Research Article

Ant Fauna (Hymenoptera: Formicidae) of District Mansehra, Pakistan

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Abstract | Ants are one of the most significant groups of insects for the ecology of many ecosystems. They act as soil turners, environmental indicators, pollinators, seed dispersal/ orchid seed removal agent and scavengers. Ants can be both prey and predators for the crops and various insects. They also spread human diseases. Ant fauna is poorly known in Pakistan. As Pakistan occupies an important biogeographic position and the taxonomic studies on ants of Pakistan are badly needed. During this study ant specimens were collected from different localities of district Mansehra. Total 28 species were identified under 16 genera of three sub-families, namely Camponotinae, Myrmecinae and Ponerinae. Subfamily Myrmicinae represented 20 species under 10 genera, followed by subfamily Camponotinae with seven species under five genera, while a single species from subfamily Ponerinae has been identified. Among 28 identified species six species, namely *Anoplolepis gracilepis* Jerdon, *Cardiocondylaw roughtonii* (Forel), *Crematogaster contemta* Mayr, *Myrmica rugosa* Mayr, *Vollenhovia laevithorax* Emery, and *Myopopone moelleri* Bingham were found new for Pakistan.

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Introduction

Ants are among the successful group of organisms on the earth with 12500 reported species within 307 genera and 21 subfamilies (Hölldobler and Wilson, 1990; Guénard, 2013). Economically, ants' role in our agriculture ecosystem has been discussed in various studies as transporter and nutrients pooler in the soil (Mueller *et al.*, 2005).

Ants are known to human about 120 million years ago (Ward, 2007), while fossil records of ants are available for the middle of the Cretaceous (Carpenter, 1992; Grimaldi and Engel, 2005; Perrichot *et al.*, 2007) and are known to arise about 140 million years ago (Brady, 2003). They may have green, black, or metallic body colour. Species richness in ants varies from region to region (Anderson, 1997; Longino and Colwell, 1997; Kaspari *et al.*, 2000). They can be found in any type of habitat from Arctic Circle to Equator (Brian, 1978), except Iceland, Greenland and Antarctica (Hölldobler and Wilson, 1990). However, they are

remarkably high in tropical region both in vegetation and on ground. They together with bees and termites, are one of the most significant group of insects for the ecology of many ecosystems (Forest and Madden, 2011), where they act as soil turners, environmental indicators, pollinators, seed dispersal/ orchid seed removal agent, and scavengers (Hölldobler and Wilson, 1990; Wenny, 2001; Li *et al*., 2014; Forest and Madden, 2011; Bharti, 2011; Wills and Landis, 2108).

Ants act as intermediate host for small birds and mammals and also hazardous to human health by causing several diseases like dysentery, typhoid fever and tuberculosis (Brown, 1965). Some ants damage the agricultural food crops and collect phloem from wounded plants in order to get plants based carbohydrates (Stewart and Vinson, 1991; Tennant and Porter, 1991). Furthermore, ants also serve as prey for various predators including reptiles, mammals, spiders and insects (Pianka and Parker, 1975; Redford, 1987; Porter and Eastmond, 1982; Gotelli, 1996) and may act as host for parasitoids of Diptera and Hymenoptera (Heraty 1994; Feener and Brown, 1997).

In subcontinent Bingham (1897) initiated work on ants and provided detail on ant fauna of British India. Recent changes in the higher classification of ants is given by Bolton (2003) and recognized that ant subfamilies varied from seven to ten. While 12,000 described species and many others are still waiting for naming, with further expected numbers of species up to 22000 (Bolton *et al*., 2006). Ward (2007) provided phylogeny, classification, and species level taxonomy.

Little is known about the ant fauna of Pakistan for example Haji (2008) reported 11 species under seven genera of house ants of Karachi. Umair *et al*. (2012) reported 21 species under 13 genera of three subfamilies from Potohar Plateau. Ahmed *et al*. (2013) reported seven species from Quetta, Balochistan. Recently Bodlah *et al*. (2016) reported two species of genus *Tetraponera*, *T. allaborans* and *T. nigra* first time from Pakistan. Both species were recorded from Rawalpindi and Islamabad. Recently, Usman *et al*. (2017) reported 17 species under 12 genera of subfamilies Myrmicinae and Camponotinae, from district Karak, Khyber Pakhtunkhwa. The fauna of Pakistan is very diverse due to its position in transitional zone between the Palearctic and the Oriental regions, however to a lesser extent to Afrotropical region. As Pakistan occupies an important biogeographic position and taxonomic studies on ants of Pakistan have been badly neglected. Keeping in view the importance of ants and so for the area present study was planned for exploring ant species of district Mansehra.

