (Pashaei Rad et al., 2018).

**World distribution.** Egypt, Iran, Israel, India (Borowiec, 2014, Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Sarakhs city (36° 31' 54" N, 61° 09' 29" E, 277 m a.s.l.), plant protection clinic, on the table, 10.viii.2020; 3 ☿ , Sarakhs city (36° 32' 26" N, 61° 09' 02" E, 277 m a.s.l.), residential house, in garden, 01.ix.2020; 1 ☿ , Sarakhs city (36° 32' 20" N, 61° 09' 08" E, 277 m a.s.l.), residential house, in the yard, 01.ix.2020; 1 ☿ , Dowlat Abad village (36° 21' 28" N, 61° 08' 32" E, 310 m a.s.l.), on the ground, 03.ix.2020; 1 ☿ , Sarakhs city (36° 32' 20" N, 61° 09' 23" E, 277 m a.s.l.), inside yard, on the ground, 20.ix.2020; 1 ☿ , Sarakhs city (36° 32' 22" N, 61° 10' 14" E, 275 m a.s.l.), in warehouse, 24.ix.2020; 1 ☿ , Sarakhs city (36° 32' 42" N, 60° 09'20" E, 276 m a.s.l.), residential house, kitchen, on the ground, 10.viii.2021; 3 ☿ , Sarakhs city (36° 32' 35" N, 61° 10' 01" E, 277 m a.s.l.), residential house, kitchen, on cabinet, 14.viii.2021; 3 ☿ , Sarakhs city (36° 32' 26" N, 61° 09' 02" E, 276 m a.s.l.), residential house, kitchen, on the ground, 22.viii.2021; 1 ☿ , Kandakli village (36° 34' 23" N, 61° 03' 09" E, 271 m a.s.l.), residential house, warehouse, on the ground, 27.viii.2021; 3 ☿ , Sarakhs city (36° 33' 12" N, 61° 08' 59" E, 277 m a.s.l.), residential house, in the yard, on the ground, 01.ix.2021; 2 ☿ , Sarakhs city (36° 31' 54" N, 61° 09' 29" E, 277 m a.s.l.), plant protection clinic, in sink, 040.ix.2021; 3 ☿ , Tappeh Mirahmad village (36° 34' 15" N, 61° 08' 05" E, 275 m a.s.l.), residential house, kitchen, on cabinet, 06.ix.2021; 1 ☿ , Sarakhs city (36° 32' 21" N, 61° 09' 33" E, 276 m a.s.l.), residential house, in the yard, on the stove, 08.ix.2021.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

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***Tetramorium nursei* Bingham, 1903**

**Distribution in Iran.** Kerman, West Azarbaijan province (Urmia) (Ghahari et al., 2011; Salata et al., 2024).

**World distribution.** China, Iran, India, Pakistan (Antmaps, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Now Bonyad village (36° 23' 42" N, 60° 52' 38" E, 394 m a.s.l.), livestock facilities, on the ground, 02.ix.2021.

**Remarks.** The species is a new record for ant fauna of Khorasan Razavi province.

***Trichomyrmex destructor* (Jerdon, 1851)**

**Distribution in Iran.** Khuzestan province mutualistic with aphids (Mossadegh et al., 2016), Khorasan Razavi province, Zanjan province (Moradloo et al., 2015), Fars province (Kiyani et al., 2021). This species has been reported under the name *Monomorium nursei* from southwestern regions (Paknia et al., 2008).

**World distribution.** Africa: Canary Islands, Cape Verde, Comoros, Eritrea, Gambia, Ghana, Guinea, Kenya, Madagascar, Mayotte, Mozambique, Nigeria, Reunion, Senegal, Seychelles, South Africa, Sudan, Tanzania, Uganda. Americas: Barbados, Brazil, Cayman Islands, Colombia, Cuba, Dominican Republic, Ecuador, Galapagos Islands, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Mexico, Puerto Rico, Saint Vincent and the Grenadines, Trinidad and Tobago, United States. Asia: Afghanistan, Bangladesh, China, India, Indonesia, Iran, Iraq, Israel, Japan, Krakatau Islands, Kuwait, Laos, Malaysia, Oman, Philippines, Qatar, Saudi Arabia, Singapore, Sri Lanka, Thailand, United Arab Emirates, Uzbekistan, Yemen. Europe: United Kingdom. Oceania: Australia, Cook Islands, Fiji, Guam, Hawaii, Kiribati, Micronesia, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands. Native to Afrotropical bioregion (Wetterer, 2009; Bolton, 2025).

