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ANT FAUNA (HYMENOPTERA: FORMICIDAE) OF QUETTA, BALOCHISTAN, PAKISTAN

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ABSTRACT

The ant fauna of Quetta, Northern Pakistan was studied using hand collected samples. A total of 1865 individuals were sampled comprising of seven species belonging to three subfamilies. A preliminary checklist of the ant species collected from Quetta city is presented. The most common subfamily observed was Myrmicinae with an abundance value of 66.8% and the most frequent species encountered was the Myrmicine Pharoah Ant, *Monomorium pharaonis* (60%). The least common species encountered were *Solenopsis invicta* (Fire ant) and *Tetramorium sessile* (Pavement ant), also belonging to the subfamilyMyrmicinae with an abundance value of 3.2% and 3%, respectively. The subfamilies Formicinae (3 species) and Dolichoderinae (1 species) were found to be moderately common with abundance values of 18% and 15%, respectively.

Keywords: Hymenoptera, Formicidae, species, outdoor, indoor.

ABSTRAK

Fauna semut daripada Quetta, Pakistan Utara telah dikaji dengan menggunakan pengumpulan tangan. Sejumlah 1865 sampel telah dikelompokkan menjadi tujuh spesies daripada tiga subfamili. Senarai awal spesies semut yang dikutip dari bandar Quetta telah dibentangkan. Subfamili terbanyak adalah Myrmicinae dengan nilai kelimpahan 66.8% dan spesies yang paling banyak dijumpai ialah Semut Myrmicine Firaun, *Monomorium pharaonis* (60%). Spesies yang kurang dijumpai iaitu *Solenopsis invicta* (semut api) dan *Tetramorium sessile* (semut turapan), yang juga termasuk subfamily Myrmicinae dengan nilai kelimpahan berturut-turut 3.2% dan diikuti 3% Formicinae (3 spesies) dan Dolichoderinae (1 spesies) telah didapati masing-masing dengan nilai kelimpahan 18% dan 15%.

Kata kunci: Hymenoptera, Formicidae, spesies, luaran, dalaman.

INTRODUCTION

The insects covera large portion of live fauna and play an important role in ecosystem (Folgarait 1998; Thomazini and Thomazini, 2000; Samways, 2005). Ants belong to the order Hymenoptera and family Formicidae (Ward, 2007). It is believed that they appeared about 120 million years ago. Among all insects, ants are found most abundant and widely distributed. Ants are beneficial insects but when they invade a home, they may be harmful. They are considered as pest around the home because they feed on human food and also introduce impurities in it, destroy structures and construct hidden mounds in lawns. Some ants cause painful bites or stings while some species of ants destroy wood by constructing nest in it, but generally, ants do not destroy fabric, leather or wood in houses. Some species of ants collect seeds of herbal tea (Downes and Laird, 1999).

Ants are widely distributed geographically and their population may be affected by some factors such as physical and chemical property of soil, for example the number of ants is less in dry soil as compared to humid place (Kusnezov, 1957). In tropical ecosystem, ants are one of the abundant and diverse animal groups. In these ecosystem, ants play an important role at different levels superficially

as prey, predators, detritivores, mutualists and herbivores (Holldobler and Wilson, 1990). The most important characteristic that differentiates ants from other insect is their antennae. Antennae are paired segmented appendages present between the two compound eyes, and function as sensory appendages and in communication. The flagellate part of antennae may be filiform or club shaped. Antennae consist of 9-12 segments or some time less than even some time four segments are present. Ants have compound eyes and some are blinds but the family Formiciniae has well developed compound eyes. Prothorax of ants is differentiated from the other two thoracic segments by the promesothoracic suture. In some species the suture is not separate and the pronotum and mesonotum are fused. Some ants have spines on the prothorax, mesothorax or the propodeum. Mesothoracic and propodeal spiracles are visible. General shape of the gaster is globous, but it differs from species to species such as heart shape or elongate gaster. Ovipositor play important role in their body. Some species have sting on their body and is useful to eject venom but in some, it is nonfunctional. The last tergal and sternal sclerite may fuse to form a cone-shape structure through which formic acid from the poison gland is squirted out (Mohamed *et al*. 2004).

