From time immemorial a group of the lower animals have retained a like interest for men. They are certain insects such as the social bees, wasps, termites and ants. It is not the structure or activities of the individuals as such that trigger this imagination but the extra-ordinary instinct and chemical communication which compel them to live permanently in intimate associations. Their industrious qualities have been a proverbial theme. For example, Herodotus (as quoted by Goetsch, 1957) reported that ants dragged grains of gold from deep in the earth. And King Solomon (as quoted by Goetsch, 1957) mentioned in his proverb, "Go to the ant, thou sluggard; look to her ways and be wise which having no guide, overseer or ruler, provideth her meat in the summer and gathereth her food in the harvest".

The social world of insects like ants, bees, wasps and termites when compared to that of our own makes it very interesting. The way they build nests, collect food and interact with themselves as a group and not as individuals reminds of our own lives. Because these insects, like man, lead community and social life, perhaps the similarity is made greater. As Wilson (1962) puts it, the very use of common language in entomology and human affairs such as, ant slavery and human slavery, termite royalty and human royalty, colony territory and tribal territory etc.; argues against humanity and social progress.
Apart from the obvious dissimilarities between the social insects and man, this anthropomorphism may be hopeless. Wilson (1982) states it as 'nonsense'. It is further said that there were no lessons to be taken home from the direct observation of colonial life of insects.

However, the large number of species of ants are primarily built on a more or less constant ground plan suggesting their rapid evolutionary history, exploiting all possible forms of social life. Even minor details of behaviour in the capture of prey or in nest building are common to many ants apart from the fact that all ants are social. But the degree of their social organization may be considered far less than man's partly because of lack of intellect and culture. In contrast, with regard to cohesion, chemical communication, caste specialization and altruism, ants are perhaps better organized. The highly organised insect colony by analogy is often called a superorganism (Emerson, 1959), the several social phenomena it exhibits are analogous to the physiological properties of organisms of tissues. Ecological problems are dealt with by employing social design among the thousands of species of these highly organised insects.

The ants are denizens of almost every possible ecological abode. They are reported to be found from the arctic regions to the tropics, from timberline on the loftiest mountains to the shifting sands of the dunes and sea shores, and from the dampest
forests to the driest deserts (Wheeler, 1910). This wide adaptive radiation makes them the most dominant of all terrestrial animals. According to Wilson (1982) the ecological dominance of social insects is overwhelming. Ants and termites are among the most dominant of all arthropods. It is said that in Amazonian rain forest they constitute about 30% of the animal biomass. Wilson also mentions that in other parts of the tropics the ants far exceed the earthworms in the amount of soil and humus turn over. Thus the study of population of ants constitutes an important aspect of ecology. Extensive population studies of ants have been carried out by various authors. Amongst them the studies by Pricer, 1908; Wheeler, 1925; Smith, 1928; Ayyar, 1937; Pickles, 1936, 1937, 1938, 1940; Cory and Haviland, 1938; Headley, 1943, 1949; Talbot, 1943, 1945, 1948, 1951, 1954; Haskins and Haskins, 1950; Brian, 1950, 1952, 1965; Brian et al., 1967; Creighton and Grigg, 1954; Roonwal, 1954; Raignier and Van Boven, 1955; Pelt, 1958; Wilson, 1959b; Odum and Pontin, 1961; Ayroso, 1962; Scharba, 1963; Golley and Gentry, 1964; Nielsen et al., 1976; Petal, 1976, 1977, are noteworthy.

The nesting habits of the ants, with their varied modifications to suit the environment are admirable. The nests are from simple excavations under stones, logs etc, to the complicated ones with varied and special chambers excavated for the eggs, larvae, pupae and for the food (Wheeler, 1910). Some
American ants do not build nests (Schneirla; et al., 1954; Jackson, 1957). Several ants build aerial nests such as nests under a leaf (Ledoux, 1958), carton nests (Bykes, 1836; Kirby, 1837; Smith, 1858; Mayr, 1878, 1896, 1901; Atkinson, 1887; Forel, 1891, 1899; Wroughton, 1892; Rothney, 1895; Weber, 1944; Strickland, 1951; Soulie, 1961), silk nests (Wheeler, 1915; Chauvin, 1952; Way, 1954; Ledoux, 1958; Vanderplank, 1960; Gupta, 1968), nests in the crevices of trees, rocks or in buildings (Assmann, 1907; Wheeler, 1910; Mitchell and Pierce, 1912; Donisthorpe, 1927; Gooswald, 1938; Creighton, 1953; Smith, 1957; Sudd, 1962; Wilson, 1964), nests in variety of plant parts like hollow stems, hollow thorns, and in hollow bulbs (Wheeler, 1910). Ants build their nests in the soil either with small or large crater mounds, masonary domes, and under stones and logs (Huber, 1810; Wheeler, 1907, 1910; Forel, 1920; Goetsch, 1928, 1929; Steiner, 1929; Kidmann, 1932; Chen, 1937; Weber, 1941, 1946; Clark, 1951; Jacoby, 1953, 1955; Hodgson, 1955; Chauvin, 1958, 1959a, b, 1960; Cloudesley-Thompson, 1958; Scherba, 1959; Peakin, 1960; Ravan, 1961; Sakagami and Hayashida, 1962; Wallis, 1962b). The above said references amply indicate the nesting ability of the ants for their survival.

