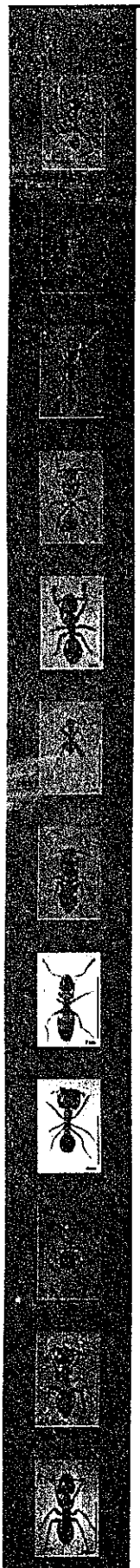

Ants of the Indian Institute of Science Campus

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Arts of the Indian Institute of Science Campus

Contents

Introduction

Ants are eusocial hymenopterous insects and have great values as objects of study. The local diversity of ants is substantial and is occupying a wide range of feeding niches in the vegetation and soil. The abundance of ants and its ecological dominance are shown by their high degree of variability as exhibited in the great number of species, subspecies, and varieties and by their extraordinary geographical ranges. Ants and termites along with bees and wasps constitute somewhat more then 75% of the total insect biomass (Beck, 1977; Fittkau and Klinge, 1973). Social insects in general and ants in particular have achieved unprecedented ecological success and dominance in tropical ecosystems (Gadagkar et. al , 1993).

According to Wilson (1990) not less than 100 genera are likely to have remained unrecognized and the number of undescribed species is immense.

There are about 15,000 living ant species, of which some 9,000-10,000 have been described (Bolton, 1994). All of these fall into a single family, the Formicidae. The family Formicidae is included in the Superfamily Vespoidea of the order Hymenoptera, which is placed in the class Insecta. Of the 16 subfamilies reported from all over the world, 10 are represented from the Oriental region. Surprisingly, out of 296 known genera, 101 are reported from Oriental region (Table 1). Among these 101 genera, 5 are endemic to Oriental region (Table 2).

In spite of its manifold importance, ant fauna of India is poorly studied. The following is a review of the earlier attempts made by different people to study the ant fauna of Karnataka. In 1903, Bingham reported 443 species of ants from India, which comes under 5 subfamilies and 79 genera. His "Fauna of British India" – Hymenoptera includes descriptions of all the species, which were then available in various scattered publications. Later, Donisthorpe

(1942) has added ant species of Karnataka to the list. Usman & Puttarudrian (1955) have listed the ants of the then Mysore state. In 1981, Reddy et.al., have studied the ant fauna of Bisthenhatti, Darwad (Karnataka) and Ali has added to the list, ant species of Karnataka. In 1983, Kamatar reported the ants of Raichur district (Karnataka). Later Ali (1991 and 1992) reported 125 species of ants from Karnataka, which come under 7 subfamilies and 30 genera. Gadagkar et.al., (1993) have sampled ants from 12 different localities in the Uttara Kannada district of Karnataka and reported 140 species of ants under 32 genera belonging to 6 subfamilies. Sunil et al., (1997) have studied ant species richness at selected localities of Bangalore and reported 75 species belonging to 33 genera and 6 subfamilies.

A preliminary study shows that Indian Institute of Science Campus is a rich store of diverse ants (Rastogi et.al.,1997). They have reported 70 species of ants from the Indian Institute of Science Campus, coming under 32 genera and 6 subfamilies. Later, some more species were added to their list. Here, I am providing 85 species of ants coming under 38 genera and 8 subfamilies. In addition, I have also made an attempt to identify them down to the species level, wherever possible. Out of 85 species, 14 are new records for Bangalore and 9 are new records for Karnataka and 1 is new record for India. All the changes in the classification of the family Formicidae are also taken into consideration.

Unfortunately, I do not have detailed accounts on nesting and feeding habits of all species of ants, in our collection. One of the main reasons is that the nests of many species are quite inconspicuous and most of the ants are solitary foragers. Another reason is that, this collection is made by a combination of All-out Search and Pit-fall trap methods.

Table 1. Number of Genera by Zoogeographical region

Subfamily	PAL	AFR	MAL	ORI	INA	AUS	NEA	NEO	Total
Aenictinae	1	1	-	1	1	1	-	-	**1**
Aenictogitoninae	-	1	-	-	-	-	-	-	**1**
Aneuretinae	-	-	-	1	-	-	-	-	**1**
Apomyrminae	-	1	-	-	-	-	-	-	**1**
Cerapachyinae	1	3	3	2	3	2	1	4	**5**
Dolichoderinae	5	4	3	8	12	13	5	8	**22**
Dorylinae	1	1	-	1	1	-	-	-	**1**
Ecitoninae	-	-	-	-	-	-	3	5	**5**
Formicinae	16	15	7	16	21	18	10	9	**49**
Leptanillinae	3	1	-	4	6	1	-	-	**7**
Leptanilloidinae	-	-	-	-	-	-	-	1	**1**
Myrmeciinae	-	-	-	-	-	1	-	-	**1**
Myrmicinae	31	38	22	46	58	35	31	66	**155**
Nothomyrmeciinae	-	-	-	-	-	1	-	-	**1**
Ponerinae	11	23	10	21	23	21	11	24	**42**
Pseudomyrmecinae	1	1	1	1	1	1	1	2	**3**
Total by region	**70**	**89**	**46**	**101**	**126**	**94**	**62**	**118**	

Total number of ant genera of the world **296**

(Data from Bolton, 1994)

Table 2. Number of Endemic Genera by Zoogeographical region

Subfamiy	PAL	AFR	MAL	ORI	INA	AUS	NEA	NEO
Aenictinae	-	-	-	-	-	-	-	-
Aenictogitoninae	-	1	-	-	-	-	-	-
Aneuretinae	-	-	-	1	-	-	-	-
Apomyrminae	-	1	-	-	-	-	-	-
Cerapchyinae	-	-	-	-	-	-	-	2
Dolichoderinae	-	2	-	-	1	2	-	3
Dorylinae	-	-	-	-	-	-	-	-
Ecitoninae	-	-	-	-	-	-	-	2
Formicinae	3	5	-	-	6	8	2	4
Leptanillinae	-	-	-	-	3	-	-	-
Leptanilloidinae	-	-	-	-	-	-	-	1
Myrmeciinae	-	-	-	-	-	1	-	-
Myrmicinae	8	12	3	4	12	7	1	39
Nothomyrmeciinae	-	-	-	-	-	1	-	-
Ponerinae	1	8	-	-	-	1	-	9
Pseudomyrmecinae	-	-	-	-	-	-	-	1
Total by region	**12**	**29**	**3**	**5**	**22**	**20**	**3**	**60**

(Data from Bolton, 1994)

Diagnostic characters of Formicidae

Without doubt, all hymenopterans can be readily distinguished from other groups of insects by the following set of characters:

1. There is a narrow constriction between the gaster and thorax.
2. Well-developed paired wings present with reduced to moderate venations.
3. Hind wing is always smaller than the forewing.

All ants may be easily distinguished from other members of Hymenoptera by a combination of characters. The most striking of which is that the second abdominal segment is reduced and isolated from the remaining abdominal segments and form a separate node or scale and is known as petiole (Fig.1A) Sometimes the third segment also is reduced and forms a post petiole (Fig.1B). Another distinguishing character is the nature of the antennae, which is geniculate between the long basal segments (scape) and the remaining funicular segments and the first segment is often very long.

Morphology

Ants bear identification characters on all parts of the body, but the area around the clypeus, mandibles and mouthparts is particularly important at genus and species rank (Bolton, 1994). In order to make this report more compact and easy to handle, only those characters, which are very important for the identification of ants are dealt with in this part.

Basically, the body of an ant is divided into head, alitrunk, petiole and gaster (Fig.2). Some of the major morphological features, which are important for taxonomic studies, are shown in figure 3

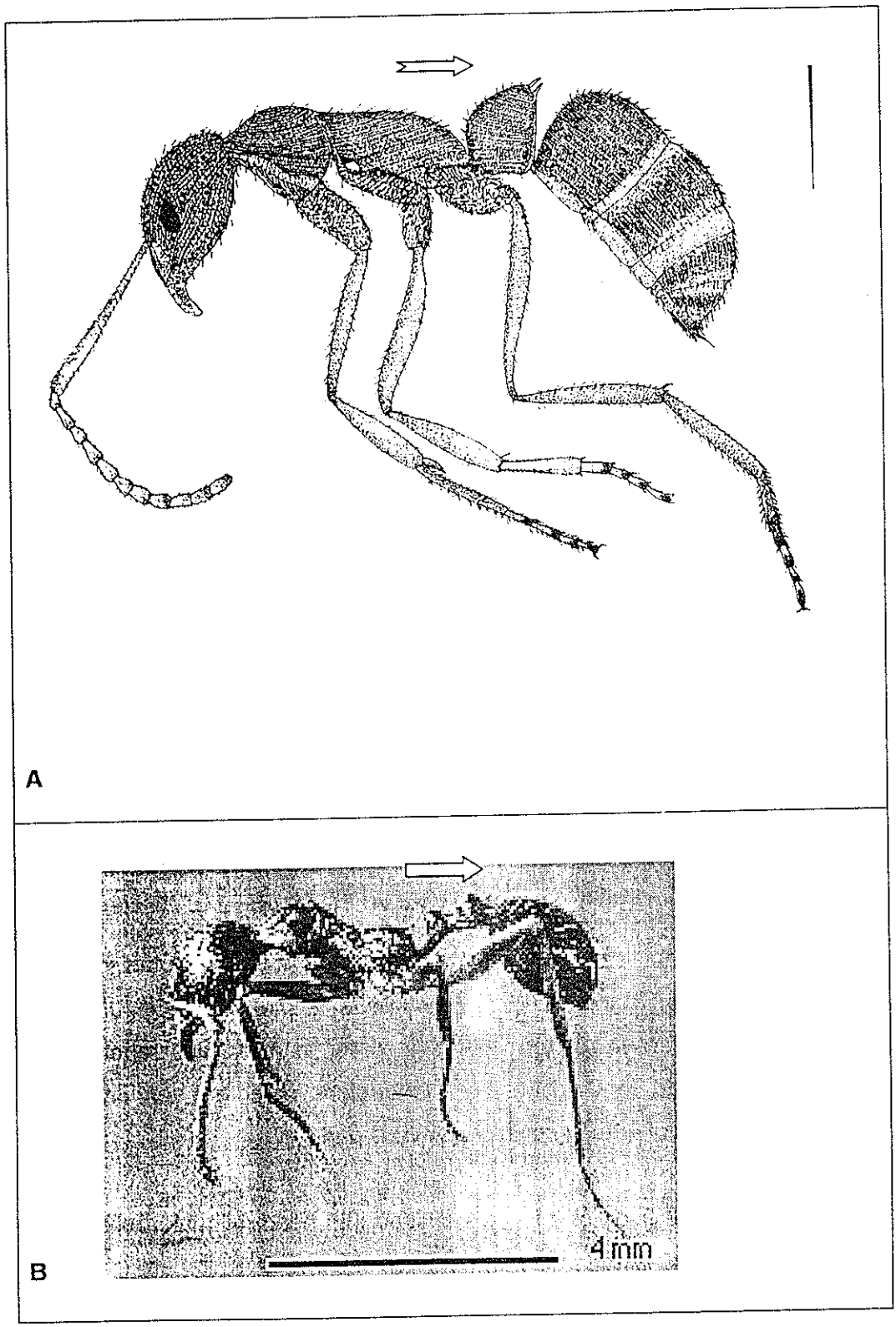


Figure 1. A. *Diacamma ceylonense* Profile, showing the single petiolar node. B. *Aphaenogaster* profile, showing the petiole and postpetiole.

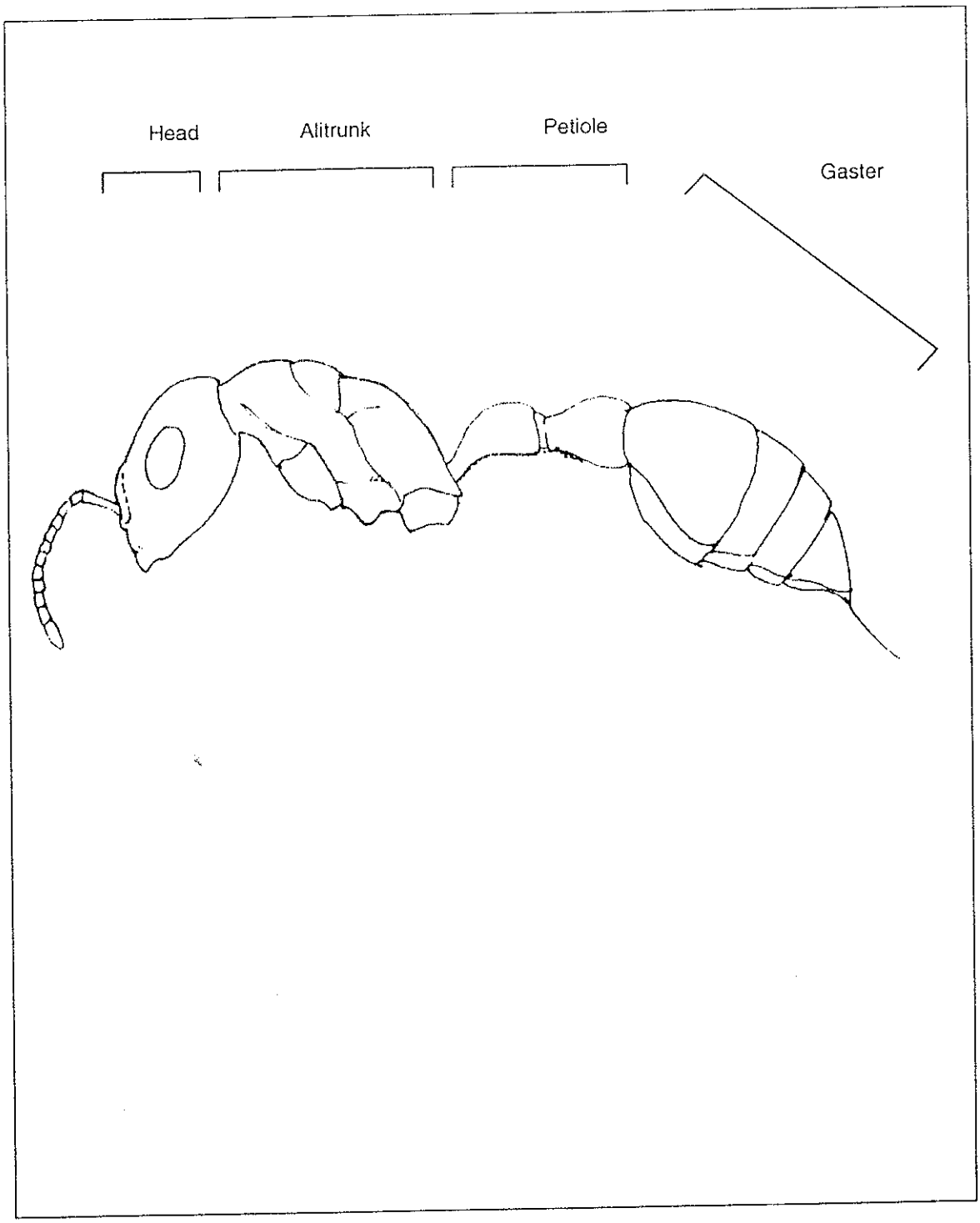


Figure 2. *Tetraponera rufonigra* profile, showing different parts of an ant body.

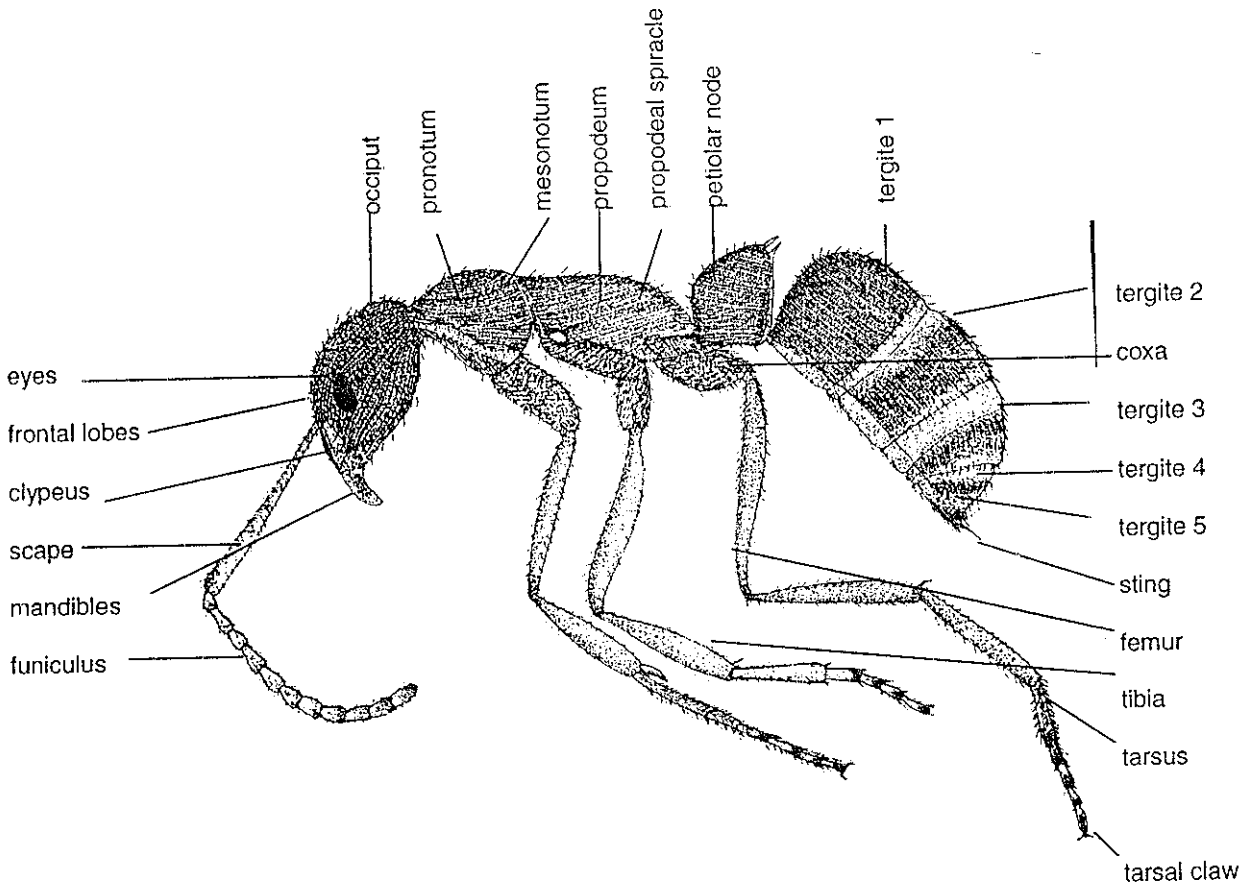


Figure 3. *Diacamma ceylonense*, showing some of the important morphological features used in taxonomy

The Head

The head varies enormously in shape and size. It consists mainly of eyes, clypeus, frons, vertex, genae, antennae and mouthparts. The size and position of the eyes are highly variable. Sometimes the absence of eyes also forms an important identifying character for some species. The mouthparts comprises of mandibles, maxillae, labium and an unpaired labrum. The region bounded anteriorly by the posterior end of the clypeus and laterally by a pair of ridges is the frons. Usually, this is a small and triangular area. The shape, size and the appearance of the frontal area are highly variable and are very important. The region between the vertex and the foramen is the occiput. The portion anterior to the eyes and lateral to the frontal carinae constitutes the gena. Usually, it is divided into two equal halves by a longitudinal suture. In the frontal view, mandibles are articulated usually on the lateral corners of the head and are seen below the posterior margin of the clypeus. They are very variable in shape, size, and dentition are very much important in ant taxonomy. Other structures like the number of segments on the maxillary and labial palps are of more importance in the diagnosis of the species. The number of segments, its relative size, and the nature of antennae also vary greatly with species and are very important The number of antennal segments varies from 4 – 12 in workers.