It is estimated that more than 22,000 species of ants have been identified (Rabeling *et al.* 2008) and classified into 14 subfamilies and 296 genera (Bolton, 1994). Ants were previously classified into nine subfamilies but now they are classified into 14 extant subfamilies. These subfamilies include *Nothomymeciinae, Myrmicinae, Ponerinae, Dorylinae, Aneuritinae, Aenictimae, Ecitoninae, Myrmicinae, Pseudomyrmecinae, Cerapachyinae, Leptanillinae, Leptandloidinae, Dolichoderinae,* and *Formicinae* (Bolton, 1994). In Asia, one fourth species of Formicidae are present (Ogata, 1991b). Geographically in Asia, Pakistan has a valuable diversity and shows affiliation with the Palaearctic, Ethiopion, and Oriental fauna (Umair *et al*. 2012). Few ant species have the ability to cause diseases in human and can penetrate into the uncovered wounds and also were reported to contaminate the sterile equipments in hospitals (Beatson, 1972).

On the basis of morphology, ants can be easily identified and classified in different region of the world. In Pakistan, two remarkablestudies on ants were conducted, namely "*House Ants of*

Karachi, Pakistan" by Haji (2008) and "*Species Composition of Ants in Potohar Pleateau of Punjab Province, Pakistan*" by Umair *et al*. (2012). As there is no scientific work done on the ants in Balochistan, specifically in Quetta region, this study was conducted to identify the local ant species, so as to partially fill up the research gap that exists in the field of taxonomy of the Formicidae.

MATERIALS AND METHOD

This study was conducted in 2012 to identify the ant species of Quetta region. A total 1865 individuals were collected from various areas of Quetta city. The ants were collected by hand picking and transferred into bottles containing 75% alcohol, stored in laboratory for study and identification under a stereo microscope. Whole mount slides as well as slides of individual body parts such as the head, thorax, abdomen, antennae, legs and mouthparts were prepared following Umair *et al*. (2012). Each specimen was mounted on a slide by firstly adding a drop of Canada Balsam onto the slide using a glass rod followed subsequently by arranging the whole ant in the drop and placing the cover slip carefully on to it, so as to avoid air bubbles. Similar procedure was applied in preparing the slides of the head, legs, mouthparts, antennae and abdomen. The position of specimen was adjusted by using entomological pins.

Identification of the collected specimen was done by using identification keys and guides which was based on the difference in the antennae segments, nodes, spines, legs (Bingham, 1897; Bolton, 1994 and Umair *et al*. 2012). Identified specimens were deposited in the Zoology Department of Sardar Bahadur Khan Women's University, Quetta, Pakistan.

RESULTS

A total of 1865 random individuals of ants were collected from various habitat types, which were classified into seven species under 3 subfamilies of Formicidae (Table 1). Identification of the species was done on the basis of their morphology: body color, size, presence or absence of nodes, and segments of antennae.

As shown in Table 1, amongst the three subfamilies, Myrmicinae was the most abundant family with an abundance value of 66.2% and *Monomorium pharaonis* was recorded as the most abundant species with a frequency of 60%. The second most abundant family was Formicidae with an abundance value of 18.8% while *Componotus modoc* and *Paraterchinia longicornis* were recorded with a % frequency 6.4 for each species. The least common subfamily encountered was Dolichodinae with a relative abundance of 15% with the only representative species, *Tapinoma sessile* having a frequency 15%. Table 2 shows the locations where the ants were sampled. *Solenopsis invicta* and *Oecophylla smaragdina* were only found outdoors while *Tetramorium caesptium* was only associated with house wall cracks. The remaining species were encountered both indoors and outdoors.

