GENERAL INTRODUCTION

Bats (ca. 1116 species) come under the order Chiroptera and are the only mammalian representatives to have true flight. Order Chiroptera is further divided into two sub orders Microchiroptera and Megachiroptera. Among the World’s mammals, bats make up 20 % of the total number. In India there are about 123 species of micro and megachiropterans.

The Megachiroptera are all found in the Old World tropics and Sub-tropics, feeding on fruit, nectar and pollen and roosting mainly in trees (Hill and Smith, 1986). Insectivorous bats are found throughout the tropical and temperate zones and are thought to play an important role in the regulation of populations of insect groups. They feed on insects, fruits, nectar, pollen, fish, other vertebrates or blood and roost in a great variety of sites including caves, buildings and trees (Hill and Smith, 1986).

Around 88% of bat species are exclusively tropical (Findley, 1993). The megachiropterans do not use high-frequency echolocation but have large ears and good vision and use sight and smell as their major locational senses. Whereas, microchiropterans use high-frequency echolocation and rely on hearing as their major locational sense.

In the Old World tropics, the Pteropodidae are the main fruit eating bats and these groups are important pollinators and seed dispersers for many plant species throughout the World and also act as ‘key-stone species’ in some communities
(Fujita and Tuttle, 1991; Rainey et al., 1995). On many oceanic islands, with their limited fauna, fruit bats are the only animals capable of carrying large-seeded fruits to long distances. In such ecosystems, fruit bats can be the important pollinators and seed dispersers.

The diversity and abundance of bats is probably attributable to a number of biological features that are unique. Bats have a wide range of feeding and roosting habits, social behaviours and reproductive strategies. Nocturnal habits and the diversity in their biology make bats a fascinating group of animals and at the same time difficult animals to study.

A study on the habits and habitats of bats is the first step towards understanding their effective conservation. Knowledge of the ecology of the bats and their habitat and roosting requirements is therefore needed for the protection of roosts and foraging areas (Nowak, 1994). The roosting ecology of bats is studied to examine the availability of man-made structures used as roosts, the roost dimensions, the roost selection, the roosting pattern, the roost fidelity and homing, the morphological adaptations for roosting and the diurnal roosting behaviour. The type of roost, the number of occupants, association of roost associates, and the roost activities are influenced by several factors.

Several factors contribute to high roost preference and fidelity. As a rule, bats show the highest fidelity toward roosts in tropical caves and the lowest toward foliage roosts. The roost characteristics seem to play a vital role in the selection of roosts by bats, the roost use pattern and the fidelity of bats to particular roosts. The
thermal environment of the roost affects the roost activities including metabolism in many bats.

The daytime activity of bats can be characterized as a period of rest interrupted by periods of spontaneous and rhythmical activity. Bats are most active in their day roost following their return from feeding. Species that form large aggregations like *Pteropus giganteus* are generally more active than solitary bats and those roosting in small groups.

Mammals in the tropics maintain a regular annual breeding cycle, and they adopt different strategies of specific mating system, which has a profound effect upon the social organization of the species. Reproduction in bats is mainly determined by the environmental factors and food availability. The study of the reproductive biology of bats has revealed that males have a parallel sexual rhythm that is synchronous with that of the females. The testes of the male become active when a female comes to oestrous (Gopakrishna and Sapkal, 1986). Pierson and Rainey (1992) reviewed the reproductive biology of fruit bats; fruit bats are long-lived animals with low reproductive rates. The reproductive biology of micro and megachiropterans doesn’t have any synchrony. Several species of the bats are found to have a distinct well-defined breeding season.

The postnatal development and mother infant relationship are of great interest in chiropterans. The postnatal period can be distinguished as three stages the neonate, preflight and weaning (Anthony, 1988).
Relatively little is known about the behaviour of *Pteropus giganteus* in its field conditions. As the roost of *P. giganteus* is in open foliages of trees, appropriate roosting pattern is a necessity for this bat, for providing them with refuge from predators, and protection from extremes of temperature and also for raising dependent young. There has been only a few studies on this species of bat because it is very hard to capture and handle this large bat (Neuweiler, 1969).

Fruit bats being important species in ecology and dearth of information on various areas like distribution, ecology, behaviour and ethology made us to initiate a study on this species. The scientific and technological improvements and the increasing number of bat biologists striving to learn more about bats, have brought us on the threshold of many existing advances in the study of these obscure night active mammals. Fieldwork on bats can contribute to the information that is required for their conservation throughout the world. Even in the most basic form, data on species present, altitudinal range and habitat use, for eg., from any area that has been poorly studied is worth collecting (Mickleburgh et al., 1992).

**Rationale**

This study was mainly carried out to make a survey on the distribution of megachiropteran fauna in the plains of Tirunelveli, Tuticorin and Kanyakumari districts of Tamilnadu, South India. A study was also made on the food preferences, foraging and flight height of these pteropodid bats. Since only a very few attempts have been made in *Pteropus giganteus* of this region, a detailed study was attempted on its behaviour, reproduction and postnatal development. While the patterns of distribution, social behaviour and reproduction of the various microchiropteran
species have been studied and reported, little has been reported on the distribution of the common frugivores in the southern districts, in general and the ethology and reproduction of *Pteropus giganteus* in particular. Hence an attempt was made to unravel the seasonality of breeding and other associated phenomena. As this species is known to survive well in captivity, the breeding behaviour and the postnatal development studies were made to examine and report the several complex socio-biological behavioural aspects. This work was necessitated to cover the potential aspects of the breeding behaviour of *P. giganteus* and also the location of various large roosting groups with interesting roost-bat related factors. Keeping the above facts in mind the results of the present investigation are reported in the following chapters.

**Chapter I** : Distribution of Megachiroptera in Tirunelveli, Tuticorin and Kanyakumari Districts

**Chapter II** : Foraging and flight height of pteropodid bats

**Chapter III** : Behaviour of *Pteropus giganteus*

**Chapter IV** : Breeding and postnatal development of *Pteropus giganteus*