Thorax

Basically, it is formed of prothorax, mesothorax and metathorax. The lateral sclerites of the thorax are propleuron, mesopleuron and metapleuron respectively. The metapleuron usually bears a gland, the metapleural gland. But in all ants, in addition to these three segments, the tergite of the first abdominal segment (the propodeum) is fused to the thorax. The thorax varies greatly in shape, size and appearance with sex, castes and with different species. It bears 3-jointed appendages, the legs and the wings (when present).

Abdomen

This portion in ants is highly specialized and consists of 7 segments. The first segment is fused with the thorax and forms the propodeum The second segment is always reduced and is separated from the remaining abdominal segments and forms a narrow waist of 1 or 2 nodes and forms the petiole. Sometimes, the third segment is also reduced and separated to form the postpetiole. The rest of the segments constitute the proper gaster. Each abdominal segment consists of a pair of sclerites, a dorsal tergite and a ventral sternite. In workers, the last abdominal tergite is the pygidium and the last visible sternite is the hypopygium. In all members of the subfamily Formicinae, the apex of the hypopygium gives rise to the acidopore. In general, it appears as a short nozzle, usually with a fringe of short setae at its apex (Fig.4A). In most formicines the acidopore is always exposed, but in some it may be concealed by the posterior margin of the pygidium when not in use In such groups the acidopore usually lacks a nozzle and takes the form of a semicircular to circular emargination of the apical margin of the hypopygium (Bolton, 1994). The terminal segment of gaster in females of some species bears an organ of defense, the sting (Fig 4B)

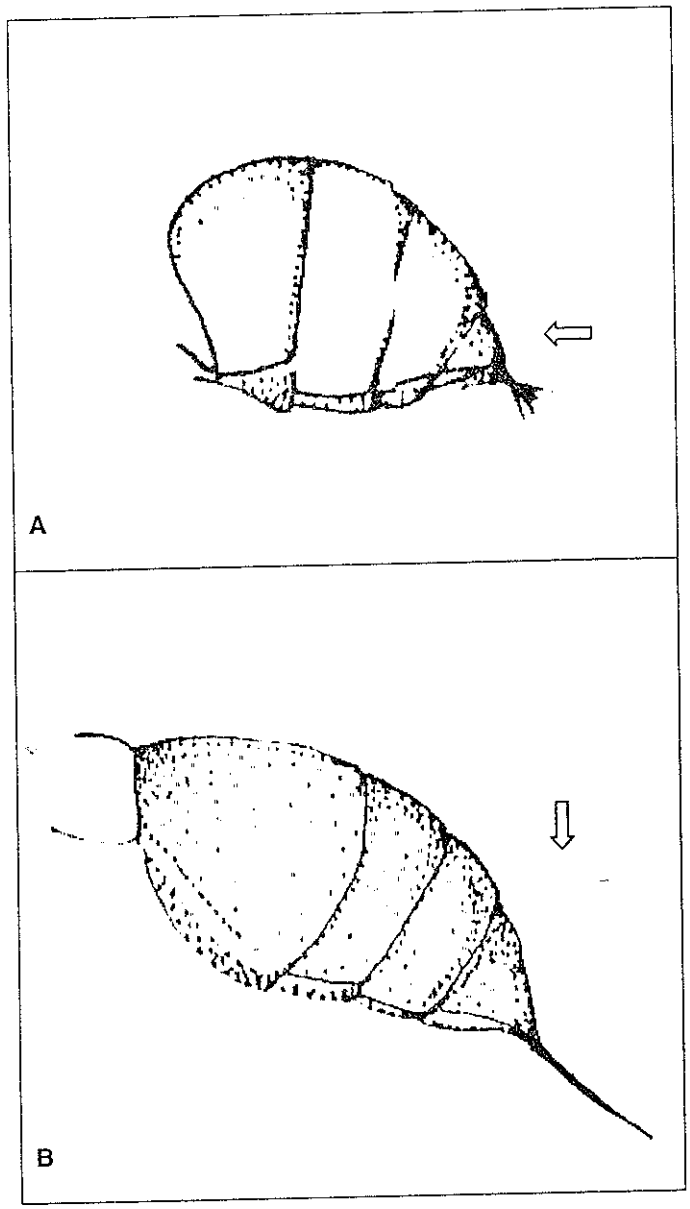


Figure 4 A. Gaster of *Paratrechina longicornis*, showing the acidopore. **B**. Gaster of *Tetraponera rufonigra* showing the sting.

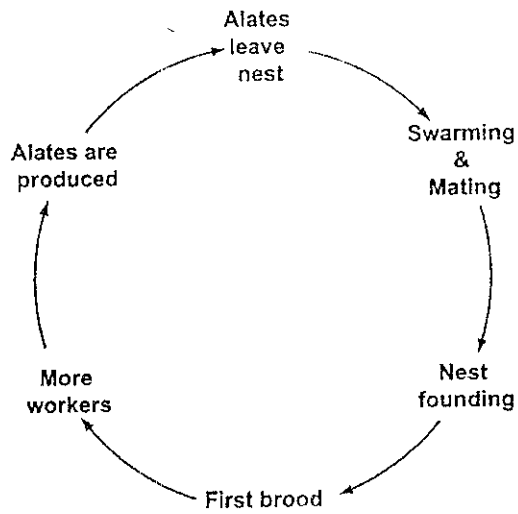
Ant colonies and Pattern of development

What are ant colonies?

All ant colonies are social and most colonies contain 3 main castes, i.e., queen, males and workers. In size they range from less than 1mm. to about 40 mm. Most of the ant colonies possess only a single queen and are called as monogynous, whereas ant colonies possessing multiple queens are referred to as Polygynous. Ant colonies vary greatly in size, from a dozen or more up to thousands of millions of individuals (eg. *Adelomyrmex*, colony size 10, *Pogonomyrmex*, 15-500, *Cardiocondyla*, about 20, *Myrmoteras*, 11 and millions in *Dorylus* and *Eciton* colonies). When all the workers in a single nest are of the same size, they are called as monomorphic. When there are only two distinct size classes of workers, they are called as dimorphic. If the variation from small to large workers is continuous, they are called as polymorphic. The polymorphism and dimorphism are mainly due to allometry, i.e., the disproportionate growth of body parts. As a result, head and mandibles of larger workers are proportionately large, when compared to smaller workers. The phenomenon of polymorphism has reached its maximum in ants. Generally different castes have specialized tasks too. However, what we see outside a typical ant nest are only the foragers, i.e, those animals who bring food for the colony. In one of our studies on *Diacamma ceylonense*, we have seen that foragers constitute about 24% of the whole colony. Rest of the colony remains inside the nest doing different tasks like; build nest, nurse, clean nest etc. Division of labour with higher level of cooperation, combined with well-developed communication systems, makes ants one of the most successful organisms on earth. Larger colonies may contain 2 or 3 types within each caste varying in size, shape and other characters. Mani (1989) has recognized as many as 2-9 different types of individuals in ant colonies. Usually, queens are winged and are larger than members of other castes. The degree of differentiation between queen and workers varies considerably with species. As a rule, workers are sterile wingless females and make up the bulk of the colony. Soldiers are modified

workers with disproportionately large head Males are always winged and are usually smaller than females. In addition, they are short-lived and die within a few days after mating. As a result all workers in a colony are females. These females do all the jobs, like search for food, nurse the young, construct nest, bring food, look after the queen, defend the colony and keep the nest clean etc. (Hölldobler and Wilson, 1990).

General pattern of development



Males and females are produced in larger numbers in certain seasons of the year and engage in mating flight Shortly after mating, usually the male dies and the queen either starts a new colony or joins an already established colony. Once she finds a suitable nesting site, she makes a small excavation and produces her first brood. The first brood is fed and cared for by the queen and consists of workers. Once the first batch of workers appear, they take over the work of the colony, like nest construction, caring of the young, foraging etc. Then onwards the queen does little more than lay eggs Subsequently, all castes will develop and transform into a full-fledged colony.

The founding of a colony by a single queen is known as haplometrosis and colony founding by multiple queens is called as Pleometrosis.

Interestingly, in some ants of the subfamily Ponerinae, the queen caste is lost and one of the mated workers takes over the function of the queen and is called as gamergate of the colony (Peeters and Crewe, 1984) In such cases, the gamergate is the sole egg-layer of the colony and controls the reproductive and non-reproductive tasks in a colony by various methods. This is a unique system in which all individuals eclose with a pair of glandular mesothoracic structures, termed "gemmae"(Fig.5) (Peeters and Billen, 1991), but later these structures are bitten off by the gamergate of the colony with the help of workers and the process is called as mutilation It is observed that in such a colony, only the gamergate is able to mate and produce diploid eggs (Peeters and Higashi, 1989). The genus *Diacamma* exhibits this phenomenon. The known exception to this, is one species from South India, which was earlier referred as *D vagans* (Peeters et al., 1992). In this species the process of mutilation is absent and hence all individuals in a colony possess gemmae and look alike, still there is only a single egg layer per colony at any given time.

In some species, fully winged queens are lacking, and egg laying is undertaken by individuals who are morphologically intermediate between typical queens and workers and are called as ergatoid queens.

Like other hymenopterans, metamorphosis is complete in ants; all of them pass through egg, larval and pupal stages before they reach adulthood. The shape and size of eggs, larvae and pupae varies with different groups. There are said to be no differences in the eggs corresponding to the castes into which they develop (Wheeler, 1913). Accordingly, the eggs laid by the same female may often vary considerably in size and shape and those laid by the workers are sometimes only half as large as those laid by the queen.

The recorded egg production of queen varies enormously according to species, from as few as 400/queen/year in *Myrmica rubra* Linn.(Brian and Hibble, 1964) to 2 million in *Eciton burchelli* Westwood (Schneirla, 1971) and 50 million in *Dorylus nigricans* Illiger (Raignier and van Boven, 1955).

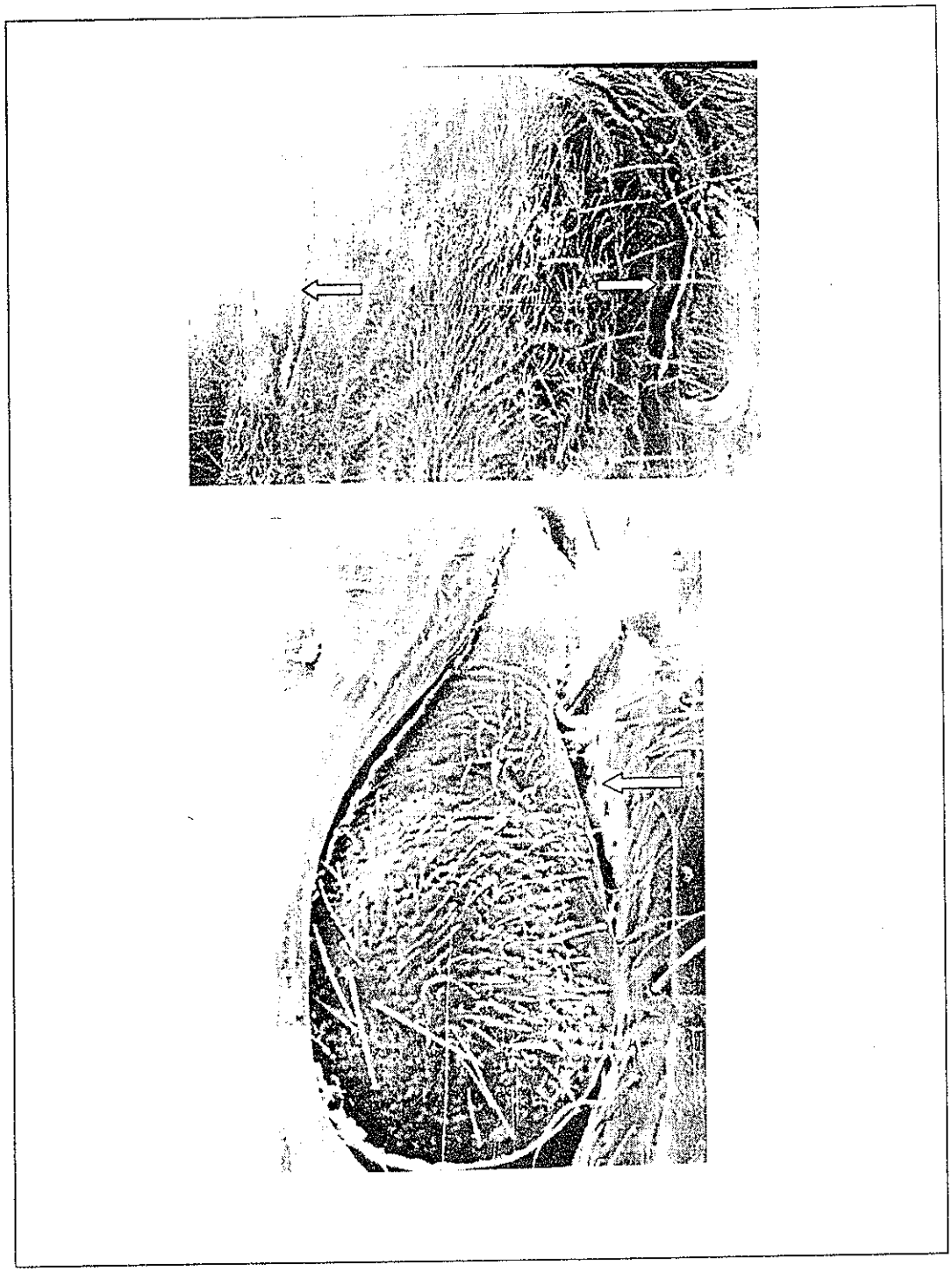


Figure 5 *Diacamma* "*nilgiri*", thorax, dorsal view showing the gemmae and enlarged view of a single gemma

Accordingly, the rate increases within and across species as colony size increases, and across species as the average worker longevity declines.

The duration of the immature period, from egg to the eclosion of the adult ant from the pupa, is only a small fraction of the adult life span and is highly dependant on temperature (Hölldobler & Wilson, 1990). According to them, the developmental time is one month to not more than three or four months

Like development, the longevity of an adult ant is more remarkable. The male in most species is very short-lived and it dies soon after the nuptial flight. According to Hölldobler and Wilson (1990), the queens live much longer than workers in all groups of ants. The maximum-recorded longevity is 30 years for *Pogonomyrmex owyheei* Cole (Porter and Jorgensen, 1981).

Food and nesting habits

What do they feed on?

Ants, though some of them are omnivorous, have adapted themselves to a more varied diet and many of them have come to rely almost exclusively on vegetable food. The fungus growing ants are the most highly specialized in their diet? The main food source of ants consists of other insects, especially, the helpless larvae and other small terrestrial arthropods. The larvae and pupae of ants are a favorite food of certain species of *Eciton* and *Formica*, which are sufficiently intrepid to pillage the nests of other species, (Wheeler, 1913). According to Wheeler, infact, in times of need many species of ants will eat their own offspring, which may therefore be considered as an ever-present and available food-supply stored up against periods of famine. Another source of food, for certain species of ants, is the excretion of plants, such as the sweet liquid exuding from the floral and extra-floral nectaries. Modified forms of these plant juices, such as honeydew excreted by plant-lice (Aphids), mealybugs (Coccids), leafhoppers (Membracids), and the secretions of caterpillars of the butterfly family Lycaenidae are another source of food for some species of ants. In general, most of these associations are mutualisms, and display special adaptations by plants, by ants, or both. The ants benefit by receiving food and nest site while plants benefit by receiving protection or seed dispersal A special kind of seed dispersal occurs in plants having seeds that bear fat bodies, elaiosomes. Ants harvest these seeds, chew off the fat body and discard the seed. Such specialized seed dispersal by ants is known as "Myrmecochory' Plants having extrafloral nectarines attract ants and ants act as guards around nectarines, driving off or preying upon herbivores. These associations, in many instances are so advanced that some species of ants inhabit only one or a few species of plants and are called as 'Plant-Ants'. While 'Myrmecophytes' are those plant species that have evolved specialized structures that house ants.