Materials and Methods

For collection of ants, surveys were conducted from different localities of district Manshera. Ants were collected from different habitats such as residential and official buildings, godowns, cereal crops, road sides, under soils, plants and trees attacked by mealy bug and aphids. 75% Ethyl Alcohol was prepared to kill ants. Ants were mounted on the triangular tags by using the glue and were properly labelled.

Collected specimens of ants were brought to the National Insect Museum (NIM), National Agriculture Research Centre, Islamabad for the taxonomic studies. Specimens were identified with the help of microscope (Labomed CZM4-4X) up to the lowest possible taxa by running them through available literature. The specimens were further confirmed by reference collection housed at National Insect Museum (NIM), NARC. Islamabad.

Results and Discussion

Super-family Vespoidea
Family Formicidae Latreille, 1809
Sub-family Camponotinae
Genus *Lepisiota* Santschi, 1926

Acantholepis frauenfeldi (Mayr, 1855)
Material examined: Pakistan: Mansehra: College Doraha, 03-iv-2013, 3 workers, leg. Sehrish; Gandhian, 24-iv-2013, 2 workers, leg. Sehrish; Oghi, 12-vi-2012, 11 workers, leg. Sehrish; ex NIM. (National Insect Museum, National Agriculture Research Center, Islamabad, Pakistan).

Remarks: Earlier Umair *et al*. (2012) reported this species from Potohar Plateau of Punjab, Pakistan. However, this species is record first time from distract Mansehra.

Genus *Anoplolepis* Santschi, 1914
Anoplolepis gracilepis Smith, 1857
Material examined: Pakistan: Mansehra: College

Doraha, 12-iv-2013, 03 workers, leg. Sehrish, Gandhian, 8-iv-2013, 02 workers, leg. Sehrish; Baffa, 17-v-2013, 04 workers, leg. Sehrish; Dhodial, 12-iv-2013, 04 workers, leg. Sehrish; ex NIM.

Remarks: New record for Pakistan.

Genus *Lasius* Fabricius, 1804

Lasiusa lienus Foerster, 1850

Material examined: Pakistan: Mansehra: Oghi, 07-iv-2013, 02 workers, leg. Sehrish; Mahandri, 11-v-2013, 03 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan. Recently, Usman *et al.* (2017) reported this species from Karak, Khyber Pakhtunkhwa, Pakistan. However, from Distract Mansehra recorded first time.

Genus *Polyrhachis* Smith, 1857

Polyrachis hodgsoni Forel, 1902

Material examined: Pakistan: Mansehra: Batrassi, 15-v-2013, 05 workers, leg. Sehrish; Oghi, 12-vi-2012, 03 workers, leg. Sehrish; Bhati, Arbora, 18-vi-2012, 05 workers, leg. Sehrish; Mahandri, 11-v-2013, 03 workers, leg. Sehrish; Naran, 15-v-2013, 04 workers, leg. Sehrish; Balakot, 25-vi-2012, 02 workers, leg. Sehrish; ex NIM.

Remarks: This species was recorded first time from distract Mansehra. Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan. Recently, Usman *et al.* (2017) reported this species from Karak, Khyber Pakhtunkhwa.

Genus *Camponotus* Mayr, 1861

Camponotus compressus Fabricius, 1787

Material examined: Pakistan: Mansehra: Oghi, 13-iv-2013, 05 workers, leg. Sehrish; Gandhian, 24-v-2013, 03 workers, leg. Sehrish; Baffa, 18-iv-2013, 09 workers, leg. Sehrish; Balakot, 25-vi-2012, 04 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan. Recently, Usman *et al.* (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, this is the first record from Distract Mansehra.

Camponotus oblongus Smith 1858

Material examined: Pakistan: Mansehra: Oghi, 13-iv-2013, 2 workers, leg. Sehrish; Balakot, 25-vi-2012, 04 workers, leg. Sehrish; ex NIM.

Remarks: This species was first time record from Distract Mansehra. Previously, Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan.

Camponotus serices Fabricius, 1798

Material examined: Pakistan: Mansehra: Oghi, 12-vi-2012, 04 workers, leg. Sehrish; Bhati, Arbora, 18-vi-2012, 03 workers, leg. Sehrish; Balakot, 25-vi-2012, 04 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan.