DISCUSSION

In developed countries, there has been more research done on diversity and identification of ants. Pakistan has a rich and diversified fauna of ants, however, there is still a high lack of information and identification of the insect fauna, particularly, the ants. In the present study, a number of 1865 individuals were randomly collected from various urban localities of Quetta city. These individuals were classified on morphological basis into three subfamilies in seven distinct species.

The most frequent species, *Monomorium pharaonis* (Pharaoh ant) with a frequency of 60% (Table 1), are also widely distributed in the world. It is considered to be abundant due to favorable environment, habitat and diet. The least abundant species was *Tetramorium caesptium* (Pavement ant) *with a frequency of* 3%. *Tapinoma sessile* (Odorous house ant) was moderately found with a frequency of 15%.

Subfamily Myrmicinae

***i) Monomorium pharaonis* (Fig. 1a)**

Pharaoh ant shows an abundant distributionof 60% and were recorded at six places among twelve collection areas. *Monomorium pharaonis* was equally abundant at both indoor and outdoor localities (Table 2).

Table 1. A list of the ant species sampled in Quetta, Pakistan

No.	Subfamily	Species	Common Name	No. of individuals collected	% frequency	Abundance
1.	**Myrmicinae**	*Monomorium pharaonis*	Pharaoh Ant	1120	60%	
		Solenopsis invicta	Fire Ant	60	3.2%	**66.2%**
		Tetramorium caesptium	Pavement Ant	55	3.0%	
2.	**Formicinae**	*Componotus modoc*	Carpenter Ant	120	6.4%	
		Oecophylla smaragdina	Weaver Ant	110	6.0%	**18.8%**
		Paraterchinia longicornis	Crazy Ant	120	6.4%	
3.	**Dolichodinae**	*Tapinoma sessile*	Odorous House Ant	280	15%	**15.0%**
Total	**3**	**7**	**7**	**1,865**	**100**	**100**

Table 2. List of collection areas of ant species at Quetta

No.	Species	Common Name	Collection areas Indoors	Outdoors
1.	*Monomorium pharaonis*	Pharaoh Ant	Kitchen, windows, wall cracks, house floor.	Wall cracks, grassy fields, flower beds
2.	*Solenopsis invicta*	Fire Ant	Absent	Grassy fields
3.	*Tetramorium caesptium*	Pavement Ant	House wall cracks	Absent
4.	*Componotus modoc*	Carpenter Ant	Kitchen windows	Around trees
5.	*Oecophylla smaragdina*	Weaver Ant	Absent	Around corn fields
6.	*Paraterchinia longicornis*	Crazy Ant	Kitchen windows, around debris	Flower beds, grassy fields, green shrubs, bushes
7.	*Tapinoma sessile*	Odorous House Ant	Kitchen, house floor	Grassy fields, wall cracks
Total	**7**	**7**	**5**	**7**

Fig. 1. (a) *Monomorium pharaonis* (Pharaoh ant); **(b)** *Solenopsis invicta* (Fire ant); **(c)** *Tetramorium caesptium* (Pavment ant); **(d)** *Oecophylla smaragdin* (Weaver ant) **(e)** *Paratrechina longicornis* (Crazy ant); **(f)** *Tapinoma sessile* (Odorous house ant)

Pharaoh ants are considered as one of the major indoor pests all over the world (Edwards, 1986; Smith, 1965) and shows worldwide distribution (Karaman, 2011). Species of pharaoh ants are distributed in tropical region of both hemispheres (Bingham, 1903). Recent studies show that the origin of this species was tropical Asia (Wetherer, 2010).

It is one of the most difficult indoor pest species to be controlled (Smith, 1965).

Diagnosis: body is reddish in color; antenna 12 segments with 3-segmented club, 2 nodes are present; long legs;pits are present on the head, thorax and petiole,. Sting is present but usually not visible.