Another important aspect of their advantageous adaptive radiation is that they are omnivorous and do not restrict their diet like the termites that feed on cellulose or the bees and
wasps that feed on honey. They are known to feed on grains (Wheeler, 1942; Tevis, 1958a, b; Brian et al., 1965; Clark and Comanor, 1973), honey from aphids and other Homopteran insects (Vowles, 1955; Ayre, 1959; Auclair, 1963; Strong, 1965) and nectar from flowers (Stager, 1935; Holldobler, 1938; Strickland, 1951; Wellenstein, 1954; Grensted, 1956; Smith and Harper, 1957; Felton, 1958). Most of the ants are also predaceous (Forel, 1928; Wilson, 1958, Sudd, 1960; Manjunath et al., 1976).

Reports on varied aspects of foraging behaviour and foraging paths in several species of ants are on record (Pickles, 1945, 1946, 1947, 1948; Ayre, 1968; Rosengren, 1971; Barrer and Cherret, 1972; Elwood et al., 1972; Sanders, 1972; Rogers, 1974; Abe and Ueze, 1977; Harkness and Wehner, 1977; Hair and Hains, 1978; Harkness, 1979). Many ants follow the recruitment technique by scent trails and tandem running (Hingston, 1929; Wilson, 1959a; Dobrzanski, 1966; Moser, 1967; Gupta, 1968; Moser and Blum, 1973; Holldobler et al., 1974; Maschwitz et al., 1974, 1975; Lane, 1977).

Like other insects, ants also pass through 4-successive instars before reaching the adult stage. The young ones are fed and kept clean by the adults. They are protected from harmful light and enemies by the adults. The eggs, larvae and pupae develop underground in the nest and so they are pale in colour. They are occasionally brought out after nightfall.
This is perhaps to avoid the warm weather and subterrenean temperature. Because the brood is nurtured in dark; tactile and olfactory senses rather than vision are highly developed. The eggs, larvae, and pupae are kept in different brood chambers because of the variation of abiotic factors. Thus, the development of young ones is temperature dependent (Janet, 1904; Fielde, 1905; Khan et al., 1967; Markin et al., 1972; Creighton and Snelling, 1974). The duration of life-cycle varies from species to species (Fluker and Beardsley, 1970; Benois, 1972; Markin et al., 1972; Creighton and Snelling, 1974; Stringer et al., 1976; Haines, 1976).

Carbohydrates, lipids and proteins constitute major metabolites in animals. Whereas the carbohydrates and lipids serve as fuel source, the proteins are involved in structural and functional aspects of the tissue cells (Gilbert, 1967; Rao and Agarwal, 1969). Very little information is available regarding the total body fat, protein and carbohydrate reserve and their metabolism in ants. However, Fast (1964) in his review has mentioned about total body fat of the ants, Camponotus vagus and Crematogaster sp.

Because of their diverse feeding habits, many workers were prompted to investigate the digestive enzymes of ants. Excellent reviews by Day and Waterhouse (1953), Gilmour (1961) House (1965), Bursell (1970), Wigglesworth (1974) and Abbott (1978)
deal with some of these aspects of insect physiology. Their studies reveal that insects are capable of digesting not only a variety of proteins and lipids but also a wide variety of carbohydrates such as disaccharides, oligosaccharides and polysaccharides. With regard to the study of digestive enzymes of Hymenoptera, particularly those of ants, comparatively little has been published and is limited to few species of ants, (Abbott, 1978). Ayre (1967) compared the enzymes of five species of ants namely Formica integra, F. fusca, Acanthomyops claviger, Camponotus herculeanus, and C. pennsylvanicus. Delage (1968) has made a comprehensive investigation of those of Messor capitatus and Ricks & Vinson (1972) in the fire ant, Solenopsis richteri. Further, the author, Martin (1974), has investigated some of the digestive enzymes in various glands including the rectal fluid of the ants.