Subfamily *myrmicinae* Lepeletier de Saint-Fargeau, 1835

Genus *Paratopula* Wheeler, 1919

Paratopula ceylonica (Emery, 1901)

Material examined: Pakistan: Mansehra: College Doraha, 9-iv-2013, 07 workers, leg. Sehrish; Mahandri, 11-v-2013, 3 workers, leg. Sehrish; Naran, 15-v-201303 workers, leg. Sehrish; Shogran, 12-v-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: Already, this species have been reported from Pakistan (Luo and Guénard, 2016). However, this species is recorded first time from Distract Mansehra.

Genus *Cardiocondyla* Emery, 1869

Cardiocondyla wroughtonii (Forel, 1890)

Material examined: Pakistan: Mansehra: College Doraha, 11-iv-2013, 02 workers, leg. Sehrish; Dhodial, 12-iv-2013, 01 worker, leg. Sehrish; ex NIM.

Remarks: New record for Pakistan.

Genus *Crematogaster* Lund, 1831

Crematogaster contemta Mayr, 1879

Material examined: Pakistan: Mansehra: 14-iv-2013, 05 workers, leg. Sehrish; Mahandri, 11-v-2013, 01 worker, leg. Sehrish; Naran, 15-v-2013, 01 worker, leg. Sehrish; Shogran, 12-v-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: New record for Pakistan.

Crematogaster rothneyi Mayr, 1879

Material examined: Pakistan: Mansehra: College

Doraha,3-iv-2013,07workers,leg.Sehrish;Gandhian, 8-iv-2013, 02 workers, leg. Sehrish; Dhodial, 12-iv-2013, 06 workers, leg. Sehrish; ex NIM.

Remarks: Already reported from Potohar Plateau of Pakistan (Umair *et al*., 2012). Recently, Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, new record from district Mansehra.

Crematogaster subnuda Mayr, 1879
Material examined: Pakistan: Mansehra: 12-iv-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: Recently, Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, new record for district Mansehra.

Genus *Meranoplus* Smith, 1853
Meranoplus bicolor (Guérin-Méneville, 1844)
Material examined: Pakistan: Mansehra: College Doraha, 19-iv-2013, 3 workers, leg. Sehrish; Dhodial, 12-iv-2013, 1 worker, leg. Sehrish; ex NIM.

Remarks: Umair *et al*. (2012) reported this species from Potohar Plateau of Pakistan. However, this is the first record for distract Mansehra.

Genus *Monomorium* Mayr, 1855
Monomorium fossulatum Emery, 1895
Material examined: Pakistan: Mansehra: College Doraha, 6-iv-2013, 03 workers, leg. Sehrish; F.C Oghi, 12-vi-2012, 02 workers, leg. Sehrish; Garhihabibullah, 12-vi-2012, 02 workers, leg. Sehrish; ex NIM.

Remarks: Recently, Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, new record for district Mansehra.

Monomorium longi Forel, 1902
Material examined: **Pakistan**: Mansehra: 19-iv-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: Umair *et al*. (2012) reported this species from Pother Plateau of Pakistan. Recently, Usman *et al*. (2017) reported this species from District Karak, Khyber Pakhtunkhwa. However, this is the first record for distract Mansehra.

Monomorium pharaonis Linnaeus, 1758
Material examined: Pakistan: Mansehra: College Doraha, 15-iv-2013, 03 workers, leg. Sehrish, ex NIM.

Remarks: Earlier this species was reported from Karachi Pakistan (Haji, 2008; Wetterer, 2010). Ahmed *et al*. (2013) reported this species from Quetta Balochistan. However, this is the first record for Distract Mansehra.

Monomorium schurri Forel, 1902
Material examined: Pakistan: Mansehra: 14-iv-2013, 02 workers, leg. Sehrish; Oghi, 12-vi-2012, 04 workers, leg. Sehrish; Dhodial, 12-iv-2013, 01 worker, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al*. (2012) reported this species from Potohar Plateau of Pakistan. However, this is the first record for distract Mansehra.

Monomorium (Holcomyrmex) scabriceps Mayr 1878
Material examined: Pakistan: Mansehra: College Doraha, 16-iv-2013, 07 workers, leg. Sehrish; Mahandri, 11-v-2013, 04 workers, leg. Sehrish; Naran, 15-v-2013, 05 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al*. (2012) reported this species from Potohar Plateau of Pakistan. Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa, Pakistan. However, this is the first record from distract Mansehra.

Genus *Myrmica* Latreille, 1804
Myrmica rugosa Mayr, 1865
Material examined: Pakistan: Mansehra: College Doraha, 03-iv-2013, 3 workers, leg. Sehrish; ex NIM.
Remarks: New record for Pakistan.

Genus *Strumigenys* Smith 1860
Strumigenys feae Emery, 1895
Material examined: Pakistan: Mansehra: College Doraha, 16-iv-2013, 03 workers, leg. Sehrish, ex NIM.