Like food habits, different species forage at different times. Foraging may be either during the day (Diurnal) or at night (nocturnal). Foraging activity

of these thermophilic insects depend mainly on temperature and many other factors. For example, Rastogi et.al , (1997) have seen that in the Jubilee garden of the Indian Institute of Science Campus, there was a clear-cut difference in the foraging pattern of *Myrmicaria brunnea* Saunders and *Diacamma ceylonense* Emery. They found that in *M brunnea* foraging was maximum in the morning and gradually decreased during the day. While *Diacamma ceylonense* showed high foraging activity during morning and evenings and very much reduced activity at midday.

Ant-nests

Ants nest in various types of habitats (Fig.6). Some of them nest in cavities in plants (in stems, galls and so on); excavate galleries in wood (carpenter ants), but the majority of ants make nest in the ground. Every species has its own plan of nest construction, which may be modified in manifold ways in order to, adapt to the particular environment, in which the species builds its nest According to Wheeler (1913), even the same colony may adopt very different methods of nest building at different periods during its growth and development.

Ant nests vary from mere cavities to a complicated system of interconnecting cavities with one or more openings to outside. When there is more than one opening to outside, the colonies are called as polydomous (eg. *Solenopsis geminata*), where as the one with a single opening to outside is referred to as monodomous (Eg. *Diacamma ceylonense*). Wheeler (1913) classified ant nests as follows:

A. Nests in the soil

a. Small crater nests (eg. *Aphaenogaster, Pheidole, Camponotus* etc)
b. Large crater nests (eg. *Myrmicaria*)
c. Mound or hill nests (eg. *Diacamma*)

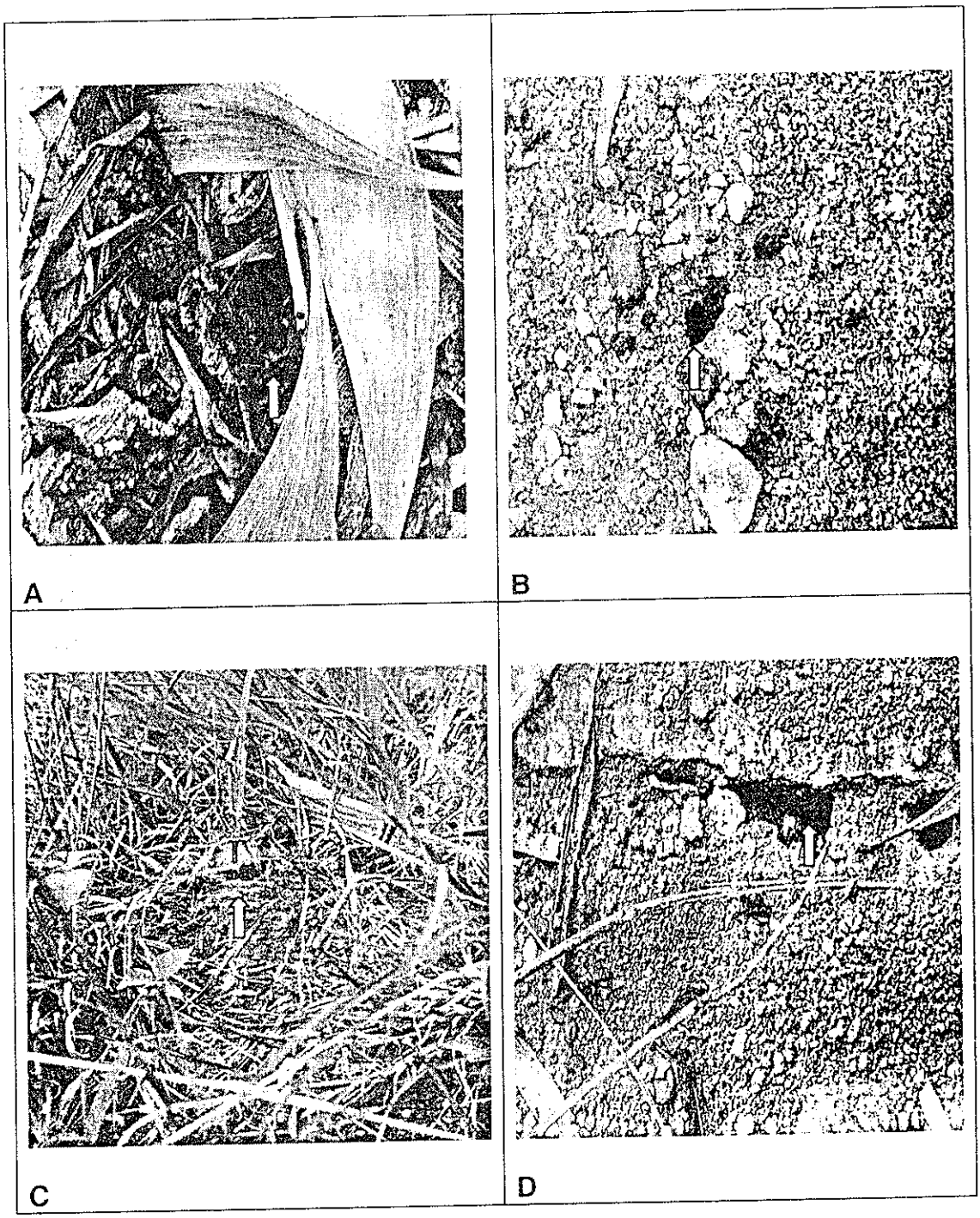


Figure 6. Nests (in soil) of, **A** *Harpegnathos saltator*, **B**. *Monomorium criniceps*, **C**. *Diacamma ceylonense* and **D**. *Leptogenys processionalis* (Photos by Subramanian, CES).

d. Masonary domes (eg. *Camponotus*)

e. Nests under stones, logs etc. (eg. *Pachycondyla*, *Platythyrea*)

B. Nests in the cavities of plants

1. Nests in the preformed cavities of living plants
   a. In hollow stems (*Camponotus, Crematogaster*)
   b. In hollow thorns (*Crematogaster*)
   c. In tillandsias
   d. In hollow bulbs (*Camponotus*)

2. Nests in woody-plant tissues, often in cavities wholly or in part excavated by other insects

   a. In or under bark (*Tapinoma, Technomyrmex*)
   b. In twigs (*Polyrhachis*)(Fig.7A)
   c. In tree trunks (*Camponotus*)
   d. In galls, pinecones, seed pods etc (*Crematogaster, Leptothorax, Camponotus* etc.)

C. Suspended nests

   a. Suspended earthern nests? (*Camponotus*?)
   b. Carton nests (*Crematogaster*)
   c. Silken nests (*Oecophylla*)(Fig.7B)

Nests in unusual sites

(In houses etc. eg. *Solenopsis, Pheidole, Monomorium etc.*)

Accessory structures

   a. Succursal nests
   b. Covered nests
   c. Tents or pavillions

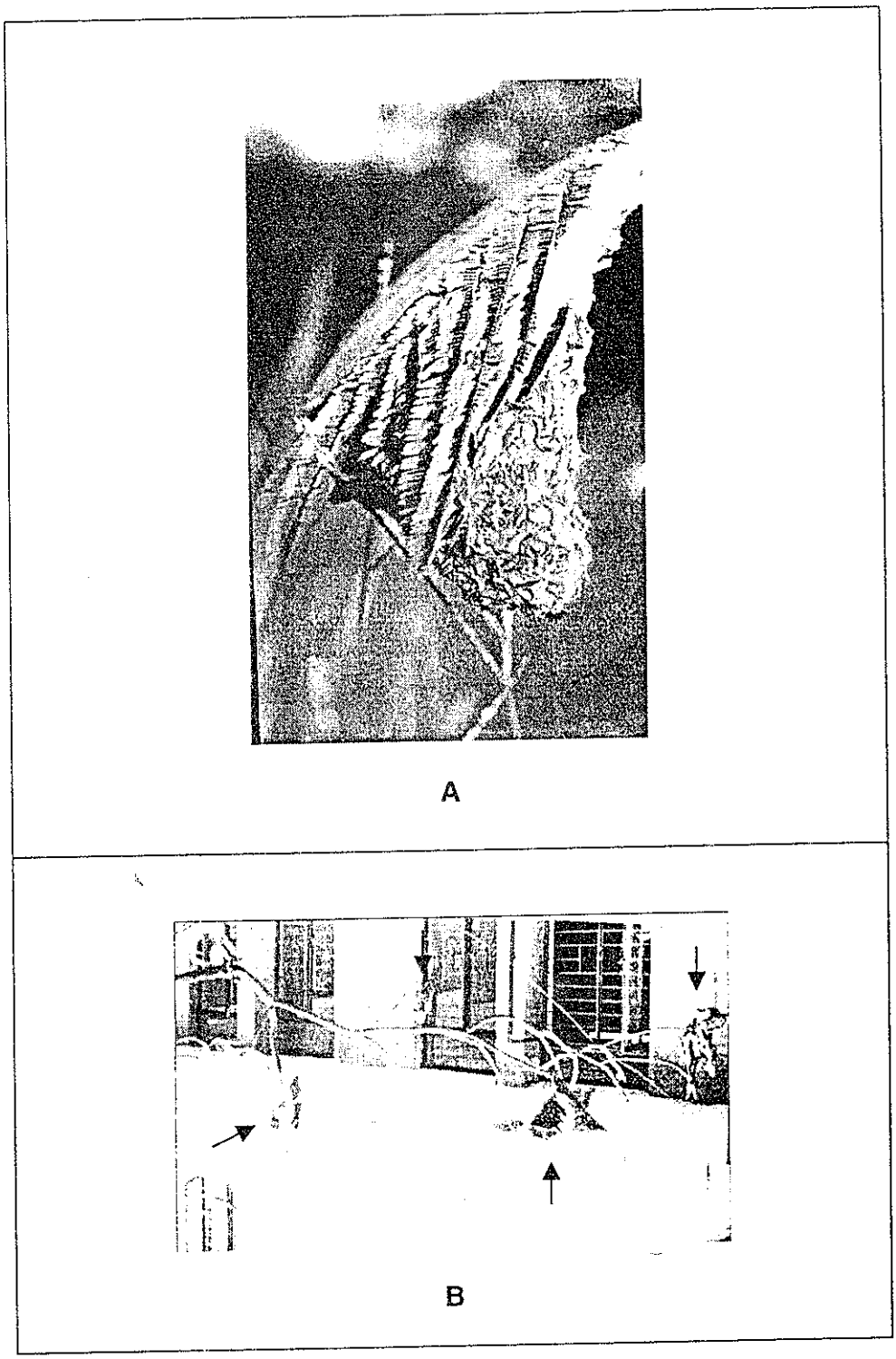


Figure 7.A. Nests (on trees) of *Polyrhachis* sp.(Photo by Subramanian). **B.** Nests of *Oecophylla smaragdina*

Collection and Preservation methods

When to collect ants?

Ants can be collected at any time, using different methods. Generally, mornings and evenings give best results for all out search method. But, for quantitative studies, collection should be carried out at other times also.

Beware; when you gear up for ant hunting, you will encounter so many similar looking arthropods, which mimics many groups of ants. One of the very common ant-mimicking groups is spider; one of the very common spiders is the mimic of the weaver ant, *Oecophylla smaragdina* Fabricius. Another ant mimicking group is mantids and there are some beetles too interested in looking like ants!!!! These creatures have modified the shape of their abdomen and gaster to match with the shape of an ant. This is an interesting and vast field of study.

How to collect ants?

How to collect an ant fauna depends on the type of ant fauna (eg. arboreal, leaf litter, ground dwelling etc.,) one would want to collect and on the needs of various investigators. Agosti et.al., (2000) describes procedures for surveying the diversity of ground-dwelling ants. They introduce a standardized protocol for collecting ant samples in any part of the world and for conducting repeated sampling over time, which enables researchers to analyze global and long-term patterns.

Mainly there are 5 methods, which are found to be useful for the collection of ants. Gadagkar et al., (1993) suggested that Pitfall trap is the most effective method of collecting ants followed by Net sweep, Scented traps and Light traps. They recommend a combination of both trapping and All-out Search method to achieve best results. A trap is a device by which insects are

attracted to something, that is so arranged that once they get into it, they cannot get out from it.

1. All-out Search Method

The most common of it is the All-out Search method. This is nothing but pick up ants using brushes or forceps. Care should be taken to collect all castes from a colony in the case of polymorphic species and keep them together in a vial, because the phenomenon of polymorphism can lead one to major confusions, during sorting and identification. Solitary foragers of different species can be kept together in a vial. Forget not to search on trees, dead twigs, holes, leaves, and flowers etc., mainly for arboreal species Many of the species that makes nest in soil are also commonly seen foraging on trees. Break some dead twigs and you may see some rare species.

2. Pit-fall trap method

It consists of a 2.5 litre plastic jar with an opening of 9cm. diameter. A tripod stand can be used to place plastic plate for protecting the jar from rain. In our studies each jar was provided with 30ml of 0.5% methyl parathion solution.

3. Net Sweep Method

Net sweep is meant mainly to collect ants from ground level vegetations. Insect nets are made of thick cotton cloth with a diameter of 30 cm. at the mouth and a bag length of 60cm.

4. Light trap Method

This is a portable light trap, which can be easily assembled and dismantled, which uses a 10-inch fluorescent light source powered by 1.5-volt battery cells. The main framework of the trap consists of 4 iron legs, an aluminium roof and two aluminium baffles, between which the light source is

placed. Insects attracted to light can be collected through a funnel in a cyanide jar, below the light.

5. Scented trap method

A plastic jar of 2.5-litre capacity can be used to fabricate a scented trap and the trap may be baited with 200ml. of saturated jaggery solution with two tablets of baker's yeast, 0.05% methyl parathion emulsion and 0.5 ml. of pineapple essence.

In addition, rotten logs and trees also can be searched for ants. Rotten logs often contain a different fauna, which are not generally caught by the above-mentioned methods.

Selection of transects

Basically, transects can be chosen such that it includes the highest number of different ant habitats (i.e., habitat with most vegetational diversity). Before selecting a particular habitat, one can have a walk through the chosen study area and can assess various factors like vegetation, type of vegetation, its density, amount of leaf litter and soil type etc.

For small studies, a minimum of 10 quadrats or sampling points (10x10 m.)10m. apart on a 200m transect is desirable. All the collection techniques should be applied in all sampling points. For more extensive studies 25 such quadrats can be used for sampling.

What is the next step?

Samples mixed with debris should be separated from debris and requires washing in alcohol before preserving them. Immediately after collection, all the specimens should be sorted out first into similar groups. Sorting is one of the very basic things, which needs to be done carefully. Most

of the taxa can be sorted based on colour, size and some basic morphological features. Next step is to sort samples into different genera and each group can be given names such as genus A, genus B etc. Following that, each of the genus can be split into morphospecies and should be kept in separate vials with appropriate labels.

Ants collected by different methods can be preserved for a long time by one of the following methods.

1. **Wet preservation**
2. **Dry preservation**

1. Wet preservation:

In this method ants can be directly put into 70% alcohol. All the vials should invariably contain small labels giving the details of the locality, date of collection, name of the collector and all the other possible information about the species' habitat, whether it is arboreal or ground dwelling. Other useful information could be whether it was collected from a trail or a solitary one.

2. Dry preservation

a. **Pinning**
b. **Point mounting**

a. Pinning:

Fine entomological pins (no.3) can be pinned through the mid-thoracic portion of ants and can be preserved for a long time. Owing to the small size of many species of ants, this method seems to be inappropriate in many cases. This method can be used to preserve large specimens.

b. Point mounting:

Between these two methods, card mounting is the most advisable method of preservation for ants. This is a process by which ants can be glued down to the apex of a small triangular strip of paper, in the region between the fore and middle coxae or between the middle and hind coxae ventrally. Finally push one pin through the base of the card and put labels Specimens belonging to different castes can be put on cards one below the other on the same pin.

All preserved specimens should be stored in standard insect boxes. Insect pins of various sizes and insect boxes are available in various scientific supply houses.

All well-preserved ants can then be identified upto the genus level using the dichotomous taxonomic keys given below for the subfamilies, genera and species categories.

Identification and Taxonomic keys

What are taxonomic keys?

Several types of keys are used in taxonomic studies; all are dichotomous and are based on a series of choices. But, the most commonly used is the dichotomous-bracket key. Taxonomic keys are prepared based on externally observable diagnostic characters. Here, in key to genera of the subfamily Myrmicinae, a single genus occurs more than once, this is because characters are chosen for ease of recognition and some characters may occur in more than one state in a single taxon. For eg. the number of antennal segments in worker ants variy from 4-12. The numbers of antennal segments is usually easily counted and hence form a very useful character for subdividing a key.

How to use a taxonomic key?

All the keys are dichotomous, so at each point there is a choice of 2 alternative characters. A set of two alternatives is called a "**couplet**" and each half couplet is called a "**lug**". First, compare the specimen to be identified with the morphological characters given in each lug of couplet 1, find out which lug matches the specimen, then turn to the couplet number given at the end of that lug. Repeat the process, until a lug or couplet is encountered where you find the scientific name of a taxon.

The process of preliminary identification is the prerequisite for any further studies like classification.

Zoological classification is the ordering of animals into groups on the basis of their relationships (Simpson, 1961). The process of classification is primarily based on structural characters. Other informations useful in classification are data from physiology, behaviour, biology, ecology and DNA studies. Those animals with certain structures in common are classified into one group and those with some other set of common characters are grouped

into some other category. Thus the animal kingdom is divided into a number of major groups called phyla, each phylum has a name and its members have certain structures in common. Each phylum is further subdivided into classes. Each class has a name and classes are further divided into orders, orders into families and families into genera and genera into species. The basic category in any scheme of classification is the species. Species are groups of interbreeding natural populations that are reproductively isolated from other such groups (Mayr, 1980). The names of categories from tribe through superfamily have standard endings:

Superfamily names end in *–iodea*; for example: Vespoidea
Family names end in *–idae*, Formicidae
Subfamily names end in *–inae* Formicinae
Tribe names end in *–ini* Formicini

Scientific nomenclature

Each animal has two names, scientific and common. The scientific name of a species is binomial; it consists of two words, the genus name and species name. The scientific name of a subspecies is trinomial. The system of nomenclature adopted by the International Congress of Zoology, by which the scientific name of an animal is designated by both a generic and specific name is known as Binomial Nomenclature. As a rule these names are always printed in italics. The scientific naming of animals is carried out as per the rules of the International code of Zoological Nomenclature. The names of genera begin with a capital letter, while the species and subspecies names begin with lower case. Names of species are followed by the name of the author, the person who described the species or subspecies. If the author name is in parantheses, it means that the author described the species in some genus other than the one now where it is placed. For example,1. *Diacamma ceylonense* Emery means that the species *ceylonense* was described by Emery under the genus *Diacamma* 2. *Leptogenys processionalis* (Jerdon); in this case, Jerdon described the species

processionalis in some other genus (it was described under the genus *Ponera*) than *Leptogenys*.