**Material examined.** Iran, Khorasan Razavi province, Sarakhs County: 1 ☿ , Shurluq village (36° 19' 02" N, 60° 37' 55" E, 579 m a.s.l.), in mud house, on the ground, 15.viii.2020; 3 ☿ , Abbas Abad village (36° 33' 48" N, 61° 08' 41" E, 275 m a.s.l.), on the ground, 19.viii.2020; 1 ☿ , Qosh Sarbozi village (36° 23' 08" N, 61° 08' 02" E, 305 m a.s.l.), residential house, kitchen, 30.ix.2020; 1 ☿ , Sarakhs city (36° 31' 14" N, 61° 09' 42" E, 276 m a.s.l.), on the ground, 04.xi.2020; 1 ☿ , Sarakhs city (36° 31' 54" N, 61° 09' 29" E, 277 m a.s.l.), plant protection clinic, on the ground, 14.iv.2021; 3 ☿ , Sarakhs city (36° 32' 30" N, 61° 09' 20" E, 276 m a.s.l.), residential house, kitchen, on the ground, 11.viii.2021; 3 ☿ , Sarakhs city (36° 32' 21" N, 61° 09' 33" E, 276 m a.s.l.), residential house, kitchen, on cabinet, 13.viii.2021; 1 ☿ , Sarakhs city (36° 32' 21" N, 61° 09' 38" E, 277 m a.s.l.), residential house, kitchen, on the ground, 13.viii.2021; 3 ☿ , Ebrahim Abad village (36° 32' 22" N, 61° 06' 30" E, 277 m a.s.l.), residential house, warehouse, on the ground, 07.ix.2021.

## Discussion

A total of 262 confirmed species have been registered in the list of Iranian ants on AntWiki (2025). According to Guénard et al. (2017), approximately 320 ant species/subspecies have been recorded for the Iranian fauna to date. However, as mentioned by Khalili-Moghadam et al. (2023a; 2025), some records in the literature are not reliable. Considering that many areas in Iran have not yet been studied, the true number of ant species in the country is likely much higher. They also stated that some faunistic reports include species which, according to recent studies, are certainly not present in Iran but are still listed as part of the country's ant fauna (Khalili-Moghadam et al., 2023b). Based on AntWiki (2025)and the report of *Messor reticuliventris* as a new addition to the Iranian ant fauna, the total number of known ant species in the country has reached 263.

Myrmicinae is the largest subfamily of Formicidae, comprising 149 genera and 7,902 species (Antwiki, 2025). In the current research, this subfamily was also the richest in terms of diversity, with 7 genera (approximately 58.3%) and 10 species (50%) collected in Sarakhs County. The genus *Messor*, with three identified species, had the highest number of species and was present in most of the sampled areas. Species of this genus were collected from rural residential houses, livestock facilities, warehouses, various human-made structures (such as clinics, offices, customs buildings), and traditional mud houses. The genus *Pheidole*, with two species, and the genera *Aphaenogaster*, *Crematogaster*, *Tetramorium*, and *Trichomyrmex*, each represented by one species, followed in species richness. So far, *Messor reticuliventris* has only been reported from three neighboring countries of Iran: Afghanistan, Pakistan, and Turkmenistan (Arnoldi, 1977; Antmaps, 2025). Considering the proximity of Sarakhs County to Turkmenistan, its presence in this region is not surprising.

During this research, *Aphaenogaster muschtaidica* was collected from a warehouse in a rural residential house. According to a previous report, individuals of a colony of *A. muschtaidica* built their nests in dry and sandy soil, under medium-sized rocks, and on a hill. Other species, such as *Camponotus piceus* (Leach, 1825), *Cataglyphis nigripes* Arnol'di, 1964, *C. schmidti*, *Dolichoderus quadripunctatus* (Linnaeus, 1771), and *Formica clara* were also present at that location (Salata & Borowiec, 2018). According to the latest data, the presence of *A. muschtaidica* has been confirmed in Tbilisi, Georgia (Salata & Borowiec, 2018), but the species *A. gibbosa* (Latreille, 1798) has also been reported from several other regions of Georgia (Gratiashvili & Barjadze, 2008). It is very likely that the previous reports of *A. gibbosa* may be the same species as *A. muschtaidica* (Salata & Borowiec, 2018). This species has also been reported from Azerbaijan (Arnoldi, 1948). The reports of *A. gibbosa* from Armenia (Arakelian, 1994) can also possibly refer to this species (Salata & Borowiec, 2018). Salata and Borowiec (2018) mentioned that the distribution of *A. muschtaidica* is probably limited to the transcaucasian region and that this species is a Caucasian species but needs a more detailed study. Samin et al. (2020) reported this species from Germi County in Ardabil Province, northwestern Iran, which is geographically close to the Caucasus region. However, the results of our study revealed the presence of this species in Sarakhs County, located in northeastern Iran, far from the Caucasus. The occurrence of this species in both a cold region (Caucasus) and a hot and dry region (Sarakhs County) indicates that *A. muschtaidica* possesses a high degree of adaptability to live in two completely different climatic zones. From the subfamily Formicinae, four genera (approximately 33.3%) and eight species (40%) were collected and identified. The genera *Lepisiota* and *Cataglyphis* included the highest number of species, with three and two species, respectively. Only one species belonging to the genus *Formica* was identified. *Dolichoderinae* was the least represented subfamily, with only one genus (8.3%) and two species (10%) collected and