Remarks: Recently, Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa. This is the first record for distract Mansehra.

Genus *Vollenhovia* Mayr, 1865
Vollenhovia laevithorax Emery, 1889
Material examined: **Pakistan:** Mansehra: College Doraha, 03-iv-2013, 03 workers, leg. Sehrish;

Oghi, 12-vi-2012, 04 workers, leg. Sehrish; Garhi Habibullah, 12-vi-2012, 02 workers, leg. Sehrish, ex NIM.

Remarks: New record for Pakistan.

Genus *Holcomyrmex* Mayr, 1879

Holcomyrmex glaber Andre, 1883

Material examined: Pakistan: Mansehra: Mahandri, 11-v-2013, 04 workers, leg. Sehrish; Naran, 15-v-2013, 04 workers, leg. Sehrish; Shogran, 12-v-2013, 03 workers, leg. Sehrish; Batrassi, 15-v-2013, 03 workers, leg. Sehrish; Oghi, 12-vi-2012, 03 workers, leg. Sehrish; Garhihabibullah, 12-vi-2012, 02♂, leg. Sehrish; Baffa, 18-iv-2013, 14 workers, leg. Sehrish; ex NIM.

Remarks: Earlier reported from Potohar Plateau of Pakistan (Umair *et al*., 2012). Recently, Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa.

Genus *Pheidole* Westwood, 1839

Pheidole nietneri Emery 1901

Material examined: Pakistan: Mansehra: 13-iv-2013, 5 workers, leg. Sehrish; Mahandri, 11-v-2013, 2 workers, leg. Sehrish; Naran, 15-v-2013, 2 workers, leg. Sehrish; Batrassi, 15-v-2013, 4 workers, leg. Sehrish; Oghi, 12-vi-2012, 3 workers, leg. Sehrish; Bhati, Arbora, 18-vi-2012, 2 workers, leg. Sehrish; Baffa18-iv-2013, 6 workers, leg. Sehrish; Balakot, 25-vi-2012, 2 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan. Usman *et al*. (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, this is the first record for distract Mansehra.

Pheidole mus Forel, 1902

Material examined: Pakistan: Mansehra: 20-iv-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan. Recently, Usman *et al.* (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, this is the first record for distract Mansehra.

Pheidole megacephala Fabricius, 1793

Material examined: Pakistan: Mansehra: 24-iv-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: Already this species have been reported from Karachi Pakistan (Haji, 2008). However, this is the first record for distract Mansehra.

Pheidole naoroji Forel, 1902

Material examined: Pakistan: Mansehra: 14-iv-2013, 01 worker, leg. Sehrish; ex NIM.

Remarks: Recently, Usman *et al.* (2017) reported this species from district Karak, Khyber Pakhtunkhwa. However, this is the first record for distract Mansehra.

Pheidole pronotalis Forel, 1902

Material examined: Pakistan: Mansehra: 18-iv-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: Earlier Umair *et al.* (2012) reported this species from Potohar Plateau of Pakistan. However, this is the first record for distract Mansehra.

Subfamily *Ponerinae* Lepeletier, 1835

Genus *Myopopone* Roger, 1861

Myopopone moelleri Bingham, 1903

Material examined: Pakistan: Mansehra: College Doraha, 04-iv-2013, 05 workers, leg. Sehrish; Gandhian, 24-v-2013, 02 workers, leg. Sehrish; ex NIM.

Remarks: New record for Pakistan.

Ant specimens were collected from different localities of district Mansehra. All the specimens fall under one super family Vespoidea and its sub-family Formicidae Latreille (1809). Total of 28 species were identified under 16 genera of three sub-families namely Camponotinae, Myrmecinae and Ponerinae. Subfamily Myrmicinae represented 20 species under 10 genera followed by subfamily Camponotinae with seven species under five genera while a single species from subfamily Ponerinae has been identified. Among 28 identified species 06 species namely *Anoplolepis gracilepis* Jerdon, *Cardiocondylaw roughtonii* (Forel), *Crematogaster contemta* Mayr, *Myrmica rugosa* Mayr, *Vollenhovia laevithorax* Emery, and *Myopopone moelleri* Bingham were found new for Pakistan. The remaining 22 specimens were first time recorded in the district Mansehra of Khyber Pakhtunkhwa though these were earlier already recorded from other parts of the country.