For more details about the taxonomy, here are few useful references:

1. Ernst Mayr (1980): *Principles of systematic zoology,* Tata Mcgraw - Hill publishing company Limited, New Delhi.
2. Simpson, G.G. (1961): *Principles of Animal Taxonomy*, Columbia University Press, New York.

All the identifications till genus level were made using the Identification keys given by Bolton (1994).

Based on our collection, we are providing with identification keys for the different Subfamilies, Genera and species of ants of the Indian Institute of Science Campus (Table 3). Plates 1-14 show few common ant genera of the Indian Institute of Science Campus. Keys to genera are based on Bolton (1994). Since taxonomic keys are made based on a few species, the characters selected for the species level keys, might not contain much information about the relationship. In most cases it is tough to find a single character, by which a genus or species can be diagnosed, so, it is a combination of one or more characters, which form identifying characters for a given taxon. As far as possible, technical words are avoided in the taxonomic keys to make it simple. I have come across 8 Subfamilies as given below. The largest Subfamily, in terms of species richness and abundance is the Myrmicinae, followed by Formicinae, Ponerinae and Dolichoderinae. Other smaller Subfamilies are Cerapachyinae, Aenictinae, Dorylinae and Pseudomyrmecinae

Checklist of ants of the Indian Institute of Science Campus

Table 3. Checklist of Ants of the Indian Institute of Science Campus.

Subfamily	Genera	Number of species
Ponerinae	*Anochetus*	1 *Anochetus graeffei* 2 *Anochetus obscurior* 3 *Anochetus yerburyi* 4 *Anochetus* sp 5
	Diacamma	1 *Diacamma ceylonense*
	Harpegnathos	1 *Harpegnathos saltator*
	Leptogenys	1 *Leptogenys chinensis* 2 *Leptogenys processionalis*
	Pachycondyla	1 *Pachycondyla crassa* 2 *Pachycondyla melanaria* 3 *Pachycondyla* sp. 4 4 *Pachycondyla* sp. 8
	Platythyrea	1 *Platythyrea parallela*
Cerapachyinae	*Cerapachys*	1 *Cerapachys aitkenii* 2 *Cerapachys longitarsus*
Dorylinae	*Dorylus*	1 *Dorylus labiatus*
Aenictinae	*Aenictus*	1 *Aenictus aratus* 2 *Aenictus ceylonicus*
Pseudomyrmecinae	*Tetraponera*	1 *Tetraponera aitkenii* 2 *Tetraponera allaborans* 3 *Tetraponera nigra* 4 *Tetraponera rufonigra*
Myrmicinae	*Aphaenogaster*	1 *Aphaenogaster beccarii*
	Cardiocondyla	1 *Cardiocondyla wroughtonii* 2 *Cardiocondyla* sp. 2 3 *Cardiocondyla* sp. 4 4 *Cardiocondyla* sp. 5
	Cataulacus	1 *Cataulacus taprobanae* 2 *Cataulacus* sp 3
	Crematogaster	1 *Crematogaster ransonneti*

Subfamily	Genera	Number of species
Myrmicinae	*Crematogaster*	2 *Crematogaster rothneyi* 3 *Crematogaster* sp.12 4 *Crematogaster* sp.13
	Dilobocondyla	1 *Dilobocondyla* sp 1
	Lophomyrmex	1 *Lophomyrmex quadrispinosus*
	Meranoplus	1 *Meranoplus bicolor*
	Monomorium	1 *Monomorium atomum* 2 *Monomorium criniceps* 3 *Monomorium destructor* 4 *Monomorium glabrum* 5 *Monomorium subopacum* 6 *Monomorium* sp. 8. 7 *Monomorium* sp 13.
	Myrmecina	1 *Myrmecina urbanii*
	Myrmicaria	1 *Myrmicaria brunnea*
	Neoblepharidatta	1 *Neoblepharidatta* sp.
	Pheidole	1 *Pheidole* sp 6 2 *Pheidole* sp. 7 3 *Pheidole* sp. 8 4 *Pheidole spathifera* 5 *Pheidole woodmasoni*
	Pheidologeton	1 *Pheidologeton affinis*
	Recurvidris	1 *Recurvidris recurvispinosa*
	(Trigonogaster) *Rhoptromyrmex*	1 *Rhoptromyrmex wroughtonii*
	Solenopsis	1 *Solenopsis geminata*
	Strumigenys	1 *Strumigenys emmae*
	Tetramorium	1 *Tetramorium mixtum* 2 *Tetramorium obesum*? 3 *Tetramorium smithi* 4 *Tetramorium walshi*
Dolichoderinae	*Dolichoderus*	1 *Dolichoderus affinis*

Subfamily	Genera	Number of species
Dolichoderinae	*Tapinoma*	1 *Tapinoma melanocephalum* 2 *Tapinoma* sp 4 3 *Tapinoma* sp. 5
	Technomyrmex	1 *Technomyrmex albipes*
Formicinae	*Acropyga*	1 *Acropyga acutiventris*
	Camponotus	1 *Camponotus compressus* 2 *Camponotus parius* 3 *Camponotus sericeus* 4 *Camponotus* sp.5 5 *Camponotus* sp.6 6 *Camponotus* sp 9
	Lepisiota	1 *Lepisiota frauenfeldi* 2 *Lepisiota* sp.1 3 *Lepisiota* sp.5
	Oecophylla	1 *Oecophylla smaragdina*
	Paratrechina	1 *Paratrechina longicornis* 2 *Paratrechina yerburyi*
	Plagiolepis	1 *Plagiolepis exigua* 2 *Plagiolepis dichroa* 3 *Plagiolepis jerdonii*
	Polyrhachis	1 *Polyrhachis bihamata* 2 *Polyrhachis punctillata* 3 *Polyrhachis rastellata* 4 *Polyrhachis* sp.
Total	**Number of subfamilies**	**8**
	Number of genera	**38**
	Number of species	**85**

Taxonomic key to the Subfamilies

Key to the subfamilies of Formicidae of the Indian Institute of Science Campus, based on external morphology of the worker caste

1. The petiole (abdominal segment 2) is isolated from the rest of the abdominal segment and forms a single segmented waist, sting present or absent, if present, then the gaster with a deep constriction between the basal two segments ---------- 2

- Both the petiole and postpetiole are isolated from the rest of the abdominal segment and form a 2-segmented waist Sting present, but often not exerted. There is no deep constriction between the basal two segments as described above ----------6

2. Gaster with a deep constriction between the abdominal segments 3 & 4, propodeal lobes present, Pygidium large and sometimes with few small teeth/ denticles/spines, sting always present, large and well developed-- ----------3

- Gaster without a deep constriction between the abdominal segments 3 & 4, propodeal lobes absent, Pygidium usually large, but simple without any teeth/denticles/spines, sting vestigial to absent ---------- 4

3. Antennal carinae widened anteriorly, more or less covering the base of antennae. Pro-mesonotal suture present, metapleural gland orifice is in the lower posterior corner of metapleuron. Abdominal segment 3 is of normal size and appearance, helcium sternite small and usually not visible---------- **Ponerinae**

- Antennal carinae not widened and not covering the base of antennae, so antennal sockets are more or less exposed. Pro-mesonotal suture absent, metapleural gland orifice concealed behind a cuticular flange. Abdominal segment 3 is reduced to form a full sized abdominal segment to a small postpetiole, helcium sternite large and convex ------- ----------**Cerapachyinae**

4. Apex of gaster with an acidopore, which is usually at the apex of a nozzle-like extention of the hypopygium and usually equipped apically with a fringe of short hairs, pygidium usually large and simple----------
----------**Formicinae**

- Apex of gaster without an acidopore, anal aperture transverse without hairs----------5

5. Eyes absent, clypeus reduced, narrow from front to back, antennal sockets very close to the anterior margin of the head, frontal lobes vestigial to absent, pygidium large, abdominal segment 7 not reflexed --
---------- **Dorylinae**

- Eyes present, median portion of clypeus broad from front to back, antennal sockets well behind the anterior margin of the head, frontal lobes usually present, pygidium usually small, abdominal segment 7 often reflexed, so that it is on the ventral surface of the gaster, often overhung and partially to almost entirely concealed by the tergite of abdominal segment 6----------**Dolichoderinae**

6. Eyes absent, clypeus reduced, narrow from front to back, especially in front of the antennal insertions, so antennal sockets are very close to the anterior margin of the head, antennal sockets are fully exposed ------
----------**Aenictinae**

- Eyes present and conspicuous, clypeus not reduced; antennal sockets are usually well behind the anterior margin of the head and are mostly concealed by the frontal lobes, rarely visible ---------- 7

7. Median portion of clypeus not conspicuosly extended backwards between the frontal carinae, its posterior margin more or less straight, frontal carinae not expanded into frontal lobes over the antennal sockets, pro-mesonotal suture present. Helcium sternite small and usually retracted ----------**Pseudomyrmecinae**

- Median portion of clypeus extended backwards between the frontal carinae, frontal lobes usually present and covers the antennal sockets.

Pro-mesonotal suture is absent. Helcium sternite usually large and convex ---------- **Myrmicinae**

Here, we are presenting the characteristic features of all genera of ants, along with some data about their nesting habits and other field characters, which are encountered in I.I.Sc. Campus. I hope that this attempt will help all beginners in Myrmecology to get familiarize with different genera and species of ants.

I have tried to identify them down to species category as much as possible; which are not identified till species level is given the museum number

Subfamily 1. Ponerinae

FAMILY: FORMICIDAE

SUBFAMILY 1: PONERINAE

Members of this subfamily are characterized by a constriction between the basal 2 segments of the abdomen and by the unmodified powerful sting The body is more or less elongate and cylindrical, especially the abdomen. The pedicel is one jointed. Most of the members are black and are of moderate to large size. Members are monomorphic.

Since there is only one Genus each under the Subfamilies Cerapachyinae, Dorylinae, Aenictinae, and Pseudomyrmecinae, key to Genera is not given for these Subfamilies Members of the Subfamily Cerapachyinae come closer to Ponerines, but can be distinguished from them in having the following characteristics; the antennal sockets are more or less open, not covered by the frontal lobes; hypopygium is armed with short teeth/spines and third abdominal segment also with tergo-sternal fusion. Members of the Subfamily Dorylinae are also with single nodes, but they differ from Ponerinae and Cerapachyinae by being blind and not having tergosternal fusion of abdominal segments. These ants differ from Formicinae, in not having the acidopore and eyes. All members of the subfamily Aenictinae are blind

Key to the genera of Ponerinae of I.I.Sc. Campus

1. Mandibles usually long and linear ----------2
- Mandibles not very long, of normal size and almost triangular--------- 3

2. Ocelli present. Mandibles articulated wide apart at lateral angles of front margin of head, each blade with a longitudinal row of teeth. Pretarsal claws equippped with a pair of teeth----***Harpegnathos*** Jerdon

- Ocelli absent. Mandibles in full-face view inserted in the middle of the anterior margin of the head with an apical armament of 3 teeth. Pretarsal claws simple---------- ***Anochetus*** Mayr

3 Metatibia with 2 distinctly pectinate spurs, the posterior spur larger than the anterior---------- ***Platythyrea*** Roger

- Metatibia with only 1 spur, which is pectinate or with a large pectinate posterior spur and a much smaller simple anterior spur ---------- 4

4. Basal portion of mandible usually thick and broad and sometimes bears a distinct circular pit or fovea dorso-laterally. Pretarsal claws of hind legs simple ---------- 5

- Mandibles usually thin and without a dorsolateral pit or fovea. Pretarsal claws of hind legs pectinate---------- ***Leptogenys*** Roger

5. Alitrunk laterally with a conspicuous pocketlike excavation above the mesopleuron. Petiole armed dorsally with a pair of spines ----------
---------- ***Diacamma*** Mayr

- Alitrunk laterally, without a pocket-like excavation above the mesopleuron. Petiole unarmed ---------- ***Pachycondyla*** Smith

Notes on genera and species of Ponerinae

Under this subfamily, 13 species belonging to 6 genera were identified.

Genus 1. *Anochetus* Mayr

Members of the genus *Anochetus* form small nests in soil or under logs. They commonly forage in leaf litter and are very rarely seen. They forage individually. They can be readily identified by the special nature of the head and by the long trap like mandibles. The mandibles are long and straight with 2/3 large teeth near the tip and are inserted in the middle of the front margin of the head. In our Campus there are 4 species belonging to this Genus.

Key to species

1. Length under 5mm ---------- 2
- Length over 5mm ---------- 3

2. Length 4mm,head and thorax reddish brown, abdomen darker, node of pedicel rounded above ----------***graeffei*** Mayr
- Length 4.5mm, head, thorax and abdomen reddish brown, petiolar node bilobed ----------***Anochetus* sp.5**

3. Length 6mm, head striate, head and thorax reddish brown, petiolar node and abdomen black ----------***obscurior*** Brown
- Length 6.5 mm, head smooth, thorax, node and first abdominal segment reddish brown----------***yerburyi*** Forel

1.1. *Anochetus graeffei* Mayr

Anochetus graeffei Mayr, 1870 *Verh. Zool - Bot. Ges. Wien*, **20** : 939 – 996.

Members of this species are monomorphic, have an average length of 3.5-4mm. It's colour is dark brown. Head, thorax and abdomen have dense pilosity and pubescence.

Where do we find the nests?

Nests in soil, shallow nests, and population size 30 – 45 (Ali, 1991). This is not a very common species in our Campus.

Range: India, Burma and Sri Lanka (Bingham, 1903).

1.2 *Anochetus obscurior* Brown

Anochetus obscurior Brown, 1978. *Stud. Entomol. (N.S.)* **20** : 549 – 652.

Nesting habits of this species are not known. This species is larger in size than *A. graffei*. Head and thorax reddish brown, node and abdomen are black. Head striate, thorax, node and the first abdominal segment punctured. This is a widespread species and is reported from South India by Brown (1978)

1.3 ***Anochetus yerburyi*** Forel

Anochetus yerburyi Forel, 1900. *J. Bombay Nat. Hist. Soc.*, **13**: 52 – 65.

This is the first record of this species from India. So far this is known only from Sri Lanka (Brown, 1978). Head and abdomen are smooth. Thorax is sculptured. Nesting habits are not known.

Range: India and Sri Lanka.

1.4 ***Anochetus* sp. 5** (Museum number)

Length 4.5mm. This species differ from all others in having a bilobed petiolar node. Head, thorax and abdomen are punctured and reddish brown in colour. This species is smaller than *yerburyi* and *obscurior* and its nesting habits are not known.

Genus 2. *Diacamma* Mayr

In our campus, we have only 1 species under this genus. It can be easily identified by a combination of characters, ie., size, colour, external morphology, majestic walk and by their characteristic nests. This is a monomorphic species.

2.1. ***Diacamma ceylonense*** Emery

Diacamma ceylonense Emery, 1897. *Rend. Sess. R. Acad. Sci. Ist. Bologna*, 1 : 147 – 167.

Members of this species have an average length of 11 59 mm. It is greyish black and shiny in appearance (pale look is attributed to the thick small hairs all over the body) Mandibles, tips of legs and abdomen are dark reddish brown. Head, thorax, petiole and the first two gastral tergites are deeply striated. Entire body is covered with dense pubescence and sparse erect hairs. This is a monomorphic species. Males are reddish brown in colour.

Where do we find the nests of *Diacamma ceylonense?*

Members of this species inhabit open fields with or without grass. It builds nests usually with characteristic mound, with a small, single entrance (very rarely two entrances). Mound height ranges from 0-10 cm. The depth of the nest ranges from 40-180 cm. Immediate vicinity of the nest entrance and a portion of the mound is always decorated with an admixture of dried leaves, slender dry twigs, bird feathers, dead ants (mainly *Leptogenys* sp.), caterpillar skins, spider exuviae etc. This kind of nest is characteristic of *Diacamma ceylonense*. Colonies are seen aggregated in the Jubilee garden and scattered in other parts of the Indian Institute of Science Campus, Bangalore. A single nest can contain as many as 600 individuals. It forages individually, no recruitment or trail formation occurs during foraging or nest shifting. During nest shifts a special behaviour called "Tandem running" is seen, in which usually one individual follows another to a new nesting site.

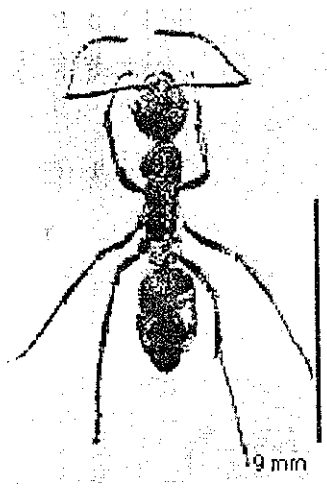
Where else you find it?

This species is widely distributed in Bangalore and is known from Tamil Nadu as well. It is reported from **Sri Lanka** also.

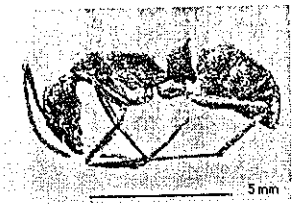
How many valid species of *Diacamma* are present in India?

Though many species and subspecies were reported from India, at present we have only 9 valid species for the genus *Diacamma*.

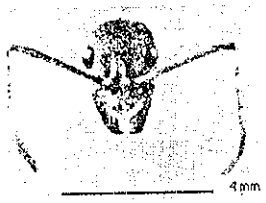
Anochetus, profile



Diacamma



Diacamma, profile



Diacamma, head

Plate 1

How many more species are there under this genus around the world?