It is undoubtedly an established fact that the social insects such as ants, bees, wasps and termites are the insects par excellence for the study of behavioural ecology and other aspects. It is indeed noteworthy that the work on such a group of insects in multivolume series (I - IV) has been embarked by Henry Hermann (1979, 1981). As Henry Hermann puts it in the preface of his book, 'Social Insects' Vol. II (1981), the field of insect sociality prior to the printing of Volume I (1979) was undergoing a definite change. He also mentions that prior to that time many of the earlier reports as reviewed by Wilson (1971)
were of investigative nature. Several reports appeared there-
after also, it seems, were mostly theoretical (Hermann, 1981).
I fully endorse the opinion of Hermann that with Volume II we 
are standing on the threshold of a new period in the study of 
insect sociality, a period of intensive research in an attempt to 
fill the gaps in our knowledge of this special group of 
arthropods. It is admirably true that multivolume treatise on 
'Social Insects' edited by Hermann is of significant mile stone 
in the field of insect sociality.

Among ants the Camponotus genus including over 1500 spp 
is widely distributed throughout the world. This genus along 
with other ants is found in abundance in Dharwad and its vicinity.
An initial survey indicated that Camponotus sericeus occurred 
fairly well in this area. Since there are no reports available,
it was thought worth while to undertake some studies on ecological 
and biochemical aspects of this species, the results of which 
are presented as follows.

PART - I

Some aspects of the ecology of the ant, Camponotus sericeus Fabr.

Chapter 1. Nesting pattern
Chapter 2. Population studies
Chapter 3. Foraging behaviour
Chapter 4. Colony founding and life-cycle.
PART II

Studies on some biochemical aspects of the various castes and developing stages of the ant, *Camponotus sericeus*.

Chapter 5. Changes in the content of some major metabolites in various castes and developing stages.

Chapter 6. Distribution of some digestive hydrolases in the intestine and extra-intestinal tissues.

Since the studies on ants are made from Dharwad district the topography and meteorological data of Dharwad district during the investigation are recorded and are given below.

Dharwad district is situated on 14° 78' to 15° 50' N and 74° 48' to 70° E and has an area of about 5284 sq miles. The soils of this district are formed from the mixture of eroded rocks of all types and are found distributed all over the district. These are black, brown, red, sand and alluvial soils. The climate in the hot season i.e. from middle of February to the end of May is hot with strong east winds till the middle of April and thunder showers during the rest of the period. The climate in the South-West Monsoon season from June-September is cool and damp. The post-monsoon season with occasional north-east rains in October and November is comparatively dry.
The cold season during the months of December, January and the first half of February is well marked. However, during the past 5-7 years there are some changes in the climatic conditions of the different seasons. The climate of Dharwad is temperate and pleasant throughout the year. The temperature, relative humidity and rainfall are given in table-A.
### TABLE A

Temperature, relative humidity and rain fall in Dharwad in different months of the years

<table>
<thead>
<tr>
<th>Months</th>
<th>Temperature (°C)</th>
<th>Relative humidity (%)</th>
<th>Rain fall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>29.7  29.8  29.4  -</td>
<td>74  71  83  -</td>
<td>00  00  26.4  00</td>
</tr>
<tr>
<td>February</td>
<td>31.4  32.6  31.4  -</td>
<td>66  73  77  -</td>
<td>4.4  00  00  00</td>
</tr>
<tr>
<td>March</td>
<td>31.4  32.6  36.0  21.6</td>
<td>64  61  72  62.5</td>
<td>00  00  00  3.4</td>
</tr>
<tr>
<td>April</td>
<td>26.4  36.3  36.9  23.7</td>
<td>62  65  63  64.5</td>
<td>67.2  109  63.4  21.5</td>
</tr>
<tr>
<td>May</td>
<td>24.2  26.6  25.6  27.4</td>
<td>65  66  63  75</td>
<td>87.7  33.5  47  107.5</td>
</tr>
<tr>
<td>June</td>
<td>27.3  27.8  30.1  24.0</td>
<td>91  93  70  67</td>
<td>65.1  159  201  126</td>
</tr>
<tr>
<td>July</td>
<td>26.7  26.2  27.0  23.1</td>
<td>92  95  93  90.5</td>
<td>122  202  78  163</td>
</tr>
<tr>
<td>August</td>
<td>25.6  25.6  26.1  22.6</td>
<td>94  95  93  92.5</td>
<td>109  149  217  123.3</td>
</tr>
<tr>
<td>September</td>
<td>27.4  28.4  28.0  23.6</td>
<td>93  85  83  85</td>
<td>66  127  202  95.3</td>
</tr>
<tr>
<td>October</td>
<td>29.5  31.4  30.0  24.0</td>
<td>95  86  89  79</td>
<td>46  43.8  77  80.3</td>
</tr>
<tr>
<td>November</td>
<td>28.5  29.1  28.6  21.7</td>
<td>85  79  81  78.5</td>
<td>00  23  53  12.2</td>
</tr>
<tr>
<td>December</td>
<td>27.7  29.3  29.0  20.7</td>
<td>82  76  79  78.5</td>
<td>00  0.5  00  00</td>
</tr>
</tbody>
</table>

Range: 28.4°/25.6°- 26.1°- 20.7°- 64°- 61°- 70°- 62.5°- 00°- 00°- 00°- 00°-