Table 1: *Classification of Ant Fauna of Mahsehra, Pakistan.*

Super-family family	Sub family	Genus	Species	Occurrence
Vespoidea Formicidae Latreille, 1809	Camponotinae	*Lepisiota* Santschi, 1926	*Acantholepis frauenfeldi* (Mayr, 1855)	Previous Pak 1st Mansehra
		Anoplolepis Santschi, 1914	*Anoplolepis gracilepis* Smith, 1857	1st Pak
		Lasius Fabricius, 1804	*Lasius alienus* Foerster, 1850	Previous Pak 1st Mansehra
		Polyrhachis Smith, 1857	*Polyrachis hodgsoni* Forel, 1902	Previous Pak 1st Mansehra
		Camponotus Mayr, 1861	*Camponotus compressus* Fabricius, 1787	Previous Pak 1st Mansehra
			Camponotus oblongus Smith 1858	Previous Pak 1st Mansehra
			Camponotus serices Fabricius, 1798	Previous Pak 1st Mansehra
	Myrmicinae	*Paratopula* Wheeler, 1919	*Paratopula ceylonica* (Emery, 1901)	Previous Pak 1st Mansehra
		Cardiocondyla Emery, 1869	*Cardiocondyla wroughtonii* (Forel, 1890)	1st Pak
		Crematogaster Lund, 1831	*Crematogaster contemta* Mayr, 1879	1st Pak
			Crematogaster rothneyi Mayr, 1879	Previous Pak 1st Mansehra
			Crematogaster subnuda Mayr, 1879	Previous Pak 1st Mansehra
		Meranoplus Smith, 1853	*Meranoplus bicolor* (Guérin-Méneville, 1844)	Previous Pak 1st Mansehra
		Monomorium Mayr, 1855	*Monomorium fossulatum* Emery, 1895	Previous Pak 1st Mansehra
			Monomorium longi Forel, 1902	Previous Pak 1st Mansehra
			Monomorium pharaonis Linnaeus, 1758	Previous Pak 1st Mansehra
			Monomorium schurri Forel, 1902	Previous Pak 1st Mansehra
			Monomorium (Holcomyrmex) scabriceps Mayr 1878	Previous Pak 1st Mansehra
		Myrmica Latreille, 1804	*Myrmica rugosa* Mayr, 1865	1st Pak
		Strumigenys Smith 1860	*Strumigenys feae* Emery, 1895	Previous Pak 1st Mansehra
		Vollenhovia Mayr, 1865	*Vollenhovia laevithorax* Emery, 1889	1st Pak
		Holcomyrmex Mayr, 1879	*Holcomyrmex glaber* Andre, 1883	Previous Pak 1st Mansehra
		Pheidole Westwood, 1839	*Pheidole nietneri* Emery 1901	Previous Pak 1st Mansehra
			Pheidole mus Forel, 1902	Previous Pak 1st Mansehra
			Pheidole megacephala Fabricius, 1793	Previous Pak 1st Mansehra
			Pheidole naoroji Forel, 1902	Previous Pak 1st Mansehra
			Pheidole pronotalis Forel, 1902	Previous Pak 1st Mansehra
	Ponerinae Lepeletier, 1835	*Myopopone* Roger, 1861	*Myopopone moelleri* Bingham, 1903	1st Pak
01/01	03	16	28	06 - Pakistan 22 - Mansehra

1st Pak: New in Pakistan.

The availability of new records on Pakistan level from district Mansehra indicates that there is need to study the occurrence of ants' species in other parts of the country. The studies are also needed on their feeding behavior, damage caused to crops, animals and human life, as well as their beneficial effects on the ecosystem. The information generated in this and such other studies on ants' diversity of Pakistan will feed to the proposed studies. The specimens of the newly discovered species are also preserved in the repository of NIM, PARC for reference purposes to be used by the students and researchers.

Novelty Statement

Among 28 identified species 06 species namely Anoplolepis gracilepis Jerdon, Cardiocondylaw roughtonii (Forel), Crematogaster contemta Mayr, Myrmi-

ca rugosa Mayr, Vollenhovia laevithorax Emery, and Myopopone moelleri Bingham were found new for Pakistan. The remaining 22 specimens were first time recorded in the district Mansehra of Khyber Pakhtunkhwa though these were earlier already recorded from other parts of the country.

Author's Contribution

Sehrish Khudadad and Muhammad Qasim: Did Survey and colleced data.
Muhammad Ather Rafi and Mian Sayed Khan: Concept and designed experiment.
Ahmed Zia and Falak Naz: Helped in identification at Insect Museum, NARC.
Mian Sayed Khan, Gulnaz Parveen, Muhammad Kamal Sheikh and Syed Waqar Shah: prepared manuscript.
Muhammad Kamal Sheikh: Correspondence Author.

Conflict of interest
The authors have declared no conflict of interest.

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