This genus has 19 valid species with many subspecies distributed over Oriental and Australian regions. Once the revision of this genus is over there may be as many as 33 valid species (Brown, unpublished data) around the world.

Genus 3. *Harpegnathos* Jerdon

We have only one species under this genus. Members of this species have characteristically long and linear mandibles. This is known for its jumping nature.

3.1. *Harpegnathos saltator* (Jerdon)

Drepanognathus saltator Jerdon, 1851, *Madras J. Lit. Sci.*, **17:** 116.

Length 15mm. Head, thorax and node are reddish and abdomen is black. In this species, mandibles are unusually long and slightly curved upwards. This species nests in soil, with a low mound decorated with twigs and leaves, with a very small nest entrance. I have seen its nests in *Acacia* plantations, where there are lots of *Diacamma* nests. Nest entrance is always characteris-tically decorated. It closes its nest in the evening and opens late in the morning. I have observed that on some days it will remain closed!!!!! This is a monomorphic species and forage individually.

Distribution: Karnataka (Ali, 1991), (Bangalore, Mysore, Shimoga, Virajpet, Gunddahalli, Dharwad), Western India and Kerala (Bingham, 1903), (I have observed this species in Wynad district of Kerala state also).

Range: India, China and Sri Lanka (Bingham, 1903: Chapman & Capco, 1951; Ali, 1991 and Tiwari, 1999)

Genus 4. *Leptogenys* Roger

Leptogenys is a large genus. The body is long and slender. They make nest in loose soil on ground. Members of this group have the habit of changing their nesting sites quite frequently. Some species forage singly while others forage in distinct trails. We have 2 species under this genus. The most important identification character for this genus is the pectinate nature of the tarsal claws (claws have a series of small teeth on their inner surface).

Key to species

1. Dark castaneous brown, head, thorax and abdomen covered with fairly abundant long pilosity, moves in trails ----------***processionalis*** (Jerdon)
- Black, body with sparse pilosity, no trail formation -----***chinensis*** (Mayr)

4.1. *Leptogenys chinensis* (Mayr)

Lobopelta chinensis Mayr, 1870, *Verh. Zool. – Bot. Ges. Wien.* **20**: 965.

Bingham (1903) mentions that this species is distributed more or less throughout Continental India and Ceylon, except the drier portions of Central and Western India and Punjab. This species is black, smooth and shining. Body is more or less elongate and slender, nests in soil and is very common in Bangalore.

Range: India, Sri Lanka, China and Japan (Bingham, 1903) and Philippines (Chapman & Capco, 1951).

4.2. *Leptogenys processionalis* (Jerdon)

Ponera processionalis Jerdon, 1851, *Madras J. Lit. Sci.*, **17**: 103 – 127

Body is comparatively robust. This species generally builds temporary nests in loose soil. Ali (1991) states that this species shifts nests quite frequently and often takes shelter under stones and leaf debris, occupy cracks and

crevices in foundations of buildings. Population size varies from 7000- 40,000 individuals. Termite constitutes more than 80% of its food.

Distribution: Karnataka, Kerala, Tamil Nadu, West Bengal and nearly the whole of Peninsular India (Bingham, 1903; Tiwari, 1999)

Range: India, Sri Lanka (Bingham, 1903; Donisthorpe, 1942 & 1943; Chapman and Capco, 1951).

Genus 5. *Pachycondyla* Smith

This is a large and diverse group among Ponerinae They nest in soil with diverse feeding and nesting habits. This genus differs from *Leptogenys* in having non-pecinate claws. It differs from *Diacamma* in not having spines on the petiole and by the absence of mesopleural cavity. Four species have been described under this genus.

Key to species

1. Length under 5mm, black, body lightly punctured, legs, antennae, mandibles pale yellow ----------***Pachycondyla* sp.8 (*Brachyponera*)**
- Length over 5mm ----------2

2 Length 8 5 mm, colour dark reddish brown all over, conical ----------
---------- ***melanaria*** Emery

- Length less than 8.5mm, colour black, node thick in side view ----------
----------3

3. Length 7mm. Black, antennae, mandibles and legs reddish brown, node thick, body punctured, but not striated ----------***crassa*** (Emery)
- Length 6 5 mm. Black, node not very thick as in *crassa*, body punctured and striated----------***Pachycondyla* sp.4**

5.1. *Pachycondyla crassa* (Emery)

Ponera crassa Emery, 1877, *Ann. Mus. Civ Stor. Nat. Genova* 9: 363 – 381.

Brown reports this species from India. Members of this species have an average length of 7mm. Black in colour with antennae, mandibles and legs reddish brown. This species can be distinguished from other species by the thick node and punctured body. Nesting habits of this species are not known.

Range: India, Burma and Mindanavo (Brown)

5.2. *Pachycondyla melanaria* (Emery)

Ponera melanaria Emery, 1893 *Ann. Soc. Ent. Fr.*, 260.

This is the largest of the *Pachycondyla* species present in our Campus. It has an average length of 8.5 mm. It is dark reddish brown all over, antennae, mandibles and legs lighter. Nesting habits of this species are not known.

Distribution: Chickmagalur (Ali, 1991), Kerala, South and North Kanara (Bingham, 1903).

Range: Sri Lanka, Burma and Singapore (Bingham, 1903; Donisthorpe, 1942; Chapman & Capco, 1951).

5.3. *Pachycondyla* sp.4 (Museum number)

This is smaller than *crassa* and *melanaria*. It is black in colour and similar to *crassa*, but differs from it in having the body punctured and striated and not having a very thick node (In *P.crassa*, the body is punctured and striated and have a very thick node).

5.4. *Pachycondyla* (*Brachyponera*) sp.8 (Museum number)

This was earlier known as *Brachyponera*, now it is placed under the genus *Pachycondyla*. This is the smallest of the 4 species available in our Campus.

It is a very common species and makes nests in leaf-litter. There is no recruitment or trail formation in this species.

Genus 6. *Platythyrea* Roger

Only one species was collected under this genus. This is a very rare group in our campus. It looks similar to the genus *Pachycondyla*, but differs from it by the characteristic pruinose appearance of the body and having 2 pectinate spurs (one small and one large) on the hind leg.

6.1. *Platythyrea parallela* (Smith)

Ponera parallela Smith,1859 *J. Proc. Linn. Soc. London Zool.*, **3**: 132 – 158.

Length 7 mm. Black, entire body is covered with dense very short pubescence, which gives a pruinose appearance to the ant. Nests in dead barks of trees ((Ali, 1991.)

Distribution: Bangalore, Chickmagalur, Tarikere (Ali, 1991), Mysore, Bengal and Western India (Bingham, 1903).

Range: India and Aru (Donisthorpe, 1942).

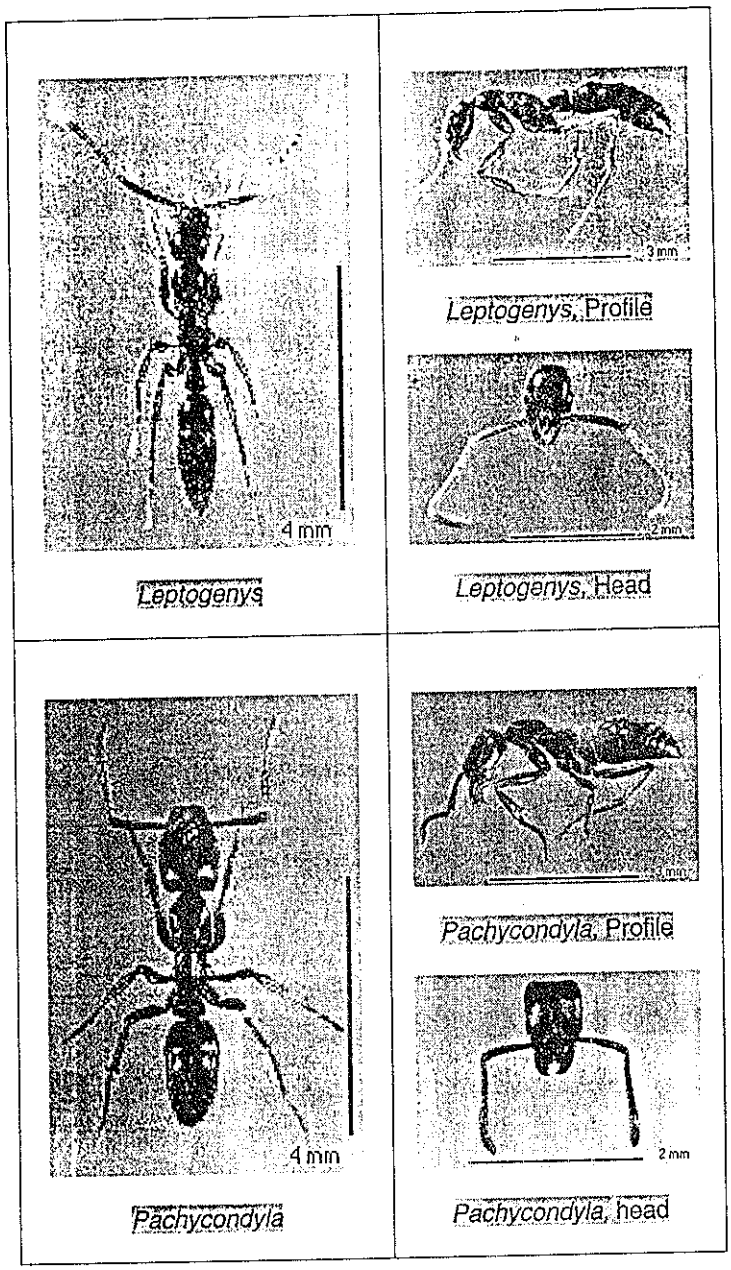

4 mm
Leptogenys
3 mm
Leptogenys, Profile
2 mm
Leptogenys, Head
4 mm
Pachycondyla
Pachycondyla, Profile
2 mm
Pachycondyla, head

Plate 2

Subfamily 2. Cerapachyinae

SUBFAMILY 2: CERAPACHYINAE

Members of this subfamily differ from ants of the subfamily Ponerinae in having the frontal lobes very narrow so that the antennal sockets are completely visible in the frontal view. Another characteristic feature is that the abdominal segment 3 is reduced to from a full sized abdominal segment to a small post-petiole. This subfamily is represented in our Campus by a single genus, *Cerapachys*.

Genus 7. *Cerapachys* Smith

In our Campus, there are only 2 species of *Cerapachys*.

Key to species

1. Length 3 mm, Black ---------- ***longitarsus*** (Mayr)
- Length 4.5 mm, head in part, thorax, pedicel and basal portion of gaster red ----------***aitkenii*** Forel

7.1. *Cerapachys aitkenii* Forel

Cerapachys aitkenii Forel, 1900. *J. Bombay Nat. Hist. Soc.*, **13**: 331 – 332.

Length 4.5 mm. Head and second and following segments of the abdomen are black; mandibles, antennae, clypeus, antennal hollows and carinae, thorax, legs, petiole and last segment of the abdomen are dark red.

It nests in soil, preferably near the base of bushes and trees. Workers forage individually; sometimes form a trail of 10 – 30 workers and forage during the cooler hours in the evening (Ali, 1991).

Distribution: Bangalore, Tarikere, Chickmagalur (Ali, 1991), South and North Kanara and Western India (Bingham, 1903).

7.2. *Cerapachys longitarsus* (Mayr)

Lioponera longitarsus Mayr, 1878. *Verh. Zool. – Bot. Ges. Wien.* **28**: 647 – 686.

This species is smaller than *aitkenii* and nests in rotting wood and leaf litters.

Distribution: Bangalore and Shimoga (Ali, 1991).

Range: India (Karnataka, West Bengal, Maharashtra to Kerala) (Bingham, 1903); Formosa and Sumatra (Chapman & Capco, 1951).

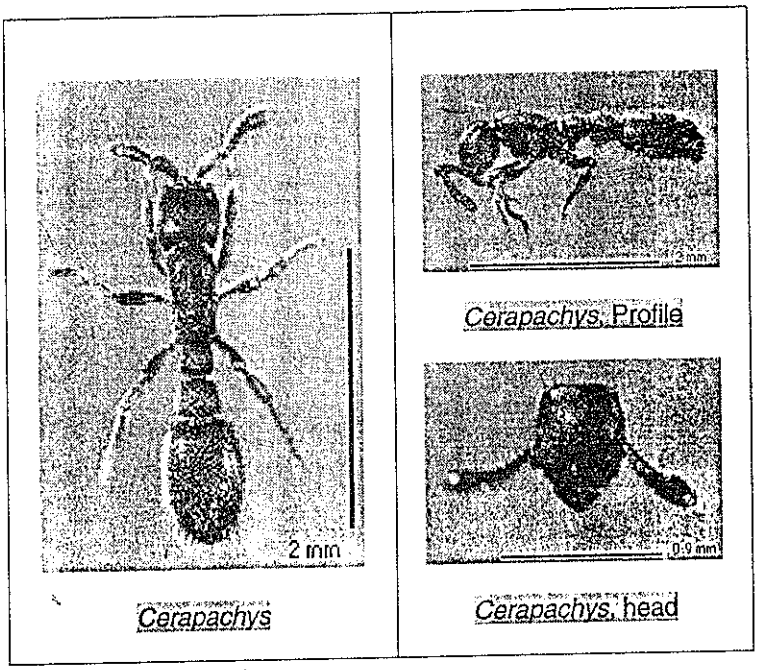


Plate 3

Subfamily 3. Dorylinae

SUBFAMILY 3: DORYLINAE

Only one species of *Dorylus* is recorded from our campus Members (workers) of this subfamily can be distinguished from ants of the subfamily Ponerinae, Dolichoderinae and Formicinae in not having eyes.

Genus 8. *Dorylus* Fabricius

The males, females and workers of this genus differ considerably in appearance The male is elongate and wasp-like in appearance with prominent eyes and ocelli.

8.1. *Dorylus labiatus* Shuckard

Dorylus labiatus Shuckard, 1840. *Ann. Mag. Nat Hist*, **5:** 315 – 328.

Major workers are 6-8mm and are yellowish, highly polished and shining. The head, thorax and abdomen are with minute scattered punctures. Minor workers are lighter in colour and are 2.5-4mm. in length Males of this species are brownish yellow and are 30-33mm. in length. Head, except the mandibles, and the antennae are balck. The legs are darker than the body. The coxae are castaneous brown.

Distribution: Dharwad, Coorg (Ali, 1991) and Rajasthan, (Tak, 1995 and Tak and Rathore, 1996).

Range: Continental India (Bingham, 1903)

Remarks: Ali (1991) observed this species to be raiding a beehive on a 3-foot pedestal.

Subfamily 4. Aenictinae

SUBFAMILY 4: AENICTINAE

Genus 9. *Aenictus* Shuckard

It belongs to the group of Army ants All members are blind. They are long, slender and resemble some of the Myrmicinae, but differ from them in not having eyes, frontal lobes, and having antennal sockets completely visible in the frontal view.

Key to species

1 Length 5.5mm, Head, thorax and pedicel reddish brown and sculptured, sculptures run into lines ----------***aratus*** (***aitkeni***) Forel

\- Length 3mm, head smooth, only metanotum sculptured-----***ceylonicus*** (Mayr)

9.1. *Aenictus aratus* Forel

Aenictus aratus Forel, 1901. *J. Bombay Nat. Hist. Soc.*, 13: 475

Length 5.5mm. Head, thorax and pedicel are reddish brown. Abdomen is almost black. Mandibles, antennae and legs are lighter. Head is oval and delicately sculptured. Mandibles are broad and are armed with distinct teeth on masticatory margin. Thorax is elongate. Node of pedicel is slightly longer than broad.

Distribution: Coorg, Sakaleshpur, North and South Kanara, Pune, Kerala, Western India and Himachal Pradesh.

Range: India, Borneo (Bingham, 1903; Chapman & Capco, 1951, Tiwari, 1999).

9.2. ***Aenictus ceylonicus*** (Mayr)

Typhlatta ceylonicus Mayr, 1866. *Sitzungsber, K. wiss.Math - Naturwiss Classe*, **53** : 484 –517.

Smaller species. Its colour is brownish red, slightly darker on the thorax. Head is smooth and shining. Thorax is very broad in front and smooth. Pilosity is sparse on head, thorax and abdomen; failry abundant and erect on the antennae and legs. Pronotum is also smooth and shining. Nodes of petiole are large, conical, smooth and shining. Abdomen is oval, smooth and polished.

Distribution: Bangalore and Maharashtra (Bingham, 1903).

Range: Nearly all Continental India and Sri Lanka (Bingham, 1903). Taiwan, Indonesia, Philippines, New Guinea and Australia (Tiwari, 1999).

Remarks: I have collected this species from a fast moving trail, in a grassy area.

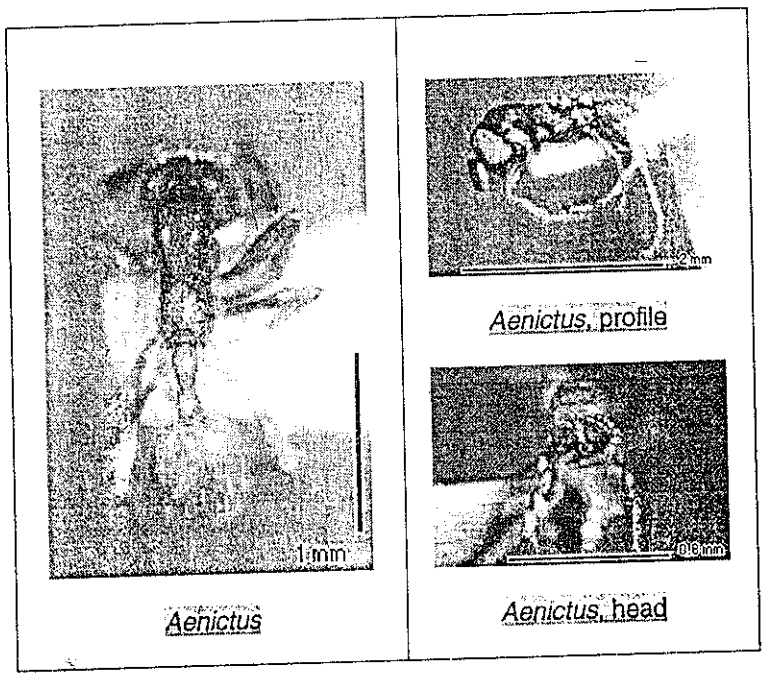


Plate 4

Subfamily 5.Pseudomyrmecinae

SUBFAMILY 5: PSEUDOMYRMECINAE

The subfamily Pseudomyrmecinae is a group of slender bodied, large-eyed, arboreal ants found throughout the Old and New World tropics (Ward, 2001). Members are mostly arboreal. Some species have mutualistic associations with particular plants; ants nest in modified cavities (domatia) of the living plants, and provide protection against herbivores (reviewed in Ward, 1990). There is only one genus, *Tetraponera*, from our Campus to represent this subfamily. Ward (2001) revised the ant genus *Tetraponera* in the Oriental and Australian regions and revealed 33 species. Four species groups are defined and aspects of their phylogeny and biogeography are explored.