identified. According to our data, among the collected specimens, 175 were associated with human habitats. Of these, six species, *T. erraticum*, *L. bipartita*, *M. denticulatus*, *M. reticuliventris*, *P. providens*, and *T. destructor*, were directly observed in various parts of residential houses, including kitchens, bedrooms, dining rooms, and living rooms. In Iran, our literature review showed that *B. sennaarensis* has been reported inside residential houses in Iranshahr and Sarbaz counties, Sistan and Baluchistan Province, southeastern Iran (Akbarzadeh et al., 2006a). In their paper, Moradloo et al. (2015) stated that *T. destructor* inhabits houses. Among 93 species of urban and rural ants belonging to 30 genera, 58 species from 21 genera (number of species in parenthesis) including: *Acanthomyops* (1), *Camponotus* (16), *Crematogaster* (4), *Doleromyrma* (1), *Dorylus* (1), *Dorymyrmex* (1), *Forelius* (1), *Hypoponeura* (1), *Lasius* (3), *Linepithema* (1), *Liometopum* (2), *Monomorium* (7), *Ochetellus* (1), *Paratrechina* (2), *Pheidole* (4), *Prenolepis* (1), *Solenopsis* (4), *Tapinoma* (2), *Technomyrmex* (1), *Tetramorium* (3) and *Wasmannia* (1) have been reported as household ants (Robinson 2005). Some researches on ants of inside residential houses show that the Argentine ant, *Linepithema humile* (Mayr, 1868) nests near and inside houses (Greenberg et al., 2017). In a study on anthropophilic ants in rooms in Brazil, 3 subfamilies, 9 genera and 9 species (*Tapinoma melanocephalum* (Fabricius, 1793), *Brachymyrmex incises* Forel, 1912, *Camponotus vittatus* Forel, 1904, *Paratrechina longicornis* (Latreille, 1802), *Atta sexdens* (Linnaeus, 1758), *Crematogaster* sp., *Monomorium floricola* (Jerdon, 1851), *Pheidole* sp., *Solenopsis megergates* Trager, 1991) were collected and identified. Myrmicinae was the predominant subfamily with 8 species. The predominant species was *T. melanocephalum* (da Silva et al., 2009). An investigation on the community structure of ants which infest houses in southern Bahia, Brazil, showed that of 31 species collected, 8 species (*Pheidole megacephala* (Fabricius, 1793), *T. melanocephalum*, *Solenopsis saevissima* (Smith, F., 1855), *P. longicornis*, *Wasmannia auropunctata* (Roger, 1863), *Camponotus* sp., *Pheidole* sp. and *Tetramorium simillimum* (Smith, F., 1851)) were as characteristics of human habitats, even though some of them were also collected from other habitats such as in regional agrosystems. Among the ants, *P. megacephala* was the dominant species (Delabie et al., 1995). A preliminary study on the species composition of household ants in urban, suburban and rural areas in Penang Island, Malaysia indicated that thirteen species of ants were found in the living premises of the four study locations. The pharaoh ant, *Monomorium pharaonis* (Linnaeus, 1758), was the predominant species (41.9%), followed by the odorous house ant, *Tapinoma sessile* (Say, 1836) (21.2%) and the crazy ant, *P. longicornis* (16.6%) (Yap & Lee, 1994). In Malaysia, ants are the most economically important and abundant household pest after mosquitoes and cockroaches. Twenty-five species of ants were found indoors and outside buildings; all species nest outdoors except *M. pharaonis*, *M. floricola*, *T. melanocephalum*, and *Solenopsis molesta* (Say, 1836) (Lee, 2002). In another study on the abundance and prevalence of structure infesting ants in residential buildings in Penang Island, Malaysia, the top five most common household ants species found from the surveyed houses were *P. longicornis* (22.09%), *Tapinoma indicum* Forel, 1895 (17.74%), *T. melanocephalum* (17.0%), *M. pharaonis* (10.61%), and *Pheidole* spp. (5.22%) (Ab Majid et al., 2016). In present study, in addition to outside residential houses and inside non-residential structures, *M. denticulatus* and *M. reticuliventris* were collected from the roofs of two rural residential houses. In literature, there was no report of the presence of *Messor* ants inside residential houses. Therefore, this is the first report about the presence of these ants in such habitats. Most likely, the presence of these ants was completely accidental and for the purpose of searching for food. Due to the presence of *Messor* ants colonies in the dirt yards of rural residential houses, there is a possibility of their presence inside these houses.