***ii) Solenopsis invicta* (Fig. 1b)**

Fire ant was recorded as the second least abundant species in Quetta (3.2%) (Table 1). It was found outdoor at a single location (Table 2). Klotz, *et al*. (2007) reported few cases of biting and stinging by fire ants.

Diagnosis*:* Body reddish brown, with much darker abdomen: size of head is similar to the body; Twonodes are prominent: antennae 10 segmented, visible with distinctly 2 segmented club. Legs are quite larger in length.

***iii) Tetramorium caesptium* (Fig. 1c)**

Pavement ant was the least commonspecies (3%) in Quetta region (Table 1). It was found from a single indoor location (Table 2). *Tetramorium caesptium* makes close association with human so it is considered as human commensal as well (Holldobler and Wilson, 1990; Schultz and Mc Glynn, 2000).

Diagnosis: Body is lighter in color compared to abdomen, which is darker, spines are present on the thorax, 12 segmented antennae were visible that end with 3 segmented club, two nodes were present. Head, thorax and petiole were strongly grooved.

Subfamily Formicinae

i) Camponotus modoc

This species was the third abundant with a frequency value of 6% recorded from Quetta (Table 1). *Camponotus modoc* was found from two locations, both indoor and outdoor (Table 2).

Carpenter ants are native to many parts of the world. Black carpenter ants are common house pest (Malik, 2008).

Diagnosis: body black in color; antennae 12 segmented but without club. Nodes were hidden but yet have circular rings of hair present around the abdomen.

***ii) Oecophylla smaragdin* (Fig. 1d)**

Weaver ants comprise 5.5% of the total number of ants collected during this study (Table 1). They were only found at one outdoor location (Table 2). This species is widely distributed in India, Myanmar and Sir Lanka (Hannan, 2007). *Oecophylla smaragdina* are distributed from the Malayan sub-region to Australia and New Guinea (Bingham, 1903).

Diagnosis: body black in color; 12 segmented antennae but without club; nodes are present; legs are larger than the body size.

***iii) Paratrechina longicornis* (Fig. 1e)**

Amongst 1865 individuals sampled, approximately 120 were crazy ants (6.4%). These ants were collected from four to five locations and were present both indoor and outdoor areas (Table 2). Crazy ants are considered as Asian in origin (Wetherer, 2010). These ants are distributed in many parts of the world due to trading (Malik, 2008). They move everywhere and do not have a sense of direction, hence, they are commonly known as the crazy ants. *Paratrechina longicornis* was recorded for the first time in Bangladesh by Hannan (2007).

Diagnosis: Body blackish in color; abdomen darker in color. Legs are very long compared to body size, grooves are present on thorax, 2 nodes are present.

Subfamily Dolichoderinae

***i) Tapinoma sessile* (Fig. 1f)**

Commonly known as the Odorous house ant, this species was the second abundant species (15%) found in Quetta region (Table 1). Among the 12 study locations, it was present at four localities (Table 2). *Tapinoma sessile* was less abundant as compared to Pharaoh ant but were recorded both indoor and outdoor. *Tapinoma sessile* was reported as one of the major pest species in U.S.A, which was displaced by the Argentine ant (Field, *et al.* 2007). This ant releases a strong rotten coconut like odor when crushed.

Diagnosis: Body mostly dark brown in color or blackish, having 12-segmented antennae, one node present and hidden by abdomen: legs were longer in length as compared to the body size.

REFERENCES

Beatson, S.H. 1972. Pharaohs ants as pathogen vectors in hospitals. Lancet 1:425-427.

Bingham C.T. 1903. *The Fauna of British India Including Ceylon and Burma. Hymenoptera*- Vol. II., Ants and Cuckoo-Wasps. Taylor and Francis, London, 506 pp.

Bolton, B.O. 1994. Identification guide to the ant genera of the world. *Harvard University Press, Cambridge*, MA. 222 pp.