Genus 10. *Tetraponera* Smith

We have only 4 species under this genus. The workers of *Tetraponera* can be distinguished from those of all other ants by the combination of well-developed postpetiole, short mandibles, large oval eyes, and a flexible promesonotal suture (Ward, 2001).

Key to species (modified from Bingham, 1903)

1. Ocelli present in workers head, second joint of pedicel and abdomen black, rest is orange–red, length 11 mm----------***rufonigra*** (Jerdon)
- Ocelli absent in workers, black ---------- 2

2. Black, small in size (less than 5mm) ----------***aitkenii*** (Forel)
- Black, larger in size (greater than 5mm) ---------- 3

3. Petiole anteriorly of first node shorter than node----***allaborans*** (Walker)
- Petiole anteriorly of first node as long as, but distinctly not longer than node itself ----------***nigra*** (Jerdon)

10.1. *Tetraponera aitkenii* (Forel)

Sima aitkenii Forel, 1902. *Rev. Suisse zool.*, **10**: 245.

This species can be distinguished from other species by its smaller size.

Distribution: Goa, Karnataka, Kerala and Tamil Nadu (Ward, 2001).

Range: India (Western India), Sri Lanka (Bingham, 1903) and Malaysia (Ward, 2001)

10.2. *Tetraponera allaborans* (Walker)

Pseudomyrma allaborans Walker, 1859. *Ann. Mag. Nat. Hist.* (3) 4: 370 – 376.

Length 5-6mm. It is black in colour and the body is highly polished and shining. Mandibles and antennae are reddish yellow. The legs are reddish brown. Pilosity is very sparse and pubescense entirely absent.

It occupies a broad range of habitats including primary and secondary rainforest, montane rainforest, broad-leaved evergreen forest (in the Himalayan foothills), oak-pine forest, bamboo forest, tropical dry forest, riparian forest, mangrove, rubber plantation, roadside and urban parkland (Ward, 2001).

Distribution: Bangalore, Chitradurga, Hosadurga (Ali, 1992), Western India (Bingham, 1903) and Tamil Nadu (Tiwari, 1999). Assam, Goa, Gujarat, Kerala, Meghalaya, Maharashtra, Orissa, Sikkim, Tamil Nadu and West Bengal (Ward, 2001)

Range: This is a wide-ranging species found in India and Sri Lanka east to Mainland China and Taiwan, and south through Southeast Asia to northern Australia (Ward, 2001).

10.3. *Tetraponera nigra* (Jerdon)

Eciton nigra Jerdon, 1851 *Madras J. Lit. Sci.*, **17**: 112.

This is a large black species. Ward (2001) recorded its habitats as tropical dry forest, riparian forest, semidecidous forest, rainforest, 'kerangas woodland' and mangrove. It nests in live stems of *Stereospermum personatum* (Karnataka) and live thorns of *Acacia horrida* (Tamil Nadu).

Distribution: Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh and West Bengal (Ward, 2001).

Range: India, Tamil Nadu, Sri Lanka, Bangladesh, Burma, Tennaserim, Malaya, Borneo, and Philippines (Bingham, 1903; Donisthorpe, 1942; Chapman and Capco, 1951). Ward (2001) reports that *T. nigra* encompasses much of the Indian subcontinent and Southeast Asia south to Java and Borneo.

10.4. *Tetraponera rufonigra* (Jerdon)

Eciton rufonigra Jerdon, 1851. *Madras. J. Lit. Sci.*, **17**: 111.

This is a large species (Length 11mm). Body usually bicoloured, head and gaster black, rest orange-red. This species can be easily distinguished from other species by its large size, presence of ocelli and bicoloured body. It nests in cavities in dead and living wood (Bingham, 1903). Habitats occupied by this species include semideciduous woodland, mangrove, urban parkland, gardens, and 'degraded costal hillforest' (Ward, 2001)

Distribution: Throughout Karnataka (Bingham, 1903), Tamil Nadu, Kerala (Tiwari, 1999) and Rajasthan (Tak and Rathore, 1996)

Range: India, Sri Lanka, Java, Sumatra, Singapore, China, Burma and Campodia (Bingham, 1903; Donisthorpe, 1942; Chapman and Capco; 1951, Tiwari, 1999 and Tak, 1995).

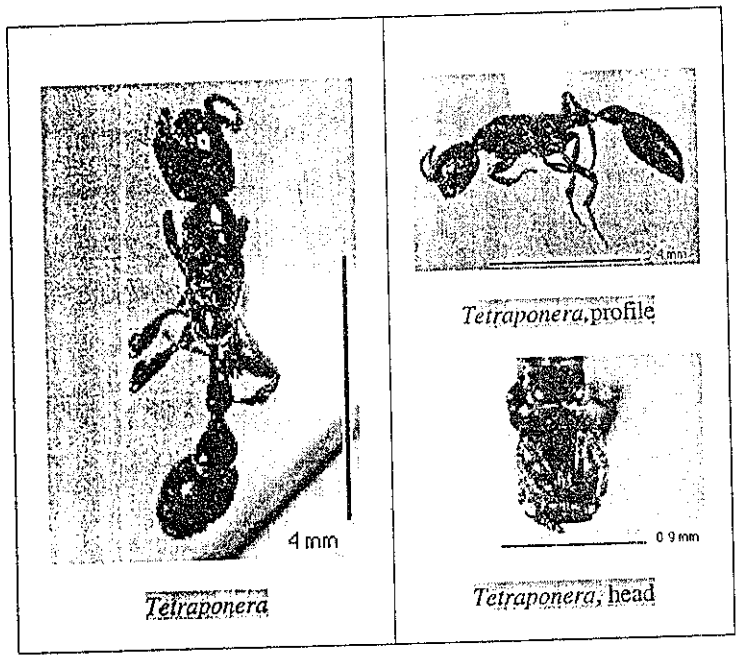

4 mm
Tetraponera
4 mm
Tetraponera, profile
0.9 mm
Tetraponera, head

Plate 5

Subfamily 6. Myrmicinae

SUBFAMILY 6: MYRMICINAE

Members of this Subfamily are characterized by 2 segmented pedicel, transversely rounded and unarmed pygidium, presence of eyes and frontal lobes, and well separated antennal sockets. Most of the genera are polymorphic in nature.

This is the largest Subfamily having 38 species and 18 genera. Among them the Genus *Monomorium* contributes more to the bulk.

Key to the genera of Myrmicinae of I.I.Sc. Campus

1. Apical and preapical antennal segments much larger than the preceeding funicular segments and forming a conspicuous 2 segmented club ----------2
- Either apical plus two preapical funicular segments of antennae enlarged and forming a conspicuous 3 segmented club or very rarely, club with more than 3 segments, very rarely the funiculus filiform and without a developed apical club ----------5

2. Antennae with 4 segments -------- ***Strumigenys*** (***Quadristruma***) Smith
- Antennae with 10-11 segments ----------3

3. Antennae with 10 segments, clypeal margin with a single, long, anteriorly projecting median seta at the midpoint of the margin----------
----------***Solenopsis*** Westwood
- Antennae with 11 segments, anterior clypeal margin lacking a median seta ---------- 4

4. Eyes very small, frontal lobes extended forwards and form two broad rounded lamina, postero-dorsal edge of head sharply angulate,

posterior margin of head medially deeply emarginate, propodeum posteriorly bidentate----------***Neoblepharidatta*** Sheela and Narendran

\- Eyes of normal-size, frontal lobes not extended forward, postero-lateral edges of head not angulate, posterio-median portion of head not deeply emarginate, propodeum posteriorly with long paired spine--------
----------***Pheidologeton*** Mayr

5 Antennae with 7-11 segments---------- 6

\- Antennae with 12 segments ----------14

6 Antennae with 7 segments ----------***Myrmicaria*** Saunders

\- Antennae with 9-11 segments----------7

7 Antennae with 9 segments, pro-mesonotum sharply marginate laterally, the margins usually expanded and form a fused dorsal shield with sharp lateral margins that project laterally ---------- ***Meranoplus*** Smith

\- Antennae with 11 segments, pro-mesonotum usual, without shield ------
----------8

8 Post-petiole articulated on dorsal surface of first gastral segment, the gaster in dorsal view roughly heart-shaped and capable of reflexion over the alitrunk, petiole dorso-ventrally flattened without a node --------
----------***Crematogaster*** Lund

\- Postpetiole articulated on anterior surface of first gastral segment, the gaster in dorsal view not heartshaped, not capable of reflection over the alitrunk, petiole not dorso-ventrally flattened, but with a node of some form ----------9

9 Antennal scrobes present, which run below the eyes, lateral margin of head and thorax denticulate and spiny ---------- ***Cataulacus*** Smith

\- Either antennal scrobes absent or present, if present runs above the eyes, lateral margins of head neither dentate nor spiny, thorax denticulate or spiny ---------- 10

10. Propodeum armed with a pair of spines, which curve upwards, and forwards, junction of post petiole and gaster strongly dorso-ventrally compressed and very narrow in profile, gaster viewed in profile flat above and triangular beneath, palp formula 5,3----------***Recurvidris*** (***Trigonogaster***)

- Propodeum armed or unarmed, if armed, spines are not curved upwards and forwards, junction of postpetiole and gaster is not formed as described above, palp formula less than 5,3----------11

11. Pronotal dorsum a flat plateau, which is sharply marginate laterally, the marginations terminating anteriorly in projecting flat, acute, tooth like processess above and behind the true humeral angles of the pronotum ----------***Lophomyrmex*** Emery

- Pronotum not modified as described above----------12

12. Antennal furrows present, mandibles broad and distinctly dentate, clypeus not bicarinate, and first node petiolate anteriorly, propodeum armed ----------***Tetramorium*** Mayr (part)

- No antennal furrows, clypeus bicarinate and sometimes bidentate also- ----------13

13. Propodeum unarmed, palp formula 2,2, clypeus bicarinate and bidentate, mandible with 4 teeth, first node petiolate-------***Monomorium*** Mayr (part)

- Propodeum armed, palp formula 4,3, mandibles indistinctly dentate, clypeus bicarinate, petiole sessile, ventro-lateral margin of head delineated by a sharp longitudinal carina on each side, the carina starts close to the inner ventral mandibular base, runs to the length of the head below the eye and ascends the occipital surface posteriorly -------- ----------***Myrmecina*** Curtis

14. Head heart-shaped in full-face view, ventral margin of petiole convex and keel-like, anterior clypeal margin strongly arcuate and prominent, eyes behind midlength of sides of head, median clypeal and median

cephalic carinae vestigial or absent, palp formula 3,2----------
----------***Rhoptromyrmex*** Mayr

- Head not heart-shaped in full-face view, ventral margin of petiole not as described abovē, ventro-lateral margin of head do not have a carina as described above, eyes usually at or in front of the midlength of the sides of the head, palp formula varies----------15

15. Midpoint of anterior clypeal margin with an unpaired median seta, which is usually elongate, stout and projects forward over the mandibles ----------16

- Midpoint of anterior clypeal margin without an unpaired median seta, instead either with a pair of setae that saddle the midpoint or with a row of long, strong setae or hairless----------18

16. With head in full-face view the occipital corners acutely angulate to dentate, frontal carinae and antennal scrobes present----------
---------- ***Dilobocondyla*** Santschi

- With head in full-face view the occipital corners broadly to narrowly rounded, frontal carinae and antennal scrobes absent----------17

17 Propodeum unarmed and rounded, atmost with minute denticles, if the latter then the eyes are only of a single ommatidium, palp formula 2,2, median portion of clypeus bidentate and bicarinate, mandible with 4 teeth----------***Monomorium*** (part)

- Propodeum usually armed with a pair of small spines, eyes always with many ommatidia, median portion of clypeus not longitudinally bicarinate and bidentate, mandible with 5 teeth, palp formula 5,3---------
----------***Cardiocondyla*** Emery

18. Propodeum armed with small teeth or spines, palp formula varies, antennal scrobes present or absent, mandibles dentate or edentate ----
----------19

- Propodeum unarmed, palp formula 2,2, antennal scrobes absent, and mandibles edentate----------***Pheidole*** Westwood (part)

19 Antennal furrows present, propodeum armed with strong spines of varying sizes, eyes usually at or infront of the midlength of the sides of the head, rarely otherwise, median clypeal carina always present, palp formula 4,3, mandibles with 7 teeth consisting of 3 larger teeth apically followed by 4 smaller teeth---------- ***Tetramorium*** (part)

\- Antennal furrows absent, eyes usually at or in front of the midlength of the sides of the head, propodeum equipped with small teeth or spines, clypeal carina present or absent, palp formula 3,2, or 2,2, mandible edentate or dentate, when dentate usually with 7 or more teeth---------- ---------- 20

20 Antennae with 3 segmented club, mandible with 2 large apical and 1 or 3 enlarged basal teeth, the margin between these groups of teeth irregularly crenulate or bluntly dentate, palp formula 2,2, usually polymorphic species---------- ***Pheidole*** (part)

\- Antennae with 4 segmented club, mandible with 3 large apical teeth followed by more than 7 small crenulations, but lack a diastema, palp formula 3,2, monomorphic ---------- ***Aphaenogaster*** Mayr

Notes on Genera and species of Myrmicinae

Genus 11. *Aphaenogaster* Mayr

Ants of this group are elongate and slender bodied. This group can be confused with few species of *Pheidole*, but it can be separated from *Pheidole* by its large size and 4-segmented antennal club (*Pheidole* has 3 segmented antennal club). More over this is a monomorphic species, while *Pheidole* is dimorphic or polymorphic.

11.1. *Aphaenogaster beccarii* (Emery)

Ischnomyrmex beccarii Emery, 1887. *Ann. Mus. Civ. Stor. Nat. Gen.*, **25**: 427 – 473.

Length 7mm. It is light brown in colour. Legs are remarkably long and slender. It makes nest in soil. Many times, I have seen it taking over the abandoned nests of other species. Nest entrance is not very large, but is always with loose soil around. It walks very slowly and in a peculiar manner, with the legs spread wide apart and the abdomen bent down between the legs, which is unique for this species. This is a very common species in Bangalore.

Distribution: Bangalore, Coorg, Chikamagalur, Dharwad, Hassan, Shimoga (Ali, 1992), Bombay and Western India (Bingham, 1903).

Range: India and Sumatra (Bingham, 1903)

Genus 12. *Cardiocondyla* Emery

There are 4 species under this genus. All the species seen in our campus are very small in size (~2mm) and may be confused with *Monomorium* species. But they can be distinguished from *Monomorium* and other similar looking ants in having spines on metanotum and not having the clypeus bilobed and bidentate. Another characteristic feature is that the post petiole is swollen and wider than long. They nest in soil and forage on the ground.

Key to species

1. Length slightly over 2mm---------- 2
- Length less than 2mm ---------- 3

2. Black all over----------***Cardiocondyla* sp.2**
- Head and thorax dark red, abdomen black----------***Cardiocondyla sp.4***

3. Head, thorax and petiole dark red, abdomen black, head and thorax sculptured, abdomen smooth----------***wroughtonii*** (Forel)

- Head, thorax and petiole reddish yellow, abdomen black, head, thorax and anterior part of gaster sculptured ----------***Cardiocondyla* sp.5**

12.1. *Cardiocondyla wroughtonii* (Forel)

Emeriya wroughtonii Forel, 1890. *Ann. Soc. Ent.Belg.* **34**: 111.

Length 1.8mm. Head, thorax, legs and pedicel are dull red, abdomen black. The metanotal spine is slightly longer than in other species. It nests in soil.

Distribution: Dharwad, Dandeli, (Ali, 1992), Bangalore (**New record**), Poona and Western India (Bingham, 1903).

Range: Southeast Asia and Australia

12.2 *Cardiocondyla* sp.2

Black all over; this species can be readily distinguished from others by its colour and large size, it is black all over. It nests in soil.

12.3. *Cardiocondyla* sp.4

This is similar to sp.2, but is lighter in colour. Head and thorax are dark reddish in colour and the abdomen black in colour.

12.4. *Cardiocondyla* sp.5

Small, head, thorax and petiole are bright reddish yellow, abdomen black.