Fourteen species of *T. erraticum*, *C. cognatocompressus*, *C. xerxes*, *C. setipes*, *F. clara*, *A. muschtaidica*, *M. denticulatus*, *M. intermedius*, *M. reticuliventris*, *M. specioides*, *P. cicatricosa*, *P. providens*, *T. nursei*, and *T. destructor* were also collected from outdoor spaces of residential houses and internal spaces of non-residential buildings (such as courtyards, parking lots, warehouses, on stairs, gardens, walls, terraces, etc.). Except for *F. clara*, *A. muschtaidica*, *M. specioides* (collected only from inside rural warehouses), *P. cicatricose* and *T. nursei* (collected only from inside livestock facilities), other 10 species were also collected from urban and rural open habitats (such as city parks, municipal parking lots, airports, customs, etc.). Five species including *T. simrothi*, *C. foreli*, *L. karawaiewi*, *L. melas*, and *C. schmidti* were collected exclusively from urban or rural open spaces. Comparing to the Iranian reports on household ants, more reports on ants of outside residential houses and inside non-residential structures are seen in literatures. Shahi et al. (2017) reported *Camponotus* sp., *Tapinoma* sp., *P. longicornis*, *Cardiocondyla* sp., *B. sennaarensis*, *Technomyrmex vexatus* (Santschi, 1919) and *T. setosus* Collingwood, 1985 inside hospitals of Bandar Abbas. Farajollahzadeh et al. (2023) reported *Lepisiota bipartita*, *L. karawaiewi*, *Tapinoma erraticum*, and *T. simrothi* from urban environments in Shiraz city. A total of 30 species from 12 genera and 3 subfamilies (Dolichoderinae, Formicinae, and Myrmicinae) were collected. Formicinae, with 16 species from 5 genera (*Camponotus*, *Cataglyphis*, *Nylanderia*, *Lepisiota*, and *Plagiolepis*), was the richest subfamily across all habitats, followed by Myrmicinae, with 12 species from 6 genera (*Crematogaster*, *Monomorium*, *Tetramorium*, *Pheidole*, *Cardiocondyla*, and *Messor*). The subfamily *Dolichoderinae* was poorly represented, with only two species from the genus *Tapinoma*. Additional scattered records of ants from open urban and rural environments in Iran include: *Lepisiota caucasica* Santschi, 1917 (rural area, Zanjan Province); *Messor ceresis* Santschi, 1938 (urban area, Mazandaran Province); *M. rufitarsis* Förster, 1850 (rural area, Zanjan Province); *M. orientalis* Emery, 1896 (rural area, Zanjan Province); *Tetramorium forte* Forel, 1904 (rural area, Zanjan Province); *T. moravicum* Kratochvil, 1941 (urban area, Mazandaran Province); *T. punicum* Smith, 1861 (rural area, Zanjan Province) (Hossein Nezhad et al., 2012); *T. caespitum* (Linnaeus, 1798) (urban areas); *Pheidole pallidula* (Nylander, 1849) (rural areas); *Myrmica gallienii* Bondroit, 1920 (villages); *T. simrothi* (urban areas); *Camponotus rebeccae* Forel, 1913 (urban areas); *Cataglyphis bellicosus* Karavaiev, 1924 (rural areas); *Formica cunicularia* Latreille, 1798 (urban areas and gardens); *Lasius turcicus* Santschi, 1921 (urban areas); *Lepisiota semenovi* (Ruzsky, 1905) (city parks) (Moradloo et al., 2015); *Monomorium areniphilum* Santschi, 1911 (urban green areas, Mashhad city) (Hosseini et al., 2015); and *T. simrothi* and *C. xerxes* from Shiraz city (Torabi et al., 2017). Based on the above-mentioned records, it can be concluded that the Iranian ant fauna associated with humans, whether inside or outside residential houses, within various human-made structures, or in urban and rural environments, is still poorly understood. Further studies are needed to expand our understanding of this group. The data obtained from such investigations will provide a foundation for future management strategies targeting household and urban ants in Iran.

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