Downes, D. and Laird, S.A., 1999. *Innovative mechanisms for sharing benefits of biodiversity and related knowledge.* The Center for International Environmental Law.

Edwards, J.P. 1986. The biology,economic importance and control of Pharaoh ants, *Monomirum Pharaonis* (L). *Economic impact and control of social insects*. Praeger, New York. pp:257-271. Vinson[ed].

Field, H.C., Evans, W.E., Hartley, R., Hansen, L.D. and Klotz, J.H. 2007. A survey of structural ant pests in the Southwestern U.S.A. (Hymenoptera: Formicidae). *Sociobiology*: 49.

Hannan, M.A. 2007. Ant records from Savar, Dhaka, Bangladesh. *Asian Myrmecology,* 1:101-104.

Folgarait, P.J. 1998. Ant biodiversity and its relationship to ecosystem functioning: a review. *Biol. Conserv.* 7:1221-1244.

Haji, M. 2008. House ants of Karachi Pakistan. Publication of Archival History and Museum Materials, State University Libraries of Florida; 1-10.

Holldobler, B. and Wilson, E.O. 1990. *The Ants*. Belknap Press of Harvard University Press, Cambridge, MA. pp:733.

Karaman, M.G. 2010. Zoogeography, diversity and altitudinal distribution of ants (Hymenoptera: Formicidae) in the Mediterranean and the oro-Mediterranean parts of Montenegro. *North-Western Journal of Zoology* 7(1):26-34.

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Klotz, J.H., Mangold, J.R.,Vail, K.M., Davis, L.R. and Patterson, R.S. (1995). A survey of the urban pest ants (Hymenoptera: Formicidae) of Peninsular Florida. *Florida Entomologist Online,* 78(1).

Kusnezov, N. 1957. Numbers of species of ants in fauna of different latitudes. *Evaluation* 11:298-299.

Mohamed, M., Rehman, H., Tachi, T. and Dawood, M. 2004. *Manual of Entomology course (1). BBEC 21.*

Ogata, K. 1991b. A generic synopsis of the poneroid complex of the family Formicidae (Hymenoptera). Part II. Subfamily Myrmicinae. *Bull. Inst. Trop. Agric. Kyushu Univ.* 14:61-149.

Rabeling, C., Brown, J.M. and Verhaagh, M., 2008. Newly discovered sister lineage sheds light on early ant evolution. Proceeding National Academy. *Science*. 105:14913.

Samways, M.J. 2005. Insect diversity and conservation. Cambridge University Press, New York, 342p.

Schultz, T.R. and T.P. McGlynn. 2000. The Interaction of Ants with Other Organisms. Pp. 35-44, in: Agosti, D., Majer, J., Alonso, E. and Schultz, T., (eds.). *Ants: Standard Methods for Measuring and Monitoring Biodiversity*. *Biological Diversity Handbook Series*. Smithsonian Institution Press. Washington D.C., 280pp.

Smith, M.R. 1965. House infesting ants of Eastern United States, their recognition biology, and economic importance. *USDA-ARS Tech*. 1326. 105 pp.

Thomazini, M.J., Thomazini, A.P.B.W. 2000. A fragmentação florestal e a diversidade de insetos nas florestas tropicais úmidas. Rio Branco: Embrapa Acre. 21p; 57.

Umair, M., Zia, A., Naeem, M. and Chaudhry, M.T. 2012. Species composition of ants (Hymenoptera: Formicidae) in Potohar Plateau of Punjab Province, Pakistan. 2012. *Pakistan Journal of Zoology,* 44(3):699-705.

Ward, P.S. 2007. Phylogeny, classification, and species-level taxonomy of ants (Hymenoptera: Formicidae). *Zootaxa,* 1668:549-563.

Wetherer, J. 2010. Worldwide spread of the pharaoh ant, *Monomorium pharaonis* (Hymenoptera: Formicidae). *Myrmecologicla News* 13:115-121.