Genus 13. *Cataulacus* Smith

Only two species are recorded under this unique genus. The peculiar nature of the head, thorax and abdomen makes it a unique one and can be identified

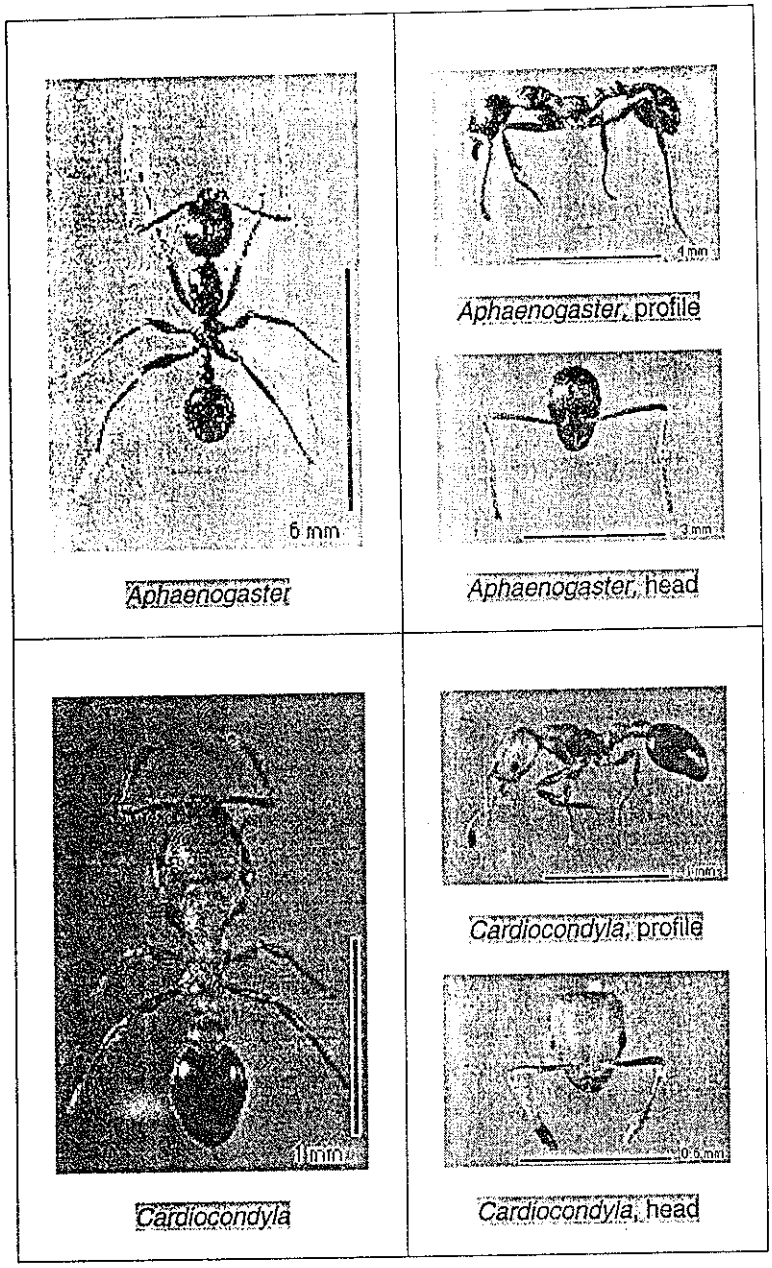

6 mm
Aphaenogaster
1 mm
Aphaenogaster, profile
3 mm
Aphaenogaster, head
1mm
Cardiocondyla
1 mm
Cardiocondyla, profile
0.5 mm
Cardiocondyla, head

Plate 6

easily from other Myrmicines. Lateral angles of head and thorax are denticulate and spiny.

13.1. *Cataulacus taprobanae* Smith

Cataulacus taprobanae Smith, 1853 *Trans. Ent. Soc., London Ser.*, **2**: 225.

Length 4.5mm. Body is jet black in colour. The scape and the basal joint of the flagellum of antennae, tibiae and tarsi of the legs are yellowish red. Spines on metanotum are sharp, long and diverging. I have seen it on the barks of trees. It is an arboreal species and nests in dead and rotten wood on trees (Ali, 1992).

Distribution: Bangalore (Ali, 1992).

Range: India, Sri Lanka and Java (Bingham, 1903; Chapman and Capco, 1951).

13.2. *Cataulacus* sp.3

This species can be easily distinguished from *C. taprobanae* in smaller size, and in having smaller non-diverging metanotal spines (in *taprobanae* metanotal spines are longer and diverging).

Genus 14. *Crematogaster* Lund

Crematogaster is one of the most common Myrmecines seen in our campus. They are of moderate size. This group has diverse nesting habits. They make nests in soil, on trees and crevices as well. Ants belonging to this genus can be readily distinguished by the nature of the attachment of the petiole to the gaster. The post petiole is attached to the upper surface of the gaster.

Bingham (1903) states that worker major and worker minor in this genus do not differ, except a little in size, in most of the species. *Crematogaster* is

essentially a tree ant, and the majority of the species build brown-papery nests of vegetable fibre, more or less, at least in the well-established nests, of a globular shape, and with little projecting eaves covering the numerous entrances into the interior; the interior itself is crowded with a mass of galleries, chambers and with dividing walls made of the same brittle papery material. He further says that like many other ants it tends and keeps "ant cattle".

Key to species

1. Head, thorax, petiole and gaster dark brown/black---------- 2
- Head, thorax and petiole lighter----------3

2. Head, thorax, and petiole dark brown, gaster black, head and gaster smooth and shining, metanotal spines long and pointing outwards-------
----------***ransonneti*** Mayr
- Head, thorax, petiole and gaster black and sculptured, metanotal spines short, thick and slightly curved inwards----------***rothneyi*** Mayr

3. Length 3.5 mm, head, thorax and petiole reddish brown, abdomen black ----------***Crematogaster*** **sp.12**
- Length 2.5 mm, head, thorax and petiole reddish yellow, apex of abdomen black---------- ***Crematogaster*** **sp.13**

14.1. *Crematogaster ransonneti* Mayr

Crematogaster ransonneti Mayr, (1868) *Verh.Zool - Bot. Ges. Wien.*, **18** : 287 – 288.

Length 4.5 mm. Head, thorax and gaster are dark brown, body smooth and shining. This species can be distinguished from other species by the nature of the metanotal spines and by the smooth and shining body. Metanotal spines are long and pointing outwards. Its nesting habits are not known.

Distribution: Bangalore (**New record**). Kanara (Wroughton, locality not mentioned)

Range: India, Sikkim and Sri Lanka (Bingham, 1903)

14.2. *Crematogaster rothneyi* Mayr

Crematogaster rothneyi Mayr, **1879**. *Verh.Zool.- Bot Ges. Wien.*, 28 : 647 – 686

Length 3.5 mm. Body is almost black, and covered with abundant pilosity. Head, thorax, pedicel and gaster are sculptured. Metanotal spines are short, thick and slightly curved inwards. Head is finely striated.

This species differs from all other species by the dark colour, sculptured body and in having abundant pilosity.

Distribution: Tamil Nadu, Gujarat, Maharashtra, Sikkim, West Bengal, Bhavanagar and Poona (Bingham, 1903; Tiwari, 1999).

Remarks: Tiwari (1999) reported that this species makes carton nests on tree trunks. The nests are about 4 meters above the ground, flat below and convex above. He states that the nest resembles that of the *Nasutitermes* sp. (Isoptera).

14.3. *Crematogaster* sp.12

This species can be distinguished from *ransonneti,* and *rothneyi* in having lighter colour, smaller size and shining body. Head, thorax and petiole are reddish brown, abdomen black.

14.4. *Crematogaster* sp.13

This is the smallest of the four species and lighter in colour too.

Genus 15. *Dilobocondyla* Santschi

This is not a very common group in our campus. Peculiar nature of the head separates this genus from other ants of the subfamily Myrmicinae. The rear corners of the head form sharp angles and are a diagnostic feature of this genus Weak but distinct grooves (antennal scrobes) are present on the front of the head for the reception of the antennae when at rest The node of the petiole is very low and rounded, so much so that it is almost absent. Its biology is not known.

15.1. *Dilobocondyla* sp.1.

We have reported this genus from Bangalore in 1997 (Sunil et.al., 1997) So far there is no other record of this genus from anywhere in India.

Genus 16. *Lophomyrmex* Emery

This genus resembles *Pheidole* in general appearance, but differs from it in the shape of the thorax. Pronotum is raised and are furnished with short spines. Unlike *Pheidole* this is a monomorphic species.

16. 1. *Lophomyrmex quadrispinosus* (Jerdon)

Ocodoma quadrispinosus Jerdon, 1851. *Madras J. Lit. Sci.*, **17**:111.

Length 3.5 mm. Head and abdomen are reddish brown. Antennae are 11 jointed. Head and abdomen are smooth and shining. The thorax is lightly sculptured It nests in soil.

Distribution: Bangalore, Dharwad, Dandeli, Hassan, Coorg, Shimoga (Ali, 1992), Kerala, North west Provinces, Sikkim, Orissa and West Bengal (Bingham, 1903: Tiwari, 1999)

Range: India and Sri Lanka (Bingham, 1903; Ali, 1992 and Tiwari, 1999).

Genus 17. *Meranoplus* Smith

This is a common ground nesting genus. This genus has a characteristic shield like mesosoma and 9 segmented antennae, these traits help to identify this genus.

17.1. *Meranoplus bicolor* (Guerin – Meneville)

Cryptocerus bicolor Guerin – Meneville, 1838. *Cuv. Iconogr. Regne Anim. Insect.*, **3**: 425.

Length 5mm. Head, thorax, legs and pedicel are reddish and abdomen black. Whole body is covered with long abundant hairs. Head, thorax and gaster are heavily sculptured. Mesonotum is armed posteriorly with 2 long acute spines It nests in loose and hard soil. Nest entrance is on ground level with a small crater surrounding it. During the rainy season nest entrances were seen on an elevated chimney (Rastogi et.al., 1997). It moves very slowly and forages on the ground.

Distribution: Throughout India (except Punjab and Central India).

Range: India, Burma and Malayan subregion (Bingham, 1903; Ali, 1992 and Tiwari, 1999).

Genus 18. *Monomorium* Mayr

Species of *Monomorium* are very diverse in size and habits. Some are generalist scavengers, while others are seed harvesters. Nests of many species make small mounds in open soil. They forage on the ground as well as on trees. These species can be significant pests as they forage in houses and buildings.

This large and diverse genus can be separated from other Myrmicine ants by the central seta on the anterior margin of the clypeus, by the 3-segmented

antennal club and by the arched nodes on the petiole and postpetiole. This is a very common group seen abundantly in our campus. We have 7 species of *Monomorium* in our campus

Key to species

1. Antennae not thickened towards apex, not forming a club----------2
- Antennae gradually thickened towards apex and form a club----------4

2. Black in colour----------***Monomorium* sp. 13**
- Head and thorax reddish brown----------3

3. Posterior half or two-thirds of head finely and closely punctate ----------
----------***criniceps*** (Mayr) **(*Holcomyrmex criniceps*)**
- Posterior half or two-thirds of head smooth and shining----------***glabrum*** (Andre)

4. Head more or less rugulose----------5
- Head smooth and shiny----------6

5. Seen from above 2nd node distinctly longer than 1st node----------
----------***Monomorium* sp.8**
- Seen from above second node of petiole not longer than first, nodes subequal----------***subopacum*** (Smith)

6. Antennae 11 segmented---------- ***atomum*** Forel
- Antennae 12 segmented----------***destructor*** (Jerdon)

18.1. *Monomorium atomum* Forel

Monomorium atomus Forel, 1902. *Rev. Suisse Zool.* **10**: 210.

This is a very small species, (1.6 mm) yellow all over. Whole body is smooth and shining. Its nesting habits are not known

Distribution: Dharwad, Dandeli (Ali, 1992) Rajasthan (Tak, 1995) and Bangalore **(New record)**

Range: India and Bangladesh (Bingham, 1903)

18.2. *Monomorium criniceps* (Mayr)

Holcomyrmex criniceps Mayr, 1879. *Verh. Zool.– Bot. Ges. Wien*, **28** : 647 – 686.

Head and thorax are dark red, and most part of abdomen black. It nests in grass fields and mud tracks, hard grounds and unpaved footpaths. The nest entrance is on ground level surrounded by loose soil, grass seeds and husk (Rastogi et. al., 1997).

Distribution: Bangalore, Mysore and Dharwad (Ali, 1992), Southern and Western India (Bingham, 1903) and Rajasthan (Tak, 1995).

Range: India, Sri Lanka, Burma, PeguYoma (Bingham, 1903).

18.3. *Monomorium destructor* (Jerdon)

Atta destructor Jerdon, 1851. *Madras J. Lit. Sci.*, **17**: 105.

Length is 2.5 mm (minor workers) Head and thorax are reddish yellow, abdomen dark brown. Whole body is more or less smooth and shining. Its nests are common in cracks of foundations of buildings (Ali, 1992).

Distribution: Bangalore, Coorg, Dharwad (Ali, 1992) and Rajasthan (Tak, 1995).

Range: Both hemispheres (Bingham, 1903)

18.4. *Monomorium glabrum* (Andre)

Holcomyrmex glaber Andre, 1883. *Spec. Hym. Europe.*, **2**: 345 – 404.

This differs from *criniceps* in having smooth and shining head. It nests in grass fields and mud tracks, hard grounds and unpaved footpaths. Nest entrance is on ground level surrounded by loose soil, grass seeds and husk (Rastogi et.al., 1997).

Distribution: Western and Southern India (Bingham 1903; Tiwari, 1999).

New record (No specific locality is mentioned in Bingham, 1903).

Range: India, Sri Lanka and Burma (Bingham 1903; Tiwari, 1999)

18.5. *Monomorium subopacum* (Smith)

Myrmica subopaca Smith, 1858 *Hym Brit Mus.*, 6: 125.

Smaller variety, dull brownish yellow all over, abdomen partly black. Head and thorax are minutely rugulose, abdomen smooth. It nests in soft ground and mud tracks. Nest entrance is on the ground level surrounded by fine excavated soil. 2-3 entrances are sometimes found close by (Rastogi et.al., 1997).

Distribution: Salem, Bangalore **(new record).**

Range: India, Sri Lanka (Bingham, 1903; Tiwari, 1999).

18.6. *Monomorium* sp. 8.

Head, thorax and abdomen are more or less brown. This species can be separated from other species in having rugulose head and relatively long antennae. Nesting habits are not known.

emarginated posteriorly. The mandibles are broad, triangular and armed with numerous small teeth. The clypeus is also broad and medially incised. Funicular segments are as broad as long.

It nests in leaf litter, under stones, flowerpots and barks of trees. Nests are frequent in fruit gardens (Ali, 1992 and Rastogi et.al. 1997).

Distribution: Widely distributed species. Bangalore, Chickmagalur, Coorg, Hassan and Shimoga (Ali, 1992).

Range: Spread over the tropics of the Old world (Bingham, 1903)

Remarks: The *Technomyrmex brunneus* is treated as subspecies of *T. albipes* (Bolton, 1995).

Subfamily 8. Formicinae

SUBFAMILY 8: FORMICINAE

All members of this Subfamily can be readily identified from similar looking Dolichoderines in having the acidopore, which usually projects as a nozzle, which is fringed with setae. Many species are polymorphic.

Under this Subfamily, 20 species belonging to 7 genera were identified. The largest genus is *Camponotus* having 6 species.

Key to genera of Formicinae of I.I.Sc. Campus

1. Antennae with 11 segments----------2
- Antennae with 12 segments----------4

2. Palp formula less than 6,4----------***Acropyga*** Roger
- Palp formula 6,4----------3

3. Propodeum and node of pedicel dentate, dorsal edge of petiole armed with a pair of teeth, atleast emarginated---------- ***Lepisiota*** Santschi
- Propodeum and node of pedicel without spines, teeth or emarginations---------- ***Plagiolepis*** Mayr

4. Antennal socket close to the posterior clypeal margin, metapleuron usually with a distinct metapleural gland orifice ----------5
- Antennal socket situated at a perceptible distance from the posterior margin of clypeus, metapleural gland orifice present or absent----------6

5. Palp formula 6,4, head and body with stout, coarse setae arranged in distinct pairs----------***Paratrechina*** Motschoulsky
- Palp formula 5,4, head and body without such paired setae, petiole reduced to an elongate low node, which allows the gaster to be reflexed over the alitrunk----------***Oecophylla*** Smith

6. Polymorphic species, thorax and node of pedicel not dentate or spinous, the angles of thorax not markedly produced, basal two abdominal segments equal or subequal in length----***Camponotus*** Mayr

- Monomorphic species, thorax and node of pedicel either dentate or with spines of varying sizes and shapes, with the angles markedly produced, basal segment of abdomen much longer than the second segment---------- ***Polyrhachis*** Smith

Notes on Genera and species of Formicinae

Genus 32. *Acropyga* Roger

We have only one species under this genus and it is a rare one. 11-segmented antennae characterize members of this genus.

32.1. *Acropyga acutiventris* Roger

Acropyga acutiventris Roger, 1862. *Berl. Entomol.* 2,6: 233 – 254.

Length 5mm. Reddish yellows all over. Eyes are unusually small and jet-black. I have seen it foraging on tree trunk. Nesting habits are not known.

Distribution: Bangalore and Kolar (Ali, 1992).

Range: India, Burma and Sri Lanka (Bingham, 1903).

Genus 33. *Camponotus* Mayr

This is one of the most common groups of ants in our campus. They are polymorphic and inhabit diverse habitats. Some species often visit houses and make raids in fairly large groups. Foraging times vary among species. I have seen some foraging at night also. Many species tend Homoptera. *Camponotus* is the largest genus in the world. Members of this genus can be

separated from other Formicinae by the position of the antennae. In all species antennal sockets are placed far behind the clypeal margin.

Key to species

1 Thorax viewed from side not forming a regular arch----------2

- Thorax viewed from side forming a regular arch----------3

2. Tibiae of legs spinous beneath, minor worker 6 mm, metanotum margined and concave medially----------***sericeus*** (Fabricius)

- Tibiae of legs not spinous beneath, minor worker 5mm---------- ----------***Camponotus* sp.9**

3. Smaller in size (minor worker length: 5 mm), light reddish brown all over---------- ***Camponotus* sp.6**

- Larger in size, (minor worker, greater than 5 mm)----------4

4. Body more or less black----------5

- Body yellowish red all over, abdomen brownish-------***Camponotus* sp.5**

5. Tibiae of legs prismatic, abdomen covered with sparse erect hairs, major worker length 11-16mm----------***compressus*** (Fabricius)

- Tibiae of legs not prismatic, abdomen with fine sericeous pubescense, major worker 9-10mm----------***parius*** Emery

33.1. *Camponotus compressus* (Fabricius)

Formica compressus Fabricius, 1787. *Mant.Insect.*, 1: 307.

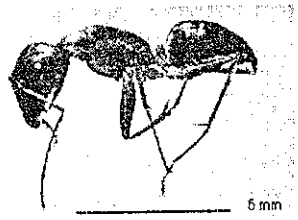
This is another very common and abundant *Camponotus* species seen in our campus. This can be separated from *parius* by its large size and by the nature of body hairs. It nests in soil, preferably at the base of trees. Bingham states that this is one of the ants noted for tending and keeping "ant –cattle".

Acropyga

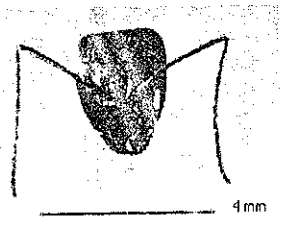
Acropyga, Profile

Acropyga, Head

Camponotus



Camponotus, profile



Camponotus, Head

Plate 12

Distribution: Karnataka, Assam, Tamil Nadu and Bengal (Bingham, 1903; Ali, 1992; Tiwari, 1999) and Rajasthan (Tak, 1995)

Range: India, Burma, Sri Lanka, Russia, Arabian countries, Africa and Malayan Subregion (Bingham, 1903).

33.2. *Camponotus parius* Emery

Camponotus micans race paria Emery, 1889. *Ann. Mus. Civ. Stor. Nat. Genova* **7**: 485 – 520.

Body is black and covered with dense pubescense. This is one of the very common species of *Camponotus* encountered in our campus. It nests in hard ground, crevices in walls and buildings. Nest entrance is surrounded by loose soil (Rastogi et.al. 1997).

Distribution: Throughout India (Bingham, 1903) Coorg, Virajpet (Ali, 1992); Kerala and Assam (Tiwari, 1999).

Range: India, Burma and Sri Lanka (Bingham, 1903)

33.3. *Camponotus sericeus* (Fabricius)

Formica sericeus Fabricius, 1798. *Ent. Syst. Suppl.* **269.**

It is black in colour. This species can be readily diagnosed by the golden silky pubescence on the abdomen and by the shape of the thorax. In this species, as mentioned in the key, the thorax viewed from side does not form a regular arch. It nests in soil. General predators, scavenger, sometimes tend aphids for honeydew and collect nectar from flowers and extra floral nectaries (Ali, 1992).

Distribution: Widely distributed in Karnataka (Ali, 1992), Tamil Nadu, West Bengal and more or less common throughout the country (Tiwari, 1999).

Range: India, Burma, Sri Lanka, Africa, Indo-china, Arabia and Egypt (Bingham, 1903; Forel, 1913b; Donisthorpe, 1942; Chapman and Capco, 1951).

33.4. *Camponotus* sp.5

This is the common yellow ant in our campus, often visits houses and gardens. This species is distinct by its colour itself.

33.5. *Camponotus* sp.6

Reddish brown all over. This is not a common species and is not seen in large numbers. This is unique by its smaller size and colour.

33.6. *Camponotus* sp.9.

In this species also, the regular arch of the thorax is interrupted at the meso-metanotal suture by the metanotum forming an angle with the mesonotum. This is comparable to sp.6 in size and colour, but can be separated by the mandibular teeth. This has only 5 teeth, whereas sp.6 has 6 teeth.

Genus 34. *Lepisiota* (*Acantholepis*) Santschi

Though this is a small group, it is quite common in our campus. The genus *Lepisiota* can be distinguished by the 11-segmented antennae, 6-segmented maxillary palpi and especially by the spinous metanotum.

Key to species

1. Brown, antennae remarkably long, extending for more than half its length beyond the top of the head----------***frauenfeldi*** (Mayr)
- Black, antennae not so long---------- 2

2. Black, trochanters, tarsi and antennae yellow---------- ***Lepisiota* sp.1**

\- Shiny black, scape and joints yellow, slightly smaller in size than sp.1--- ---------- ***Lepisiota* sp.5**

34.1. *Lepisiota frauenfeldi* (Mayr)

Hypoclinea frauenfeldi Mayr, 1855. *Verh. Zool.-Bot. Ver. Wien.*, **5**: 378.

Length nearly 3mm. Its unusually long antennae can easily diagnose this species. Head, thorax, legs and node of the pedicel are brownish yellow, abdomen dark brown. Head, thorax and abdomen are smooth and shining. Its nesting habits are not known.

Distribution: Throughout India (Bingham, 1903), Bangalore, Dharwad and Hassan (Ali, 1992) and Rajasthan (Tak, 1995).

Range: India, Southern Europe and North Africa (Bingham, 1903)

34.2. *Lepisiota* sp.1

This differs from *frauenfeldi* by its colour; black all over, except the trochanters and antennae. Body is more or less sculptured. Its nesting habits are not known.

34.3. *Lepisiota* sp.5

This is a shiny black species and its biology is not known. This species differs from sp.1 in being smaller in size and having smooth body

Genus 35. *Oecophylla* Smith

This is a very common and abundant species in our campus. Its nests are constructed by attaching leaves together with silk produced by their larvae. Usually it is polydomous, individual colonies can become very large with many

separate nests spread over several branches or sometimes spread over several trees. It forages both on trees and on ground.

35.1. *Oecophylla smaragdina* (Fabricius)

Formica smaragdina Fabricius, 1775. *Syst. Ent.*, 828.

This is a very distinct species with yellowish red all over. This is a dimorphic species. Minor worker is slightly smaller than the major worker. The queen of this species is greenish in colour. Males are little darker than workers. This is the "red ant" of India. It inhabits trees and makes nests with the leaves of host plant and is also called as "weaver ants".

Distribution: Throughout India

Range: India, Burma, Sri Lanka, Malayan sub region to Australia and New Guinea (Bingham, 1903).

Genus 36. *Paratrechina* Motschoulsky

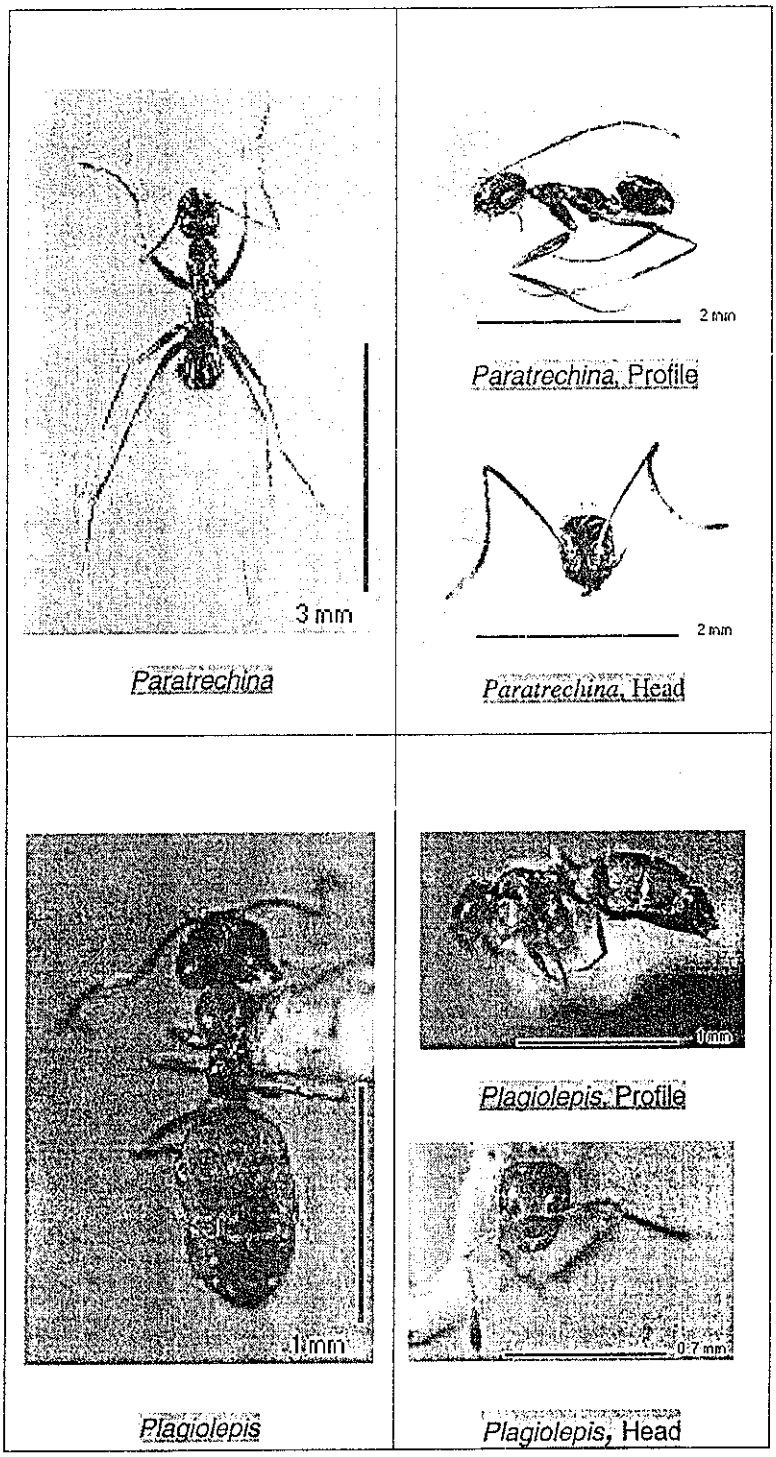
Key to species

1. Scape of antennae remarkably long, extending beyond head by more than half its length----------***longicornis*** (Latr.)
- Scape of antennae extending beyond top of head by less than half its length----------***yerburyi*** (Forel)

36.1. *Paratrechina longicornis* (Latreille)

Formica longicornis Latreille, 1802. *Hist. Nat. Fourmis.*, 113.

Dull brown in colour. Members of this species are elongate, slender ants, with very long legs. In this species antennal scape is extremely long. Another characteristic feature of this species is the presence of the fairly abundant stiff



Paratrechina

Paratrechina, Profile

Paratrechina, Head

Plagiolepis

Plagiolepis, Profile

Plagiolepis, Head

Plate 13

hairs all over the body. Nests in leaf litter; occupy cracks and crevices in houses (Ali, 1992).

Distribution: This is seen throughout our limits (Bingham, 1903). All over Karnataka (Ali, 1992) and Tamil Nadu (Tiwari, 1999)

Range: Throughout tropical countries, even in Europe common in hothouses and large conservatories (Bingham, 1903).

36.2. *Paratrechina yerburyi* (Forel)

Prenolepis yerburyi Forel, 1894. *J. Bombay Nat. Hist. Soc.*, **8**: 408.

This species can be distinguished from *P. longicornis* in not having a very long antennal scape. Its nesting habits are not studied.

Distribution: Tamil Nadu and Kerala (Tiwari, 1999). **This is recorded for the first time from Bangalore and Karnataka.**

Range: India and Sri Lanka.

Genus 37. *Plagiolepis* Mayr

This is a very small (in size, not in the number of species) group of ants, not very commonly seen. This group can be identified by its smaller size, 11-segmented antennae and by the palp formula 6,4. It makes nest in soil under rocks, logs and in rotten wood on the ground.

Key to species

1. Body black, head smooth and polished----------***jerdonii*** Forel
- Body brownish yellow----------2
2. Head, thorax and abdomen punctured----------***exigua*** Forel
- Head, thorax and abdomen smooth, not punctured---------***dichroa*** Forel

37.1. *Plagiolepis dichroa* Forel

Plagiolepis dichroa Forel, A 1902. *Rev. Suisse Zool.* **10**: 165-249.

Length under 2mm. Colour is brownish yellow, tip of abdomen black. Head, thorax and abdomen are smooth and shining. Pilosity is very sparse.

Distribution: Sikkim and Begal (Bingham, 1903) **New record for Karnataka.**

37.2. *Plagiolepis exigua* Forel

Plagiolepis exigua Forel, 1894. *J. Bombay Nat. Hist. Soc*, **8:** 396 – 420.

Worker 1.5mm. Colour is brownish yellow, with a brown shade on he head and posterior portion of the abdomen Pilosity is very sparse.

Distribution: Western India. **New record for Bangalore and Karnataka.**

Range: India and Madagaskar (Bingham, 1903).

37.3. *Plagiolepis jerdonii* Forel

Plagiolepis jerdonii Forel, 1894. *J. Bombay Nat. Hist. Soc.*, **7**: 415 – 416.

Length 1.5mm. Body is black in colour. The head is smooth and polished. The antennae and the tibiae and tarsi of the legs are brownish yellow. The head, thorax and abdomen are with white, silky pubescence.

Distribution: Western India and Kerala (Bingham, 1903); Chickmagalur (Ali, 1992); Maharashtra (Tiwari, 1999) and Rajasthan (Tak, 1995).

This is a new record for Bangalore and Karnataka.

Genus 38. *Polyrhachis* Smith

This is another interesting, large group of Formicinae seen commonly in our campus. They make nests in soil and on tree with leaves. Nests in soil are not very prominent. Members of this group can be easily recognized by the presence of spines on thorax and node or rarely only on node. In addition, all species of *Polyrhachis* have the first upper plate of the gaster elongate and comprising more than one-half the total length of the gaster. We have 4 species under this genus.

Key to species

1. Thorax unarmed, node with 4 subequals spines, rather teeth ----------2
- Thorax and node with spines---------- 3

2. Thorax not forming ridges, smooth and shining---------- ***rastellata*** Latr
- Thorax more or less flat above, the sides margined along their whole length----------***punctillata*** Roger

3. Thorax and node with long spines, body covered with dense golden pubescense----------***bihamata***? (Drury)
- Thorax and node with spines, no golden pubescence----------
----------***Polyrhachis* sp. 7**

38.1. *Polyrhachis bihamata* (*affinis*)(Drury)

Formica bihamata Drury, 1773. *Ill. of Nat. Hist.*, **2**: 92.

Black. Pronotum, metanotum and node is armed with long curved spines. Characteristic feature of this species is that there are 3 small teeth between spines on upper lateral angles of node.

Distribution: New record for Karnataka

Range: India and Burma (Bingham, 1903).

38.2. *Polyrhachis punctillata* Roger

Polyrhachis punctillata Roger, 1863. Berl Ent Zeit., 7: 152.

Body is black. This species can be distinguished from other species by the flat thorax. Thorax broad, margined laterally with teeth on pronotum and metanotum. Node of the petiole quadridentate, spines subequal. Nesting habits are not known.

Distribution: Tamil Nadu, Karnataka (probably a new record for Bangalore) and North-West Provinces.

Range: India, Sri Lanka, Burma and Java (Bingham, 1903; Tiwari, 1999)

38.3. *Polyrhachis rastellata* Latreille

Polyrhachis rastellata Latreille, 1802. *Hist. Nat. Fourmis.* 130.

Black, but the coxae, femora and tibiae of the legs are blood red. Head, thorax and abdomen are shining. Pilosity is very sparse. One of the characteristic features of this species is the convex and rounded thorax. Node is with 4 sub equal small spines. Arboreal species, makes nests with the leaves of trees.

Distribution: Karnataka. **New record for Bangalore.**

Range: India, Sri Lanka, Burma, Thailand, Philippines, Sumatra, Borneo, Indonesia, New Guinea and Australia (Bingham, 1903; Tiwari, 1999).

38.4. *Polyrhachis* sp. 7.

This is similar in appearance to *bihamata*, but differs from it in not having golden pubescense on body. Pronotum, metanotum and node of petiole is armed with long spines. Its biology is not known.

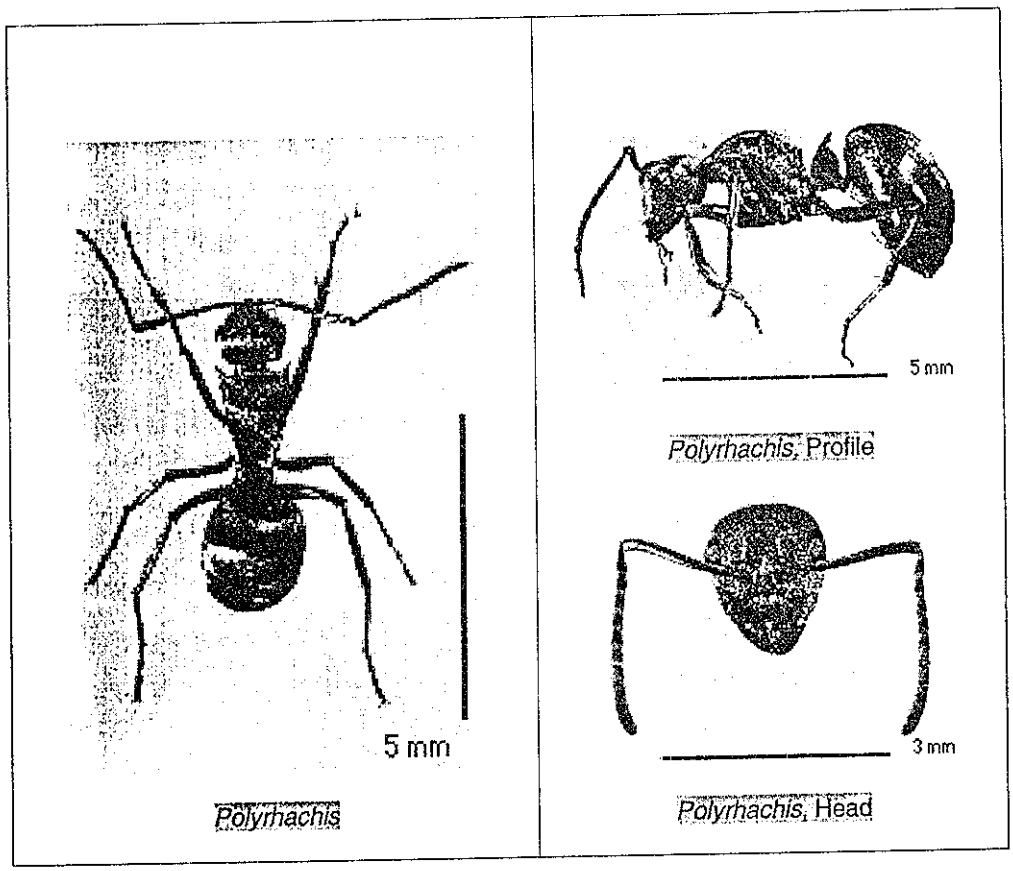

5 mm
Polyrhachis
5 mm
Polyrhachis, Profile
3 mm
Polyrhachis, Head

Plate 14

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